Gonzales Stoller Surveillance, LLC
Environmental Surveillance, Education, and Research Program
ISSN NUMBER 1089-5469

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

November 2011

Contributors:
Russ Mitchell, Marilyn Case

Program conducted for the U.S. Department of Energy, Idaho Operations Office
Under Contract DE-NE0000300

By Gonzales Stoller Surveillance, LLC
Environmental Surveillance, Education, and Research Program
Douglas K. Halford, Program Manager
120 Technology Dr., Idaho Falls, Idaho 83401
www.gsseser.com

EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the second quarter of 2011 could be directly linked with INL Site activities. During April and the first half of May, fallout was detected from the Fukushima nuclear accident in Japan. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below guidelines set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the second 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, April 1 through June 30, 2011. All sample types (media) and the sampling schedule followed during 2011 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including particulate air filters, charcoal cartridges, and atmospheric moisture
- Precipitation sampling
- Drinking and surface water sampling
- Milk sampling
- Game animal sampling
- Environmental radiation measurements using thermoluminescent dosimeters

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

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	No statistical differences were noted in either gross alpha or gross beta data on quarterly and monthly comparisons. During one week, gross alpha concentrations were statistically higher at distant locations than boundary locations. During two weeks, gross beta concentrations were statistically higher at boundary locations than distant locations. These differences appeared to be normal variations in the data. No result exceeded the DCG for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, select actinides (^{241}Am, ^{238}Pu, and ^{239,240} Pu), ^{90}Sr	Selected weekly filters were analyzed by gamma spectrometry to measure fallout from the Fukushima accident in Japan. Two manmade gamma-emitting radionuclides were found during the week of April 6 but after this date only naturally-occurring Beryllium-7 was detected.. Cesium-137 was found on six of the quarterly composites. Final ^{90}Sr and actinide results were not yet available.
	Charcoal Cartridge	Iodine-131	Iodine-131 from Fukushima was reported on all charcoal cartridge batches during the weeks of April 6 and April 31, and then on selected cartridges through the week of May 11. The highest result was approximately 0.01 percent of the DCG for ^{131}I.
Atmospheric Moisture	Liquid	Tritium	A total of 13 samples were collected. Nine of these samples had tritium results greater than the 3s uncertainty. No sample result exceeded the DCG for tritium in air. Results were consistent with historical measurements.
Precipitation	Liquid	Tritium	Fourteen results for samples collected were available. All of the results were greater than the 3s uncertainty. The concentrations were consistent with those reported across the region by the Environmental Protection Agency and with previous results.
Drinking and Surrface Water	Liquid	Tritium	Tritium was detected in six of nine drinking water samples, including bottled water, and three of four surface water samples. Concentrations were similar to those measured in other media.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides, ^{90}Sr, tritium	Thirty-six samples, including two duplicates, were collected. Iodine-131 was reported in April and May samples from one location during the period of fallout from Fukushima. The highest reported value was 0.4 percent of the Food and Drug Administration's Limit for Public Health. Tritium was detected in two of seven samples and ^{90}Sr was found one of seven samples analyzed. All results were similar to previous measurements.
Large Game	Tissue	Gamma-emitting	One mule deer was sampled. No manmade

Animals		radionuclides	gamma-emitting radionuclides 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), the Wildlife Conservation Society, and Teledyne Brown Engineering.

This report contains monitoring results from the ESER Program for samples collected during the second quarter of 2011 (April 1-June 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. 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 Teledyne Brown Engineering, Inc. of Knoxville, Tennessee.

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.

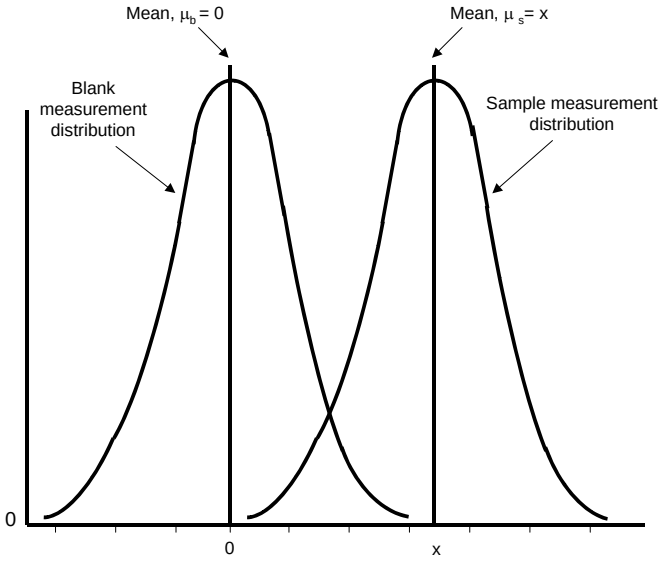

Figure 1. Example of overlap of blank and sample measurement distributions.

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 second 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 second 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 20,197 ft^3 (572 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.

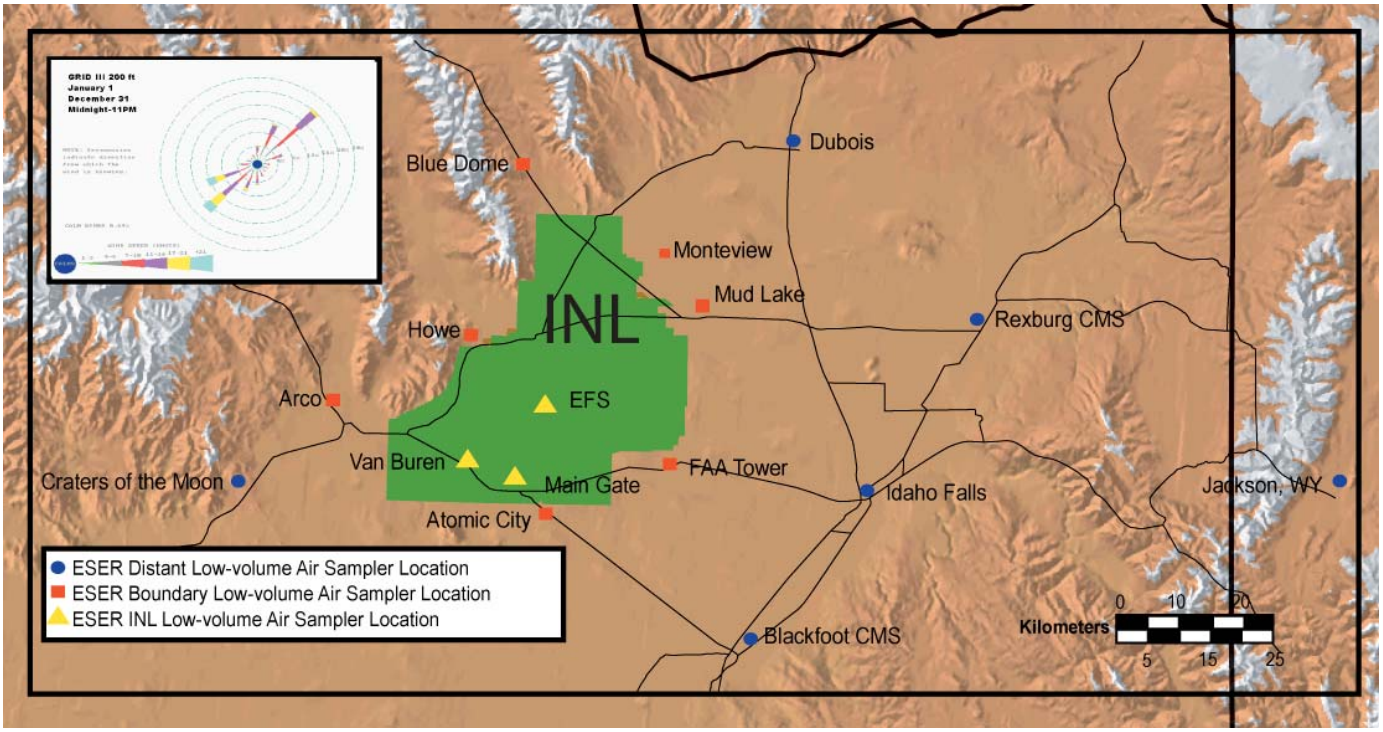

Figure 2. Low-volume air sampler locations.

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

Comparisons of gross alpha concentrations were made for each month of the quarter. Again the Kruskal-Wallis test of multiple independent groups was used to determine if statistical differences exist between INL Site, Boundary, and Distant data groups. No statistical differences in gross alpha concentrations between groups were noted during any month of the quarter (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL Site sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL Site and would not aid in determining offsite impacts. In the second quarter, there was one week (June 15) where a statistical difference existed between the two sample groups (Table D-2). During this week, the Distant group was higher than the Boundary group. This appears due in part to a higher concentration at Idaho Falls, which had a low volume for the week indicating some mechanical problems.

Gross beta results are presented in Table C-1. 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).

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 noted during any month.

Comparison of weekly Boundary and Distant gross beta data sets, using the Mann Whitney U test, showed statistical differences between Boundary and Distant measurements

during two weeks (April 13 and May 11) during the quarter (Table D-1). During both of these weeks, the Boundary group was higher than the Distant Group. Analysis of individual location data for these weeks shows a fairly narrow range of concentrations; however, the Jackson location was particularly low for both of these weeks compared to the other locations. All data were within normal ranges.

Fallout from the Fukushima nuclear accident in Japan was first reported in the western United States about the middle of March by the EPA RadNet program. To monitor impacts in eastern Idaho, selected weekly filters were analyzed by gamma spectrometry during the last three weeks of March and throughout the month of April. Radionuclides that were detected are shown in Figure 3. During the first week of the quarter, two manmade radionuclides were found in addition to naturally-occurring ^{7}Be. By the following week, only ^{7}Be was still present.

Iodine-131 from the Fukushima accident was detected in all cartridges measured during the weeks of April 6 and April 13. Iodine-131 continued to be above the detection limit and selected locations each week through May 11. Concentrations found during these weeks are presented in Figures 4 through 9. Weekly ^{131}I results for each location are also listed in Table C-2 of Appendix C. The highest measured concentration was approximately 0.01 percent of the DOE Derived Concentration Guide for ^{131}I.

Weekly filters for the second quarter of 2011 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs. Results are reported in Table C-3, Appendix C. Six of the 18 composites had measurable ^{137}Cs from the Fukushima accident.

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

ATMOSPHERIC MOISTURE SAMPLING

Results were available for 13 atmospheric moisture samples collected during the second quarter of 2011 from Atomic City, Blackfoot, Idaho Falls, and Rexburg. 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.

Nine of the 13 samples 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 9.51×10^{-13} $\mu Ci/mL_{air}$ at Idaho Falls. All results are shown in Table C-4, Appendix C.

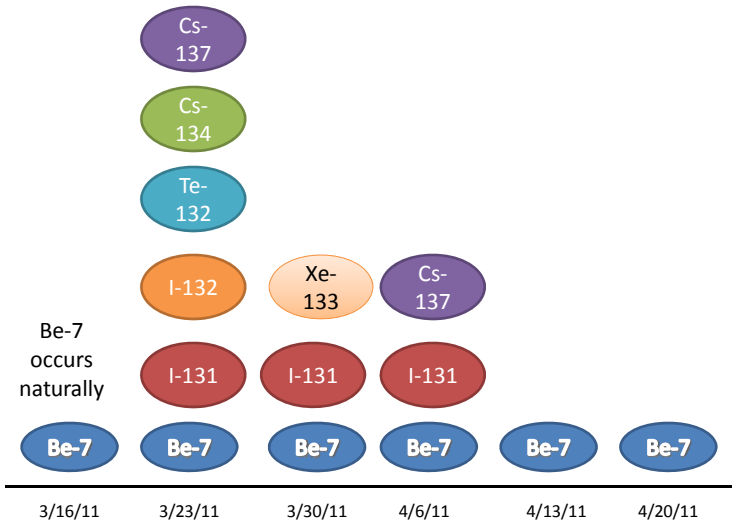

Figure 3. Gamma-emitting radionuclides detected in air filters

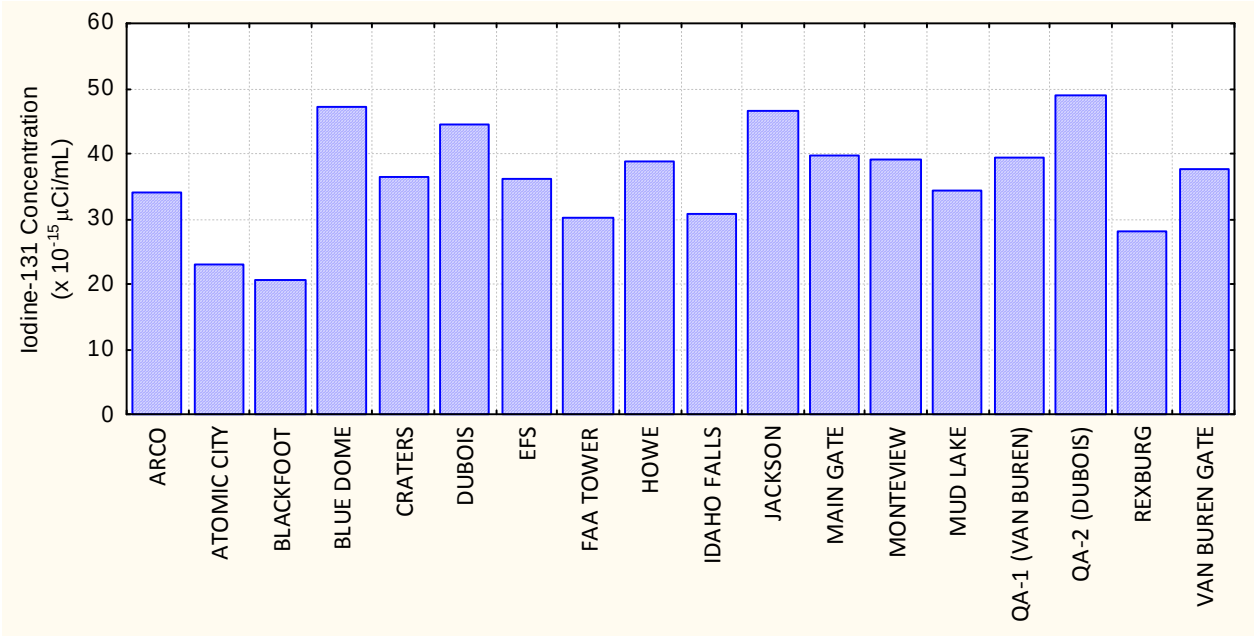

Figure 4. Iodine-131 concentrations in charcoal cartridges during the week of April 6

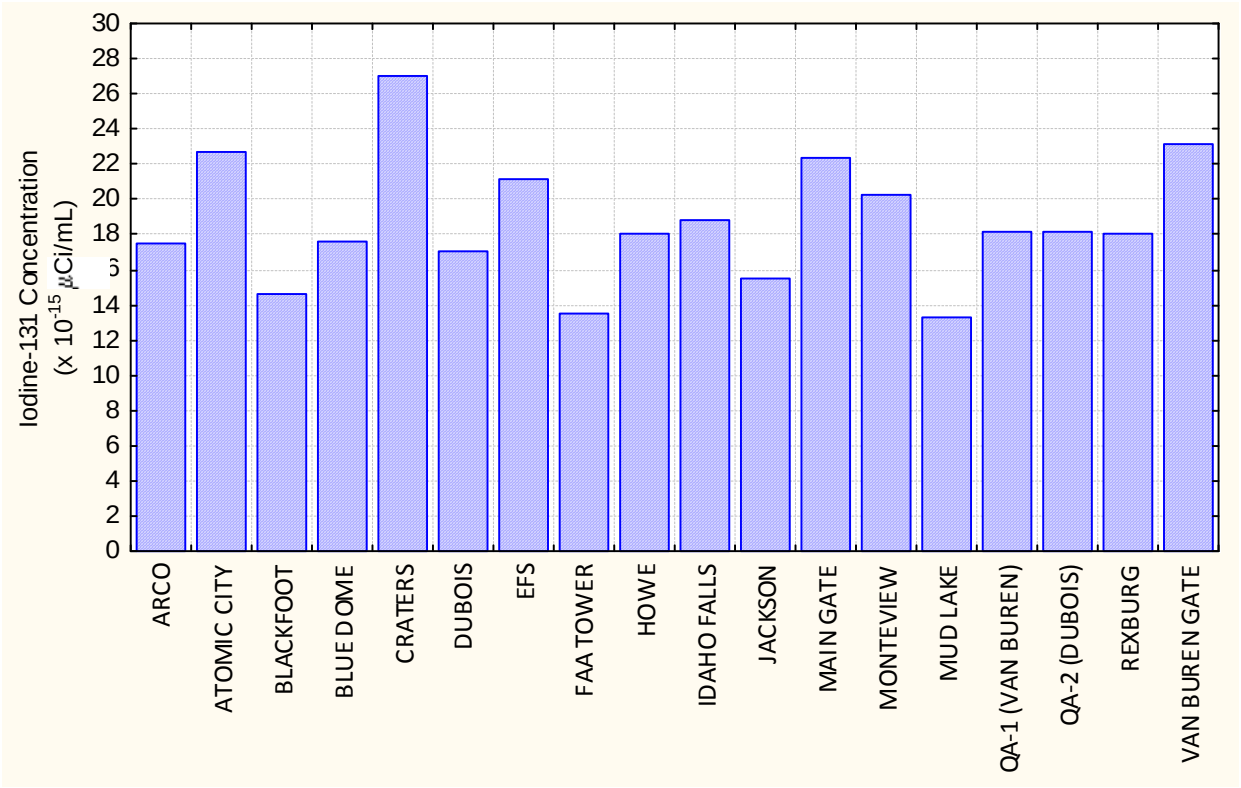

Figure 5. Iodine-131 concentrations in charcoal cartridges during the week of April 13

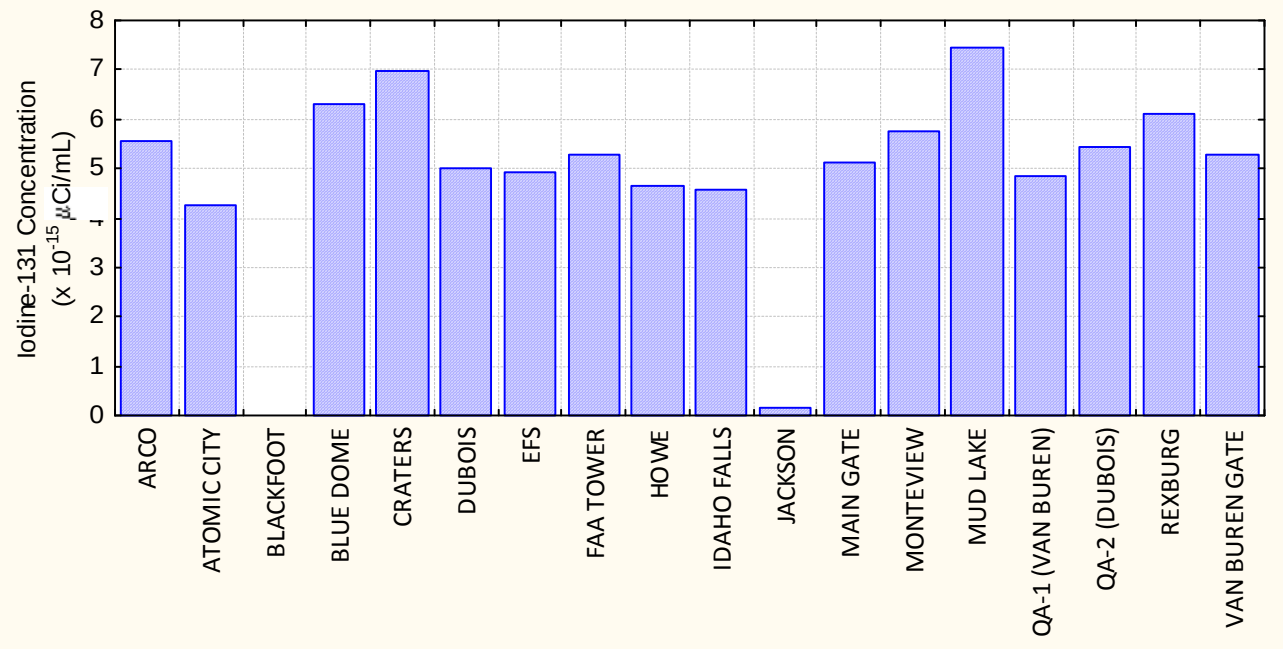

Figure 6. Iodine-131 concentrations in charcoal cartridges during the week of April 20

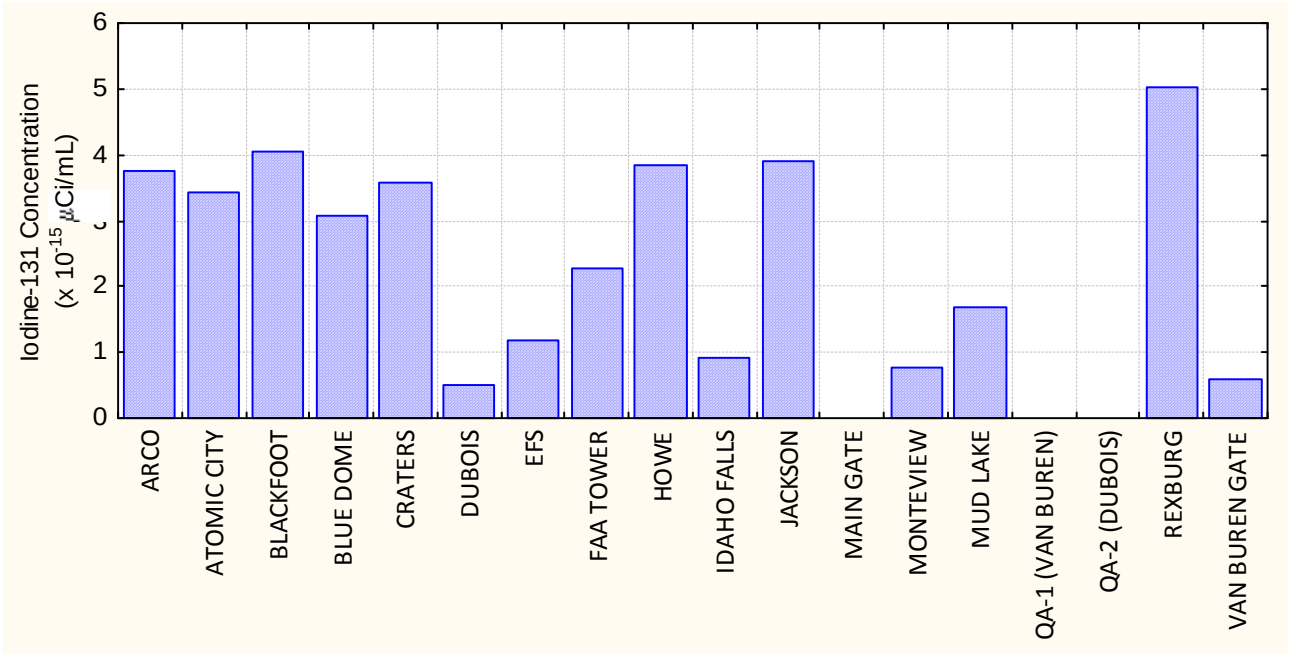

Figure 7. Iodine-131 concentrations in charcoal cartridges during the week of April 27

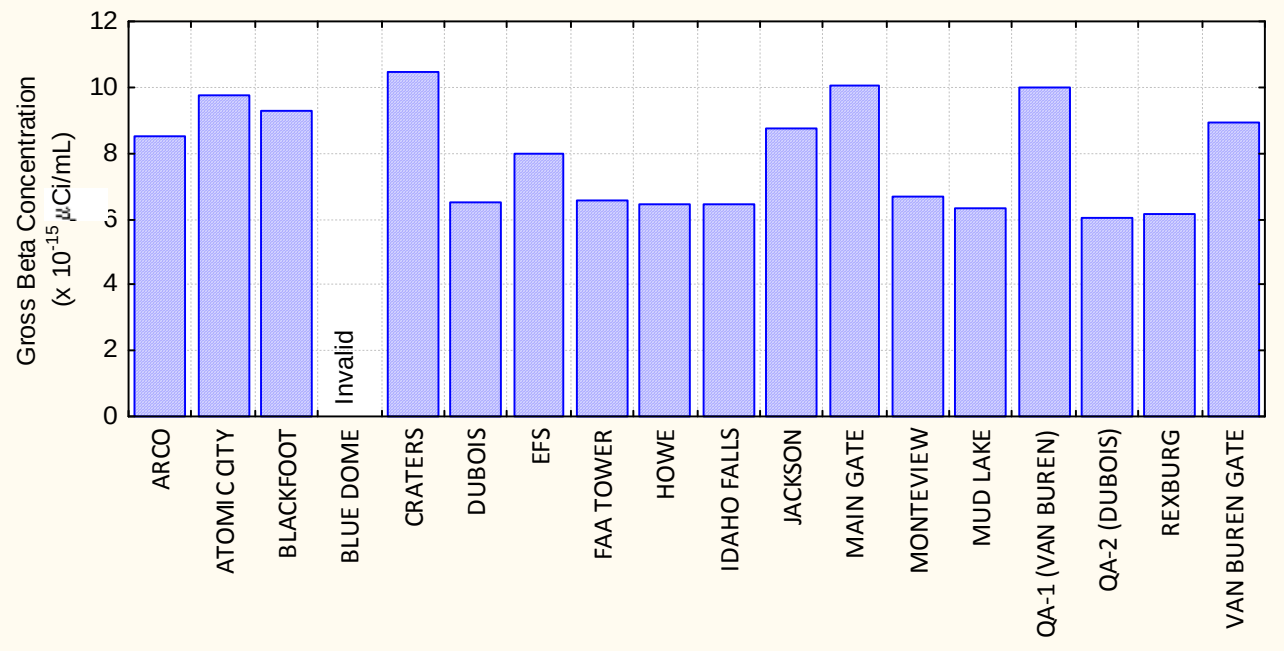

Figure 8. Iodine-131 concentrations in charcoal cartridges during the week of May 4

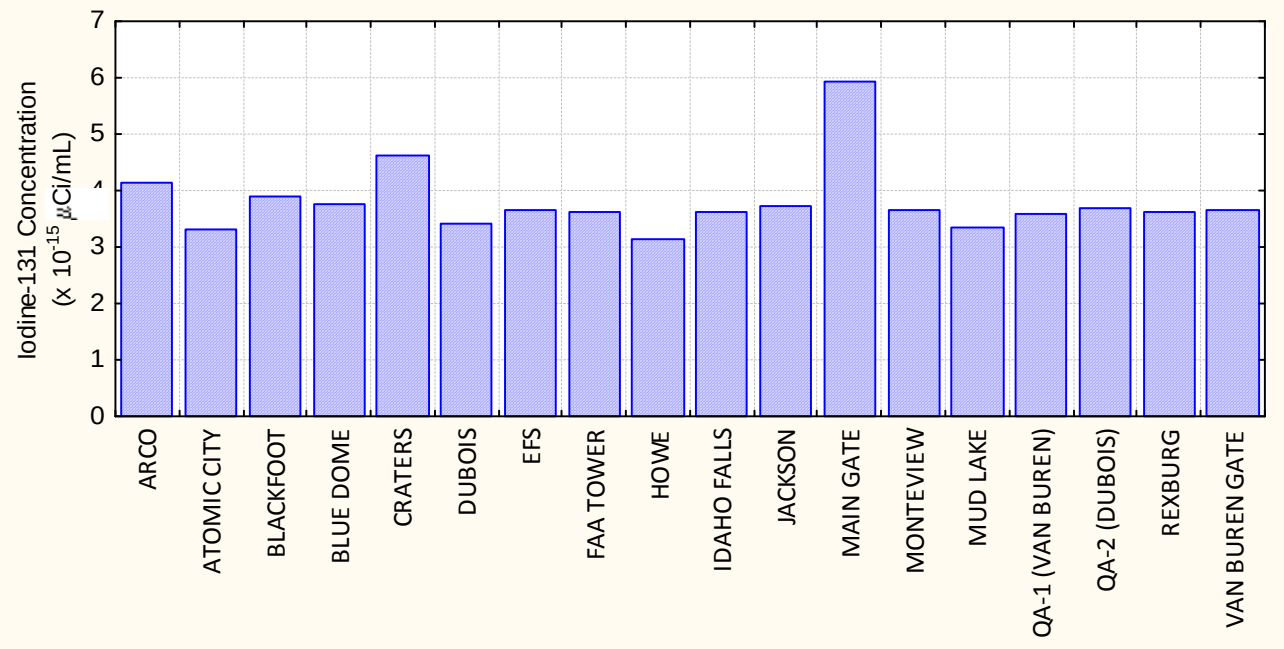

Figure 9. Iodine-131 concentrations in charcoal cartridges during the week of May 11

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the second quarter of 2011 produced sufficient precipitation to yield 14 samples.

Tritium was measured above the 3s values in all of the 14 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 second quarter precipitation samples collected by the ESER Program were within the range of this value (averaging about 132 pCi/L) and are listed in Table C-5 (Appendix C).

WATER SAMPLING

Tritium results were available for drinking and surface water samples collected during the second quarter of 2011 Some of these locations are sampled in conjunction with the state of Idaho's INL Oversight Program. Drinking water was collected at eight locations; in addition, a bottled water sample was analyzed as a control sample. Surface water was collected from springs near Twin Falls, Buhl (plus a duplicate), and Hagerman. Results are listed in Table C-6 of Appendix C.

Tritium was detected in six of the nine drinking water samples (including the bottled water) and three of the four surface water samples. Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years.

.

5. AGRICULTURAL PRODUCT, WILDLIFE, AND SOIL SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL Site and Southeast Idaho. Specifically, milk, grain, potatoes, lettuce, large game animals, and waterfowl are sampled. Milk is sampled throughout the year and large game animals are sampled whenever large game animals are killed onsite from vehicle collisions. Lettuce and grain are sampled during the third quarter, while potatoes are collected during the fourth quarter. Waterfowl are collected in either the third or fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk, grain, soil, and large game animal samples collected during the second 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 second quarter of 2011. In addition, commercially-available organic milk was purchased as a control sample. All samples were analyzed for gamma emitting radionuclides.

Iodine-131 was detected in monthly samples collected at one location (Fort Hall) during the period when eastern Idaho received fallout from the Fukushima nuclear accident. At this location, cows were on pasture and drinking from an open water source. The higher measured concentration of 14.3 pCi/L was found in the April sample. DOE does not have a derived concentration guide for milk but for comparison the Food and Drug Administration's Limit for Public Health is 3,700 pCi/L. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-7.

Sample collected during May were also analyzed for ^{90}Sr and tritium. Results are listed in Appendix C, Table C-8. Strontium-90 was detected in only one sample this quarter and tritium was detected in two samples. All results were similar to those previously measured.

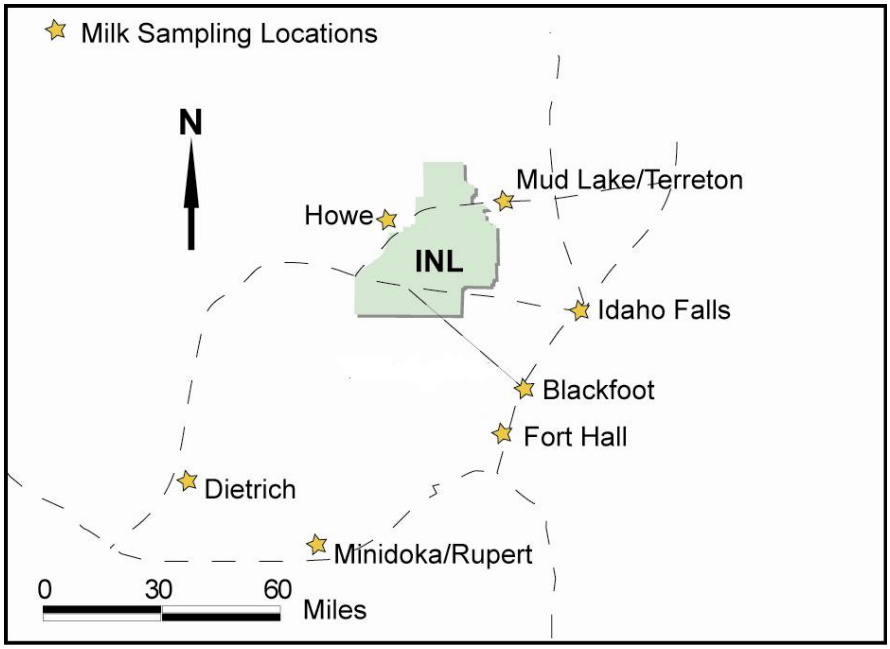

Figure 10. ESER milk sampling locations.

LARGE GAME ANIMAL SAMPLING

Muscle from one mule deer was sampled during the second quarter. No manmade radionuclides were detected in the sample. Results are presented in Appendix C, Table C-9.

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 November 2010 through April 2011 are discussed below.

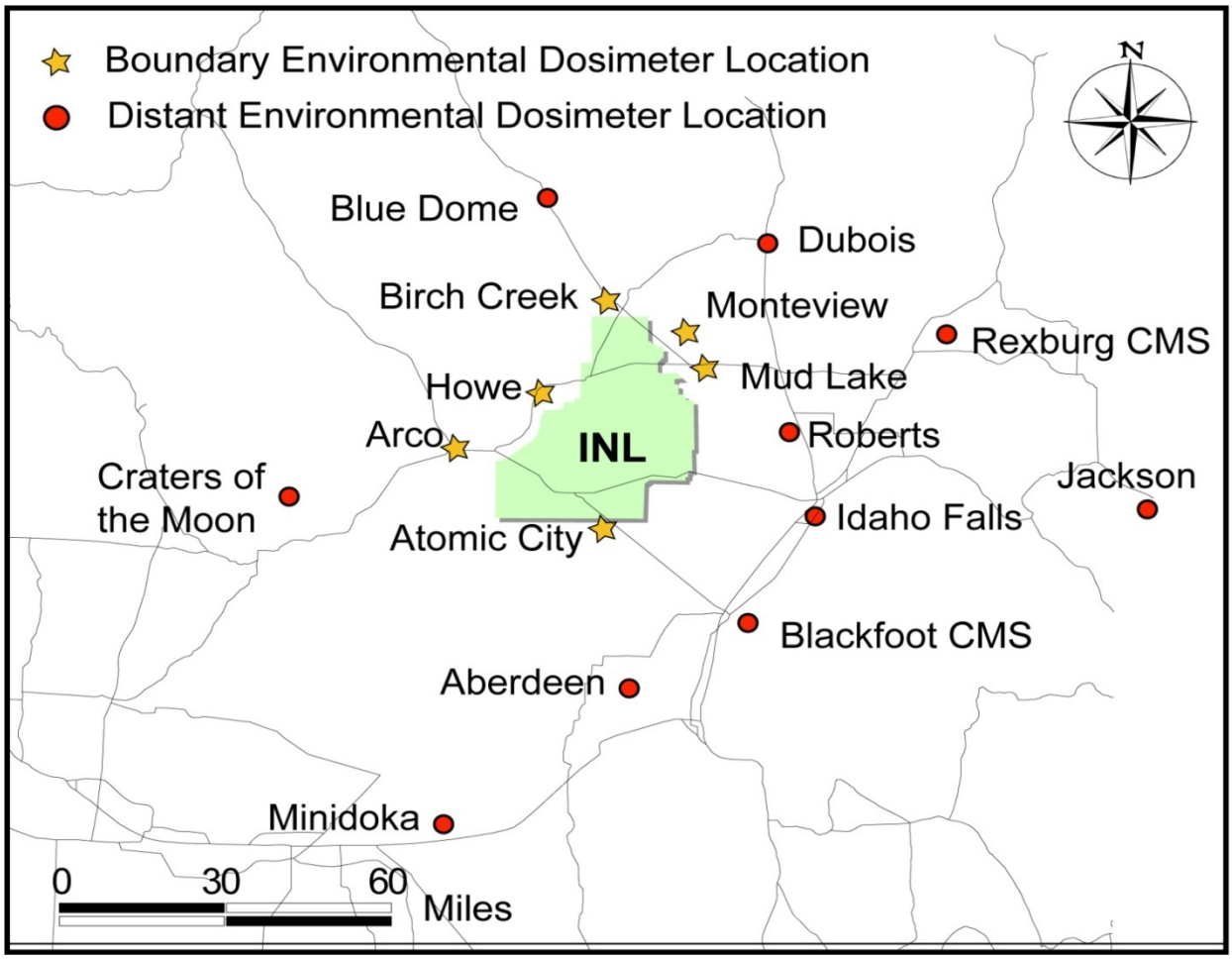

Figure 11. TLD locations.

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 0.37 mR/day at Mud Lake. The overall Boundary average was 0.32 mR/day. The Distant group had a high of 0.37 mR/day at Roberts and a low of 0.27 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-10.

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 second quarter of 2011.

QA Sample Type	Number of Sample Results	Number of Results Meeting Criteria	Percentage Meeting Criteria
Spikes/Laboratory Control Samples	206	201	97.6
Field Duplicates	60	56	93.3
Laboratory Splits	29	28	96.6
Recounts	190	190	100.0
Blanks	65	60	92.3
Method Uncertainty	1676	1660	99.1

8. REFERENCES

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

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

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

DOE, 1993, "Radiation Protection of the Public and the Environment," U.S. Department of Energy Order 5400.5, January 1993.

EPA, 2009, RadNet—Tracking Environmental Radiation Nationwide, Web-page: http://www.epa.gov/narel/radnet/

GSS, 2011, *Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program*, Environmental Surveillance, Education and Research Program, January 2011.

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 Second Quarter 2011

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	4.89×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.32×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	1.69×10^{-16} µCi/mL	4×10^{-10} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.06×10^{-15} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	69.6 pCi/L_{water}	1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	69.0 pCi/L	2×10^{-3} µCi/mL
Milk	^{131}I	0.63 pCi/L	--
	^{137}Cs	1.17 pCi/L	--
	^{3}H	79.3 pCi/L	--
	^{90}Sr	0.26 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	4/6/2011	1.01 ± 0.15	3.74 ± 0.57	Y	22.90 ± 0.62	84.73 ± 2.28	Y
	4/13/2011	0.64 ± 0.13	2.36 ± 0.48	Y	20.10 ± 0.56	74.37 ± 2.05	Y
	4/20/2011	1.13 ± 0.15	4.18 ± 0.56	Y	23.20 ± 0.59	85.84 ± 2.16	Y
	4/27/2011	0.89 ± 0.14	3.29 ± 0.51	Y	16.70 ± 0.51	61.79 ± 1.89	Y
	5/4/2011	0.45 ± 0.12	1.66 ± 0.45	Y	13.20 ± 0.48	48.84 ± 1.76	Y
	5/11/2011	1.15 ± 0.17	4.26 ± 0.61	Y	10.90 ± 0.41	40.33 ± 1.52	Y
	5/18/2011	0.92 ± 0.14	3.40 ± 0.53	Y	13.00 ± 0.41	48.10 ± 1.50	Y
	5/25/2011	1.05 ± 0.15	3.89 ± 0.54	Y	16.00 ± 0.50	59.20 ± 1.86	Y
	6/1/2011	1.03 ± 0.14	3.81 ± 0.53	Y	13.50 ± 0.47	49.95 ± 1.72	Y
	6/8/2011	1.16 ± 0.15	4.29 ± 0.57	Y	16.60 ± 0.51	61.42 ± 1.89	Y
	6/15/2011	1.03 ± 0.15	3.81 ± 0.56	Y	21.00 ± 0.59	77.70 ± 2.18	Y
	6/22/2011	0.84 ± 0.12	3.12 ± 0.44	Y	9.57 ± 0.32	35.41 ± 1.20	Y
	6/29/2011	1.34 ± 0.17	4.95 ± 0.64	Y	25.03 ± 0.65	92.60 ± 2.39	Y
ATOMIC CITY	4/6/2011	1.18 ± 0.17	4.37 ± 0.64	Y	29.70 ± 0.72	109.89 ± 2.68	Y
	4/13/2011	0.91 ± 0.14	3.38 ± 0.51	Y	21.30 ± 0.54	78.81 ± 2.00	Y
	4/20/2011	1.13 ± 0.15	4.18 ± 0.55	Y	23.50 ± 0.58	86.95 ± 2.15	Y
	4/27/2011	0.94 ± 0.13	3.47 ± 0.49	Y	16.10 ± 0.47	59.57 ± 1.75	Y
	5/4/2011	0.74 ± 0.15	2.75 ± 0.56	Y	13.20 ± 0.52	48.84 ± 1.93	Y
	5/11/2011	0.80 ± 0.13	2.94 ± 0.47	Y	11.70 ± 0.37	43.29 ± 1.36	Y
	5/18/2011	0.62 ± 0.15	2.29 ± 0.54	Y	14.00 ± 0.46	51.80 ± 1.71	Y
	5/25/2011	0.64 ± 0.12	2.38 ± 0.44	Y	15.60 ± 0.47	57.72 ± 1.75	Y
	6/1/2011	0.89 ± 0.13	3.29 ± 0.48	Y	15.30 ± 0.47	56.61 ± 1.74	Y
	6/8/2011	1.05 ± 0.15	3.89 ± 0.55	Y	17.80 ± 0.52	65.86 ± 1.94	Y
	6/15/2011	0.83 ± 0.14	3.08 ± 0.51	Y	18.70 ± 0.56	69.19 ± 2.08	Y
	6/22/2011	0.87 ± 0.13	3.20 ± 0.47	Y	9.84 ± 0.34	36.41 ± 1.27	Y
	6/29/2011	0.79 ± 0.14	2.93 ± 0.54	Y	21.69 ± 0.62	80.25 ± 2.29	Y
BLUE DOME	4/6/2011	0.51 ± 0.12	1.90 ± 0.44	Y	17.50 ± 0.53	64.75 ± 1.98	Y
	4/13/2011	0.94 ± 0.15	3.46 ± 0.54	Y	19.30 ± 0.55	71.41 ± 2.03	Y
	4/20/2011	1.39 ± 0.17	5.14 ± 0.64	Y	27.80 ± 0.67	102.86 ± 2.46	Y
	4/27/2011	0.90 ± 0.14	3.33 ± 0.52	Y	17.70 ± 0.53	65.49 ± 1.95	Y
a	5/4/2011	-0.49 ± 0.76	-1.82 ± 2.82		9.16 ± 2.61	33.89 ± 9.66	Y
	5/11/2011	0.45 ± 0.13	1.65 ± 0.49	Y	9.60 ± 0.40	35.52 ± 1.48	Y
	5/18/2011	1.08 ± 0.16	4.00 ± 0.60	Y	14.10 ± 0.44	52.17 ± 1.64	Y
	5/25/2011	0.46 ± 0.11	1.69 ± 0.42	Y	12.50 ± 0.46	46.25 ± 1.71	Y
	6/1/2011	0.67 ± 0.13	2.48 ± 0.46	Y	14.10 ± 0.48	52.17 ± 1.77	Y
	6/8/2011	0.70 ± 0.14	2.58 ± 0.51	Y	18.60 ± 0.56	68.82 ± 2.08	Y
	6/15/2011	0.83 ± 0.14	3.08 ± 0.50	Y	18.60 ± 0.55	68.82 ± 2.04	Y
	6/22/2011	0.38 ± 0.09	1.39 ± 0.32	Y	9.05 ± 0.29	33.49 ± 1.08	Y
	6/29/2011	1.08 ± 0.15	4.01 ± 0.55	Y	24.67 ± 0.60	91.27 ± 2.21	Y
FAA TOWER	4/6/2011	0.95 ± 0.16	3.50 ± 0.59	Y	22.60 ± 0.65	83.62 ± 2.39	Y
	4/13/2011	0.70 ± 0.14	2.60 ± 0.51	Y	18.70 ± 0.55	69.19 ± 2.04	Y
	4/20/2011	1.40 ± 0.17	5.18 ± 0.63	Y	27.30 ± 0.65	101.01 ± 2.39	Y
	4/27/2011	0.92 ± 0.15	3.41 ± 0.57	Y	17.60 ± 0.56	65.12 ± 2.09	Y
	5/4/2011	0.71 ± 0.15	2.64 ± 0.56	Y	13.80 ± 0.53	51.06 ± 1.97	Y
	5/11/2011	0.70 ± 0.14	2.59 ± 0.53	Y	10.90 ± 0.41	40.33 ± 1.52	Y
	5/18/2011	0.78 ± 0.15	2.88 ± 0.55	Y	13.60 ± 0.44	50.32 ± 1.62	Y
	5/25/2011	0.65 ± 0.13	2.41 ± 0.47	Y	15.00 ± 0.50	55.50 ± 1.84	Y
	6/1/2011	0.70 ± 0.13	2.60 ± 0.46	Y	14.20 ± 0.47	52.54 ± 1.75	Y
	6/8/2011	1.10 ± 0.15	4.07 ± 0.57	Y	18.20 ± 0.54	67.34 ± 1.99	Y
	6/15/2011	0.68 ± 0.14	2.53 ± 0.50	Y	19.90 ± 0.60	73.63 ± 2.21	Y
	6/22/2011	0.64 ± 0.11	2.37 ± 0.40	Y	9.32 ± 0.32	34.48 ± 1.17	Y
	6/29/2011	1.14 ± 0.16	4.20 ± 0.60	Y	23.00 ± 0.62	85.10 ± 2.30	Y
HOWE	4/6/2011	1.07 ± 0.15	3.96 ± 0.54	Y	20.00 ± 0.55	74.00 ± 2.03	Y
	4/13/2011	1.28 ± 0.15	4.74 ± 0.56	Y	23.10 ± 0.55	85.47 ± 2.03	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
	4/20/2011	1.24 ± 0.17	4.59 ± 0.62	Y	24.40 ± 0.64	90.28 ± 2.37	Y
	4/27/2011	1.21 ± 0.14	4.48 ± 0.53	Y	18.70 ± 0.50	69.19 ± 1.84	Y
	5/4/2011	0.78 ± 0.15	2.88 ± 0.57	Y	14.20 ± 0.53	52.54 ± 1.97	Y
	5/11/2011	0.68 ± 0.13	2.50 ± 0.48	Y	10.20 ± 0.37	37.74 ± 1.35	Y
	5/18/2011	0.85 ± 0.14	3.13 ± 0.52	Y	13.10 ± 0.41	48.47 ± 1.50	Y
	5/25/2011	0.69 ± 0.13	2.54 ± 0.47	Y	13.10 ± 0.46	48.47 ± 1.72	Y
	6/1/2011	0.90 ± 0.13	3.32 ± 0.49	Y	13.90 ± 0.46	51.43 ± 1.70	Y
	6/8/2011	0.91 ± 0.14	3.37 ± 0.53	Y	19.40 ± 0.54	71.78 ± 2.01	Y
	6/15/2011	0.84 ± 0.13	3.10 ± 0.48	Y	20.40 ± 0.54	75.48 ± 2.00	Y
	6/22/2011	0.99 ± 0.14	3.66 ± 0.51	Y	8.79 ± 0.35	32.52 ± 1.28	Y
	6/29/2011	1.30 ± 0.16	4.81 ± 0.60	Y	25.89 ± 0.62	95.81 ± 2.29	Y
MONTEVIEW	4/6/2011	0.93 ± 0.15	3.42 ± 0.54	Y	19.30 ± 0.56	71.41 ± 2.08	Y
	4/13/2011	1.02 ± 0.16	3.77 ± 0.57	Y	19.80 ± 0.57	73.26 ± 2.10	Y
	4/20/2011	1.90 ± 0.20	7.03 ± 0.73	Y	27.40 ± 0.67	101.38 ± 2.48	Y
	4/27/2011	1.08 ± 0.15	4.00 ± 0.57	Y	16.90 ± 0.53	62.53 ± 1.96	Y
	5/4/2011	1.13 ± 0.18	4.18 ± 0.65	Y	14.40 ± 0.55	53.28 ± 2.03	Y
	5/11/2011	0.84 ± 0.15	3.12 ± 0.56	Y	12.10 ± 0.43	44.77 ± 1.59	Y
	5/18/2011	0.93 ± 0.16	3.45 ± 0.58	Y	13.50 ± 0.44	49.95 ± 1.62	Y
	5/25/2011	0.49 ± 0.12	1.81 ± 0.46	Y	13.90 ± 0.51	51.43 ± 1.89	Y
	6/1/2011	0.92 ± 0.15	3.40 ± 0.54	Y	13.40 ± 0.50	49.58 ± 1.85	Y
	6/8/2011	0.70 ± 0.14	2.59 ± 0.53	Y	17.50 ± 0.56	64.75 ± 2.08	Y
	6/15/2011	0.64 ± 0.14	2.36 ± 0.51	Y	17.50 ± 0.59	64.75 ± 2.19	Y
	6/22/2011	0.50 ± 0.11	1.84 ± 0.39	Y	9.26 ± 0.33	34.26 ± 1.23	Y
	6/29/2011	1.17 ± 0.17	4.34 ± 0.62	Y	24.74 ± 0.66	91.54 ± 2.44	Y
MUD LAKE	4/6/2011	1.15 ± 0.16	4.26 ± 0.59	Y	24.60 ± 0.63	91.02 ± 2.33	Y
	4/13/2011	0.84 ± 0.14	3.10 ± 0.52	Y	21.50 ± 0.57	79.55 ± 2.10	Y
	4/20/2011	1.56 ± 0.18	5.77 ± 0.66	Y	26.10 ± 0.64	96.57 ± 2.38	Y
	4/27/2011	1.01 ± 0.14	3.74 ± 0.51	Y	16.10 ± 0.48	59.57 ± 1.78	Y
	5/4/2011	0.81 ± 0.15	2.98 ± 0.56	Y	14.40 ± 0.53	53.28 ± 1.95	Y
	5/11/2011	0.67 ± 0.13	2.49 ± 0.50	Y	11.10 ± 0.39	41.07 ± 1.45	Y
	5/18/2011	0.74 ± 0.14	2.75 ± 0.52	Y	13.40 ± 0.42	49.58 ± 1.57	Y
	5/25/2011	0.45 ± 0.11	1.68 ± 0.41	Y	12.10 ± 0.45	44.77 ± 1.65	Y
	6/1/2011	0.72 ± 0.13	2.67 ± 0.49	Y	13.90 ± 0.49	51.43 ± 1.82	Y
	6/8/2011	0.79 ± 0.15	2.92 ± 0.54	Y	17.80 ± 0.56	65.86 ± 2.07	Y
	6/15/2011	0.93 ± 0.14	3.43 ± 0.51	Y	18.50 ± 0.54	68.45 ± 1.99	Y
	6/22/2011	0.60 ± 0.10	2.21 ± 0.37	Y	9.00 ± 0.30	33.30 ± 1.12	Y
	6/29/2011	1.09 ± 0.16	4.05 ± 0.59	Y	26.44 ± 0.66	97.84 ± 2.44	Y
DISTANT							
BLACKFOOT CMS	4/6/2011	1.25 ± 0.17	4.63 ± 0.62	Y	25.60 ± 0.65	94.72 ± 2.39	Y
	4/13/2011	0.86 ± 0.15	3.16 ± 0.56	Y	22.60 ± 0.61	83.62 ± 2.26	Y
	4/20/2011	1.34 ± 0.17	4.96 ± 0.61	Y	20.20 ± 0.58	74.74 ± 2.13	Y
	4/27/2011	0.95 ± 0.15	3.50 ± 0.55	Y	17.80 ± 0.54	65.86 ± 2.01	Y
	5/4/2011	0.65 ± 0.14	2.41 ± 0.53	Y	13.70 ± 0.51	50.69 ± 1.89	Y
	5/11/2011	0.76 ± 0.14	2.82 ± 0.52	Y	9.76 ± 0.38	36.11 ± 1.40	Y
	5/18/2011	0.97 ± 0.16	3.59 ± 0.59	Y	14.40 ± 0.45	53.28 ± 1.68	Y
	5/25/2011	1.03 ± 0.16	3.81 ± 0.59	Y	19.30 ± 0.58	71.41 ± 2.16	Y
	6/1/2011	1.03 ± 0.15	3.81 ± 0.56	Y	14.60 ± 0.51	54.02 ± 1.89	Y
	6/8/2011	1.18 ± 0.17	4.37 ± 0.63	Y	20.00 ± 0.60	74.00 ± 2.21	Y
	6/15/2011	1.12 ± 0.16	4.14 ± 0.58	Y	20.30 ± 0.59	75.11 ± 2.19	Y
	6/22/2011	1.07 ± 0.15	3.96 ± 0.54	Y	9.35 ± 0.36	34.60 ± 1.35	Y
	6/29/2011	1.58 ± 0.20	5.83 ± 0.75	Y	25.85 ± 0.73	95.63 ± 2.70	Y
CRATERS OF	4/6/2011	0.91 ± 0.15	3.37 ± 0.54	Y	17.20 ± 0.55	63.64 ± 2.03	Y
THE MOON	4/13/2011	0.91 ± 0.17	3.37 ± 0.61	Y	19.40 ± 0.62	71.78 ± 2.29	Y
	4/20/2011	0.94 ± 0.16	3.46 ± 0.60	Y	20.40 ± 0.64	75.48 ± 2.36	Y
	4/27/2011	0.69 ± 0.15	2.57 ± 0.56	Y	16.20 ± 0.59	59.94 ± 2.18	Y
	5/4/2011	0.81 ± 0.16	3.00 ± 0.61	Y	15.20 ± 0.57	56.24 ± 2.12	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
	5/11/2011	0.60 ± 0.15	2.23 ± 0.56	Y	10.20 ± 0.43	37.74 ± 1.59	Y
	5/18/2011	0.67 ± 0.15	2.48 ± 0.56	Y	11.80 ± 0.44	43.66 ± 1.64	Y
	5/25/2011	0.82 ± 0.15	3.03 ± 0.57	Y	16.70 ± 0.58	61.79 ± 2.14	Y
	6/1/2011	0.70 ± 0.14	2.58 ± 0.52	Y	12.40 ± 0.51	45.88 ± 1.89	Y
	6/8/2011	1.00 ± 0.16	3.69 ± 0.61	Y	15.20 ± 0.56	56.24 ± 2.07	Y
	6/15/2011	1.09 ± 0.16	4.03 ± 0.60	Y	20.00 ± 0.61	74.00 ± 2.25	Y
	6/22/2011	0.43 ± 0.10	1.59 ± 0.37	Y	9.09 ± 0.33	33.63 ± 1.21	Y
	6/29/2011	1.45 ± 0.19	5.37 ± 0.72	Y	25.11 ± 0.71	92.91 ± 2.64	Y
DUBOIS	4/6/2011	0.99 ± 0.16	3.67 ± 0.59	Y	20.30 ± 0.61	75.11 ± 2.27	Y
	4/13/2011	0.78 ± 0.14	2.88 ± 0.53	Y	19.60 ± 0.57	72.52 ± 2.11	Y
	4/20/2011	1.59 ± 0.19	5.88 ± 0.69	Y	24.60 ± 0.66	91.02 ± 2.42	Y
	4/27/2011	1.00 ± 0.15	3.70 ± 0.55	Y	18.80 ± 0.55	69.56 ± 2.02	Y
	5/4/2011	1.18 ± 0.20	4.37 ± 0.73	Y	15.40 ± 0.62	56.98 ± 2.28	Y
	5/11/2011	0.81 ± 0.14	3.01 ± 0.53	Y	8.84 ± 0.37	32.71 ± 1.35	Y
	5/18/2011	1.04 ± 0.16	3.85 ± 0.61	Y	13.30 ± 0.45	49.21 ± 1.65	Y
	5/25/2011	0.61 ± 0.13	2.27 ± 0.47	Y	14.00 ± 0.50	51.80 ± 1.84	Y
	6/1/2011	0.64 ± 0.13	2.35 ± 0.47	Y	12.40 ± 0.48	45.88 ± 1.77	Y
	6/8/2011	1.01 ± 0.16	3.74 ± 0.57	Y	16.70 ± 0.54	61.79 ± 2.01	Y
	6/15/2011	0.90 ± 0.15	3.34 ± 0.55	Y	19.80 ± 0.60	73.26 ± 2.21	Y
	6/22/2011	0.41 ± 0.10	1.52 ± 0.36	Y	9.17 ± 0.32	33.93 ± 1.18	Y
	6/29/2011	1.12 ± 0.16	4.15 ± 0.60	Y	26.06 ± 0.66	96.43 ± 2.44	Y
QA-2	4/6/2011	1.07 ± 0.15	3.96 ± 0.57	Y	23.00 ± 0.61	85.10 ± 2.25	Y
(DUBOIS)	4/13/2011	1.25 ± 0.17	4.63 ± 0.62	Y	21.10 ± 0.59	78.07 ± 2.17	Y
	4/20/2011	1.36 ± 0.17	5.03 ± 0.62	Y	25.00 ± 0.63	92.50 ± 2.32	Y
	4/27/2011	0.80 ± 0.14	2.95 ± 0.51	Y	16.10 ± 0.52	59.57 ± 1.91	Y
	5/4/2011	0.67 ± 0.14	2.47 ± 0.52	Y	13.20 ± 0.50	48.84 ± 1.84	Y
	5/11/2011	0.89 ± 0.16	3.31 ± 0.58	Y	11.30 ± 0.42	41.81 ± 1.55	Y
	5/18/2011	0.84 ± 0.15	3.10 ± 0.56	Y	13.50 ± 0.44	49.95 ± 1.62	Y
	5/25/2011	0.82 ± 0.14	3.02 ± 0.52	Y	12.70 ± 0.49	46.99 ± 1.80	Y
	6/1/2011	0.86 ± 0.14	3.19 ± 0.52	Y	15.20 ± 0.51	56.24 ± 1.88	Y
	6/8/2011	0.86 ± 0.15	3.18 ± 0.56	Y	19.30 ± 0.58	71.41 ± 2.16	Y
	6/15/2011	1.06 ± 0.15	3.92 ± 0.55	Y	18.80 ± 0.56	69.56 ± 2.06	Y
	6/22/2011	0.63 ± 0.12	2.31 ± 0.43	Y	9.64 ± 0.34	35.67 ± 1.27	Y
	6/29/2011	1.31 ± 0.17	4.84 ± 0.61	Y	25.11 ± 0.63	92.91 ± 2.33	Y
IDAHO FALLS	4/6/2011	1.54 ± 0.22	5.70 ± 0.81	Y	34.10 ± 0.87	126.17 ± 3.23	Y
	4/13/2011	1.40 ± 0.18	5.18 ± 0.65	Y	21.00 ± 0.60	77.70 ± 2.21	Y
	4/20/2011	1.13 ± 0.16	4.18 ± 0.59	Y	22.60 ± 0.61	83.62 ± 2.26	Y
	4/27/2011	1.30 ± 0.16	4.81 ± 0.60	Y	18.10 ± 0.54	66.97 ± 1.99	Y
	5/4/2011	1.13 ± 0.17	4.18 ± 0.63	Y	15.00 ± 0.54	55.50 ± 2.01	Y
	5/11/2011	0.68 ± 0.14	2.50 ± 0.52	Y	9.41 ± 0.39	34.82 ± 1.43	Y
	5/18/2011	1.16 ± 0.17	4.29 ± 0.63	Y	13.80 ± 0.45	51.06 ± 1.67	Y
	5/25/2011	0.55 ± 0.13	2.03 ± 0.48	Y	14.90 ± 0.53	55.13 ± 1.95	Y
	6/1/2011	0.77 ± 0.14	2.85 ± 0.51	Y	14.90 ± 0.52	55.13 ± 1.91	Y
	6/8/2011	1.49 ± 0.18	5.51 ± 0.66	Y	18.60 ± 0.56	68.82 ± 2.09	Y
	6/15/2011	1.42 ± 0.22	5.25 ± 0.81	Y	26.70 ± 0.84	98.79 ± 3.12	Y
	6/22/2011	0.65 ± 0.11	2.40 ± 0.40	Y	8.39 ± 0.31	31.04 ± 1.15	Y
	6/29/2011	1.43 ± 0.18	5.31 ± 0.66	Y	23.48 ± 0.64	86.88 ± 2.38	Y
JACKSON	4/6/2011	1.84 ± 0.22	6.81 ± 0.82	Y	28.90 ± 0.78	106.93 ± 2.89	Y
	4/13/2011	0.76 ± 0.14	2.80 ± 0.52	Y	15.30 ± 0.52	56.61 ± 1.92	Y
	4/20/2011	1.12 ± 0.15	4.14 ± 0.56	Y	19.90 ± 0.56	73.63 ± 2.06	Y
	4/27/2011	0.99 ± 0.15	3.67 ± 0.54	Y	18.00 ± 0.53	66.60 ± 1.98	Y
	5/4/2011	0.82 ± 0.15	3.05 ± 0.54	Y	15.40 ± 0.51	56.98 ± 1.90	Y
	5/11/2011	0.63 ± 0.13	2.33 ± 0.47	Y	7.22 ± 0.33	26.71 ± 1.22	Y
	5/18/2011	0.77 ± 0.14	2.85 ± 0.52	Y	13.40 ± 0.42	49.58 ± 1.56	Y
	5/25/2011	0.83 ± 0.13	3.07 ± 0.49	Y	12.80 ± 0.46	47.36 ± 1.69	Y
	6/1/2011	0.86 ± 0.14	3.18 ± 0.53	Y	13.50 ± 0.49	49.95 ± 1.83	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
	6/8/2011	0.86 ± 0.15	3.19 ± 0.55	Y	18.80 ± 0.57	69.56 ± 2.09	Y
	6/15/2011	1.14 ± 0.15	4.22 ± 0.57	Y	19.30 ± 0.56	71.41 ± 2.09	Y
	6/22/2011	0.78 ± 0.12	2.89 ± 0.43	Y	11.00 ± 0.34	40.70 ± 1.25	Y
	6/29/2011	1.39 ± 0.17	5.13 ± 0.64	Y	27.47 ± 0.66	101.63 ± 2.45	Y
REXBURG CMS	4/6/2011	1.48 ± 0.18	5.48 ± 0.65	Y	23.00 ± 0.61	85.10 ± 2.26	Y
	4/13/2011	1.03 ± 0.15	3.81 ± 0.57	Y	18.40 ± 0.55	68.08 ± 2.02	Y
	4/20/2011	1.50 ± 0.18	5.55 ± 0.65	Y	23.00 ± 0.62	85.10 ± 2.28	Y
	4/27/2011	0.91 ± 0.15	3.37 ± 0.54	Y	16.20 ± 0.53	59.94 ± 1.96	Y
	5/4/2011	1.01 ± 0.16	3.74 ± 0.59	Y	13.50 ± 0.51	49.95 ± 1.88	Y
	5/11/2011	0.96 ± 0.16	3.54 ± 0.58	Y	9.09 ± 0.38	33.63 ± 1.42	Y
	5/18/2011	0.96 ± 0.16	3.55 ± 0.58	Y	12.80 ± 0.44	47.36 ± 1.61	Y
	5/25/2011	1.14 ± 0.17	4.22 ± 0.61	Y	15.00 ± 0.54	55.50 ± 1.99	Y
	6/1/2011	1.00 ± 0.15	3.70 ± 0.56	Y	13.90 ± 0.51	51.43 ± 1.88	Y
	6/8/2011	1.03 ± 0.16	3.81 ± 0.59	Y	18.50 ± 0.58	68.45 ± 2.14	Y
	6/15/2011	0.86 ± 0.15	3.18 ± 0.54	Y	20.30 ± 0.60	75.11 ± 2.21	Y
	6/22/2011	0.74 ± 0.12	2.72 ± 0.43	Y	9.69 ± 0.33	35.85 ± 1.23	Y
	6/29/2011	1.13 ± 0.17	4.18 ± 0.62	Y	26.45 ± 0.68	97.85 ± 2.52	Y
INL SITE							
EFS	4/6/2011	1.02 ± 0.16	3.77 ± 0.60	Y	24.40 ± 0.65	90.28 ± 2.42	Y
	4/13/2011	0.88 ± 0.14	3.24 ± 0.51	Y	19.20 ± 0.52	71.04 ± 1.94	Y
	4/20/2011	1.22 ± 0.15	4.51 ± 0.56	Y	21.70 ± 0.56	80.29 ± 2.08	Y
	4/27/2011	0.75 ± 0.13	2.78 ± 0.47	Y	17.80 ± 0.51	65.86 ± 1.88	Y
	5/4/2011	0.43 ± 0.12	1.58 ± 0.43	Y	12.00 ± 0.44	44.40 ± 1.64	Y
	5/11/2011	0.63 ± 0.13	2.34 ± 0.48	Y	10.90 ± 0.38	40.33 ± 1.41	Y
	5/18/2011	0.78 ± 0.13	2.89 ± 0.49	Y	12.80 ± 0.39	47.36 ± 1.44	Y
	5/25/2011	0.85 ± 0.13	3.13 ± 0.49	Y	14.80 ± 0.47	54.76 ± 1.75	Y
	6/1/2011	0.65 ± 0.12	2.41 ± 0.43	Y	11.60 ± 0.42	42.92 ± 1.54	Y
	6/8/2011	0.71 ± 0.13	2.62 ± 0.47	Y	15.50 ± 0.49	57.35 ± 1.81	Y
a	6/15/2011	8.99 ± 1.70	33.26 ± 6.29	Y	232.00 ± 7.24	858.40 ± 26.79	Y
	6/22/2011	1.38 ± 0.28	5.11 ± 1.05	Y	19.00 ± 0.81	70.30 ± 3.00	Y
	6/29/2011	0.89 ± 0.18	3.29 ± 0.68	Y	27.61 ± 0.82	102.14 ± 3.03	Y
MAIN GATE	4/6/2011	1.02 ± 0.15	3.77 ± 0.56	Y	20.80 ± 0.58	76.96 ± 2.13	Y
	4/13/2011	1.13 ± 0.17	4.18 ± 0.63	Y	21.20 ± 0.61	78.44 ± 2.27	Y
	4/20/2011	1.60 ± 0.19	5.92 ± 0.71	Y	26.20 ± 0.68	96.94 ± 2.52	Y
	4/27/2011	1.09 ± 0.17	4.03 ± 0.62	Y	18.30 ± 0.59	67.71 ± 2.20	Y
	5/4/2011	0.82 ± 0.16	3.02 ± 0.59	Y	13.80 ± 0.54	51.06 ± 2.00	Y
	5/11/2011	0.53 ± 0.18	1.96 ± 0.66		13.10 ± 0.55	48.47 ± 2.04	Y
	5/18/2011	0.82 ± 0.19	3.04 ± 0.70	Y	14.90 ± 0.56	55.13 ± 2.06	Y
	5/25/2011	0.91 ± 0.16	3.38 ± 0.58	Y	17.40 ± 0.58	64.38 ± 2.13	Y
	6/1/2011	0.88 ± 0.13	3.27 ± 0.50	Y	14.50 ± 0.47	53.65 ± 1.74	Y
	6/8/2011	0.94 ± 0.14	3.47 ± 0.53	Y	18.60 ± 0.53	68.82 ± 1.98	Y
	6/15/2011	1.01 ± 0.16	3.74 ± 0.60	Y	21.10 ± 0.64	78.07 ± 2.36	Y
	6/22/2011	0.70 ± 0.12	2.58 ± 0.43	Y	9.50 ± 0.33	35.15 ± 1.23	Y
	6/29/2011	0.75 ± 0.14	2.76 ± 0.52	Y	23.41 ± 0.63	86.63 ± 2.34	Y
VAN BUREN GATE	4/6/2011	1.43 ± 0.17	5.29 ± 0.63	Y	26.20 ± 0.64	96.94 ± 2.35	Y
	4/13/2011	0.84 ± 0.14	3.10 ± 0.52	Y	19.90 ± 0.55	73.63 ± 2.03	Y
	4/20/2011	1.38 ± 0.16	5.11 ± 0.60	Y	24.40 ± 0.60	90.28 ± 2.21	Y
	4/27/2011	0.84 ± 0.14	3.10 ± 0.50	Y	18.10 ± 0.53	66.97 ± 1.95	Y
	5/4/2011	0.74 ± 0.14	2.73 ± 0.53	Y	12.70 ± 0.49	46.99 ± 1.80	Y
	5/11/2011	0.58 ± 0.13	2.13 ± 0.46	Y	10.20 ± 0.37	37.74 ± 1.37	Y
	5/18/2011	0.86 ± 0.16	3.18 ± 0.60	Y	14.70 ± 0.47	54.39 ± 1.75	Y
	5/25/2011	1.04 ± 0.15	3.85 ± 0.55	Y	17.20 ± 0.52	63.64 ± 1.92	Y
	6/1/2011	0.72 ± 0.13	2.67 ± 0.47	Y	13.70 ± 0.48	50.69 ± 1.76	Y
	6/8/2011	0.90 ± 0.15	3.33 ± 0.55	Y	18.00 ± 0.55	66.60 ± 2.04	Y
	6/15/2011	0.75 ± 0.14	2.78 ± 0.50	Y	17.70 ± 0.56	65.49 ± 2.06	Y
	6/22/2011	0.73 ± 0.12	2.70 ± 0.43	Y	9.00 ± 0.32	33.30 ± 1.20	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
	6/29/2011	1.24	±	0.17	4.58	±	0.62	Y	23.37	±	0.63	86.47	±	2.33	Y
QA-1 (VAN BUREN)	4/6/2011	2.24	±	0.23	8.29	±	0.85	Y	33.20	±	0.79	122.84	±	2.92	Y
	4/13/2011	0.86	±	0.14	3.19	±	0.51	Y	21.30	±	0.55	78.81	±	2.05	Y
	4/20/2011	1.28	±	0.16	4.74	±	0.58	Y	24.60	±	0.60	91.02	±	2.22	Y
	4/27/2011	1.28	±	0.16	4.74	±	0.59	Y	19.00	±	0.54	70.30	±	1.99	Y
	5/4/2011	0.71	±	0.15	2.63	±	0.57	Y	16.30	±	0.57	60.31	±	2.11	Y
	5/11/2011	0.73	±	0.13	2.72	±	0.49	Y	10.10	±	0.37	37.37	±	1.36	Y
	5/18/2011	0.75	±	0.14	2.76	±	0.50	Y	13.40	±	0.41	49.58	±	1.51	Y
	5/25/2011	0.82	±	0.13	3.02	±	0.49	Y	16.00	±	0.50	59.20	±	1.83	Y
	6/1/2011	0.83	±	0.13	3.05	±	0.49	Y	14.00	±	0.47	51.80	±	1.74	Y
	6/8/2011	0.74	±	0.13	2.73	±	0.49	Y	18.90	±	0.54	69.93	±	1.98	Y
	6/15/2011	1.05	±	0.14	3.89	±	0.53	Y	20.90	±	0.56	77.33	±	2.07	Y
a	6/22/2011	3.05	±	0.49	11.29	±	1.82	Y	44.00	±	1.45	162.80	±	5.37	Y
	6/29/2011	1.13	±	0.16	4.19	±	0.58	Y	25.27	±	0.63	93.49	±	2.33	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	04/06/2011	34.09	±	3.34	126.13	±	12.36	Y
	04/13/2011	17.48	±	1.81	64.68	±	6.71	Y
	04/20/2011	5.54	±	2.52	20.50	±	9.32	
	04/27/2011	3.76	±	2.76	13.91	±	10.22	
	05/04/2011	8.48	±	1.11	31.39	±	4.09	Y
	05/11/2011	4.13	±	1.65	15.28	±	6.11	
	05/18/2011	0.20	±	0.95	0.73	±	3.53	
	05/25/2011	2.60	±	0.99	9.61	±	3.66	
	06/01/2011	1.00	±	0.94	3.69	±	3.48	
	06/08/2011	0.47	±	0.95	1.74	±	3.50	
	06/15/2011	0.44	±	1.02	1.64	±	3.76	
	06/22/2011	0.92	±	1.15	3.39	±	4.24	
	06/29/2011	1.42	±	1.16	5.24	±	4.30	
ATOMIC CITY	04/06/2011	22.86	±	1.96	84.59	±	7.26	Y
	04/13/2011	22.71	±	2.59	84.04	±	9.56	Y
	04/20/2011	4.26	±	1.46	15.75	±	5.41	
	04/27/2011	3.44	±	2.49	12.73	±	9.20	
	05/04/2011	9.77	±	1.27	36.14	±	4.71	Y
	05/11/2011	3.30	±	1.32	12.22	±	4.89	
	05/18/2011	0.24	±	1.14	0.87	±	4.20	
	05/25/2011	2.38	±	0.91	8.81	±	3.35	
	06/01/2011	0.94	±	0.88	3.47	±	3.27	
	06/08/2011	0.47	±	0.94	1.73	±	3.49	
	06/15/2011	0.44	±	1.02	1.64	±	3.77	
	06/22/2011	0.99	±	1.23	3.66	±	4.57	
	06/29/2011	1.46	±	1.20	5.39	±	4.43	
BLUE DOME	04/06/2011	47.27	±	3.20	174.91	±	11.82	Y
	04/13/2011	17.66	±	2.55	65.34	±	9.44	Y
	04/20/2011	6.32	±	2.28	23.39	±	8.43	
	04/27/2011	3.07	±	2.33	11.35	±	8.63	
	05/04/2011	53.45	±	9.18	197.76	±	33.96	Y
	05/11/2011	3.78	±	1.07	13.97	±	3.97	Y
	05/18/2011	1.79	±	0.98	6.63	±	3.63	
	05/25/2011	-0.58	±	0.87	-2.13	±	3.24	
	06/01/2011	-0.67	±	0.86	-2.48	±	3.20	
	06/08/2011	0.72	±	0.92	2.65	±	3.42	
	06/15/2011	1.39	±	0.90	5.15	±	3.33	
	06/22/2011	1.93	±	0.86	7.12	±	3.19	
	06/29/2011	-0.04	±	0.91	-0.14	±	3.37	
FAA TOWER	04/06/2011	30.24	±	2.11	111.87	±	7.79	Y
	04/13/2011	13.50	±	1.69	49.96	±	6.26	Y
	04/20/2011	5.28	±	1.51	19.53	±	5.60	Y
	04/27/2011	2.28	±	2.98	8.45	±	11.01	
	05/04/2011	6.58	±	1.13	24.34	±	4.18	Y
	05/11/2011	3.64	±	1.04	13.47	±	3.83	Y
	05/18/2011	1.82	±	1.00	6.73	±	3.69	
	05/25/2011	-0.58	±	0.88	-2.15	±	3.26	
	06/01/2011	-0.65	±	0.84	-2.41	±	3.11	
	06/08/2011	0.68	±	0.87	2.50	±	3.22	
	06/15/2011	1.52	±	0.99	5.63	±	3.65	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	06/22/2011	2.15	±	0.96	7.96	±	3.56	
	06/29/2011	-0.04	±	1.03	-0.16	±	3.80	
HOWE	04/06/2011	38.74	±	3.07	143.32	±	11.37	Y
	04/13/2011	18.06	±	1.50	66.84	±	5.56	Y
	04/20/2011	4.66	±	2.58	17.25	±	9.54	
	04/27/2011	3.84	±	1.26	14.21	±	4.68	Y
	05/04/2011	6.46	±	1.11	23.89	±	4.10	Y
	05/11/2011	3.15	±	0.90	11.65	±	3.31	Y
	05/18/2011	1.63	±	0.89	6.03	±	3.30	
	05/25/2011	-0.56	±	0.85	-2.08	±	3.16	
	06/01/2011	-0.63	±	0.81	-2.33	±	3.00	
	06/08/2011	0.66	±	0.85	2.43	±	3.13	
	06/15/2011	1.27	±	0.82	4.68	±	3.03	
	06/22/2011	2.57	±	1.15	9.51	±	4.26	
	06/29/2011	-0.04	±	0.94	-0.15	±	3.46	
MONTEVIEW	04/06/2011	38.98	±	2.21	144.22	±	8.19	Y
	04/13/2011	20.26	±	2.64	74.98	±	9.77	Y
	04/20/2011	5.74	±	1.46	21.24	±	5.41	Y
	04/27/2011	0.76	±	2.40	2.80	±	8.88	
	05/04/2011	6.69	±	1.15	24.76	±	4.25	Y
	05/11/2011	3.66	±	1.04	13.53	±	3.85	Y
	05/18/2011	1.83	±	1.00	6.77	±	3.71	
	05/25/2011	-0.64	±	0.97	-2.37	±	3.59	
	06/01/2011	-0.74	±	0.95	-2.74	±	3.53	
	06/08/2011	0.75	±	0.97	2.78	±	3.58	
	06/15/2011	1.63	±	1.05	6.02	±	3.90	
	06/22/2011	2.33	±	1.04	8.63	±	3.86	
	06/29/2011	-0.05	±	1.08	-0.17	±	4.00	
MUD LAKE	04/06/2011	34.21	±	2.08	126.57	±	7.70	Y
	04/13/2011	13.30	±	1.46	49.21	±	5.40	Y
	04/20/2011	7.47	±	2.49	27.64	±	9.21	
	04/27/2011	1.69	±	2.28	6.24	±	8.44	
	05/04/2011	6.31	±	1.08	23.35	±	4.01	Y
	05/11/2011	3.34	±	0.95	12.34	±	3.51	Y
	05/18/2011	1.74	±	0.96	6.45	±	3.53	
	05/25/2011	-0.56	±	0.84	-2.06	±	3.12	
	06/01/2011	-0.70	±	0.90	-2.59	±	3.35	
	06/08/2011	0.73	±	0.94	2.70	±	3.48	
	06/15/2011	1.34	±	0.87	4.95	±	3.21	
	06/22/2011	2.04	±	0.91	7.55	±	3.38	
	06/29/2011	-0.04	±	1.03	-0.16	±	3.81	
DISTANT								
BLACKFOOT CMS	04/06/2011	20.68	±	3.24	76.50	±	12.00	Y
	04/13/2011	14.62	±	3.07	54.11	±	11.34	Y
	04/20/2011	-0.27	±	2.79	-1.01	±	10.32	
	04/27/2011	4.05	±	1.74	14.99	±	6.45	
	05/04/2011	9.27	±	1.21	34.30	±	4.47	Y
	05/11/2011	3.89	±	1.55	14.38	±	5.75	
	05/18/2011	0.22	±	1.08	0.83	±	3.99	
	05/25/2011	2.94	±	1.12	10.86	±	4.14	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	06/01/2011	1.11	±	1.04	4.10	±	3.86	
	06/08/2011	0.54	±	1.08	1.99	±	4.00	
	06/15/2011	0.46	±	1.05	1.69	±	3.87	
	06/22/2011	1.12	±	1.40	4.14	±	5.18	
	06/29/2011	1.69	±	1.39	6.27	±	5.14	
CRATERS	04/06/2011	36.50	±	2.25	135.05	±	8.34	Y
	04/13/2011	27.01	±	2.82	99.92	±	10.43	Y
	04/20/2011	6.99	±	2.53	25.86	±	9.36	
	04/27/2011	3.57	±	2.79	13.23	±	10.32	
	05/04/2011	10.48	±	1.37	38.78	±	5.06	Y
	05/11/2011	4.64	±	1.85	17.16	±	6.86	
	05/18/2011	0.24	±	1.18	0.90	±	4.36	
	05/25/2011	3.17	±	1.21	11.73	±	4.47	
	06/01/2011	1.22	±	1.15	4.51	±	4.25	
	06/08/2011	0.58	±	1.16	2.13	±	4.29	
	06/15/2011	0.48	±	1.11	1.78	±	4.09	
	06/22/2011	0.96	±	1.20	3.55	±	4.44	
	06/29/2011	1.66	±	1.36	6.15	±	5.05	
DUBOIS	04/06/2011	44.53	±	3.34	164.76	±	12.37	Y
	04/13/2011	17.04	±	2.51	63.04	±	9.29	Y
	04/20/2011	5.01	±	1.42	18.53	±	5.26	Y
	04/27/2011	0.51	±	1.39	1.88	±	5.13	
	05/04/2011	6.52	±	1.12	24.14	±	4.15	Y
	05/11/2011	3.42	±	0.97	12.64	±	3.59	Y
	05/18/2011	1.90	±	1.04	7.02	±	3.85	
	05/25/2011	-0.61	±	0.92	-2.24	±	3.40	
	06/01/2011	-0.72	±	0.93	-2.67	±	3.45	
	06/08/2011	0.72	±	0.93	2.67	±	3.44	
	06/15/2011	1.53	±	0.99	5.66	±	3.67	
	06/22/2011	2.21	±	0.99	8.19	±	3.67	
	06/29/2011	-0.04	±	1.04	-0.16	±	3.84	
QA-2	04/06/2011	49.08	±	3.44	181.59	±	12.72	Y
	04/13/2011	18.13	±	2.69	67.07	±	9.96	Y
	04/20/2011	5.44	±	1.47	20.13	±	5.43	Y
	04/27/2011	-2.27	±	2.61	-8.41	±	9.64	
	05/04/2011	6.04	±	1.04	22.36	±	3.84	Y
	05/11/2011	3.70	±	1.05	13.69	±	3.89	Y
	05/18/2011	1.82	±	1.00	6.73	±	3.69	
	05/25/2011	-0.62	±	0.94	-2.29	±	3.47	
	06/01/2011	-0.70	±	0.90	-2.59	±	3.34	
	06/08/2011	0.75	±	0.96	2.76	±	3.56	
	06/15/2011	1.40	±	0.91	5.17	±	3.35	
	06/22/2011	2.41	±	1.08	8.90	±	3.98	
	06/29/2011	-0.04	±	0.98	-0.16	±	3.64	
IDAHO FALLS	04/06/2011	30.65	±	2.61	113.40	±	9.66	Y
	04/13/2011	18.85	±	2.37	69.75	±	8.75	Y
	04/20/2011	4.56	±	1.25	16.87	±	4.64	Y
	04/27/2011	0.92	±	2.04	3.39	±	7.56	
	05/04/2011	6.44	±	1.11	23.81	±	4.09	Y
	05/11/2011	3.61	±	1.03	13.35	±	3.80	Y

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	05/18/2011	1.89	±	1.04	6.99	±	3.83	
	05/25/2011	-0.64	±	0.97	-2.38	±	3.60	
	06/01/2011	-0.73	±	0.95	-2.71	±	3.50	
	06/08/2011	0.72	±	0.92	2.65	±	3.42	
	06/15/2011	2.21	±	1.43	8.18	±	5.30	
	06/22/2011	2.21	±	0.99	8.18	±	3.66	
	06/29/2011	-0.05	±	1.07	-0.17	±	3.95	
JACKSON	04/06/2011	46.62	±	3.79	172.49	±	14.02	Y
	04/13/2011	19.99	±	1.97	73.96	±	7.29	Y
	04/20/2011	0.14	±	2.05	0.52	±	7.57	
	04/27/2011	3.89	±	2.27	14.40	±	8.38	
	05/04/2011	8.76	±	1.14	32.42	±	4.23	Y
	05/11/2011	3.72	±	1.49	13.78	±	5.51	
	05/18/2011	0.21	±	1.00	0.77	±	3.69	
	05/25/2011	2.57	±	0.98	9.50	±	3.62	
	06/01/2011	1.10	±	1.04	4.07	±	3.83	
	06/08/2011	0.51	±	1.03	1.90	±	3.83	
	06/15/2011	0.43	±	1.00	1.61	±	3.69	
	06/22/2011	0.89	±	1.11	3.30	±	4.12	
	06/29/2011	1.38	±	1.13	5.10	±	4.19	
REXBURG CMS	04/06/2011	28.03	±	2.72	103.73	±	10.05	Y
	04/13/2011	18.09	±	2.38	66.92	±	8.80	Y
	04/20/2011	6.12	±	2.10	22.65	±	7.77	
	04/27/2011	5.01	±	2.27	18.55	±	8.41	
	05/04/2011	6.18	±	1.06	22.85	±	3.92	Y
	05/11/2011	3.63	±	1.03	13.43	±	3.82	Y
	05/18/2011	1.86	±	1.02	6.89	±	3.78	
	05/25/2011	-0.66	±	1.00	-2.43	±	3.69	
	06/01/2011	-0.74	±	0.96	-2.75	±	3.54	
	06/08/2011	0.75	±	0.97	2.79	±	3.59	
	06/15/2011	1.50	±	0.97	5.54	±	3.59	
	06/22/2011	2.27	±	1.02	8.39	±	3.76	
	06/29/2011	-0.05	±	1.08	-0.17	±	4.01	
INL SITE								
EFS	04/06/2011	36.14	±	2.61	133.73	±	9.64	Y
	04/13/2011	21.10	±	2.26	78.07	±	8.37	Y
	04/20/2011	4.91	±	1.96	18.17	±	7.27	
	04/27/2011	1.17	±	1.20	4.34	±	4.45	
	05/04/2011	8.00	±	1.04	29.59	±	3.86	Y
	05/11/2011	3.66	±	1.46	13.53	±	5.41	
	05/18/2011	0.19	±	0.91	0.69	±	3.35	
	05/25/2011	2.47	±	0.94	9.13	±	3.48	
	06/01/2011	0.92	±	0.87	3.41	±	3.21	
	06/08/2011	0.46	±	0.92	1.69	±	3.41	
	06/15/2011	5.83	±	13.38	21.58	±	49.50	
	06/22/2011	2.65	±	3.32	9.82	±	12.28	
	06/29/2011	1.98	±	1.62	7.33	±	6.01	
MAIN GATE	04/06/2011	39.63	±	3.59	146.64	±	13.29	Y
	04/13/2011	22.38	±	3.09	82.81	±	11.43	Y
	04/20/2011	5.11	±	2.88	18.91	±	10.67	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	04/27/2011	-2.79	±	3.20	-10.34	±	11.84	
	05/04/2011	10.05	±	1.31	37.19	±	4.85	Y
	05/11/2011	5.92	±	2.37	21.91	±	8.76	
	05/18/2011	0.31	±	1.48	1.14	±	5.48	
	05/25/2011	3.09	±	1.18	11.44	±	4.36	
	06/01/2011	0.98	±	0.92	3.62	±	3.41	
	06/08/2011	0.47	±	0.95	1.74	±	3.50	
	06/15/2011	0.50	±	1.15	1.86	±	4.26	
	06/22/2011	0.96	±	1.20	3.55	±	4.43	
	06/29/2011	1.43	±	1.18	5.31	±	4.35	
VAN BUREN GATE	04/06/2011	37.50	±	3.24	138.75	±	11.99	Y
	04/13/2011	23.19	±	2.73	85.81	±	10.12	Y
	04/20/2011	5.29	±	2.49	19.59	±	9.20	
	04/27/2011	0.58	±	1.55	2.14	±	5.74	
	05/04/2011	8.94	±	1.17	33.09	±	4.31	Y
	05/11/2011	3.66	±	1.47	13.56	±	5.42	
	05/18/2011	0.24	±	1.15	0.88	±	4.24	
	05/25/2011	2.61	±	0.99	9.65	±	3.67	
	06/01/2011	1.03	±	0.97	3.80	±	3.58	
	06/08/2011	0.51	±	1.02	1.87	±	3.77	
	06/15/2011	0.45	±	1.04	1.68	±	3.85	
	06/22/2011	0.95	±	1.19	3.51	±	4.39	
	06/29/2011	1.42	±	1.16	5.24	±	4.30	
QA-1	04/06/2011	39.31	±	3.43	145.46	±	12.68	Y
	04/13/2011	18.11	±	2.97	66.99	±	10.97	Y
	04/20/2011	4.86	±	1.61	17.99	±	5.96	Y
	04/27/2011	-1.41	±	2.86	-5.23	±	10.60	
	05/04/2011	10.00	±	1.30	36.99	±	4.82	Y
	05/11/2011	3.60	±	1.44	13.32	±	5.33	
	05/18/2011	0.20	±	0.94	0.72	±	3.49	
	05/25/2011	2.53	±	0.96	9.35	±	3.56	
	06/01/2011	1.00	±	0.94	3.70	±	3.49	
	06/08/2011	0.47	±	0.94	1.73	±	3.48	
	06/15/2011	0.41	±	0.93	1.51	±	3.46	
	06/22/2011	4.03	±	5.04	14.93	±	18.66	
	06/29/2011	1.34	±	1.10	4.97	±	4.08	

a. Invalid Sample Result

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	6/30/2011	CESIUM-137	9.98	±	129.00	36.93	±	477.30	
ATOMIC CITY	6/30/2011	CESIUM-137	496.00	±	113.00	1835.20	±	418.10	Y
BLUE DOME	6/30/2011	CESIUM-137	235.00	±	137.00	869.50	±	506.90	
FAA TOWER	6/30/2011	CESIUM-137	372.00	±	88.30	1376.40	±	326.71	Y
HOWE	6/30/2011	CESIUM-137	341.00	±	129.00	1261.70	±	477.30	
MONTEVIEW	6/30/2011	CESIUM-137	225.00	±	91.90	832.50	±	340.03	
MUD LAKE	6/30/2011	CESIUM-137	110.00	±	84.50	407.00	±	312.65	
DISTANT									
BLACKFOOT	6/30/2011	CESIUM-137	277.00	±	146.00	1024.90	±	540.20	
CRATERS	6/30/2011	CESIUM-137	309.00	±	92.10	1143.30	±	340.77	Y
DUBOIS	6/30/2011	CESIUM-137	151.00	±	124.00	558.70	±	458.80	
DUBOIS (QA-2)	6/30/2011	CESIUM-137	192.00	±	92.00	710.40	±	340.40	
IDAHO FALLS	6/30/2011	CESIUM-137	264.00	±	124.00	976.80	±	458.80	
JACKSON	6/30/2011	CESIUM-137	348.00	±	76.40	1287.60	±	282.68	Y
REXBURG CMS	6/30/2011	CESIUM-137	562.00	±	140.00	2079.40	±	518.00	Y
INL SITE									
EFS	6/30/2011	CESIUM-137	349.00	±	140.00	1291.30	±	518.00	
MAIN GATE	6/30/2011	CESIUM-137	80.30	±	95.80	297.11	±	354.46	
VAN BUREN GATE	6/30/2011	CESIUM-137	172.00	±	136.00	636.40	±	503.20	
VAN BUREN GATE (QA-1)	6/30/2011	CESIUM-137	331.00	±	104.00	0.00	±	0.00	Y

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	03/16/2011	04/06/2011	6.54	±	1.65	24.22	±	6.12	Molecular Sieve	Y
ATOMIC CITY	04/06/2011	05/04/2011	0.98	±	0.92	3.61	±	3.42	Molecular Sieve	
ATOMIC CITY	05/04/2011	05/25/2011	5.12	±	1.31	18.96	±	4.85	Molecular Sieve	Y
ATOMIC CITY	05/25/2011	06/15/2011	6.01	±	1.36	22.22	±	5.02	Molecular Sieve	Y
DISTANT										
BLACKFOOT	03/30/2011	04/20/2011	3.12	±	1.11	11.54	±	4.10	Molecular Sieve	
BLACKFOOT	04/20/2011	05/11/2011	7.25	±	1.13	26.81	±	4.19	Molecular Sieve	Y
BLACKFOOT	05/25/2011	06/08/2011	8.24	±	1.47	30.48	±	5.44	Molecular Sieve	Y
IDAHO FALLS	03/30/2011	04/20/2011	1.09	±	1.26	4.03	±	4.66	Molecular Sieve	
IDAHO FALLS	04/20/2011	05/13/2011	3.64	±	1.07	13.47	±	3.97	Molecular Sieve	Y
IDAHO FALLS	05/27/2011	06/10/2011	9.51	±	1.51	35.19	±	5.59	Molecular Sieve	Y
REXBURG	03/30/2011	04/27/2011	0.63	±	1.34	2.33	±	4.95	Molecular Sieve	
REXBURG	04/27/2011	05/18/2011	7.09	±	1.46	26.23	±	5.40	Molecular Sieve	Y
REXBURG	05/18/2011	06/08/2011	7.03	±	1.79	26.01	±	6.61	Molecular Sieve	Y

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

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
IDAHO FALLS	3/1/2011	4/1/2011	132.00	±	34.20	4.88	±	1.27	Y
	4/1/2011	5/2/2011	64.20	±	20.60	2.38	±	0.76	Y
	5/2/2011	6/1/2011	104.00	±	21.40	3.85	±	0.79	Y
CFA	3/1/2011	4/1/2011	175.00	±	35.20	6.48	±	1.30	Y
	4/1/2011	5/2/2011	90.20	±	21.70	3.34	±	0.80	Y
	5/2/2011	6/6/2011	106.00	±	21.00	3.92	±	0.78	Y
EFS	4/6/2011	4/13/2011	132.00	±	21.50	4.88	±	0.80	Y
	4/13/2011	4/20/2011	206.00	±	22.60	7.62	±	0.84	Y
	4/20/2011	4/27/2011	143.00	±	21.80	5.29	±	0.81	Y
	5/4/2011	5/11/2011	114.00	±	21.40	4.22	±	0.79	Y
	5/11/2011	5/18/2011	121.00	±	21.60	4.48	±	0.80	Y
	5/18/2011	5/25/2011	129.00	±	21.20	4.77	±	0.78	Y
	5/25/2011	6/1/2011	153.00	±	21.50	5.66	±	0.80	Y
	6/1/2011	6/8/2011	175.00	±	21.80	6.48	±	0.81	Y

Table C-6. Tritium Concentrations in Drinking and Surface Water

Location	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
DRINKING WATER									
ATOMIC CITY	TRITIUM	6/1/11	37.00	±	21.00	1.37	±	0.78	
CONTROL	TRITIUM	5/31/11	93.00	±	21.00	3.44	±	0.78	Y
CRATERS OF THE MOON	TRITIUM	5/25/11	40.00	±	21.00	1.48	±	0.78	
HOWE	TRITIUM	5/25/11	53.00	±	21.00	1.96	±	0.78	
IDAHO FALLS	TRITIUM	5/26/11	106.00	±	21.00	3.93	±	0.78	Y
MINIDOKA	TRITIUM	5/23/11	73.00	±	20.00	2.70	±	0.74	Y
MUD LAKE	TRITIUM	5/25/11	65.00	±	20.00	2.41	±	0.74	Y
REST AREA	TRITIUM	5/25/11	107.00	±	21.00	3.96	±	0.78	Y
SHOSHONE	TRITIUM	5/23/11	70.00	±	21.00	2.59	±	0.78	Y
SURFACE WATER									
ALPHEUS SPRING (TWIN FALLS)	TRITIUM	5/23/11	81.00	±	21.00	3.00	±	0.78	Y
CLEAR SPRINGS (BUHL)	TRITIUM	5/23/11	110.00	±	21.00	4.07	±	0.78	Y
CLEAR SPRINGS DUPLICATE	TRITIUM	5/23/11	64.00	±	20.00	2.37	±	0.74	Y
BILL JONES FISH FARM (HAGERMAN)	TRITIUM	5/23/11	59.00	±	22.00	2.19	±	0.81	

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							
	04/05/11	2.64 ± 1.89	0.098 ± 0.070		1.21 ± 0.91	0.045 ± 0.034	
	05/03/11	1.67 ± 2.66	0.062 ± 0.099		1.86 ± 1.46	0.069 ± 0.054	
	06/07/11	1.01 ± 1.95	0.037 ± 0.072		2.00 ± 0.88	0.074 ± 0.033	
CONTROL							
	04/05/11	3.45 ± 1.62	0.128 ± 0.060		-0.20 ± 0.88	-0.007 ± 0.033	
	05/03/11	-3.46 ± 2.23	-0.128 ± 0.083		1.59 ± 1.44	0.059 ± 0.053	
	06/07/11	-1.58 ± 2.04	-0.059 ± 0.076		-0.12 ± 1.42	-0.005 ± 0.053	
DIETRICH							
	04/05/11	0.65 ± 1.57	0.024 ± 0.058		1.53 ± 1.33	0.057 ± 0.049	
	05/03/11	0.10 ± 0.97	0.004 ± 0.036		-0.35 ± 0.77	-0.013 ± 0.029	
	06/07/11	-0.23 ± 1.72	-0.009 ± 0.064		-0.42 ± 1.42	-0.015 ± 0.053	
FORT HALL							
	04/05/11	14.30 ± 1.46	0.530 ± 0.054	Y	2.52 ± 0.92	0.093 ± 0.034	
	05/03/11	7.37 ± 1.33	0.273 ± 0.049	Y	2.15 ± 0.91	0.080 ± 0.034	
	06/07/11	1.95 ± 1.90	0.072 ± 0.070		2.03 ± 1.44	0.075 ± 0.053	
HOWE							
	04/06/11	1.68 ± 1.18	0.062 ± 0.044		0.23 ± 0.77	0.008 ± 0.029	
	05/03/11	-0.74 ± 1.08	-0.027 ± 0.040		-0.84 ± 0.79	-0.031 ± 0.029	
	06/07/11	0.12 ± 1.08	0.004 ± 0.040		1.36 ± 0.77	0.050 ± 0.029	
IDAHO FALLS							
	04/05/11	1.23 ± 0.93	0.046 ± 0.034		0.11 ± 0.81	0.004 ± 0.030	
	04/12/11	0.59 ± 1.63	0.022 ± 0.060		-0.02 ± 1.34	-0.001 ± 0.050	
	04/19/11	0.25 ± 1.00	0.009 ± 0.037		1.95 ± 0.74	0.072 ± 0.027	
	04/26/11	-1.86 ± 1.72	-0.069 ± 0.064		0.66 ± 1.44	0.024 ± 0.053	
	05/03/11	-1.46 ± 1.58	-0.054 ± 0.059		1.94 ± 1.36	0.072 ± 0.050	
	05/10/11	-0.52 ± 1.17	-0.019 ± 0.043		1.05 ± 0.87	0.039 ± 0.032	
	05/17/11	0.90 ± 0.90	0.033 ± 0.033		0.50 ± 0.78	0.019 ± 0.029	
	05/24/11	-0.44 ± 0.77	-0.016 ± 0.028		0.88 ± 0.76	0.033 ± 0.028	
	05/31/11	0.36 ± 1.15	0.013 ± 0.043		-0.64 ± 0.89	-0.024 ± 0.033	
	06/07/11	-0.77 ± 1.01	-0.028 ± 0.037		0.90 ± 0.78	0.033 ± 0.029	
Duplicate	06/07/11	0.41 ± 0.89	0.015 ± 0.033		0.23 ± 0.77	0.008 ± 0.028	
	06/14/11	-1.04 ± 0.92	-0.039 ± 0.034		1.04 ± 0.75	0.039 ± 0.028	
	06/22/11	-2.03 ± 0.94	-0.075 ± 0.035		0.45 ± 0.79	0.017 ± 0.029	
	06/28/11	-0.04 ± 0.92	-0.002 ± 0.034		0.56 ± 0.78	0.021 ± 0.029	
RUPERT							
	04/05/11	0.18 ± 1.07	0.007 ± 0.040		0.43 ± 0.80	0.016 ± 0.030	
Duplicate	04/05/11	-0.61 ± 1.83	-0.023 ± 0.068		-1.26 ± 1.43	-0.047 ± 0.053	
	05/03/11	-0.49 ± 1.70	-0.018 ± 0.063		0.82 ± 1.43	0.030 ± 0.053	
	06/07/11	-2.83 ± 1.73	-0.105 ± 0.064		0.69 ± 1.30	0.026 ± 0.048	
TERRETON							
	04/05/11	1.87 ± 1.00	0.069 ± 0.037		-0.21 ± 0.79	-0.008 ± 0.029	
	05/03/11	1.97 ± 1.79	0.073 ± 0.066		2.51 ± 1.41	0.093 ± 0.052	
	06/07/11	2.01 ± 1.78	0.074 ± 0.066		1.44 ± 1.36	0.053 ± 0.050	

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								
CONTROL	05/03/11	0.14	±	0.14	0.005	±	0.005	
DIETRICH	05/03/11	0.50	±	0.17	0.019	±	0.006	
FORT HALL	05/03/11	0.30	±	0.16	0.011	±	0.006	
HOWE	05/03/11	0.09	±	0.16	0.003	±	0.006	
IDAHO FALLS	05/03/11	0.65	±	0.21	0.024	±	0.008	Y
RUPERT	05/03/11	0.24	±	0.16	0.009	±	0.006	
TERRETON	05/03/11	0.23	±	0.16	0.008	±	0.006	
Tritium								
		Concentration ± 1s (pCi/L)			Concentration ± 1s (Bq/L)			Result > 3s
CONTROL	05/03/11	32.50	±	34.60	1.204	±	1.281	
DIETRICH	05/03/11	55.90	±	34.00	2.070	±	1.259	
FORT HALL	05/03/11	44.30	±	35.00	1.641	±	1.296	
HOWE	05/03/11	70.70	±	34.10	2.619	±	1.263	
IDAHO FALLS	05/03/11	97.10	±	34.00	3.596	±	1.259	
RUPERT	05/03/11	120.00	±	33.90	4.444	±	1.256	Y
TERRETON	05/03/11	285.00	±	36.90	10.556	±	1.367	Y

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

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
MULE DEER	6/22/2011	Muscle	^{131}I	-1.82	±	1.49	-6.73	±	5.51	
			^{137}Cs	0.72	±	1.33	2.66	±	4.92	

Table C-10. Environmental Radiation Measurements.

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR	Exposure mR/day
BOUNDARY				
ARCO	11/3/2010	5/4/2011	60.7 ± 11.9	0.33
ATOMIC CITY	11/3/2010	5/4/2011	59.1 ± 11.6	0.32
BIRCH CREEK	11/3/2010	5/4/2011	54.8 ± 10.7	0.30
BLUE DOME	11/3/2010	5/4/2011	52.9 ± 10.4	0.29
HOWE	11/3/2010	5/4/2011	56.3 ± 11.0	0.31
MONTEVIEW	11/3/2010	5/4/2011	54.3 ± 10.7	0.30
MUD LAKE	11/3/2010	5/4/2011	68.2 ± 13.4	0.37
			Boundary Average	**0.32**
DISTANT				
ABERDEEN	11/2/2010	5/3/2011	63.3 ± 12.4	0.35
BLACKFOOT	11/3/2010	5/4/2011	63.3 ± 12.4	0.35
BLACKFOOT CMS	11/3/2010	5/4/2011	57.7 ± 11.3	0.32
CRATERS	11/3/2010	5/4/2011	57.2 ± 11.2	0.31
DUBOIS	11/3/2010	5/4/2011	48.5 ± 9.5	0.27
IDAHO FALLS	11/3/2010	5/4/2011	61.5 ± 12.1	0.34
MINIDOKA	11/2/2010	5/3/2011	59.1 ± 11.6	0.32
REXBURG	11/3/2010	5/4/2011	64.5 ± 12.7	0.35
ROBERTS	11/2/2010	5/3/2011	67.2 ± 13.2	0.37
			Distant Average	**0.33**
OUT-OF-STATE				
JACKSON	10/29/2010	4/28/2011	50.9 ± 10.0	0.28

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	0.06
April	0.86
May	0.18
June	0.12
Gross Beta	
Quarter	0.93
April	0.69
May	0.79
June	0.87

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

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

		Mann-Whitney U test
Parameter	**Week**	**P[a]**
Gross Alpha		
	April 6	0.12
	April 13	0.78
	April 20	0.39
	April 27	1.00
	May 4	0.13
	May 11	0.89
	May 18	0.32
	May 25	0.15
	June 1	0.83
	June 8	0.25
	June 15	0.02
	June 22	1.00
	June 29	0.06
Gross Beta		
	April 6	0.39
	April 13	0.32
	April 20	0.01
	April 27	0.25
	May 4	0.11
	May 11	0.01
	May 18	0.52
	May 25	0.28
	June 1	0.52
	June 8	0.62
	June 15	0.20
	June 22	0.67
	June 29	0.12

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