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

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the fourth quarter of 2011 could be directly linked with INL Site activities, with the possible exception of Strontium-90 in exterior portions of waterfowl taken from wastewater ponds. 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 fourth 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, October 1 through December 31, 2011. Additional results that were not available for the third quarter report are also included. 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
- Drinking and surface water sampling
- Milk sampling
- Lettuce, grain, and potato sampling
- Alfalfa and elk forage sampling
- Game animal sampling, including large game animals and waterfowl
- Environmental radiation measurements

Table E-1 Summary of results for the Fourth 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 any quarterly, monthly, or weekly comparisons. Gross beta concentrations at all sampling locations were somewhat elevated during two weeks in December as a result of strong and persistent inversion conditions. No result exceeded the DCG for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting radionuclides or actinides were detected. Strontium-90 was found on most of the composites with similar results at distant, boundary, and INL Site locations
	Charcoal Cartridge	Iodine-131	No Iodine-131 was found on any fourth quarter charcoal cartridges.
Atmospheric Moisture	Liquid	Tritium	Results were available for the third and fourth quarters. Five of the 31 reported results had tritium concentrations greater than the 3s uncertainty. No sample result exceeded the DCG for tritium in air. Results were consistent with historical measurements.
Precipitation	Liquid	Tritium	Ten samples were collected. Three 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 and Surface Water	Liquid	Gross alpha, gross beta, tritium	Gross alpha was not detected. Gross beta was detected in most samples from naturally-occurring radioactivity. Tritium was detected in only one sample. Concentrations were similar to those measured historically in drinking and surface water.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides, ^{90}Sr, tritium	No Iodine-131 or other human-made gamma-emitting radionuclides were detected. Strontium-90 was found in six of eight samples analyzed, including an out-of-state control sample. Tritium was only reported in one sample.
Lettuce and Grain	Vegetation	^{90}Sr	Strontium-90 was found in half the lettuce samples. Its presence in the soil from worldwide fallout is the likely

			source. Strontium-90 was not found in grain..
Alfalfa and Elk Forage	Vegetation	^{90}Sr	Strontium-90 was found in one of three subsamples for both sample types. Concentrations were similar to those in lettuce.
Potatoes	Vegetation	Gamma-emitting radionuclides, ^{90}Sr	No human-made gamma-emitting radionuclides of ^{90}Sr were found.
Large Game Animals	Tissue	Gamma-emitting radionuclides	One pronghorn and one deer were sampled. No human-made gamma-emitting radionuclides were detected.
Waterfowl	Tissue	^{90}Sr, actinides (americium and plutonium)	Strontium-90 was detected in the exterior and remainder portions of two ducks from the Advanced Test Reactor Complex but not in edible tissues. No actinides were detected.
Thermo-luminescent Dosimeters	Environmental radiation	External radioactivity	The average measurements over the six-month period were 0.32 mrem/day at boundary and 0.33 mrem/day at distant locations.

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 fourth quarter of 2011 (October 1-December 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 second quarter samples, analyses requiring radiochemistry including strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu), and americium-241 (^{241}Am) were performed by a new laboratory—ALS Global of Fort Collins, Colorado.

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

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident, the EPA may request additional sampling be performed through RadNet [previously known as the Environmental Radiation Ambient Monitoring System (ERAMS) network] (EPA 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.

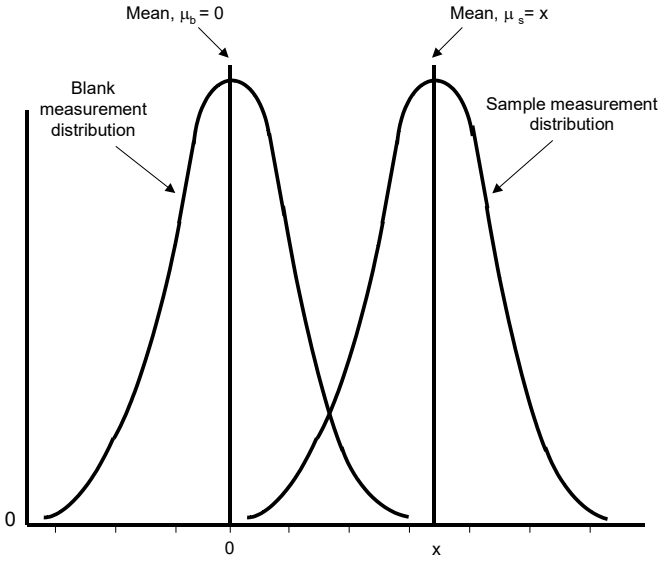

Figure 1. Example of overlap of blank and sample measurement distributions.

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 fourth 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 fourth 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 20,167 ft^3 (571 m^3) of air was sampled at each location, each week, at an average flow rate of 2.00 ft^3/min (0.06 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

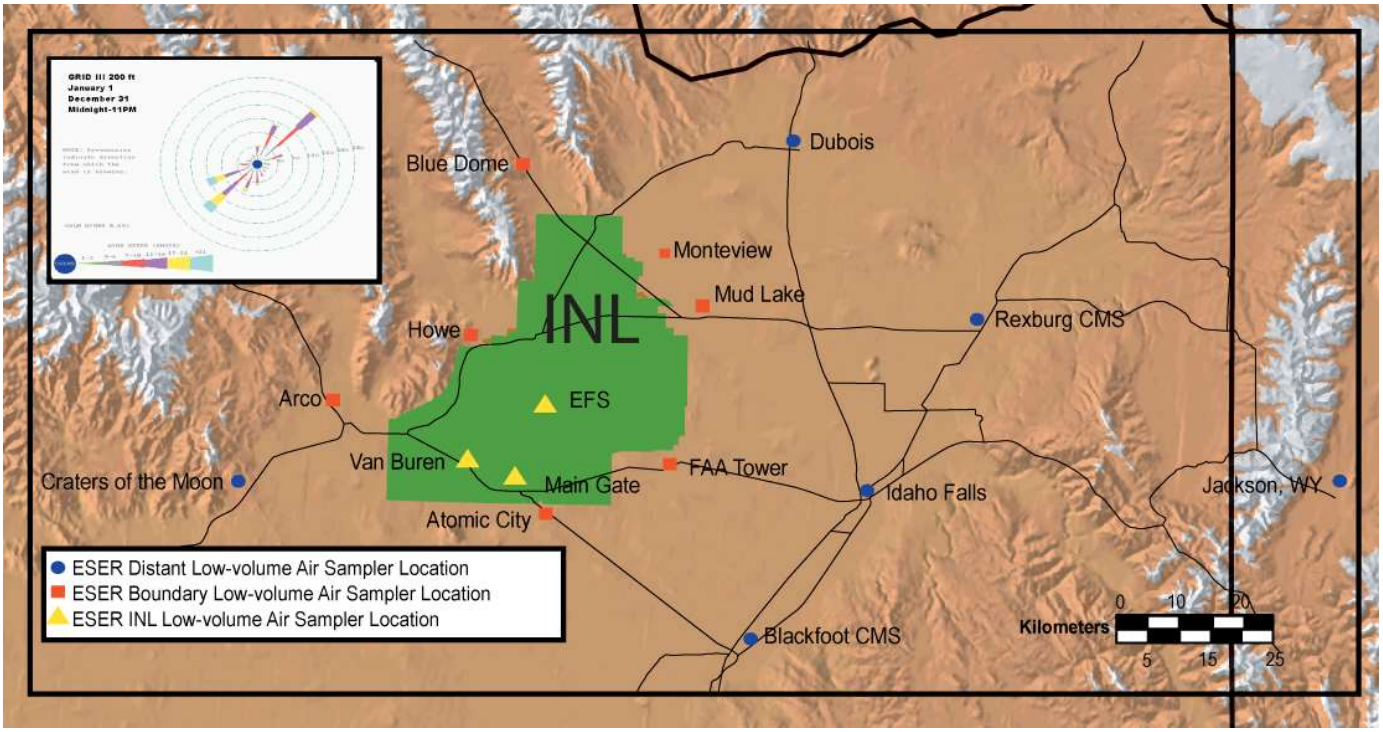

Figure 2. Low-volume air sampler locations.

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

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

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

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

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 fourth quarter, there were no weeks where a statistical difference existed between the two sample groups (Table D-2).

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10. The data were tested and found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. No statistical differences were noted in the quarterly data using the Kruskal-Wallace test (Table D-1).

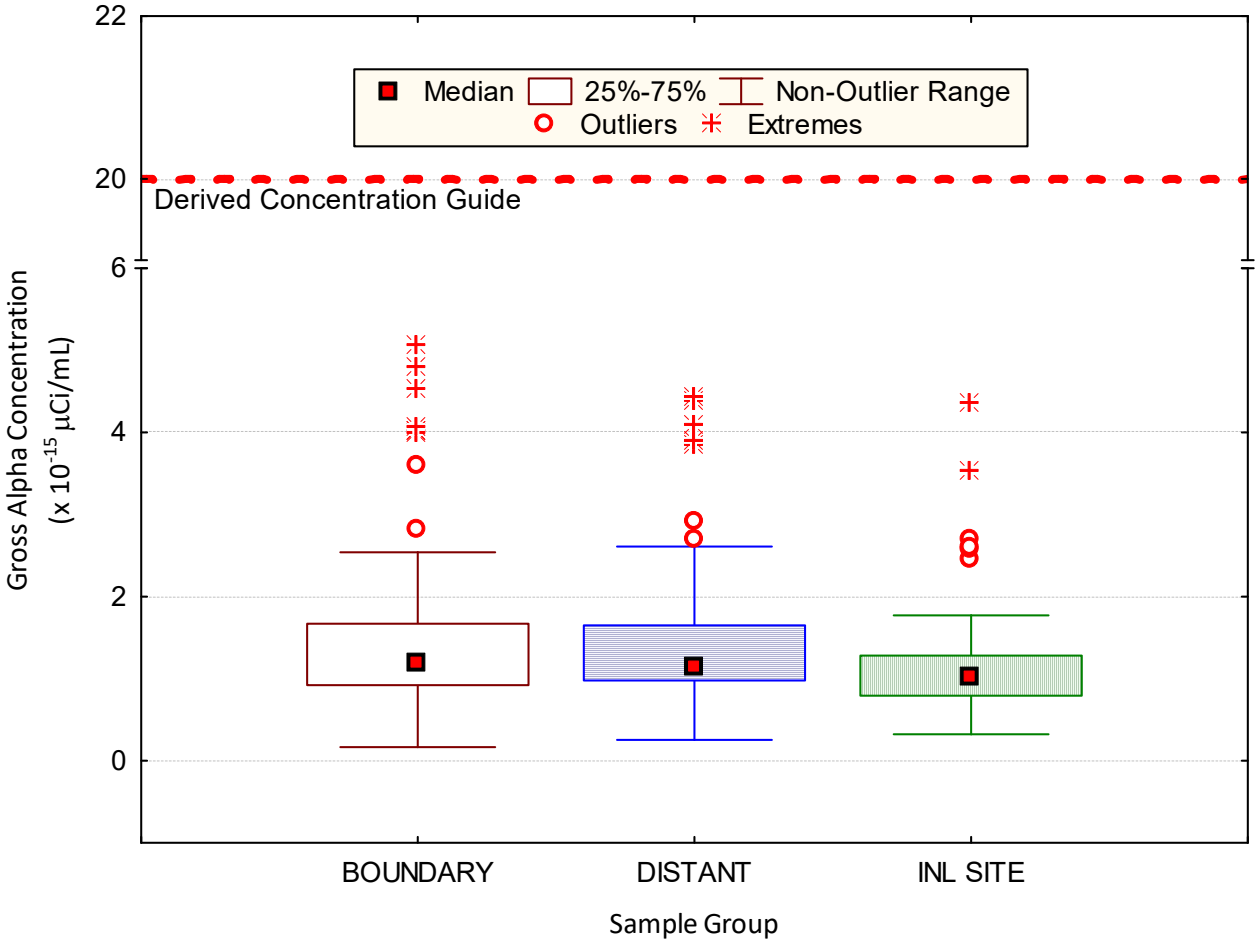

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth quarter of 2011.

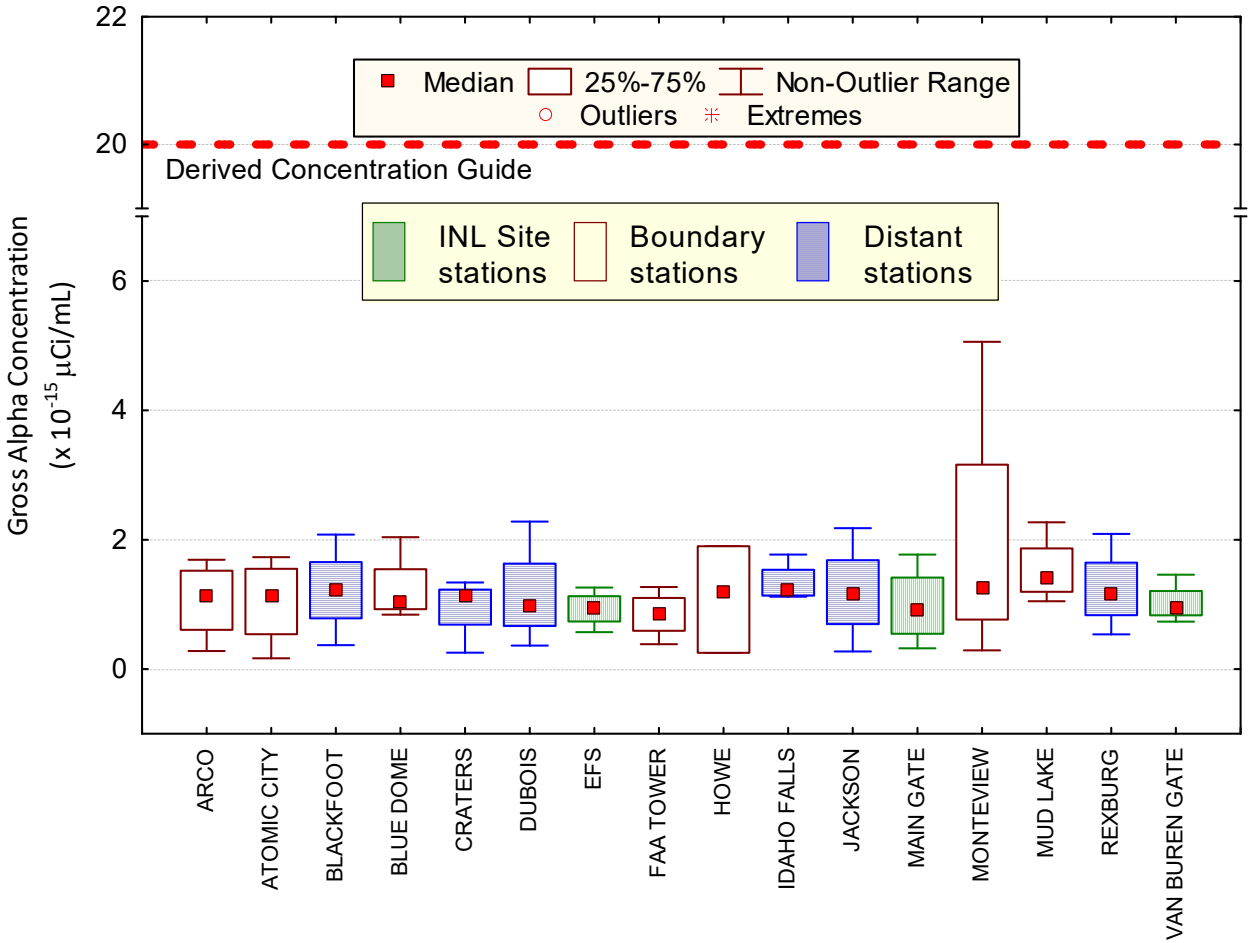

Figure 4. October gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Howe (N = 3).

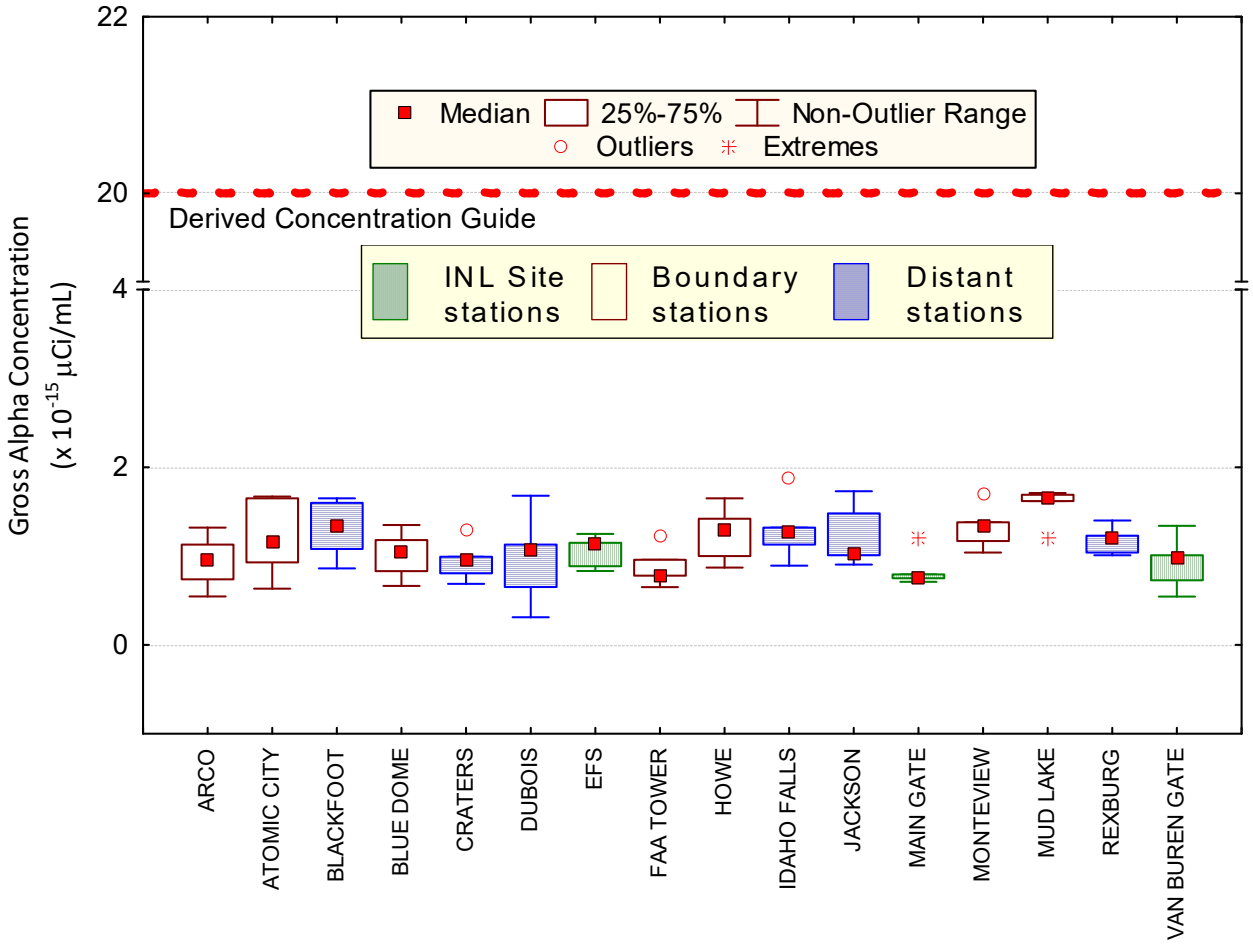

Figure 5. November gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

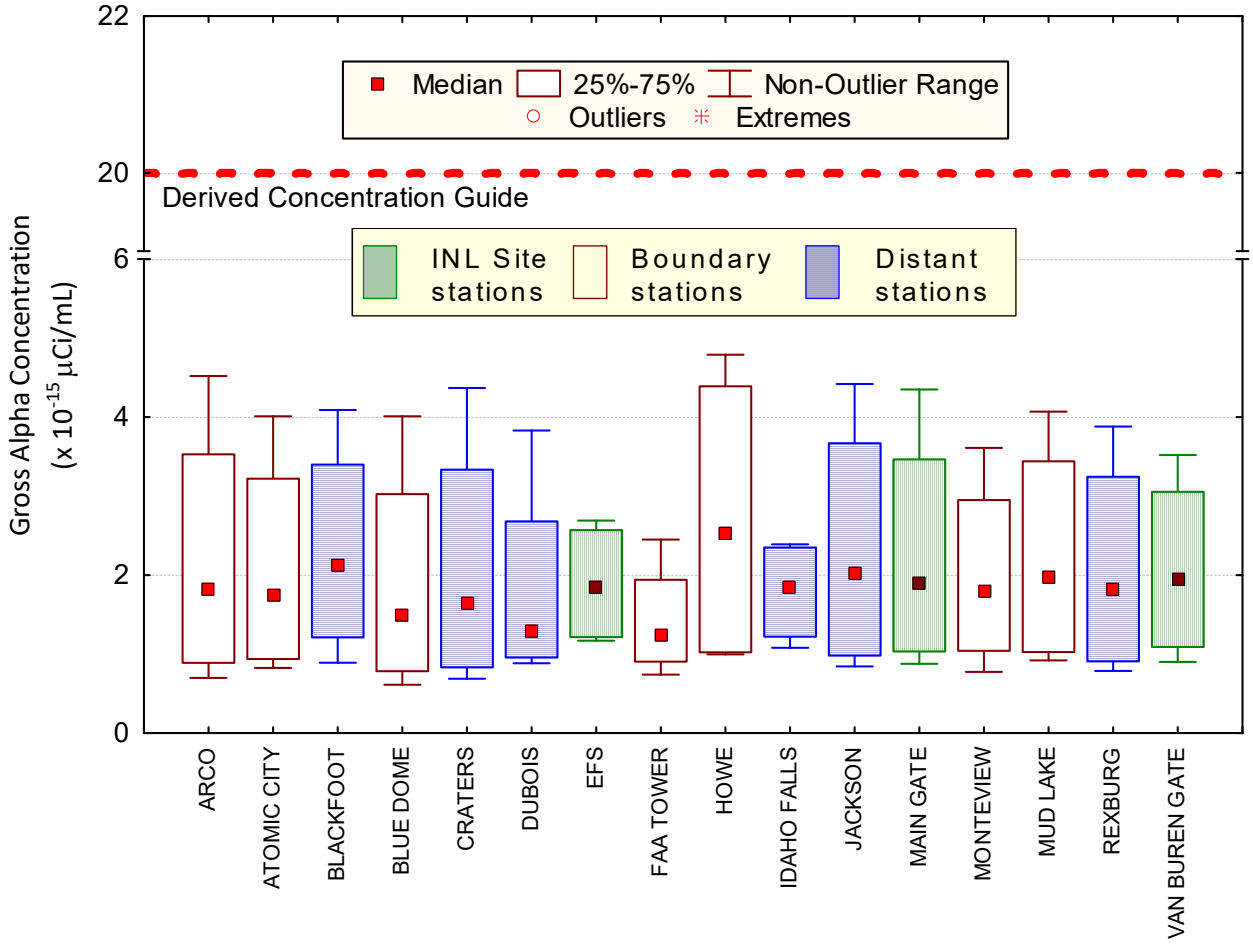

Figure 6. December gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

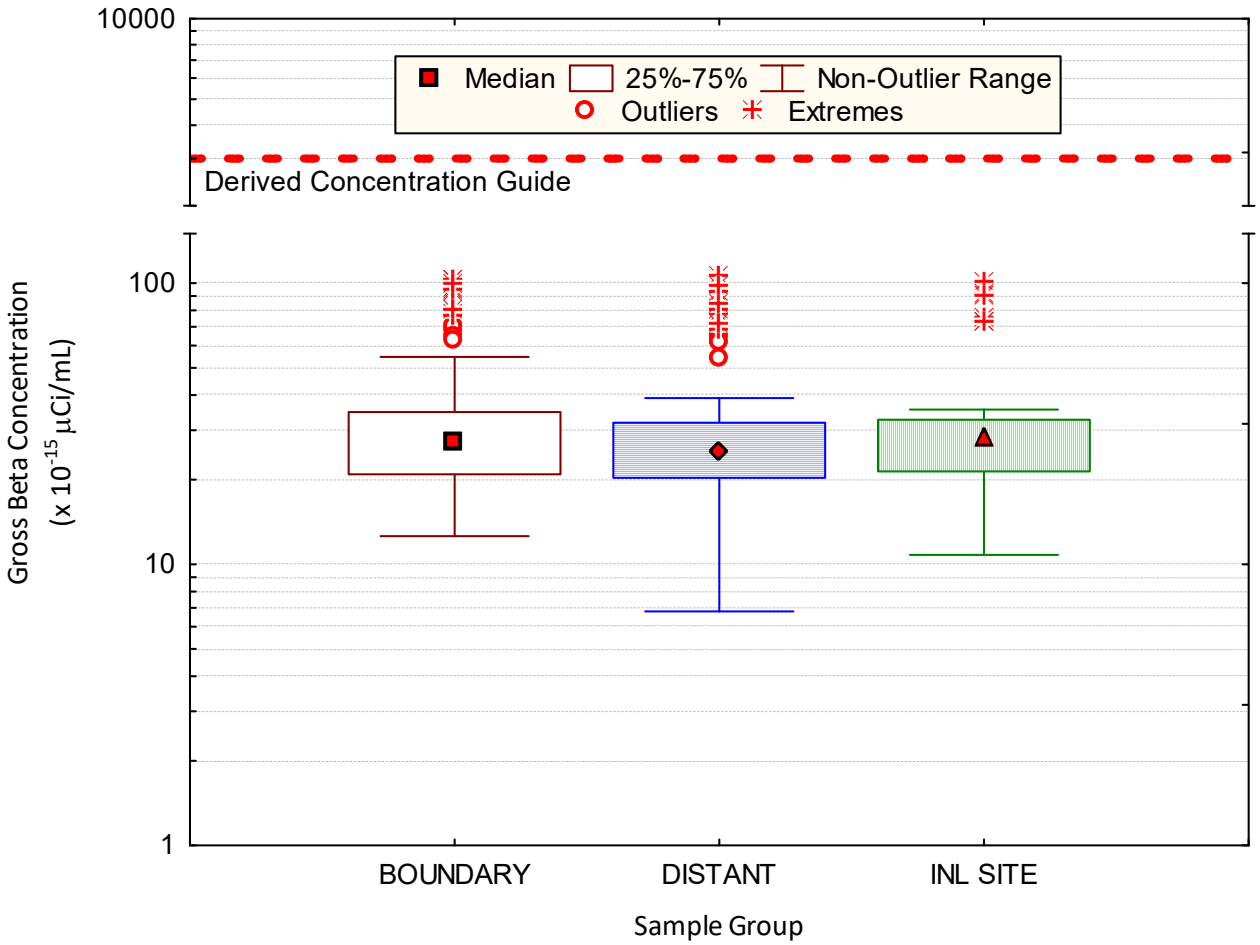

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth quarter of 2011.

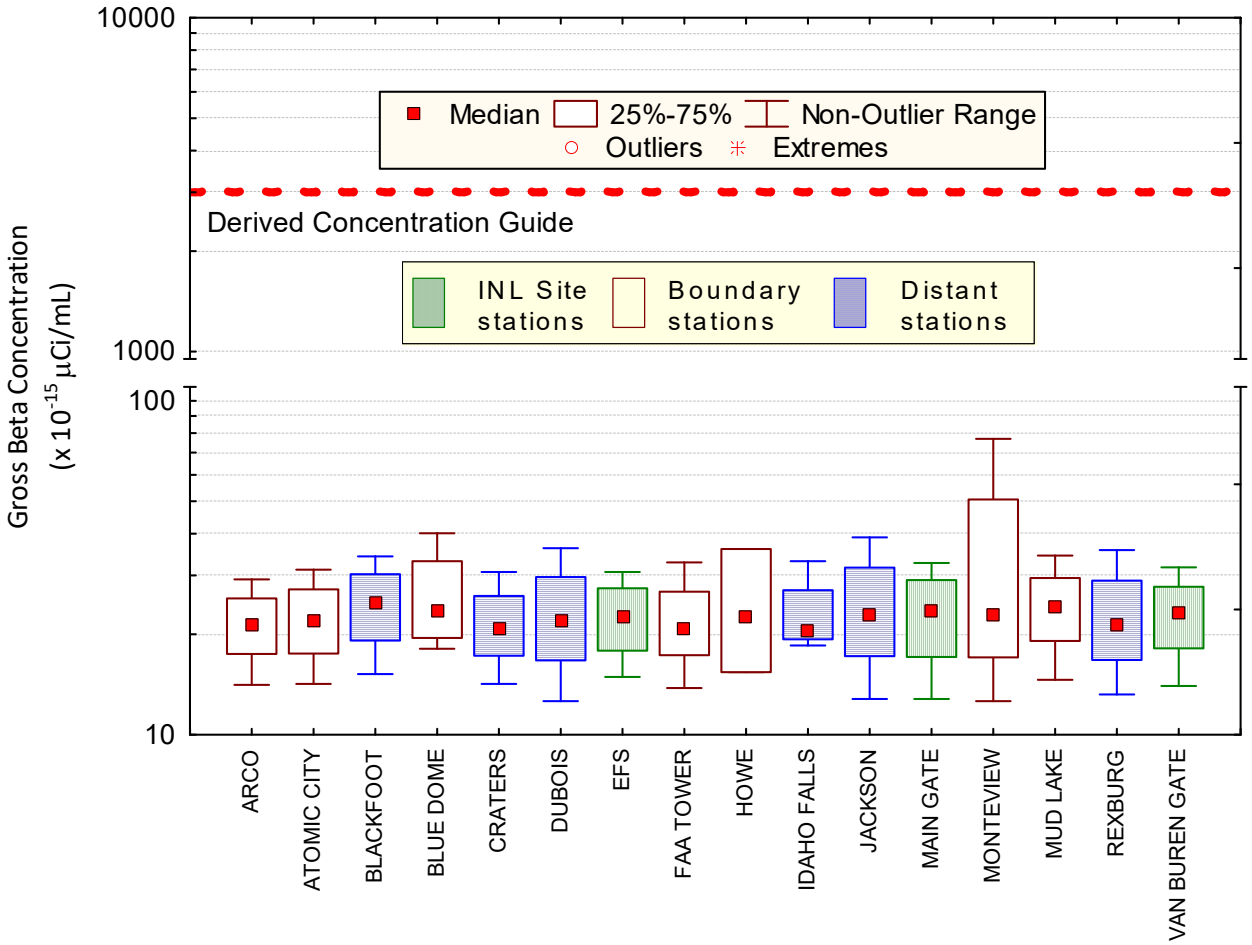

Figure 8. October gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Howe (N = 3).

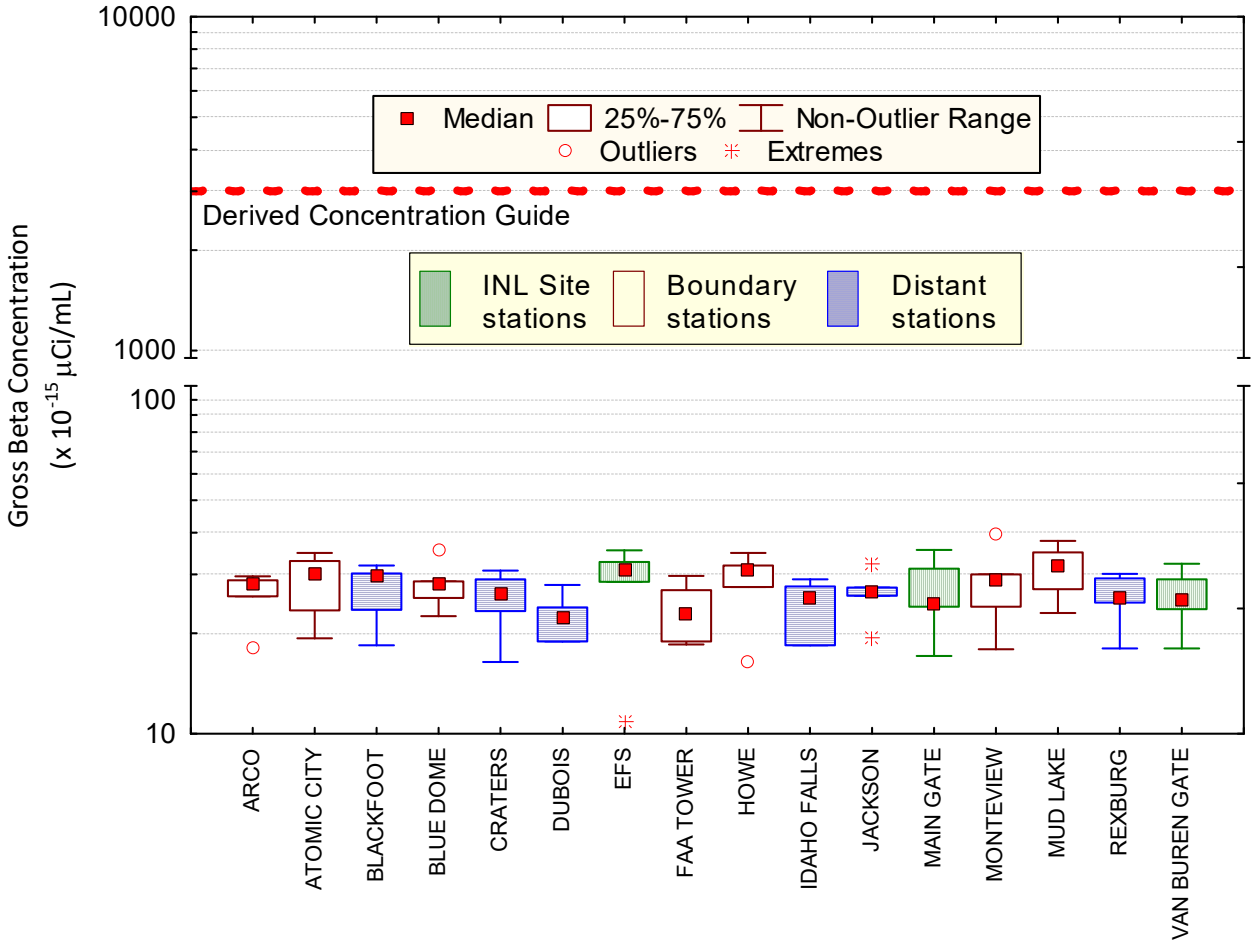

Figure 9. November gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

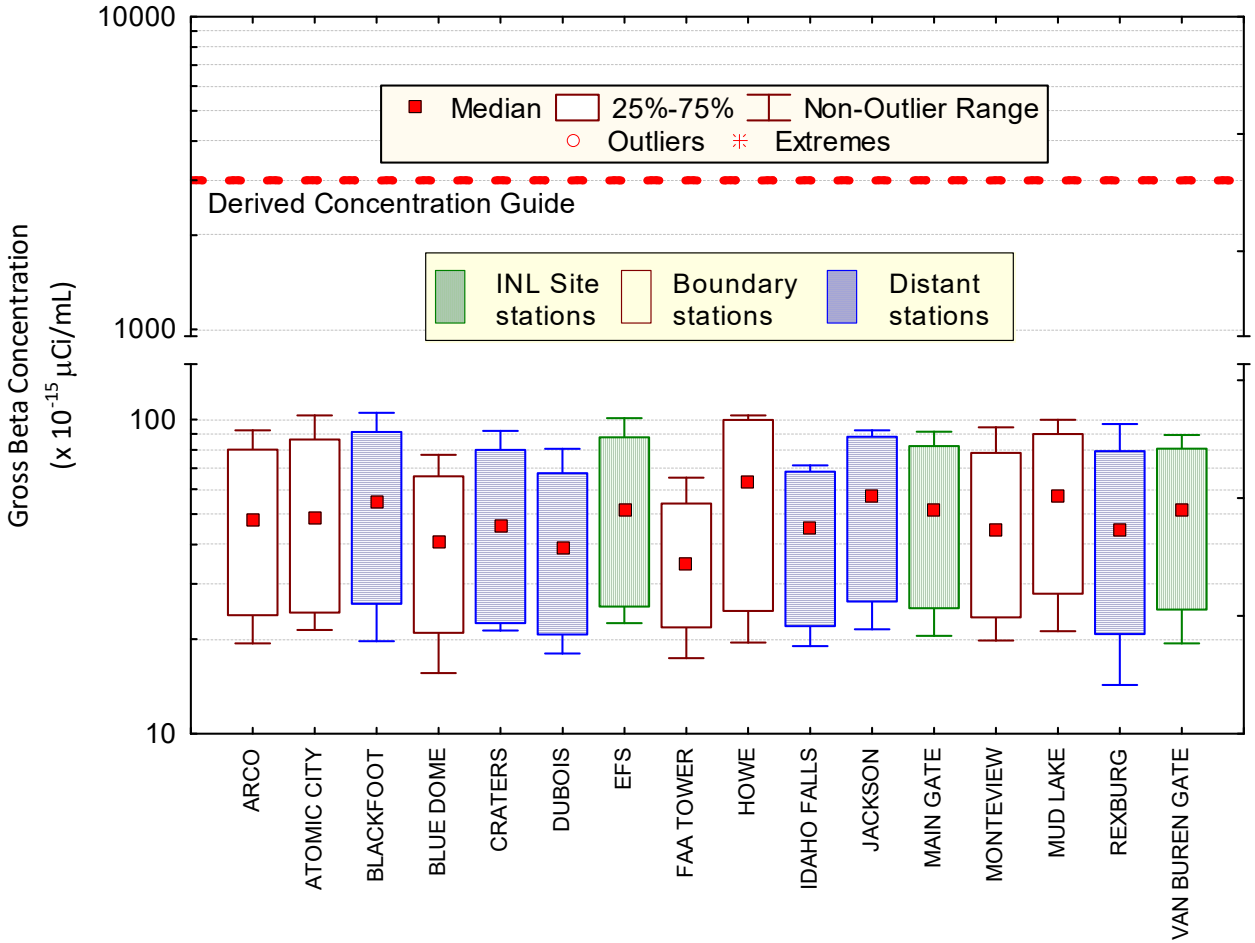

Figure 10. December gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

Comparisons of gross beta concentrations were made for each month of the quarter. Statistical data are presented in Table D-1. No statistical differences were found during any month of the quarter.

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). There were two weeks (December 7 and December 14) where gross beta concentrations at all locations were elevated above typical values. This is frequently the result of inversion conditions during winter months. Analysis of meteorological data for this period indicated particularly strong and persistent inversions were noted throughout this period.

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

Weekly filters for the fourth quarter of 2011 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs. Selected composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. Results are reported in Table C-3, Appendix C.

No ^{137}Cs, ^{238}Pu, $^{239/240}Pu$, or ^{241}Am.were detected. Strontium-90 was found on most of the composites analyzed, with similar results at Boundary, Distant, and INL Site locations. Similar results were found during the second and third quarters. Beginning with the second quarter composites a new laboratory (ALS Environmental) has been used for ^{90}Sr analysis and it appears the detection limit is lower than those obtained previously.

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 31 atmospheric moisture samples collected during the third and fourth quarters of 2011. Five 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.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the fourth quarter of 2011 produced sufficient precipitation to yield ten samples.

Tritium was measured above the 3s values in three of the ten samples. Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere. 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 fourth quarter precipitation samples collected by the ESER Program were below the range of this value due to a number of negative reported concentrations and are listed in Table C-5 (Appendix C).

WATER SAMPLING

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

Gross alpha activity was not detected in any samples. Gross beta activity was detected in all of the drinking water samples except the control sample and in two of the three surface water samples. 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 one of the surface water samples. The concentration was similar to those found in atmospheric moisture and precipitation samples and was 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, agricultural products, waterfowl and large game animal samples available during the fourth 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 fourth quarter of 2011. In addition, commercially-available organic milk was purchased as a control sample. All samples were analyzed for gamma emitting radionuclides. Samples from November were also analyzed for ^{90}Sr and tritium.

Iodine-131 and other human-made radionuclides were not detected in any weekly or monthly samples during the fourth quarter. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-7.

Results are listed in Appendix C, Table C-8. Strontium-90 was detected in six of eight samples, including the control sample. Tritium was detected in only one sample. All results were similar to those previously measured.

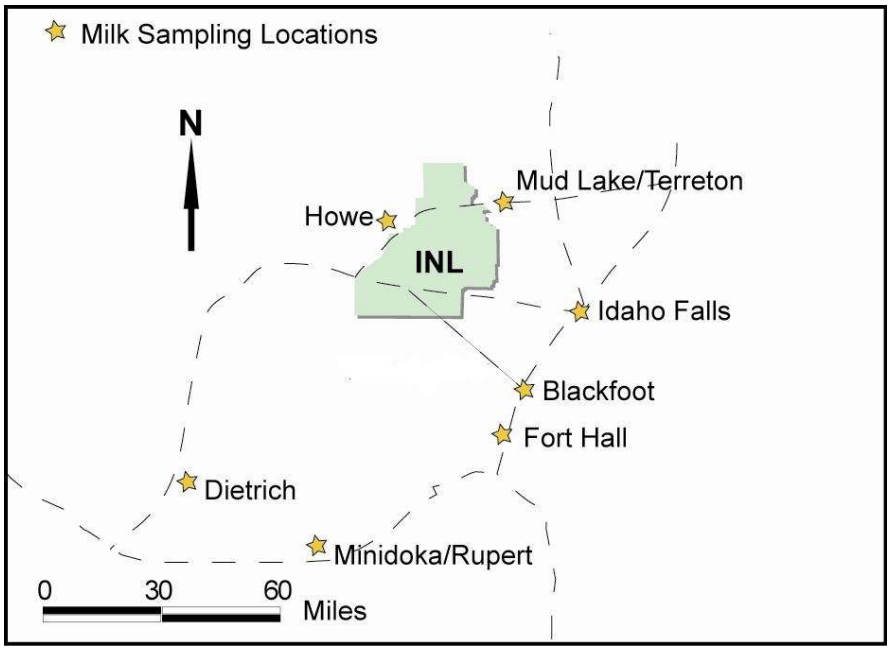

Figure 10. ESER milk sampling locations.

LETTUCE SAMPLING

Lettuce sampling was completed during the third quarter and ^{90}Sr results are reported this quarter. Data for ^{90}Sr in all lettuce samples are listed in Appendix C, Table C-9. In the spring of 2021, a review of Table C-9 identified the uncertainty values for the Atomic City (Duplicate), Carey, and EFS samples were incorrect. The affected values differed from the database and analytical lab reported values by 0.1 pCi/kg. The values were updated with the correct values. Strontium-90 was detected in half of the samples analyzed. Strontium-90 is present in the environment as a residual of fallout from aboveground nuclear weapons testing, which occurred between 1945 and 1980. This is the likely source for the measured results.

GRAIN SAMPLING

Grain sampling (wheat and barley) was completed during the third quarter of 2011. Results for ^{90}Sr were not available for that report so they are reported here. No ^{90}Sr was detected in any grain sample. Data for ^{90}Sr in all grain samples taken during the third quarter are listed in Appendix C, Table C-9. Table C-9 was reviewed in the spring of 2021 which identified several uncertainty values were incorrect. The affected values differed from the database and analytical lab reported values by 0.1 pCi/kg. The values were updated with the correct values. Strontium-90 was not detected in any grain sample.

ALFALFA SAMPLING

Strontium-90 results were available for samples of alfalfa obtained from a grower in the Mud Lake area. The sample was divided into three subsamples. One of the three subsamples showed detectable ^{90}Sr at 100 pCi/kg, which is just above the detection limit; the other two subsamples were just below the detection limit. Data for ^{90}Sr in alfalfa samples are listed in Appendix C, Table C-10. In the spring of 2021, a review of Table C-10 the uncertainty values listed differed from the database and analytical lab reported values by 0.1 pCi/kg. In addition, the alfalfa sampling location was identified to be Terreton instead of Mud Lake. The samples were collected from a field located equidistant from Terreton and Mud Lake, however, the city listed for the farm was Terreton. All values were updated with the correct values.

ELK FORAGE SAMPLING

Strontium-90 results were also available for elk forage samples collected during the third quarter from near the Radioactive Waste Management Complex on the INL Site. Three sample splits were prepared from this location. One of the three sample splits from RWMC had a detectable ^{90}Sr result. The value of 124 pCi/kg is similar to values found in both lettuce and alfalfa samples during 2011. Data for ^{90}Sr in alfalfa samples are listed in Appendix C, Table C-10. The review performed in the spring of 2021 also identified the uncertainties for the elk forage samples differed from the database and analytical lab reported values by 0.1 pCi/kg. The values were updated with the correct uncertainty values.

POTATO SAMPLING

Locally-grown potatoes from seven locations and one duplicate were analyzed for gamma-emitting radionuclides and ^{90}Sr. A control sample from Oregon was also analyzed. Data for potato samples are listed in Appendix C, Table C-11. A review of Table C-11 was performed in the spring of 2021 and identified that an incorrect equation was used to calculate the ^{137}Cs concentration and uncertainty of the samples. The equation was referencing a cell which did not contain the weight of the sample. The equation was corrected, and the values were updated in the table. In addition, the ^{90}Sr uncertainty values for samples collected at five locations differed from the database and analytical lab reported values by 0.1 pCi/kg. The values were updated

with the correct uncertainty values. No human made gamma emitters or ^{90}Sr were found in any sample.

LARGE GAME ANIMAL SAMPLING

Muscle tissue, liver, and the thyroid from one pronghorn and one mule deer were sampled during the fourth quarter. No manmade radionuclides were detected in the samples. Results are presented in Appendix C, Table C-12.

WATERFOWL SAMPLING

Strontium-90 and actinide (plutonium and americium) analysis was completed during the fourth quarter for waterfowl samples. Three samples from wastewater ponds located at the Advanced Test Reactor Complex (ATR Complex) and from ponds near the Materials and Fuels Complex (MFC) plus three control samples were analyzed. 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. No actinides were detected in any samples. Strontium-90 was found in the exterior and remainder portions of two of the ducks from the ATR Complex but not in edible tissues. Strontium and actinide concentrations measured in the edible tissues of 2011 waterfowl are shown in Table C-13 (Appendix C).

During the spring of 2021, a review of Table C-13 determined the activity concentrations for ^{90}Sr were correct, however, the uncertainty values were incorrect. The review identified the ^{90}Sr uncertainties differed from the database and analytical lab reported values by 0.1 pCi/kg. The ^{90}Sr uncertainty values were updated with the correct values. Strontium-90 was not found in any of the samples analyzed. In addition, the review revealed the unit of concentration listed in the column headings 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 correct units of concentration (pCi/kg and Bq/kg).

6. ENVIRONMENTAL RADIATION

An array of thermoluminescent dosimeters (TLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation (Figure 11). TLDs are changed out in May and again in November after six months in the field. The results of the TLDs exposed from May through October 2011 are discussed below.

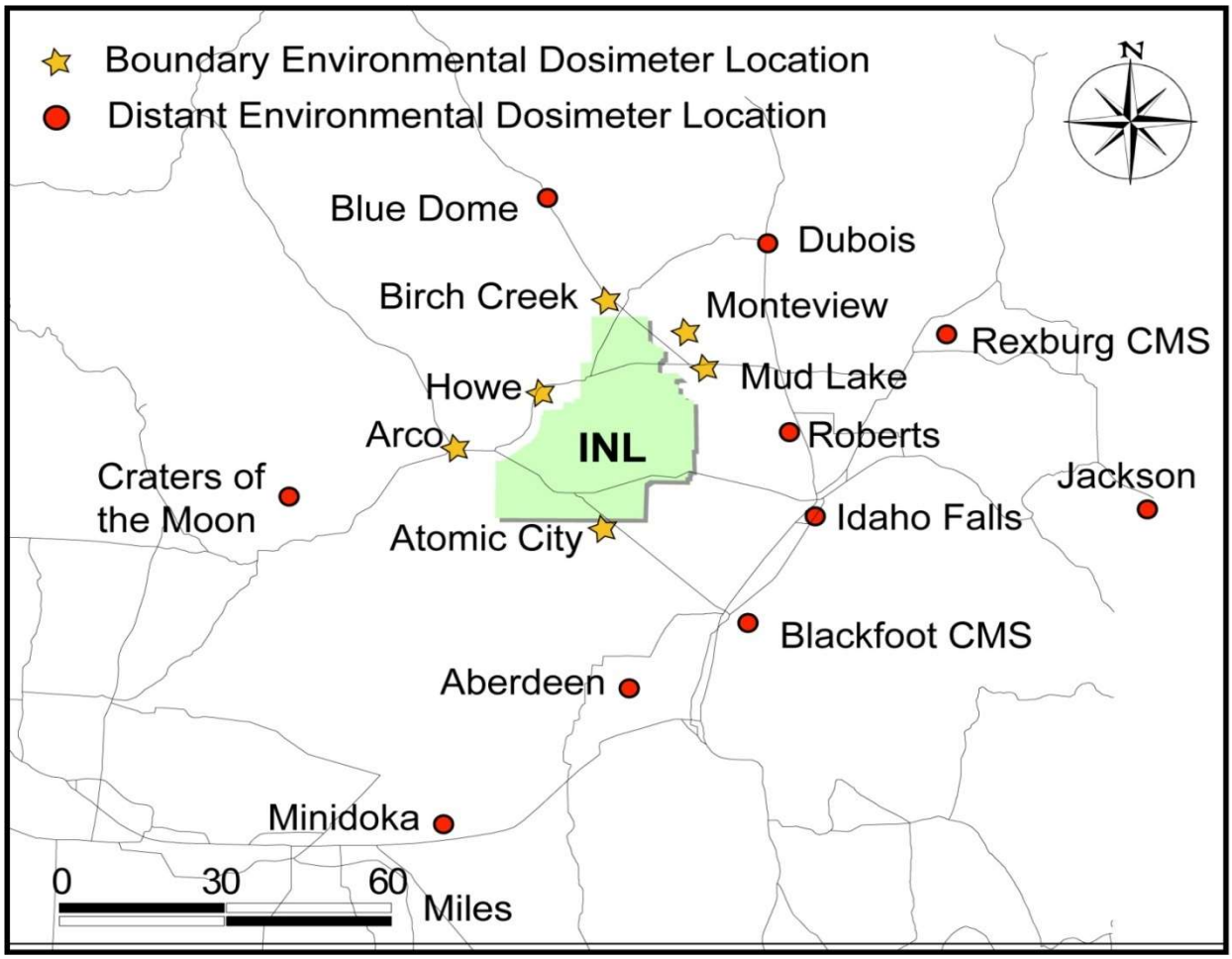

Figure 11. TLD locations.

Similar to the low-volume air results the environmental dosimeter locations are also divided into Boundary and Distant groupings. Boundary average exposure rates ranged from a low of 0.29 mR/day at Blue Dome to a high of 0.36 mR/day at Mud Lake. The overall Boundary average was 0.32 mR/day. The Distant group had a high of 0.40 mR/day at Rexburg and a low of 0.28 mR/day at the Dubois location. The overall average Distant value was 0.33 mR/day. There was no statistical difference between Boundary and Distant locations and all values are consistent with past readings. All results are listed in Appendix C, Table C-14.

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 2011). The following table summarizes the results of the quality assurance program for the fourth quarter of 2011.

QA Sample Type	Number of Sample Results	Number of Results Meeting Criteria	Percentage Meeting Criteria
Spikes/Laboratory Control Samples	328	323	98.5
Field Duplicates	69	67	97.1
Laboratory Splits	48	48	100.0
Recounts	229	229	100.0
Blanks	75	71	94.7
Method Uncertainty	1944	1922	98.9

8. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, 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 Fourth Quarter 2011

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	4.35×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.16×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	1.69×10^{-16} µCi/mL	4×10^{-10} µCi/mL
	^{241}Am	3.74×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{238}Pu	1.80×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}$Pu	3.30×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	2.89×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.58×10^{-15} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	81,8 pCi/L_{water}	1×10^{-7} µCi/mL_{air}
Air (precipitation)	^{3}H	89.3 pCi/L	2×10^{-3} µCi/mL
Milk	^{131}I	0.63 pCi/L	--
	^{137}Cs	1.17 pCi/L	--
	^{3}H	86.7 pCi/L	--
	^{90}Sr	0.30 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	10/6/2011	1.69 ± 0.17	6.25 ± 0.64	Y	29.20 ± 0.62	108.04 ± 2.29	Y
	10/12/2011	0.28 ± 0.13	1.04 ± 0.47		14.10 ± 0.54	52.17 ± 2.00	Y
	10/19/2011	1.35 ± 0.17	5.00 ± 0.62	Y	22.00 ± 0.50	81.40 ± 1.86	Y
	10/26/2011	0.93 ± 0.15	3.46 ± 0.55	Y	20.80 ± 0.48	76.96 ± 1.79	Y
	11/2/2011	1.13 ± 0.16	4.18 ± 0.57	Y	28.20 ± 0.64	104.34 ± 2.37	Y
	11/9/2011	0.74 ± 0.14	2.73 ± 0.52	Y	25.80 ± 0.60	95.46 ± 2.22	Y
	11/16/2011	1.32 ± 0.16	4.88 ± 0.60	Y	28.80 ± 0.63	106.56 ± 2.35	Y
	11/23/2011	0.55 ± 0.11	2.02 ± 0.41	Y	18.10 ± 0.53	66.97 ± 1.96	Y
	11/30/2011	0.95 ± 0.16	3.52 ± 0.60	Y	29.60 ± 0.65	109.52 ± 2.41	Y
	12/7/2011	0.70 ± 0.12	2.59 ± 0.46	Y	19.40 ± 0.52	71.78 ± 1.93	Y
	12/14/2011	2.54 ± 0.21	9.40 ± 0.78	Y	68.00 ± 0.91	251.60 ± 3.37	Y
	12/21/2011	4.52 ± 0.27	16.72 ± 1.00	Y	92.40 ± 1.05	341.88 ± 3.89	Y
	12/28/2011	1.08 ± 0.15	4.00 ± 0.54	Y	28.30 ± 0.52	104.71 ± 1.92	Y
ATOMIC CITY	10/6/2011	1.73 ± 0.18	6.40 ± 0.67	Y	31.20 ± 0.66	115.44 ± 2.45	Y
	10/12/2011	0.17 ± 0.13	0.61 ± 0.47		14.20 ± 0.58	52.54 ± 2.14	Y
	10/19/2011	1.37 ± 0.17	5.07 ± 0.64	Y	20.80 ± 0.51	76.96 ± 1.88	Y
	10/26/2011	0.91 ± 0.16	3.37 ± 0.60	Y	23.30 ± 0.55	86.21 ± 2.02	Y
	11/2/2011	1.65 ± 0.21	6.11 ± 0.76	Y	30.20 ± 0.76	111.74 ± 2.81	Y
	11/9/2011	0.63 ± 0.15	2.35 ± 0.56	Y	23.40 ± 0.63	86.58 ± 2.33	Y
	11/16/2011	1.67 ± 0.21	6.18 ± 0.76	Y	32.90 ± 0.77	121.73 ± 2.86	Y
	11/23/2011	0.93 ± 0.15	3.44 ± 0.54	Y	19.30 ± 0.59	71.41 ± 2.16	Y
	11/30/2011	1.15 ± 0.19	4.26 ± 0.69	Y	34.80 ± 0.75	128.76 ± 2.76	Y
	12/7/2011	1.05 ± 0.15	3.89 ± 0.57	Y	21.40 ± 0.59	79.18 ± 2.16	Y
	12/14/2011	2.43 ± 0.23	8.99 ± 0.84	Y	69.80 ± 1.00	258.26 ± 3.70	Y
	12/21/2011	4.01 ± 0.28	14.84 ± 1.05	Y	103.00 ± 1.20	381.10 ± 4.44	Y
	12/28/2011	0.83 ± 0.15	3.06 ± 0.54	Y	27.20 ± 0.54	100.64 ± 2.01	Y
BLUE DOME	10/5/2011	2.04 ± 0.23	7.55 ± 0.85	Y	40.10 ± 0.87	148.37 ± 3.22	Y
	10/12/2011	0.84 ± 0.24	3.11 ± 0.88	Y	20.90 ± 0.88	77.33 ± 3.27	Y
	10/19/2011	1.01 ± 0.16	3.74 ± 0.59	Y	18.10 ± 0.48	66.97 ± 1.79	Y
	10/26/2011	1.05 ± 0.19	3.89 ± 0.70	Y	26.10 ± 0.62	96.57 ± 2.31	Y
	11/2/2011	1.04 ± 0.15	3.85 ± 0.57	Y	25.50 ± 0.63	94.35 ± 2.32	Y
	11/9/2011	0.67 ± 0.16	2.46 ± 0.60	Y	28.00 ± 0.70	103.60 ± 2.60	Y
	11/16/2011	1.35 ± 0.21	5.00 ± 0.76	Y	35.40 ± 0.84	130.98 ± 3.11	Y
	11/23/2011	0.83 ± 0.16	3.07 ± 0.58	Y	22.50 ± 0.70	83.25 ± 2.58	Y
	11/30/2011	1.18 ± 0.20	4.37 ± 0.75	Y	28.60 ± 0.74	105.82 ± 2.75	Y
	12/7/2011	0.61 ± 0.13	2.26 ± 0.47	Y	15.60 ± 0.51	57.72 ± 1.90	Y
	12/14/2011	2.04 ± 0.20	7.55 ± 0.75	Y	54.70 ± 0.87	202.39 ± 3.22	Y
	12/21/2011	4.01 ± 0.28	14.84 ± 1.02	Y	77.20 ± 1.04	285.64 ± 3.85	Y
	12/28/2011	0.96 ± 0.15	3.54 ± 0.56	Y	26.30 ± 0.53	97.31 ± 1.96	Y
FAA TOWER	10/5/2011	1.27 ± 0.18	4.70 ± 0.66	Y	32.80 ± 0.74	121.36 ± 2.73	Y
	10/12/2011	0.38 ± 0.13	1.42 ± 0.47	Y	13.80 ± 0.51	51.06 ± 1.89	Y
	10/19/2011	0.93 ± 0.15	3.44 ± 0.56	Y	20.80 ± 0.50	76.96 ± 1.84	Y
	10/26/2011	0.80 ± 0.15	2.96 ± 0.55	Y	20.80 ± 0.50	76.96 ± 1.84	Y
	11/2/2011	0.78 ± 0.14	2.89 ± 0.52	Y	22.80 ± 0.60	84.36 ± 2.21	Y
	11/9/2011	0.78 ± 0.15	2.89 ± 0.56	Y	18.50 ± 0.56	68.45 ± 2.06	Y
	11/16/2011	0.96 ± 0.16	3.55 ± 0.58	Y	26.90 ± 0.65	99.53 ± 2.41	Y
	11/23/2011	0.65 ± 0.12	2.41 ± 0.46	Y	18.90 ± 0.56	69.93 ± 2.08	Y
	11/30/2011	1.23 ± 0.19	4.55 ± 0.70	Y	29.70 ± 0.70	109.89 ± 2.58	Y
	12/7/2011	0.74 ± 0.13	2.74 ± 0.48	Y	17.40 ± 0.52	64.38 ± 1.91	Y
	12/14/2011	2.45 ± 0.22	9.07 ± 0.80	Y	65.30 ± 0.94	241.61 ± 3.46	Y
	12/21/2011	1.43 ± 0.18	5.29 ± 0.68	Y	42.80 ± 0.78	158.36 ± 2.87	Y
	12/28/2011	1.07 ± 0.15	3.96 ± 0.57	Y	26.20 ± 0.52	96.94 ± 1.94	Y
HOWE	10/5/2011	1.90 ± 0.22	7.03 ± 0.81	Y	36.00 ± 0.81	133.20 ± 3.00	Y
	10/12/2011	0.25 ± 0.12	0.93 ± 0.45		15.40 ± 0.54	56.98 ± 2.01	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
	10/19/2011	1.18 ± 0.17	4.37 ± 0.63	Y	22.60 ± 0.54	83.62 ± 1.99	Y
a	10/26/2011	7.80 ± 1.17	28.86 ± 4.33	Y	162.00 ± 3.72	599.40 ± 13.76	Y
	11/2/2011	1.00 ± 0.16	3.70 ± 0.58	Y	27.50 ± 0.66	101.75 ± 2.46	Y
	11/9/2011	1.65 ± 0.26	6.11 ± 0.95	Y	34.80 ± 0.94	128.76 ± 3.46	Y
	11/16/2011	1.42 ± 0.18	5.25 ± 0.67	Y	31.90 ± 0.71	118.03 ± 2.64	Y
	11/23/2011	0.87 ± 0.14	3.22 ± 0.53	Y	16.50 ± 0.56	61.05 ± 2.05	Y
	11/30/2011	1.30 ± 0.19	4.81 ± 0.72	Y	30.80 ± 0.72	113.96 ± 2.65	Y
	12/7/2011	1.05 ± 0.16	3.89 ± 0.58	Y	19.50 ± 0.58	72.15 ± 2.15	Y
	12/14/2011	3.99 ± 0.34	14.76 ± 1.27	Y	103.00 ± 1.46	381.10 ± 5.40	Y
	12/21/2011	4.79 ± 0.29	17.72 ± 1.09	Y	96.40 ± 1.13	356.68 ± 4.18	Y
	12/28/2011	1.00 ± 0.16	3.69 ± 0.58	Y	29.70 ± 0.57	109.89 ± 2.10	Y
MONTEVIEW	10/5/2011	5.06 ± 0.51	18.72 ± 1.88	Y	76.90 ± 1.74	284.53 ± 6.44	Y
	10/12/2011	0.29 ± 0.12	1.07 ± 0.44		12.60 ± 0.49	46.62 ± 1.82	Y
	10/19/2011	1.26 ± 0.17	4.66 ± 0.61	Y	21.50 ± 0.51	79.55 ± 1.87	Y
	10/26/2011	1.24 ± 0.17	4.59 ± 0.63	Y	24.40 ± 0.54	90.28 ± 2.00	Y
	11/2/2011	1.17 ± 0.16	4.33 ± 0.59	Y	30.00 ± 0.67	111.00 ± 2.47	Y
	11/9/2011	1.04 ± 0.16	3.85 ± 0.61	Y	24.00 ± 0.62	88.80 ± 2.29	Y
	11/16/2011	1.33 ± 0.17	4.92 ± 0.63	Y	28.80 ± 0.66	106.56 ± 2.44	Y
	11/23/2011	1.38 ± 0.16	5.11 ± 0.60	Y	17.90 ± 0.55	66.23 ± 2.02	Y
	11/30/2011	1.71 ± 0.25	6.33 ± 0.91	Y	39.90 ± 0.91	147.63 ± 3.36	Y
	12/7/2011	1.31 ± 0.16	4.85 ± 0.60	Y	19.80 ± 0.55	73.26 ± 2.05	Y
	12/14/2011	2.29 ± 0.21	8.47 ± 0.78	Y	62.20 ± 0.92	230.14 ± 3.39	Y
	12/21/2011	3.61 ± 0.27	13.36 ± 1.01	Y	94.40 ± 1.16	349.28 ± 4.29	Y
	12/28/2011	0.78 ± 0.14	2.87 ± 0.52	Y	27.10 ± 0.53	100.27 ± 1.95	Y
MUD LAKE	10/5/2011	2.27 ± 0.22	8.40 ± 0.83	Y	34.40 ± 0.77	127.28 ± 2.83	Y
	10/12/2011	1.05 ± 0.16	3.89 ± 0.61	Y	14.60 ± 0.53	54.02 ± 1.95	Y
	10/19/2011	1.46 ± 0.18	5.40 ± 0.67	Y	23.60 ± 0.54	87.32 ± 2.01	Y
	10/26/2011	1.34 ± 0.18	4.96 ± 0.67	Y	24.50 ± 0.55	90.65 ± 2.04	Y
	11/2/2011	1.65 ± 0.19	6.11 ± 0.71	Y	34.90 ± 0.76	129.13 ± 2.80	Y
	11/9/2011	1.21 ± 0.18	4.48 ± 0.68	Y	23.00 ± 0.64	85.10 ± 2.38	Y
	11/16/2011	1.62 ± 0.20	5.99 ± 0.73	Y	31.90 ± 0.73	118.03 ± 2.72	Y
	11/23/2011	1.69 ± 0.22	6.25 ± 0.83	Y	27.10 ± 0.82	100.27 ± 3.04	Y
	11/30/2011	1.71 ± 0.21	6.33 ± 0.79	Y	37.80 ± 0.79	139.86 ± 2.90	Y
	12/7/2011	0.92 ± 0.15	3.41 ± 0.57	Y	21.20 ± 0.61	78.44 ± 2.24	Y
	12/14/2011	2.81 ± 0.24	10.40 ± 0.90	Y	80.00 ± 1.08	296.00 ± 4.00	Y
	12/21/2011	4.07 ± 0.30	15.06 ± 1.12	Y	99.80 ± 1.25	369.26 ± 4.63	Y
	12/28/2011	1.13 ± 0.17	4.18 ± 0.63	Y	34.60 ± 0.62	128.02 ± 2.31	Y
DISTANT							
BLACKFOOT CMS	10/5/2011	2.08 ± 0.22	7.70 ± 0.82	Y	34.20 ± 0.78	126.54 ± 2.90	Y
	10/12/2011	0.37 ± 0.12	1.37 ± 0.46	Y	15.20 ± 0.52	56.24 ± 1.92	Y
	10/19/2011	1.20 ± 0.18	4.44 ± 0.65	Y	23.10 ± 0.55	85.47 ± 2.04	Y
	10/26/2011	1.23 ± 0.18	4.55 ± 0.68	Y	26.30 ± 0.59	97.31 ± 2.19	Y
	11/2/2011	1.35 ± 0.17	5.00 ± 0.64	Y	29.80 ± 0.69	110.26 ± 2.54	Y
	11/9/2011	0.86 ± 0.17	3.19 ± 0.63	Y	23.50 ± 0.66	86.95 ± 2.45	Y
	11/16/2011	1.65 ± 0.19	6.11 ± 0.71	Y	30.20 ± 0.70	111.74 ± 2.59	Y
	11/23/2011	1.08 ± 0.15	4.00 ± 0.54	Y	18.40 ± 0.55	68.08 ± 2.05	Y
	11/30/2011	1.60 ± 0.21	5.92 ± 0.79	Y	31.90 ± 0.75	118.03 ± 2.77	Y
	12/7/2011	0.89 ± 0.16	3.30 ± 0.58	Y	19.70 ± 0.61	72.89 ± 2.25	Y
	12/14/2011	2.71 ± 0.25	10.03 ± 0.91	Y	77.60 ± 1.09	287.12 ± 4.03	Y
	12/21/2011	4.09 ± 0.32	15.13 ± 1.18	Y	105.00 ± 1.34	388.50 ± 4.96	Y
	12/28/2011	1.53 ± 0.20	5.66 ± 0.74	Y	32.10 ± 0.65	118.77 ± 2.42	Y
CRATERS OF THE MOON	10/6/2011	1.34 ± 0.17	4.96 ± 0.62	Y	30.70 ± 0.66	113.59 ± 2.46	Y
	10/12/2011	0.25 ± 0.14	0.94 ± 0.51		14.20 ± 0.59	52.54 ± 2.18	Y
	10/19/2011	1.12 ± 0.17	4.14 ± 0.63	Y	21.40 ± 0.53	79.18 ± 1.97	Y
	10/26/2011	1.12 ± 0.17	4.14 ± 0.64	Y	20.30 ± 0.52	75.11 ± 1.93	Y
	11/2/2011	1.30 ± 0.18	4.81 ± 0.66	Y	30.80 ± 0.72	113.96 ± 2.68	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
	11/9/2011	0.95 ± 0.16	3.51 ± 0.61	Y	23.30 ± 0.63	86.21 ± 2.31	Y
	11/16/2011	0.99 ± 0.17	3.67 ± 0.63	Y	29.00 ± 0.72	107.30 ± 2.66	Y
	11/23/2011	0.81 ± 0.14	2.98 ± 0.52	Y	16.40 ± 0.56	60.68 ± 2.07	Y
	11/30/2011	0.69 ± 0.17	2.54 ± 0.63	Y	26.30 ± 0.68	97.31 ± 2.52	Y
	12/7/2011	0.69 ± 0.14	2.55 ± 0.52	Y	21.30 ± 0.60	78.81 ± 2.23	Y
	12/14/2011	2.30 ± 0.23	8.51 ± 0.85	Y	68.10 ± 1.02	251.97 ± 3.77	Y
	12/21/2011	4.37 ± 0.29	16.17 ± 1.09	Y	92.00 ± 1.15	340.40 ± 4.26	Y
	12/28/2011	0.98 ± 0.16	3.61 ± 0.58	Y	23.70 ± 0.52	87.69 ± 1.94	Y
DUBOIS	10/5/2011	2.28 ± 0.23	8.44 ± 0.85	Y	36.20 ± 0.81	133.94 ± 2.98	Y
	10/12/2011	0.36 ± 0.13	1.34 ± 0.47		12.60 ± 0.51	46.62 ± 1.88	Y
	10/19/2011	0.97 ± 0.17	3.59 ± 0.61	Y	23.10 ± 0.55	85.47 ± 2.04	Y
	10/26/2011	0.98 ± 0.17	3.63 ± 0.61	Y	20.80 ± 0.52	76.96 ± 1.92	Y
	11/2/2011	0.31 ± 0.11	1.15 ± 0.40		6.80 ± 0.39	25.16 ± 1.45	Y
	11/9/2011	0.65 ± 0.15	2.41 ± 0.56	Y	22.30 ± 0.62	82.51 ± 2.29	Y
	11/16/2011	1.68 ± 0.20	6.22 ± 0.74	Y	27.90 ± 0.70	103.23 ± 2.58	Y
	11/23/2011	1.08 ± 0.15	4.00 ± 0.57	Y	18.90 ± 0.58	69.93 ± 2.15	Y
	11/30/2011	1.13 ± 0.19	4.18 ± 0.69	Y	23.90 ± 0.65	88.43 ± 2.40	Y
	12/7/2011	0.88 ± 0.15	3.27 ± 0.55	Y	18.00 ± 0.56	66.60 ± 2.06	Y
	12/14/2011	1.53 ± 0.20	5.66 ± 0.72	Y	54.30 ± 0.92	200.91 ± 3.39	Y
	12/21/2011	3.83 ± 0.27	14.17 ± 1.00	Y	80.70 ± 1.05	298.59 ± 3.89	Y
	12/28/2011	1.03 ± 0.16	3.81 ± 0.59	Y	23.40 ± 0.52	86.58 ± 1.94	Y
QA-2	10/5/2011	2.42 ± 0.24	8.95 ± 0.90	Y	34.60 ± 0.82	128.02 ± 3.02	Y
(DUBOIS)	10/12/2011	0.45 ± 0.14	1.66 ± 0.52	Y	11.70 ± 0.53	43.29 ± 1.94	Y
	10/19/2011	1.24 ± 0.18	4.59 ± 0.67	Y	22.30 ± 0.55	82.51 ± 2.04	Y
	10/26/2011	1.03 ± 0.18	3.81 ± 0.65	Y	22.10 ± 0.55	81.77 ± 2.05	Y
	11/2/2011	0.36 ± 0.11	1.34 ± 0.42	Y	8.26 ± 0.42	30.56 ± 1.57	Y
	11/9/2011	0.90 ± 0.18	3.32 ± 0.65	Y	22.00 ± 0.66	81.40 ± 2.43	Y
	11/16/2011	1.26 ± 0.18	4.66 ± 0.68	Y	25.10 ± 0.68	92.87 ± 2.52	Y
	11/23/2011	1.14 ± 0.17	4.22 ± 0.61	Y	18.60 ± 0.61	68.82 ± 2.26	Y
	11/30/2011	1.02 ± 0.19	3.77 ± 0.71	Y	26.80 ± 0.71	99.16 ± 2.62	Y
	12/7/2011	0.77 ± 0.15	2.83 ± 0.54	Y	19.90 ± 0.60	73.63 ± 2.22	Y
	12/14/2011	2.24 ± 0.23	8.29 ± 0.85	Y	57.20 ± 0.96	211.64 ± 3.56	Y
	12/21/2011	3.47 ± 0.27	12.84 ± 1.01	Y	87.20 ± 1.14	322.64 ± 4.22	Y
	12/28/2011	1.05 ± 0.16	3.89 ± 0.61	Y	23.10 ± 0.53	85.47 ± 1.96	Y
IDAHO FALLS	10/5/2011	1.77 ± 0.19	6.55 ± 0.71	Y	33.10 ± 0.71	122.47 ± 2.62	Y
	10/12/2011	1.15 ± 0.20	4.26 ± 0.73	Y	18.50 ± 0.65	68.45 ± 2.42	Y
	10/19/2011	1.30 ± 0.17	4.81 ± 0.62	Y	21.10 ± 0.50	78.07 ± 1.85	Y
	10/26/2011	1.12 ± 0.17	4.14 ± 0.61	Y	20.10 ± 0.50	74.37 ± 1.85	Y
	11/2/2011	1.32 ± 0.17	4.88 ± 0.62	Y	25.50 ± 0.63	94.35 ± 2.33	Y
	11/9/2011	0.89 ± 0.16	3.30 ± 0.60	Y	18.40 ± 0.57	68.08 ± 2.12	Y
	11/16/2011	1.87 ± 0.19	6.92 ± 0.71	Y	27.60 ± 0.65	102.12 ± 2.40	Y
	11/23/2011	1.13 ± 0.15	4.18 ± 0.56	Y	18.40 ± 0.56	68.08 ± 2.08	Y
	11/30/2011	1.27 ± 0.18	4.70 ± 0.65	Y	29.00 ± 0.65	107.30 ± 2.40	Y
	12/7/2011	1.36 ± 0.17	5.03 ± 0.61	Y	19.00 ± 0.55	70.30 ± 2.04	Y
	12/14/2011	2.31 ± 0.21	8.55 ± 0.79	Y	65.00 ± 0.94	240.50 ± 3.47	Y
	12/21/2011	2.39 ± 0.21	8.84 ± 0.79	Y	71.50 ± 0.95	264.55 ± 3.51	Y
	12/28/2011	1.08 ± 0.15	4.00 ± 0.55	Y	25.00 ± 0.50	92.50 ± 1.85	Y
JACKSON	10/5/2011	2.18 ± 0.21	8.07 ± 0.79	Y	39.00 ± 0.78	144.30 ± 2.87	Y
	10/12/2011	0.27 ± 0.11	1.01 ± 0.40		12.80 ± 0.47	47.36 ± 1.73	Y
	10/19/2011	1.12 ± 0.16	4.14 ± 0.59	Y	21.60 ± 0.50	79.92 ± 1.86	Y
	10/26/2011	1.19 ± 0.17	4.40 ± 0.62	Y	24.30 ± 0.53	89.91 ± 1.98	Y
	11/2/2011	1.73 ± 0.18	6.40 ± 0.68	Y	26.60 ± 0.63	98.42 ± 2.34	Y
	11/9/2011	1.01 ± 0.16	3.74 ± 0.60	Y	25.90 ± 0.63	95.83 ± 2.33	Y
	11/16/2011	1.48 ± 0.18	5.48 ± 0.65	Y	27.40 ± 0.64	101.38 ± 2.38	Y
	11/22/2011	0.90 ± 0.15	3.34 ± 0.54	Y	19.50 ± 0.60	72.15 ± 2.23	Y
	11/30/2011	1.03 ± 0.16	3.81 ± 0.60	Y	32.40 ± 0.67	119.88 ± 2.46	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
	12/7/2011	0.84 ± 0.15	3.12 ± 0.56	Y	21.50 ± 0.61	79.55 ± 2.26	Y
	12/14/2011	2.92 ± 0.29	10.80 ± 1.08	Y	83.80 ± 1.28	310.06 ± 4.74	Y
	12/21/2011	4.42 ± 0.34	16.35 ± 1.26	Y	92.40 ± 1.31	341.88 ± 4.85	Y
	12/28/2011	1.12 ± 0.18	4.14 ± 0.68	Y	31.20 ± 0.64	115.44 ± 2.38	Y
REXBURG CMS	10/5/2011	2.09 ± 0.22	7.73 ± 0.80	Y	35.70 ± 0.78	132.09 ± 2.87	Y
	10/12/2011	0.54 ± 0.13	1.99 ± 0.48	Y	13.20 ± 0.49	48.84 ± 1.81	Y
	10/19/2011	1.13 ± 0.17	4.18 ± 0.61	Y	22.20 ± 0.53	82.14 ± 1.94	Y
	10/26/2011	1.20 ± 0.17	4.44 ± 0.62	Y	20.30 ± 0.50	75.11 ± 1.85	Y
	11/2/2011	1.40 ± 0.19	5.18 ± 0.69	Y	25.70 ± 0.69	95.09 ± 2.55	Y
	11/9/2011	1.04 ± 0.17	3.85 ± 0.64	Y	24.70 ± 0.66	91.39 ± 2.43	Y
	11/16/2011	1.23 ± 0.17	4.55 ± 0.63	Y	30.10 ± 0.69	111.37 ± 2.56	Y
	11/23/2011	1.01 ± 0.14	3.74 ± 0.53	Y	18.00 ± 0.54	66.60 ± 2.01	Y
	11/30/2011	1.20 ± 0.19	4.44 ± 0.69	Y	29.20 ± 0.69	108.04 ± 2.56	Y
	12/7/2011	0.79 ± 0.13	2.91 ± 0.49	Y	14.30 ± 0.48	52.91 ± 1.76	Y
	12/14/2011	2.61 ± 0.23	9.66 ± 0.86	Y	61.90 ± 0.96	229.03 ± 3.54	Y
	12/21/2011	3.88 ± 0.30	14.36 ± 1.10	Y	96.70 ± 1.24	357.79 ± 4.59	Y
	12/28/2011	1.03 ± 0.17	3.81 ± 0.61	Y	27.20 ± 0.57	100.64 ± 2.12	Y
INL SITE							
EFS	10/5/2011	1.26 ± 0.17	4.66 ± 0.62	Y	30.70 ± 0.68	113.59 ± 2.52	Y
	10/12/2011	0.90 ± 0.15	3.34 ± 0.57	Y	14.90 ± 0.52	55.13 ± 1.91	Y
	10/19/2011	0.99 ± 0.16	3.68 ± 0.59	Y	20.80 ± 0.51	76.96 ± 1.90	Y
	10/26/2011	0.57 ± 0.14	2.11 ± 0.53	Y	24.20 ± 0.54	89.54 ± 2.00	Y
	11/2/2011	1.13 ± 0.16	4.18 ± 0.60	Y	28.50 ± 0.67	105.45 ± 2.48	Y
	11/9/2011	1.15 ± 0.21	4.26 ± 0.76	Y	32.70 ± 0.82	120.99 ± 3.05	Y
	11/16/2011	1.25 ± 0.17	4.63 ± 0.64	Y	30.90 ± 0.70	114.33 ± 2.59	Y
	11/23/2011	0.89 ± 0.14	3.28 ± 0.51	Y	10.80 ± 0.46	39.96 ± 1.72	Y
	11/30/2011	0.83 ± 0.17	3.08 ± 0.63	Y	35.40 ± 0.74	130.98 ± 2.75	Y
	12/7/2011	1.26 ± 0.16	4.66 ± 0.60	Y	22.50 ± 0.59	83.25 ± 2.17	Y
	12/14/2011	2.45 ± 0.23	9.07 ± 0.84	Y	74.60 ± 1.03	276.02 ± 3.81	Y
	12/21/2011	2.69 ± 0.24	9.95 ± 0.87	Y	101.00 ± 1.15	373.70 ± 4.26	Y
	12/28/2011	1.17 ± 0.16	4.33 ± 0.60	Y	28.30 ± 0.55	104.71 ± 2.05	Y
MAIN GATE	10/5/2011	1.77 ± 0.19	6.55 ± 0.71	Y	32.70 ± 0.71	120.99 ± 2.63	Y
	10/12/2011	0.32 ± 0.12	1.19 ± 0.44		12.80 ± 0.50	47.36 ± 1.83	Y
	10/19/2011	1.06 ± 0.16	3.92 ± 0.58	Y	21.40 ± 0.51	79.18 ± 1.87	Y
	10/26/2011	0.77 ± 0.15	2.85 ± 0.56	Y	25.40 ± 0.55	93.98 ± 2.04	Y
	11/2/2011	0.71 ± 0.14	2.63 ± 0.51	Y	24.50 ± 0.62	90.65 ± 2.29	Y
	11/9/2011	0.75 ± 0.15	2.79 ± 0.56	Y	24.00 ± 0.62	88.80 ± 2.30	Y
	11/16/2011	0.79 ± 0.15	2.93 ± 0.56	Y	31.20 ± 0.70	115.44 ± 2.60	Y
	11/23/2011	0.75 ± 0.13	2.78 ± 0.48	Y	17.10 ± 0.55	63.27 ± 2.03	Y
	11/30/2011	1.20 ± 0.19	4.44 ± 0.68	Y	35.50 ± 0.74	131.35 ± 2.75	Y
	12/7/2011	0.88 ± 0.14	3.25 ± 0.53	Y	20.50 ± 0.57	75.85 ± 2.09	Y
	12/14/2011	2.58 ± 0.23	9.55 ± 0.84	Y	73.10 ± 1.01	270.47 ± 3.74	Y
	12/21/2011	4.35 ± 0.29	16.10 ± 1.06	Y	91.50 ± 1.12	338.55 ± 4.14	Y
	12/28/2011	1.19 ± 0.16	4.40 ± 0.61	Y	29.70 ± 0.57	109.89 ± 2.09	Y
VAN BUREN GATE	10/6/2011	1.46 ± 0.17	5.40 ± 0.63	Y	31.70 ± 0.66	117.29 ± 2.44	Y
	10/12/2011	0.73 ± 0.16	2.71 ± 0.60	Y	14.00 ± 0.56	51.80 ± 2.08	Y
	10/19/2011	0.93 ± 0.15	3.44 ± 0.57	Y	22.30 ± 0.52	82.51 ± 1.91	Y
	10/26/2011	0.96 ± 0.16	3.54 ± 0.58	Y	23.80 ± 0.53	88.06 ± 1.97	Y
	11/2/2011	1.01 ± 0.14	3.74 ± 0.53	Y	23.60 ± 0.58	87.32 ± 2.14	Y
	11/9/2011	0.54 ± 0.14	2.01 ± 0.53	Y	25.20 ± 0.64	93.24 ± 2.36	Y
	11/16/2011	1.34 ± 0.18	4.96 ± 0.65	Y	29.00 ± 0.68	107.30 ± 2.53	Y
	11/23/2011	0.73 ± 0.13	2.69 ± 0.48	Y	18.00 ± 0.57	66.60 ± 2.09	Y
	11/30/2011	0.98 ± 0.18	3.62 ± 0.65	Y	32.30 ± 0.71	119.51 ± 2.63	Y
	12/7/2011	0.90 ± 0.15	3.34 ± 0.54	Y	19.40 ± 0.56	71.78 ± 2.07	Y
	12/14/2011	2.59 ± 0.23	9.58 ± 0.86	Y	72.30 ± 1.02	267.51 ± 3.77	Y
	12/21/2011	3.52 ± 0.26	13.02 ± 0.97	Y	89.30 ± 1.10	330.41 ± 4.07	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
	12/28/2011	1.28	±	0.17	4.74	±	0.62	Y	30.30	±	0.57	112.11	±	2.12	Y
QA-1 (VAN BUREN)	10/6/2011	1.13	±	0.14	4.18	±	0.53	Y	31.20	±	0.61	115.44	±	2.27	Y
	10/12/2011	0.74	±	0.15	2.73	±	0.56	Y	15.50	±	0.55	57.35	±	2.02	Y
	10/19/2011	1.28	±	0.16	4.74	±	0.58	Y	21.90	±	0.49	81.03	±	1.79	Y
	10/26/2011	0.97	±	0.15	3.57	±	0.54	Y	22.10	±	0.49	81.77	±	1.79	Y
	11/2/2011	1.64	±	0.18	6.07	±	0.68	Y	30.20	±	0.68	111.74	±	2.51	Y
	11/9/2011	0.40	±	0.12	1.48	±	0.46	Y	22.80	±	0.57	84.36	±	2.11	Y
	11/16/2011	1.30	±	0.16	4.81	±	0.60	Y	31.00	±	0.66	114.70	±	2.43	Y
	11/23/2011	0.69	±	0.12	2.53	±	0.44	Y	17.60	±	0.52	65.12	±	1.93	Y
	11/30/2011	1.22	±	0.17	4.51	±	0.63	Y	30.90	±	0.65	114.33	±	2.42	Y
	12/7/2011	0.76	±	0.13	2.80	±	0.47	Y	21.00	±	0.54	77.70	±	1.99	Y
	12/14/2011	2.74	±	0.22	10.14	±	0.81	Y	74.50	±	0.96	275.65	±	3.56	Y
	12/21/2011	4.34	±	0.27	16.06	±	0.99	Y	94.70	±	1.07	350.39	±	3.96	Y
	12/28/2011	1.16	±	0.15	4.29	±	0.56	Y	28.60	±	0.53	105.82	±	1.96	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	10/06/2011	-0.86	±	0.94	-3.18	±	3.48	
	10/12/2011	-0.07	±	1.14	-0.25	±	4.21	
	10/19/2011	-2.30	±	0.97	-8.52	±	3.60	
	10/26/2011	0.13	±	0.99	0.48	±	3.66	
	11/02/2011	-1.15	±	0.96	-4.26	±	3.56	
	11/09/2011	-0.96	±	0.98	-3.54	±	3.64	
	11/16/2011	-1.39	±	0.93	-5.15	±	3.46	
	11/23/2011	-1.46	±	1.03	-5.39	±	3.80	
	11/30/2011	-0.98	±	0.97	-3.64	±	3.60	
	12/07/2011	0.46	±	0.99	1.71	±	3.65	
	12/14/2011	0.02	±	0.93	0.06	±	3.45	
	12/21/2011	-0.02	±	0.88	-0.08	±	3.26	
	12/28/2011	-0.65	±	0.87	-2.41	±	3.21	
ATOMIC CITY	10/06/2011	-0.92	±	1.01	-3.40	±	3.72	
	10/12/2011	-0.07	±	1.26	-0.28	±	4.65	
	10/19/2011	-2.46	±	1.04	-9.10	±	3.84	
	10/26/2011	0.15	±	1.12	0.54	±	4.14	
	11/02/2011	-1.47	±	1.23	-5.44	±	4.54	
	11/09/2011	-1.11	±	1.14	-4.12	±	4.23	
	11/16/2011	-1.78	±	1.19	-6.59	±	4.42	
	11/23/2011	-1.64	±	1.16	-6.07	±	4.27	
	11/30/2011	-1.10	±	1.09	-4.07	±	4.03	
	12/07/2011	0.52	±	1.11	1.93	±	4.13	
	12/14/2011	0.02	±	1.09	0.07	±	4.04	
	12/21/2011	-0.03	±	1.03	-0.10	±	3.81	
	12/28/2011	-0.73	±	0.97	-2.70	±	3.60	
BLUE DOME	10/05/2011	-1.47	±	1.22	-5.45	±	4.53	
	10/12/2011	1.96	±	1.83	7.25	±	6.76	
	10/19/2011	-0.04	±	1.00	-0.16	±	3.68	
	10/26/2011	-0.09	±	1.18	-0.33	±	4.37	
	11/02/2011	1.44	±	0.97	5.32	±	3.59	
	11/09/2011	2.14	±	1.04	7.90	±	3.86	
	11/16/2011	0.59	±	1.26	2.18	±	4.65	
	11/23/2011	-0.58	±	1.19	-2.15	±	4.40	
	11/30/2011	0.83	±	1.14	3.07	±	4.23	
	12/07/2011	0.83	±	1.02	3.09	±	3.77	
	12/14/2011	-1.27	±	0.94	-4.68	±	3.47	
	12/21/2011	0.82	±	0.95	3.05	±	3.53	
	12/28/2011	-1.72	±	0.88	-6.36	±	3.24	
FAA TOWER	10/05/2011	-1.29	±	1.07	-4.78	±	3.97	
	10/12/2011	1.06	±	0.99	3.91	±	3.65	
	10/19/2011	-0.04	±	0.95	-0.16	±	3.50	
	10/26/2011	-0.07	±	0.95	-0.27	±	3.50	
	11/02/2011	1.44	±	0.97	5.31	±	3.58	
	11/09/2011	1.90	±	0.93	7.01	±	3.43	
	11/16/2011	0.46	±	0.99	1.71	±	3.66	
	11/23/2011	-0.46	±	0.94	-1.69	±	3.47	
	11/30/2011	0.72	±	1.00	2.68	±	3.69	
	12/07/2011	0.79	±	0.96	2.93	±	3.57	
	12/14/2011	-1.25	±	0.92	-4.62	±	3.42	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	12/21/2011	0.79	±	0.91	2.91	±	3.37	
	12/28/2011	-1.69	±	0.86	-6.26	±	3.20	
HOWE	10/05/2011	-1.41	±	1.17	-5.23	±	4.34	
	10/12/2011	1.09	±	1.01	4.03	±	3.75	
	10/19/2011	-0.05	±	1.02	-0.17	±	3.76	
a	10/26/2011	-0.52	±	6.83	-1.93	±	25.28	
	11/02/2011	1.50	±	1.01	5.56	±	3.75	
	11/09/2011	2.95	±	1.44	10.91	±	5.33	
	11/16/2011	0.48	±	1.02	1.77	±	3.78	
	11/23/2011	-0.49	±	1.00	-1.80	±	3.69	
	11/30/2011	0.74	±	1.02	2.74	±	3.77	
	12/07/2011	0.89	±	1.08	3.29	±	4.00	
	12/14/2011	-1.92	±	1.42	-7.12	±	5.27	
	12/21/2011	0.80	±	0.92	2.95	±	3.41	
	12/28/2011	-1.76	±	0.90	-6.52	±	3.33	
MONTEVIEW	10/05/2011	-3.03	±	2.52	-11.22	±	9.32	
	10/12/2011	1.04	±	0.97	3.85	±	3.59	
	10/19/2011	-0.04	±	0.94	-0.16	±	3.49	
	10/26/2011	-0.07	±	0.96	-0.27	±	3.56	
	11/02/2011	1.43	±	0.96	5.28	±	3.56	
	11/09/2011	1.90	±	0.93	7.02	±	3.43	
	11/16/2011	0.45	±	0.96	1.66	±	3.55	
	11/23/2011	-0.45	±	0.92	-1.66	±	3.39	
	11/30/2011	0.93	±	1.28	3.43	±	4.72	
	12/07/2011	0.81	±	0.98	2.99	±	3.64	
	12/14/2011	-1.25	±	0.93	-4.62	±	3.42	
	12/21/2011	0.85	±	0.98	3.14	±	3.63	
	12/28/2011	-1.67	±	0.85	-6.17	±	3.15	
MUD LAKE	10/05/2011	-1.32	±	1.10	-4.89	±	4.06	
	10/12/2011	1.06	±	0.99	3.93	±	3.67	
	10/19/2011	-0.04	±	1.00	-0.17	±	3.71	
	10/26/2011	-0.08	±	1.00	-0.28	±	3.70	
	11/02/2011	1.58	±	1.07	5.84	±	3.94	
	11/09/2011	2.08	±	1.02	7.71	±	3.77	
	11/16/2011	0.50	±	1.07	1.85	±	3.96	
	11/23/2011	-0.67	±	1.38	-2.48	±	5.09	
	11/30/2011	0.75	±	1.03	2.77	±	3.81	
	12/07/2011	0.90	±	1.10	3.34	±	4.08	
	12/14/2011	-1.38	±	1.02	-5.10	±	3.77	
	12/21/2011	0.93	±	1.08	3.45	±	3.99	
	12/28/2011	-1.85	±	0.95	-6.86	±	3.50	
DISTANT								
BLACKFOOT CMS	10/05/2011	-1.15	±	1.26	-4.25	±	4.65	
	10/12/2011	-0.06	±	1.02	-0.22	±	3.78	
	10/19/2011	-2.62	±	1.11	-9.71	±	4.10	
	10/26/2011	0.15	±	1.18	0.57	±	4.37	
	11/02/2011	-1.25	±	1.04	-4.61	±	3.85	
	11/09/2011	-1.20	±	1.24	-4.45	±	4.57	
	11/16/2011	-1.60	±	1.07	-5.91	±	3.96	
	11/23/2011	-1.54	±	1.08	-5.69	±	4.01	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	11/30/2011	-1.18	±	1.17	-4.37	±	4.32	
	12/07/2011	0.59	±	1.25	2.17	±	4.64	
	12/14/2011	0.02	±	1.16	0.07	±	4.29	
	12/21/2011	-0.03	±	1.24	-0.12	±	4.60	
	12/28/2011	-0.89	±	1.19	-3.31	±	4.41	
CRATERS	10/06/2011	-0.94	±	1.02	-3.46	±	3.78	
	10/12/2011	-0.08	±	1.29	-0.28	±	4.79	
	10/19/2011	-2.61	±	1.10	-9.67	±	4.08	
	10/26/2011	0.15	±	1.15	0.56	±	4.26	
	11/02/2011	-1.34	±	1.12	-4.95	±	4.13	
	11/09/2011	-1.10	±	1.13	-4.05	±	4.17	
	11/16/2011	-1.73	±	1.16	-6.38	±	4.28	
	11/23/2011	-1.70	±	1.19	-6.27	±	4.42	
	11/30/2011	-1.15	±	1.14	-4.27	±	4.23	
	12/07/2011	0.56	±	1.19	2.06	±	4.40	
	12/14/2011	0.02	±	1.15	0.07	±	4.26	
	12/21/2011	-0.03	±	1.05	-0.10	±	3.88	
	12/28/2011	-0.76	±	1.02	-2.82	±	3.76	
DUBOIS	10/05/2011	-1.39	±	1.16	-5.15	±	4.27	
	10/12/2011	1.10	±	1.02	4.06	±	3.79	
	10/19/2011	-0.05	±	1.05	-0.17	±	3.89	
	10/26/2011	-0.08	±	1.02	-0.29	±	3.77	
	11/02/2011	1.43	±	0.97	5.30	±	3.58	
	11/09/2011	1.99	±	0.97	7.38	±	3.61	
	11/16/2011	0.50	±	1.08	1.87	±	3.99	
	11/23/2011	-0.48	±	0.99	-1.78	±	3.65	
	11/30/2011	0.74	±	1.02	2.75	±	3.79	
	12/07/2011	0.87	±	1.06	3.23	±	3.94	
	12/14/2011	-1.40	±	1.03	-5.17	±	3.83	
	12/21/2011	0.81	±	0.93	2.98	±	3.45	
	12/28/2011	-1.86	±	0.95	-6.88	±	3.51	
QA-2	10/05/2011	-1.47	±	1.22	-5.44	±	4.52	
(DUBOIS)	10/12/2011	1.20	±	1.12	4.43	±	4.13	
	10/19/2011	-0.05	±	1.07	-0.18	±	3.98	
	10/26/2011	-0.08	±	1.09	-0.31	±	4.02	
	11/02/2011	1.48	±	1.00	5.46	±	3.69	
	11/09/2011	2.22	±	1.09	8.22	±	4.02	
	11/16/2011	0.52	±	1.11	1.93	±	4.12	
	11/23/2011	-0.53	±	1.08	-1.95	±	4.00	
	11/30/2011	0.80	±	1.10	2.96	±	4.07	
	12/07/2011	0.92	±	1.13	3.42	±	4.17	
	12/14/2011	-1.47	±	1.09	-5.43	±	4.02	
	12/21/2011	0.88	±	1.02	3.26	±	3.76	
	12/28/2011	-1.92	±	0.98	-7.10	±	3.62	
IDAHO FALLS	10/05/2011	-1.19	±	0.99	-4.40	±	3.65	
	10/12/2011	1.31	±	1.22	4.85	±	4.53	
	10/19/2011	-0.04	±	0.94	-0.16	±	3.50	
	10/26/2011	-0.07	±	0.97	-0.27	±	3.60	
	11/02/2011	1.45	±	0.98	5.35	±	3.61	
	11/09/2011	1.97	±	0.96	7.30	±	3.57	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	11/16/2011	0.45	±	0.96	1.66	±	3.54	
	11/23/2011	-0.46	±	0.95	-1.71	±	3.50	
	11/30/2011	0.65	±	0.90	2.42	±	3.33	
	12/07/2011	0.82	±	1.00	3.05	±	3.71	
	12/14/2011	-1.26	±	0.93	-4.66	±	3.45	
	12/21/2011	0.74	±	0.86	2.75	±	3.18	
	12/28/2011	-1.61	±	0.82	-5.97	±	3.05	
JACKSON	10/05/2011	-1.03	±	1.12	-3.81	±	4.16	
	10/12/2011	-0.06	±	0.96	-0.21	±	3.54	
	10/19/2011	-2.35	±	0.99	-8.69	±	3.67	
	10/26/2011	0.14	±	1.04	0.51	±	3.86	
	11/02/2011	-1.18	±	0.98	-4.35	±	3.63	
	11/09/2011	-1.03	±	1.06	-3.82	±	3.93	
	11/16/2011	-1.47	±	0.99	-5.45	±	3.66	
	11/22/2011	-0.59	±	1.76	-2.19	±	6.52	
	11/30/2011	-0.95	±	0.94	-3.53	±	3.49	
	12/07/2011	0.56	±	1.20	2.08	±	4.45	
	12/14/2011	0.02	±	1.47	0.09	±	5.43	
	12/21/2011	-0.03	±	1.34	-0.13	±	4.94	
	12/28/2011	-0.89	±	1.18	-3.29	±	4.38	
REXBURG CMS	10/05/2011	-1.32	±	1.09	-4.87	±	4.04	
	10/12/2011	1.01	±	0.94	3.74	±	3.49	
	10/19/2011	-0.04	±	0.99	-0.16	±	3.66	
	10/26/2011	-0.07	±	0.97	-0.27	±	3.57	
	11/02/2011	1.67	±	1.13	6.19	±	4.17	
	11/09/2011	2.05	±	1.00	7.60	±	3.72	
	11/16/2011	0.47	±	1.01	1.75	±	3.73	
	11/23/2011	-0.44	±	0.91	-1.64	±	3.36	
	11/30/2011	0.73	±	1.00	2.69	±	3.70	
	12/07/2011	0.78	±	0.96	2.90	±	3.53	
	12/14/2011	-1.36	±	1.00	-5.02	±	3.71	
	12/21/2011	0.94	±	1.09	3.48	±	4.02	
	12/28/2011	-1.94	±	0.99	-7.18	±	3.66	
INL SITE								
EFS	10/05/2011	-0.98	±	1.07	-3.62	±	3.96	
	10/12/2011	-0.06	±	1.02	-0.22	±	3.77	
	10/19/2011	-2.50	±	1.06	-9.27	±	3.91	
	10/26/2011	0.14	±	1.08	0.52	±	3.98	
	11/02/2011	-1.24	±	1.04	-4.59	±	3.83	
	11/09/2011	-1.39	±	1.43	-5.13	±	5.27	
	11/16/2011	-1.58	±	1.06	-5.83	±	3.91	
	11/23/2011	-1.59	±	1.12	-5.89	±	4.14	
	11/30/2011	-1.08	±	1.07	-4.00	±	3.97	
	12/07/2011	0.51	±	1.08	1.87	±	4.00	
	12/14/2011	0.02	±	1.07	0.06	±	3.97	
	12/21/2011	-0.03	±	0.97	-0.09	±	3.60	
	12/28/2011	-0.73	±	0.98	-2.71	±	3.61	
MAIN GATE	10/05/2011	-1.01	±	1.10	-3.72	±	4.07	
	10/12/2011	-0.06	±	1.05	-0.23	±	3.87	
	10/19/2011	-2.39	±	1.01	-8.84	±	3.73	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	10/26/2011	0.14	±	1.07	0.52	±	3.96	
	11/02/2011	-1.21	±	1.01	-4.48	±	3.74	
	11/09/2011	-1.07	±	1.10	-3.95	±	4.06	
	11/16/2011	-1.58	±	1.06	-5.84	±	3.91	
	11/23/2011	-1.59	±	1.12	-5.89	±	4.15	
	11/30/2011	-1.08	±	1.06	-3.98	±	3.94	
	12/07/2011	0.51	±	1.09	1.88	±	4.02	
	12/14/2011	0.02	±	1.05	0.06	±	3.90	
	12/21/2011	-0.03	±	1.00	-0.10	±	3.69	
	12/28/2011	-0.73	±	0.97	-2.71	±	3.61	
VAN BUREN GATE	10/06/2011	-0.90	±	0.99	-3.35	±	3.66	
	10/12/2011	-0.07	±	1.21	-0.27	±	4.48	
	10/19/2011	-2.40	±	1.01	-8.88	±	3.75	
	10/26/2011	0.14	±	1.06	0.51	±	3.91	
	11/02/2011	-1.10	±	0.92	-4.06	±	3.39	
	11/09/2011	-1.08	±	1.11	-4.00	±	4.11	
	11/16/2011	-1.58	±	1.06	-5.84	±	3.92	
	11/23/2011	-1.62	±	1.14	-6.00	±	4.22	
	11/30/2011	-1.08	±	1.07	-3.98	±	3.94	
	12/07/2011	0.52	±	1.11	1.92	±	4.11	
	12/14/2011	0.02	±	1.09	0.07	±	4.03	
	12/21/2011	-0.03	±	0.98	-0.09	±	3.64	
	12/28/2011	-0.74	±	0.98	-2.73	±	3.64	
QA-1	10/06/2011	-0.80	±	0.88	-2.97	±	3.25	
(VAN BUREN GATE)	10/12/2011	-0.06	±	1.09	-0.24	±	4.04	
	10/19/2011	-2.17	±	0.92	-8.04	±	3.39	
	10/26/2011	0.12	±	0.95	0.46	±	3.51	
	11/02/2011	-1.21	±	1.01	-4.48	±	3.74	
	11/09/2011	-0.96	±	0.99	-3.56	±	3.66	
	11/16/2011	-1.41	±	0.94	-5.21	±	3.49	
	11/23/2011	-1.44	±	1.02	-5.34	±	3.76	
	11/30/2011	-0.95	±	0.95	-3.53	±	3.50	
	12/07/2011	0.46	±	0.98	1.70	±	3.64	
	12/14/2011	0.02	±	0.95	0.06	±	3.53	
	12/21/2011	-0.02	±	0.89	-0.08	±	3.29	
	12/28/2011	-0.67	±	0.89	-2.46	±	3.28	

a. Invalid Sample Result

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	12/28/2011	CESIUM-137	-174.00	±	116.00	-643.80	±	429.20	
ATOMIC CITY	12/28/2011	AMERICIUM-241	1.06	±	0.75	3.93	±	2.77	
		CESIUM-137	32.90	±	113.00	121.73	±	418.10	
		PLUTONIUM-238	1.16	±	1.43	4.31	±	5.28	
		PLUTONIUM-239/240	2.32	±	1.65	8.59	±	6.12	
BLUE DOME	12/28/2011	CESIUM-137	17.60	±	95.60	65.12	±	353.72	
FAA TOWER	12/28/2011	CESIUM-137	111.00	±	121.00	410.70	±	447.70	
		STRONTIUM-90	45.48	±	8.56	168.27	±	31.66	Y
HOWE	12/28/2011	AMERICIUM-241	2.69	±	1.09	9.96	±	4.05	
		CESIUM-137	-45.50	±	109.00	-168.35	±	403.30	
		PLUTONIUM-238	0.57	±	0.70	2.10	±	2.58	
		PLUTONIUM-239/240	0.28	±	0.69	1.05	±	2.57	
MONTEVIEW	12/28/2011	CESIUM-137	26.50	±	131.00	98.05	±	484.70	
MUD LAKE	12/28/2011	CESIUM-137	-36.70	±	124.00	-135.79	±	458.80	
		STRONTIUM-90	44.23	±	8.90	163.67	±	32.94	Y
DISTANT									
BLACKFOOT	12/28/2011	CESIUM-137	-358.00	±	139.00	-1324.60	±	514.30	
CRATERS	12/28/2011	AMERICIUM-241	1.36	±	0.94	5.02	±	3.47	
		CESIUM-137	-18.30	±	89.20	-67.71	±	330.04	
		PLUTONIUM-238	0.56	±	0.69	2.08	±	2.55	
		PLUTONIUM-239/240	1.12	±	0.69	4.15	±	2.56	
DUBOIS	12/28/2011	CESIUM-137	116.00	±	130.00	429.20	±	481.00	
		STRONTIUM-90	-3.15	±	6.79	-11.65	±	25.13	
DUBOIS (QA-2)	12/28/2011	CESIUM-137	63.00	±	109.00	233.10	±	403.30	
		STRONTIUM-90	57.31	±	10.41	212.05	±	38.54	Y
IDAHO FALLS	12/28/2011	CESIUM-137	59.60	±	81.90	220.52	±	303.03	
		STRONTIUM-90	32.33	±	7.98	119.63	±	29.53	Y
JACKSON	12/28/2011	AMERICIUM-241	1.74	±	0.94	6.42	±	3.46	
		CESIUM-137	-33.00	±	93.70	-122.10	±	346.69	
		PLUTONIUM-238	0.43	±	1.04	1.58	±	3.86	
		PLUTONIUM-239/240	0.00	±	1.04	0.00	±	3.85	
REXBURG CMS	12/28/2011	CESIUM-137	-46.30	±	87.00	-171.31	±	321.90	

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
INL SITE									
EFS	12/28/2011	CESIUM-137	4.48	±	77.70	16.58	±	287.49	
		STRONTIUM-90	51.69	±	9.30	191.27	±	34.43	Y
MAIN GATE	12/28/2011	CESIUM-137	9.68	±	124.00	35.82	±	458.80	
		STRONTIUM-90	35.89	±	8.06	132.79	±	29.83	Y
VAN BUREN GATE	12/28/2011	AMERICIUM-241	2.43	±	1.23	8.99	±	4.56	
		CESIUM-137	49.20	±	91.30	182.04	±	337.81	
		PLUTONIUM-238	0.24	±	0.59	0.89	±	2.18	
		PLUTONIUM-239/240	1.69	±	0.73	6.25	±	2.71	
VAN BUREN GATE (QA-1)	12/28/2011	AMERICIUM-241	0.86	±	0.67	3.20	±	2.48	
		CESIUM-137	-88.30	±	102.00	-326.71	±	377.40	
		PLUTONIUM-238	0.49	±	0.60	1.82	±	2.23	
		PLUTONIUM-239/240	0.00	±	0.60	0.00	±	2.23	

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	6/15/2011	7/6/2011	14.14	±	1.70	52.32	±	6.31	Molecular Sieve	Y
ATOMIC CITY	7/6/2011	7/27/2011	11.13	±	1.76	41.17	±	6.53	Molecular Sieve	Y
ATOMIC CITY	7/27/2011	8/10/2011	-11.52	±	2.29	-42.62	±	8.47	Molecular Sieve	
ATOMIC CITY	8/10/2011	8/31/2011	2.91	±	1.93	10.76	±	7.15	Molecular Sieve	
ATOMIC CITY	8/31/2011	9/21/2011	-1.38	±	1.93	-5.10	±	7.15	Molecular Sieve	
ATOMIC CITY	9/21/2011	10/12/2011	1.41	±	1.77	5.22	±	6.55	Molecular Sieve	
ATOMIC CITY	10/12/2011	11/9/2011	3.34	±	1.31	12.34	±	4.84	Molecular Sieve	
DISTANT										
CMS	06/22/2011	07/06/2011	10.43	±	1.74	38.59	±	6.45	Molecular Sieve	Y
CMS	07/06/2011	07/20/2011	2.55	±	1.70	9.42	±	6.27	Molecular Sieve	
CMS	07/20/2011	08/03/2011	-5.21	±	2.02	-19.29	±	7.48	Molecular Sieve	
CMS	08/03/2011	08/17/2011	-0.99	±	2.30	-3.66	±	8.53	Molecular Sieve	
CMS	08/17/2011	08/31/2011	-7.65	±	2.29	-28.32	±	8.48	Molecular Sieve	
CMS	08/31/2011	09/14/2011	5.73	±	2.46	21.18	±	9.09	Molecular Sieve	
CMS	09/14/2011	09/28/2011	1.77	±	2.12	6.57	±	7.85	Molecular Sieve	
CMS	09/28/2011	10/19/2011	4.21	±	2.21	15.56	±	8.17	Molecular Sieve	
CMS	10/19/2011	11/16/2011	2.15	±	1.08	7.95	±	3.98	Molecular Sieve	
IDAHO FALLS	06/23/2011	07/06/2011	10.26	±	1.74	37.95	±	6.43	Molecular Sieve	Y
IDAHO FALLS	07/06/2011	07/20/2011	-1.01	±	1.56	-3.75	±	5.77	Molecular Sieve	
IDAHO FALLS	07/20/2011	08/03/2011	-1.29	±	1.86	-4.77	±	6.90	Molecular Sieve	
IDAHO FALLS	08/03/2011	08/17/2011	-4.12	±	2.27	-15.25	±	8.40	Molecular Sieve	
IDAHO FALLS	08/17/2011	08/31/2011	-2.41	±	2.50	-8.91	±	9.25	Molecular Sieve	
IDAHO FALLS	08/31/2011	09/14/2011	6.11	±	2.21	22.59	±	8.19	Molecular Sieve	
IDAHO FALLS	09/14/2011	09/29/2011	2.52	±	1.87	9.31	±	6.92	Molecular Sieve	
IDAHO FALLS	09/29/2011	10/19/2011	4.70	±	1.72	17.39	±	6.37	Molecular Sieve	
IDAHO FALLS	10/19/2011	11/07/2011	1.86	±	1.27	6.90	±	4.72	Molecular Sieve	
REXBURG	06/29/2011	07/20/2011	2.08	±	3.29	7.70	±	12.16	Molecular Sieve	
REXBURG	07/20/2011	08/10/2011	-18.44	±	4.41	-68.22	±	16.32	Molecular Sieve	
REXBURG	08/10/2011	08/31/2011	-5.48	±	2.92	-20.28	±	10.80	Molecular Sieve	
REXBURG	08/31/2011	09/21/2011	11.84	±	2.52	43.82	±	9.32	Molecular Sieve	Y
REXBURG	09/21/2011	10/12/2011	2.39	±	2.24	8.83	±	8.28	Molecular Sieve	
REXBURG	10/12/2011	11/02/2011	0.98	±	1.76	3.64	±	6.51	Molecular Sieve	

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

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
IDAHO FALLS	9/1/2011	10/3/2011	115.00	±	22.20	4.26	±	0.82	Y
	10/3/2011	11/2/2011	-244.00	±	33.10	-9.03	±	1.22	
	11/2/2011	12/1/2011	-30.20	±	26.80	-1.12	±	0.99	
CFA	9/1/2011	10/3/2011	105.00	±	22.30	3.89	±	0.83	Y
	10/3/2011	10/31/2011	-30.70	±	32.50	-1.14	±	1.20	
	10/31/2011	12/1/2011	-16.90	±	27.00	-0.63	±	1.00	
EFS	9/28/2011	10/5/2011	-6.28	±	23.60	-0.23	±	0.87	
	10/5/2011	10/12/2011	82.10	±	33.60	3.04	±	1.24	
	10/12/2011	10/19/2011	-39.80	±	32.40	-1.47	±	1.20	
	11/16/2011	11/23/2011	111.00	±	28.80	4.11	±	1.07	Y

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

Location	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Alpheus Spring	GROSS ALPHA	11/14/11	0.56	±	0.34	0.02	±	0.01	
	GROSS BETA		5.21	±	0.54	0.19	±	0.02	Y
	TRITIUM		119.00	±	29.60	4.41	±	1.10	Y
Bill Jones Fish Farm	GROSS ALPHA	11/14/11	0.06	±	0.30	0.00	±	0.01	
	GROSS BETA		1.23	±	0.46	0.05	±	0.02	
	TRITIUM		67.30	±	28.00	2.49	±	1.04	
Clear Springs	GROSS ALPHA	11/14/11	1.23	±	0.57	0.05	±	0.02	
	GROSS BETA		4.89	±	0.60	0.18	±	0.02	Y
	TRITIUM		45.20	±	27.50	1.67	±	1.02	
DRINKING WATER									
Atomic City	GROSS ALPHA	11/16/11	1.10	±	0.40	0.04	±	0.01	
	GROSS BETA		2.69	±	0.50	0.10	±	0.02	Y
	TRITIUM		54.60	±	28.80	2.02	±	1.07	
Control	GROSS ALPHA	11/16/11	-0.08	±	0.17	0.00	±	0.01	
	GROSS BETA		0.29	±	0.40	0.01	±	0.01	
	TRITIUM		22.70	±	27.80	0.84	±	1.03	
Craters of the Moon	GROSS ALPHA	11/16/11	0.74	±	0.37	0.03	±	0.01	
	GROSS BETA		2.61	±	0.50	0.10	±	0.02	Y
	TRITIUM		62.50	±	29.00	2.31	±	1.07	
Howe	GROSS ALPHA	11/16/11	0.68	±	0.39	0.03	±	0.01	
	GROSS BETA		1.53	±	0.48	0.06	±	0.02	Y
	TRITIUM		-10.60	±	27.40	-0.39	±	1.01	
Idaho Falls	GROSS ALPHA	11/17/11	-0.03	±	0.46	0.00	±	0.02	
	GROSS BETA		3.77	±	0.56	0.14	±	0.02	Y
	TRITIUM		10.70	±	27.90	0.40	±	1.03	
Minidoka	GROSS ALPHA	11/14/11	0.38	±	0.46	0.01	±	0.02	
	GROSS BETA		3.53	±	0.55	0.13	±	0.02	Y
	TRITIUM		-48.30	±	26.80	-1.79	±	0.99	
Minidoka (Duplicate)	GROSS ALPHA	11/14/11	-0.33	±	0.44	-0.01	±	0.02	
	GROSS BETA		11.00	±	0.69	0.41	±	0.03	Y
	TRITIUM		80.80	±	27.80	2.99	±	1.03	
Mud Lake	GROSS ALPHA	11/18/11	0.64	±	0.39	0.02	±	0.01	
	GROSS BETA		3.30	±	0.50	0.12	±	0.02	Y
	TRITIUM		-10.90	±	27.60	-0.40	±	1.02	
Rest Area	GROSS ALPHA	11/16/11	0.16	±	0.29	0.01	±	0.01	
	GROSS BETA		4.85	±	0.51	0.18	±	0.02	Y
	TRITIUM		73.70	±	29.40	2.73	±	1.09	
Shoshone	GROSS ALPHA	11/14/11	0.63	±	0.44	0.02	±	0.02	
	GROSS BETA		4.33	±	0.53	0.16	±	0.02	Y
	TRITIUM		36.00	±	28.10	1.33	±	1.04	

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															
	11/01/11	0.44	±	1.98	0.016	±	0.073		-0.42	±	1.39	-0.015	±	0.051	
	12/06/11	1.85	±	1.42	0.069	±	0.053		-1.84	±	0.92	-0.068	±	0.034	
CONTROL															
	10/04/11	-1.80	±	2.01	-0.067	±	0.074		0.36	±	1.42	0.013	±	0.053	
	11/01/11	0.46	±	1.28	0.017	±	0.047		-0.31	±	0.91	-0.012	±	0.034	
	12/06/11	0.85	±	1.90	0.031	±	0.070		1.37	±	1.38	0.051	±	0.051	
DIETRICH															
	10/04/11	1.62	±	1.66	0.060	±	0.061		-0.82	±	1.35	-0.030	±	0.050	
Duplicate	10/04/11	-2.87	±	1.84	-0.106	±	0.068		1.76	±	1.40	0.065	±	0.052	
	11/01/11	1.70	±	1.47	0.063	±	0.054		1.90	±	1.33	0.070	±	0.049	
	12/06/11	0.53	±	1.19	0.020	±	0.044		-1.99	±	0.88	-0.074	±	0.033	
FORT HALL															
	11/01/11	0.37	±	1.69	0.014	±	0.063		-0.77	±	1.40	-0.029	±	0.052	
	12/06/11	0.47	±	1.72	0.018	±	0.064		-1.00	±	1.47	-0.037	±	0.054	
HOWE															
	10/04/11	-0.05	±	1.11	-0.002	±	0.041		-0.19	±	0.79	-0.007	±	0.029	
	11/01/11	-0.42	±	0.99	-0.015	±	0.037		1.76	±	0.80	0.065	±	0.030	
	12/06/11	-0.69	±	1.29	-0.026	±	0.048		-1.59	±	0.90	-0.059	±	0.033	
IDAHO FALLS															
	10/04/11	-2.94	±	1.02	-0.109	±	0.038		0.58	±	0.79	0.022	±	0.029	
	10/11/11	-0.94	±	0.94	-0.035	±	0.035		0.86	±	0.79	0.032	±	0.029	
	10/18/11	-2.07	±	1.75	-0.077	±	0.065		0.25	±	1.40	0.009	±	0.052	
	10/25/11	-0.10	±	1.56	-0.004	±	0.058		1.31	±	1.30	0.049	±	0.048	
	11/01/11	-0.10	±	0.92	-0.004	±	0.034		-0.42	±	0.80	-0.016	±	0.030	
	11/08/11	0.84	±	1.54	0.031	±	0.057		-0.38	±	1.47	-0.014	±	0.054	
	11/15/11	1.31	±	1.58	0.049	±	0.059		2.61	±	1.36	0.097	±	0.050	
	11/22/11	1.13	±	1.17	0.042	±	0.043		0.02	±	0.88	0.001	±	0.032	
	11/29/11	1.79	±	0.95	0.066	±	0.035		0.44	±	0.79	0.016	±	0.029	
	12/06/11	-0.52	±	0.94	-0.019	±	0.035		0.68	±	0.79	0.025	±	0.029	
Duplicate	12/06/11	-1.98	±	1.59	-0.073	±	0.059		1.80	±	1.31	0.067	±	0.049	
	12/13/11	1.09	±	0.93	0.040	±	0.034		0.83	±	0.77	0.031	±	0.028	
	12/20/11	0.16	±	0.92	0.006	±	0.034		0.26	±	0.77	0.009	±	0.029	
	12/27/11	1.41	±	1.59	0.052	±	0.059		0.05	±	1.47	0.002	±	0.054	
RUPERT															
	10/04/11	-0.16	±	1.88	-0.006	±	0.070		2.70	±	1.33	0.100	±	0.049	
	11/01/11	0.64	±	1.15	0.024	±	0.043		-1.18	±	0.89	-0.044	±	0.033	
	12/06/11	-1.94	±	1.75	-0.072	±	0.065		1.97	±	1.45	0.073	±	0.054	
TERRETON															
	10/03/11	9.30	±	3.44	0.344	±	0.127		2.80	±	1.48	0.104	±	0.055	
	11/02/11	4.76	±	2.05	0.176	±	0.076		2.64	±	1.40	0.098	±	0.052	
	12/05/12	1.32	±	2.28	0.049	±	0.084		-0.53	±	1.43	-0.020	±	0.053	

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

Location	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
Strontium-90								
BLACKFOOT	11/01/11	0.43	±	0.10	0.016	±	0.004	Y
CONTROL	11/01/11	0.49	±	0.11	0.018	±	0.004	Y
DIETRICH	11/01/11	0.27	±	0.10	0.010	±	0.004	
FORT HALL	11/01/11	0.65	±	0.12	0.024	±	0.004	Y
HOWE	11/01/11	0.34	±	0.09	0.012	±	0.004	Y
IDAHO FALLS	11/01/11	0.16	±	0.10	0.006	±	0.004	
MUD LAKE	11/02/11	0.62	±	0.12	0.023	±	0.004	Y
RUPERT	11/01/11	0.44	±	0.11	0.016	±	0.004	Y
Tritium								
BLACKFOOT	11/01/11	80.60	±	24.80	2.985	±	0.919	Y
CONTROL	11/01/11	44.00	±	22.00	1.630	±	0.815	
DIETRICH	11/01/11	45.20	±	21.90	1.674	±	0.811	
FORT HALL	11/01/11	-171.00	±	26.50	-6.333	±	0.981	
HOWE	11/01/11	-248.00	±	25.60	-9.185	±	0.948	
IDAHO FALLS	11/01/11	-296.00	±	26.10	-10.963	±	0.967	
MUD LAKE	11/02/11	40.51	±	24.34	1.500	±	0.901	
RUPERT	11/01/11	-264.00	±	26.40	-9.778	±	0.978	

Table C-9. Strontium-90
Concentrations in Lettuce and Grain

Lettuce

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty Bq/kg			Result > 3s
ARCO	07/28/11	85.20	±	26.60	3.16	±	0.99	Y
ATOMIC CITY	07/28/11	80.20	±	25.80	2.97	±	0.96	Y
ATOMIC CITY (DUPLICATE)[a]	07/28/11	60.60	±	24.30	2.24	±	0.90	
BLACKFOOT	08/04/11	58.50	±	24.80	2.17	±	0.92	
CAREY[a]	08/02/11	82.60	±	26.70	3.06	±	0.99	Y
CONTROL	08/25/11	25.30	±	21.80	0.94	±	0.81	
EFS[a]	07/28/11	112.00	±	28.50	4.15	±	1.06	Y
FAA TOWER	07/28/11	74.90	±	24.80	2.77	±	0.92	Y
HOWE	08/10/11	48.30	±	23.20	1.79	±	0.86	
MONTEVIEW	07/28/11	60.80	±	24.60	2.25	±	0.91	

[a] A review of the table, performed in the spring of 2021, determined that the uncertainty values listed were incorrect. The uncertainty values were updated to the correct values. For further discussion, see Lettuce Sampling in Section 5.

Grain

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	09/06/11	34.50	±	24.00	1.28	±	0.89	
ARCO	09/14/11	-5.51	±	19.90	-0.20	±	0.74	
CONTROL	09/06/11	50.10	±	26.60	1.86	±	0.99	
IDAHO FALLS[b]	09/06/11	54.40	±	24.10	2.01	±	0.89	
MONTEVIEW[b]	09/07/11	-26.10	±	19.00	-0.97	±	0.70	
MORELAND[b]	08/17/11	34.80	±	21.50	1.29	±	0.80	
RUPERT	09/06/11	-6.62	±	19.20	-0.25	±	0.71	
RUPERT (DUPLICATE)[b]	09/06/11	11.40	±	21.10	0.42	±	0.78	
TABER[b]	08/17/11	33.60	±	22.10	1.24	±	0.82	
TERRETON	09/07/11	3.36	±	20.80	0.12	±	0.77	

[b] A review of the table, performed in the spring of 2021, determined that the uncertainty values listed were incorrect. The uncertainty values were updated to reflect the values contained in the database. For further discussion, see Grain Sampling in Section 5.

Table C-10. Strontium-90
Concentrations in Alfalfa and Elk Forage

Alfalfa

		Strontium-90						
		Result ± 1s Uncertainty[a]			Result ± 1s Uncertainty			
Location[b]	Sampling Date	pCi/kg			Bq/kg			Result > 3s
TERRETON	06/23/11	76.00	±	29.90	2.81	±	1.11	
TERRETON	06/23/11	70.40	±	27.90	2.61	±	1.03	
TERRETON	06/23/11	100.00	±	30.70	3.70	±	1.14	Y

[a] A review of the table, performed in the spring of 2021, determined that the uncertainty values listed were incorrect. The uncertainty values were updated to the correct values. For further discussion, see Alfalfa Sampling in Section 5.

[b] A review of the table, performed in the spring of 2021, determined that the location listed was incorrect. The location was updated from Mud Lake to Terreton. For further discussion, see Alfalfa Sampling in Section 5.

Elk Forage

		Strontium-90						
		Result ± 1s Uncertainty[a]			Result ± 1s Uncertainty			
Location	Sampling Date	pCi/kg			Bq/kg			Result > 3s
RWMC	07/07/11	124.00	±	32.50	4.59	±	1.20	Y
RWMC	07/07/11	87.10	±	29.70	3.23	±	1.10	
RWMC	07/07/11	90.60	±	30.90	3.36	±	1.14	

[a] A review of the table, performed in the spring of 2021, determined that the uncertainty values listed were incorrect. The uncertainty values were updated to the correct values. For further discussion, see Elk Forage Sampling in Section 5.

Table C-11. Cesium-137 and Strontium-90 Concentrations in Potatoes

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty[a] pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
BLACKFOOT	9/25/2011	0.30	±	1.06	0.01	±	0.04	
BUTTE CITY	10/4/2011	-0.33	±	1.57	-0.01	±	0.06	
CONTROL (OREGON)	10/13/2011	1.06	±	1.09	0.04	±	0.04	
IDAHO FALLS	10/3/2011	1.07	±	1.12	0.04	±	0.04	
MONTEVIEW	9/30/2011	-0.08	±	1.22	0.00	±	0.05	
RUPERT	10/4/2011	0.33	±	1.10	0.01	±	0.04	
SHELLEY	10/1/2011	1.47	±	1.41	0.05	±	0.05	
TERRETON	9/30/2011	1.31	±	1.06	0.05	±	0.04	
TERRETON (DUPLICATE)	9/30/2011	0.31	±	1.17	0.01	±	0.04	
		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty Bq/kg**			**Result > 3s**
BLACKFOOT[b]	9/25/2011	32.20	±	22.50	1.19	±	0.83	
BUTTE CITY[b]	10/4/2011	-25.30	±	17.10	-0.94	±	0.63	
CONTROL (OREGON)	10/13/2011	-8.14	±	17.90	-0.30	±	0.66	
IDAHO FALLS	10/3/2011	-23.30	±	17.20	-0.86	±	0.64	
MONTEVIEW[b]	9/30/2011	-41.80	±	17.30	-1.55	±	0.64	
RUPERT	10/4/2011	7.81	±	20.60	0.29	±	0.76	
SHELLEY[b]	10/1/2011	9.13	±	22.50	0.34	±	0.83	
TERRETON[b]	9/30/2011	-2.21	±	19.40	-0.08	±	0.72	
TERRETON (DUPLICATE)	9/30/2011	21.40	±	22.00	0.79	±	0.81	

[a] A review of the table, performed in the spring of 2021, determined that the result and uncertainty values listed were incorrect. The result and uncertainty values were updated to the correct values. For further discussion, see Potato Sampling in Section

[b] A review of the table, performed in the spring of 2021, determined that the uncertainty values listed were incorrect. The uncertainty values were updated to the correct values. For further discussion, see Potato Sampling in Section 5.

Table C-12. 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
PRONGHORN	10/5/2011	Liver	^{131}I	38.40	±	62.90	142.08	±	232.73	
			^{137}Cs	2.61	±	2.12	9.66	±	7.84	
PRONGHORN	10/5/2011	Muscle	^{131}I	108.00	±	38.10	399.60	±	140.97	
			^{137}Cs	1.91	±	1.14	7.07	±	4.22	
PRONGHORN	10/5/2011	Thyroid	^{131}I	-11.50	±	63.90	-42.55	±	236.43	
			^{137}Cs	-103.00	±	70.70	-381.10	±	261.59	
MULE DEER	12/7/2011	Liver	^{131}I	-0.83	±	2.46	-3.06	±	9.10	
			^{137}Cs	-0.78	±	1.63	-2.87	±	6.03	
MULE DEER	12/7/2011	Muscle	^{131}I	-0.42	±	1.54	-1.56	±	5.70	
			^{137}Cs	1.43	±	0.92	5.29	±	3.40	
MULE DEER	12/7/2011	Thyroid	^{131}I	45.80	±	270.00	169.46	±	999.00	
			^{137}Cs	157.00	±	285.00	580.90	±	1054.50	

Table C-13. Strontium-90 and Transuranic 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									
		AMERICIUM-241	3.28	±	1.60	12.15	±	5.91	
		PLUTONIUM-238	1.23	±	0.83	4.56	±	3.07	
		PLUTONIUM-239/240	0.18	±	0.82	0.67	±	3.04	
		STRONTIUM-90[b]	3.48	±	25.50	12.89	±	94.44	
ATR Complex									
		AMERICIUM-241	-0.93	±	1.51	-3.46	±	5.59	
		PLUTONIUM-238	0.86	±	0.91	3.17	±	3.38	
		PLUTONIUM-239/240	0.50	±	0.91	1.86	±	3.36	
		STRONTIUM-90[b]	-32.90	±	21.30	-121.85	±	78.89	
ATR Complex									
		AMERICIUM-241	0.93	±	1.11	3.44	±	4.13	
		PLUTONIUM-238	0.18	±	0.80	0.66	±	2.96	
		PLUTONIUM-239/240	0.44	±	0.80	1.63	±	2.96	
		STRONTIUM-90[b]	14.10	±	24.30	52.22	±	90.00	
MFC									
		AMERICIUM-241	-0.68	±	0.77	-2.53	±	2.85	
		PLUTONIUM-238	1.20	±	0.81	4.44	±	2.99	
		PLUTONIUM-239/240	1.06	±	0.80	3.93	±	2.98	
		STRONTIUM-90	13.50	±	24.00	50.00	±	88.89	
MFC									
		AMERICIUM-241	0.78	±	1.17	2.87	±	4.32	
		PLUTONIUM-238	1.48	±	0.90	5.48	±	3.35	
		PLUTONIUM-239/240	0.49	±	0.89	1.83	±	3.30	
		STRONTIUM-90[b]	43.90	±	31.50	162.59	±	116.67	
MFC									
		AMERICIUM-241	-0.44	±	1.38	-1.64	±	5.13	
		PLUTONIUM-238	1.70	±	1.04	6.30	±	3.84	
		PLUTONIUM-239/240	0.00	±	1.02	0.00	±	3.79	
		STRONTIUM-90[b]	72.30	±	35.00	267.78	±	129.63	
CONTROL									
		AMERICIUM-241	-1.50	±	1.06	-5.56	±	3.92	
		PLUTONIUM-238	0.82	±	1.05	3.02	±	3.90	
		PLUTONIUM-239/240	0.23	±	1.05	0.86	±	3.89	
		STRONTIUM-90[b]	-0.04	±	27.30	-0.14	±	101.11	
CONTROL									
		AMERICIUM-241	0.33	±	0.99	1.20	±	3.68	
		PLUTONIUM-238	0.18	±	0.80	0.65	±	2.95	
		PLUTONIUM-239/240	0.61	±	0.79	2.27	±	2.94	
		STRONTIUM-90	2.76	±	20.20	10.22	±	74.81	
CONTROL									
		AMERICIUM-241	-0.30	±	0.92	-1.10	±	3.41	
		PLUTONIUM-238	0.72	±	0.93	2.65	±	3.43	
		PLUTONIUM-239/240	1.58	±	1.06	5.85	±	3.93	
		STRONTIUM-90[b]	17.50	±	20.70	64.81	±	76.67	

[a] During the fall of 2020, a review of the table determined the unit of concentration needed updating due to adopting pCi/kg for reporting radionuclide concentrations in biota (vegetation and animals). The column headings have been updated to the concentration units of pCi/kg and (x10^{-2}) Bq/kg. For further discussion see Waterfowl Sampling in Section 5.

[b] A review of the table determined the uncertainty value was incorrect. The value was updated with the correct value. For further discussion see Waterfowl Sampling in Section 5.

Table C-14. Environmental Radiation Measurements.

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR	Exposure mR/day
BOUNDARY				
ARCO	5/4/2011	11/2/2011	61.3 ± 12.0	0.34
ATOMIC CITY	5/4/2011	11/2/2011	62.2 ± 12.2	0.34
BIRCH CREEK	5/4/2011	11/2/2011	53.9 ± 10.6	0.30
BLUE DOME	5/4/2011	11/2/2011	52.4 ± 10.3	0.29
HOWE	5/4/2011	11/2/2011	54.8 ± 10.7	0.30
MONTEVIEW	5/4/2011	11/2/2011	57.7 ± 11.3	0.32
MUD LAKE	5/4/2011	11/2/2011	65.3 ± 12.8	0.36
			Boundary Average	**0.32**
DISTANT				
ABERDEEN	5/3/2011	11/1/2011	63.0 ± 12.4	0.35
BLACKFOOT	5/4/2011	11/2/2011	58.0 ± 11.4	0.32
BLACKFOOT CMS	5/4/2011	11/2/2011	54.7 ± 10.7	0.30
CRATERS	5/4/2011	11/2/2011	61.6 ± 12.1	0.34
DUBOIS	5/4/2011	11/2/2011	51.8 ± 10.1	0.28
IDAHO FALLS	5/4/2011	11/2/2011	62.2 ± 12.2	0.34
MINIDOKA	5/3/2011	11/1/2011	56.8 ± 11.1	0.31
REXBURG	5/4/2011	11/2/2011	73.4 ± 14.4	0.40
ROBERTS	5/3/2011	11/1/2011	66.3 ± 13.0	0.36
			Distant Average	**0.33**
OUT-OF-STATE				
JACKSON	4/28/2011	10/28/2011	50.0 ± 9.8	0.27

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	0.28
October	0.38
November	0.06
December	0.86
Gross Beta	
Quarter	0.56
October	0.95
November	0.20
December	0.89

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

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

		Mann-Whitney U test
Parameter	**Week**	**P[a]**
Gross Alpha		
	October 5	0.76
	October 12	0.67
	October 19	0.32
	October 26	0.42
	November 2	0.39
	November 9	0.94
	November 16	0.39
	November 23	0.46
	November 30	0.32
	December 7	0.89
	December 14	0.89
	December 21	0.89
	December 28	0.22
Gross Beta		
	October 5	0.76
	October 12	0.57
	October 19	0.39
	October 26	0.20
	November 2	0.43
	November 9	0.39
	November 16	0.20
	November 23	0.33
	November 30	0.12
	December 7	1.00
	December 14	0.67
	December 21	0.83
	December 28	0.43

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