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Environmental Surveillance, Education, and Research Program
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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Third Quarter 2008

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EXECUTIVE SUMMARY

Most of the radionuclides detected in samples collected during the third quarter of 2008 could be directly linked with INL Site activities. One exception was Cesium-137 found in a mule deer sample collected on the INL Site. Levels of other detected radionuclides were no different than values measured at other locations across the United States or were consistent with levels measured historically at the INL Site. All detected radionuclide concentrations were well below guidelines set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the third quarter of 2008 contains results from the Environmental Surveillance, Education and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, July 1 through September 30, 2008. All sample types (media) and the sampling schedule followed during 2008 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including particulate air filters, charcoal cartridges and atmospheric moisture
- Precipitation sampling
- Milk sampling
- Lettuce and wheat sampling
- Game animal sampling
- Soil Sampling

Table E-1 Summary of results for the Third Quarter of 2008.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	A statistical difference was found between quarterly gross alpha concentrations but the Distant locations were higher than Boundary locations, not indicating an INL Site impact. There were no other statistical differences in gross alpha or gross beta quarterly or monthly data in the third quarter. A couple of statistical differences were noted in weekly results but these appeared to result from natural variability 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	No manmade radionuclides were found in third quarter composites
	Charcoal Cartridge	Iodine-131	No detections of ¹³¹ I were made during the third quarter.
Atmospheric Moisture	Liquid	Tritium	A total of 21 samples were collected. Eleven of these samples had a tritium result greater than

			the 3s uncertainty. No sample result exceeded the DCG for tritium in air.
Precipitation	Liquid	Tritium	Three samples were collected. One of the results were greater than the 3s uncertainty. The concentration was consistent with those reported across the region and with previous results.
Milk	Liquid	Iodine-131, gamma-emitting radionuclides	Thirty-eight samples, including three duplicates, were collected. No Iodine-131 or other manmade gamma-emitting radionuclides were detected in any sample.
Lettuce	Solid	Gamma-emitting radionuclides, ⁹⁰ Sr	Eleven samples were collected, including one duplicate. No man-made gamma-emitting radionuclides were detected. Strontium-90 was detected in six samples at levels consistent with historical measurements and can be attributed to residual ⁹⁰ Sr from past nuclear weapons testing.
Wheat	Solid	Gamma-emitting radionuclides, ⁹⁰ Sr	Eight samples were collected, including one duplicate. No man-made radionuclides were detected in any sample.
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides	Three animals were sampled. One mule deer had Cesium-137 in muscle tissues within the range of recent years. A second mule deer have Cesium-137 in the muscle and liver tissues at concentrations above the range of recent years. This deer may have ingested plants growing within soil contamination areas. A dose of 0.23 mrem was calculated for a person consuming the entire muscle and liver of this game animal.

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
CFA	Central Facilities Area
CMS	community monitoring station
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
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
μ Ci	microcurie
mL	milliliter
mR	milliRoentgen
pCi	picocurie

1. ESEER 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 2008, 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 (ESEER) Program. The ESEER Program is led by the S.M. Stoller Corporation 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 ESEER Program for samples collected during the third quarter of 2008 (July 1-September 30, 2008).

The surveillance portion of the ESEER 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
- agricultural products, including milk at eight 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 ESEER Program.

The ESEER 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 (⁹⁰Sr), plutonium-238

(²³⁸Pu), plutonium-239/240 (^{239/240}Pu) and americium-241 (²⁴¹Am) 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 2006). 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.

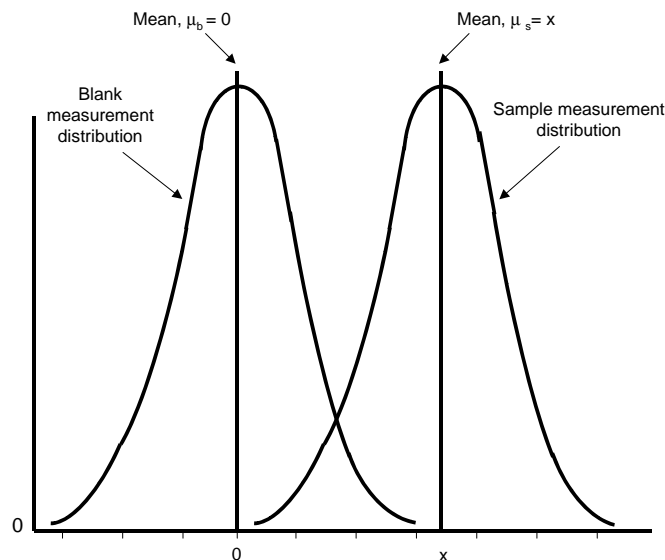


Figure 1. Example of overlap of blank and sample measurement distributions.

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 95-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 5 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 \pm 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 the S.M. Stoller Corporation at (208) 525-9358, or visit the Program's web page (<http://www.stoller-eser.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 mi² (2,300 km²) of the upper Snake River Plain in Southeastern Idaho. The history of the INL Site began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested on the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the war, as the nation worked to develop nuclear power, the Atomic Energy Commission (AEC), predecessor to the DOE, became interested in the Naval Proving Ground and made plans for a facility to build, test, and perfect nuclear power reactors.

The Naval Proving Ground became the National Reactor Testing Station (NRTS) in 1949, under the AEC. By the end of 1951, a reactor at the NRTS became the first to produce useful amounts of electricity. Over time the site has operated 52 various types of reactors, associated research centers, and waste handling areas. The NRTS was renamed the Idaho National Engineering Laboratory (INEL) in 1974, and the Idaho National Engineering and Environmental Laboratory (INEEL) in January 1997. With renewed interest in nuclear power the DOE announced in 2003 that Argonne National Laboratory and the INEEL would be the lead laboratories for development of the next generation of power reactors. On February 1, 2005 the INEEL and Argonne National Laboratory-West became the INL. The INL is committed to providing international nuclear leadership for the 21st Century, developing and demonstrating compelling national security technologies, and delivering excellence in science and technology as one of the Department of Energy's multiprogram national laboratories.

The cleanup operation, the ICP, is now a separately managed effort. The ICP is charged with safely and cost-effectively completing the majority of cleanup work from past laboratory missions by 2012.



3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the third quarter of 2008 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the third quarter of 2008 (Figure 2). Three of these samplers are located on the INL Site, nine are situated off the INL Site near the boundary and six have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. At the start of 2008, one replicate sampler was moved to Blue Dome (a Boundary location) and one was moved to Atomic City (also a Boundary location). An average of 13,257 ft³ (375 m³) of air was sampled at each location, each week, at an average flow rate of 1.32 ft³/min (0.04 m³/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.

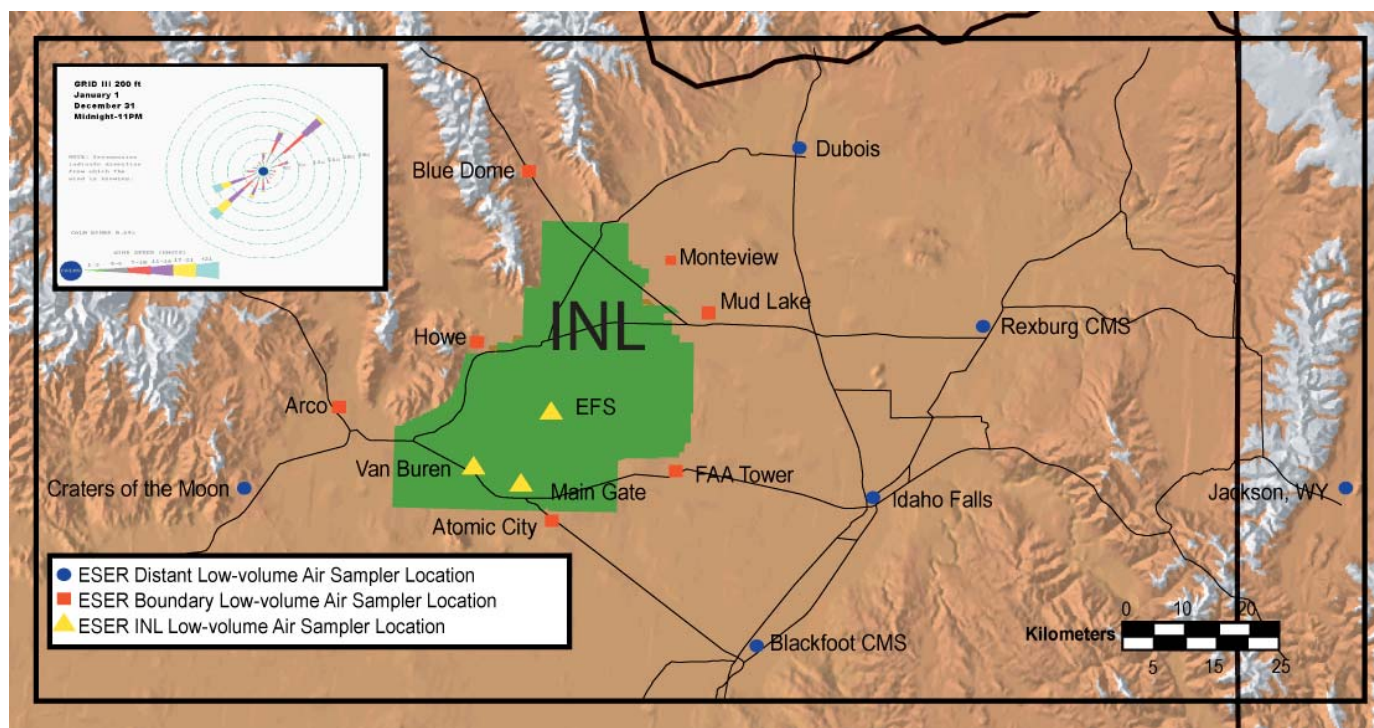


Figure 2. Low-volume air sampler locations.

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 , $^{239/240}\text{Pu}$ 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. Median gross alpha concentrations in air for INL Site, Boundary, and Distant locations for the third quarter of 2008 are shown in Figure 3. Gross alpha data are tested for normality prior to statistical analyses, and generally show no consistent discernable distribution. Box and whisker plots are commonly used when there is no assumed distribution. Each data group in Figure 3 is presented as a box and whisker plot, with a median (small red square), a box enclosing values between the 25th and 75th percentiles, and whiskers representing the non-outlier range. Outliers and extreme values are identified separately from the box and whiskers. Outliers and extreme values are atypical, infrequent data points that are far from the middle of the data distribution. For this report, outliers are defined as values that are greater than 1.5 times the height of the box, above or below the box. Extreme values are greater than 2 times the height of the box, above or below the box. Outliers and extreme values may reflect inherent variability, may be due to errors associated with transcription or measurement, or may be related to other anomalies. A careful review of the data collected during the fourth quarter indicates that the outlier values were not due to mistakes in collection, analysis, or reporting procedures, but rather reflect natural variability in the measurements. The outlier values lie within the range of measurements made within the past several years. Thus, rather than dismissing the outliers, they were included in the subsequent statistical analyses.

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 a statistical difference noted. However, Figure 3 graphically shows that the gross alpha measurements made at INL Site, Boundary and Distant locations are similar for the third quarter. If the INL Site were a significant source of offsite contamination, concentrations of contaminants could be statistically greater at Boundary locations than at Distant locations. In the third quarter, the opposite case is true—the Distant locations are statistically higher than the Boundary locations.

Comparisons of gross alpha concentrations were made for each month of the quarter (Figures 4 – 6). 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.

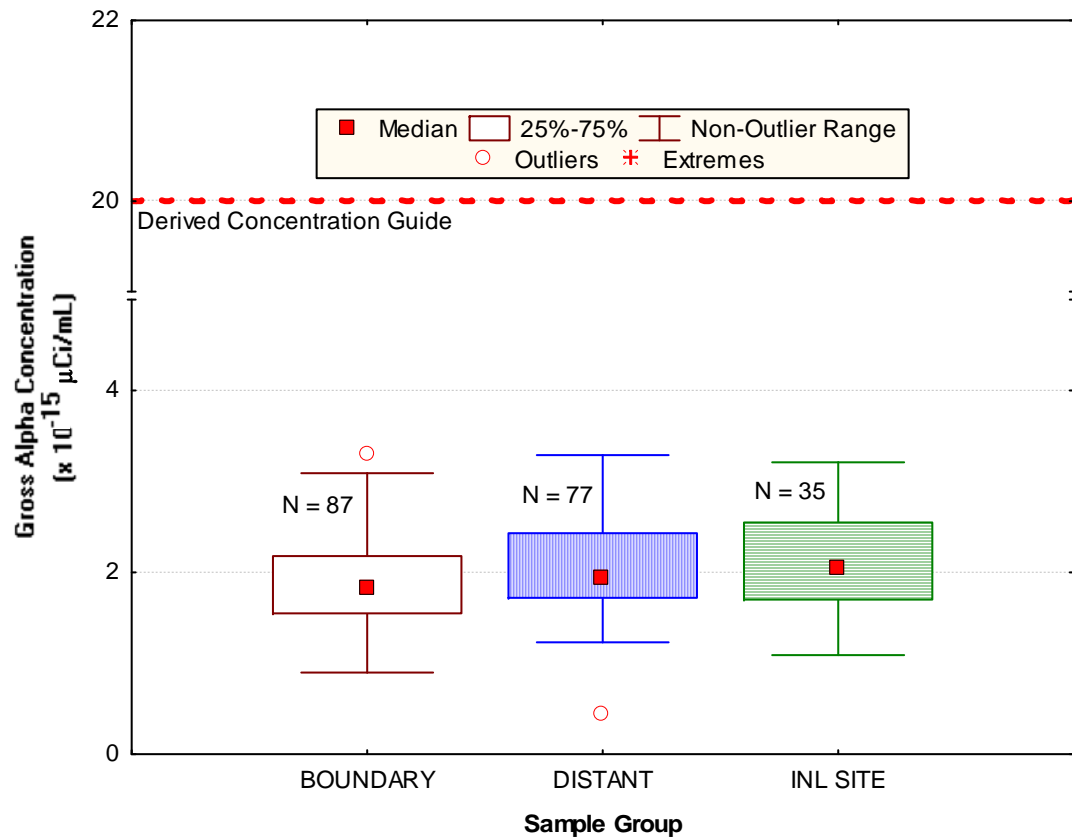


Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations for the third quarter of 2008.

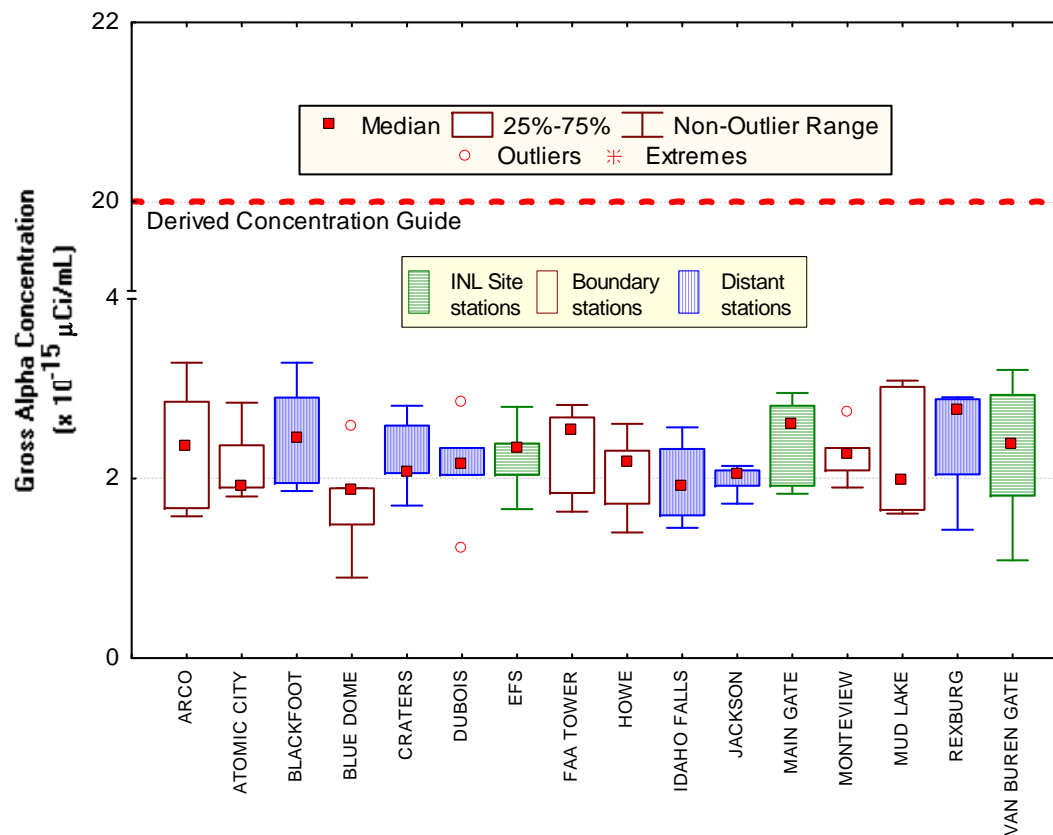


Figure 4. July gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 5 at each location, except Idaho Falls and Rexburg (N = 4).

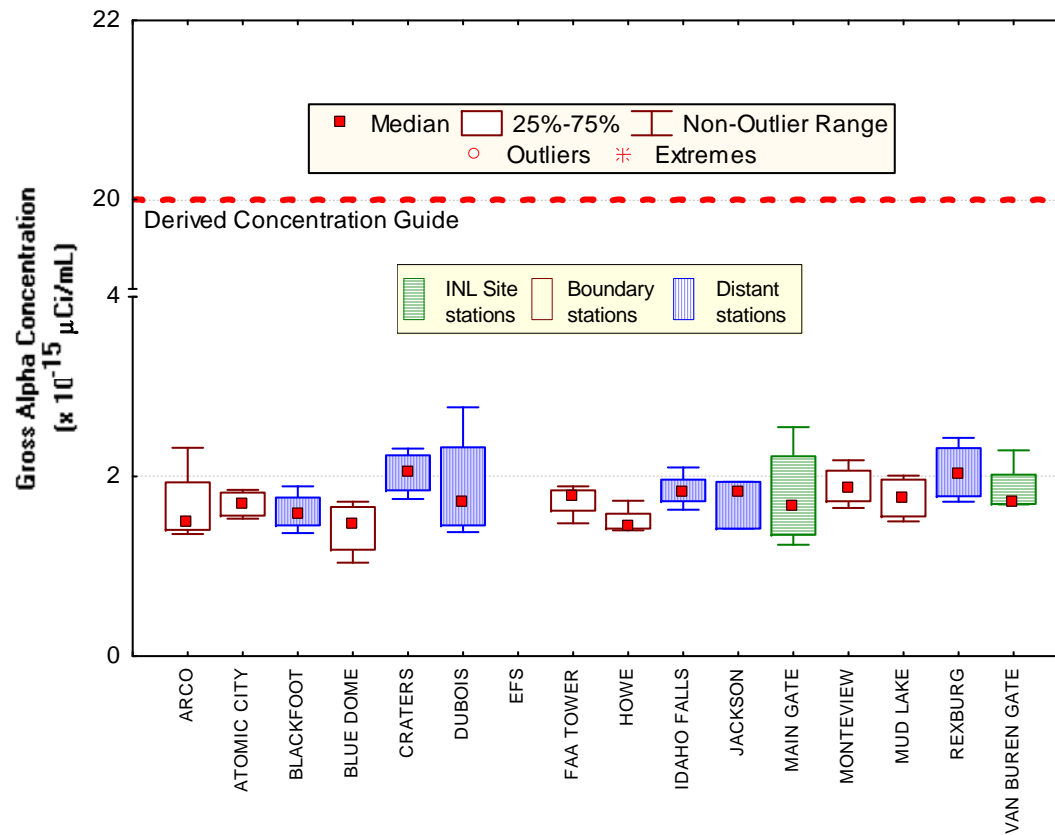


Figure 5. August gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except Jackson (N = 3) and EFS (N = 0).

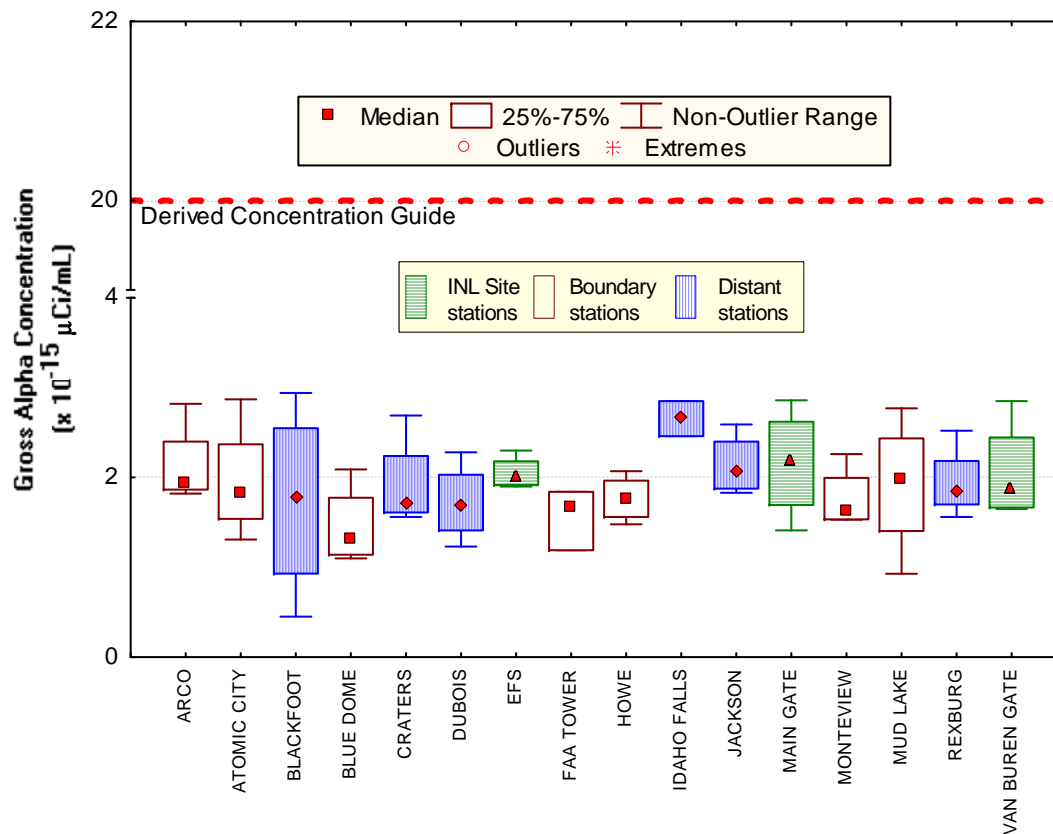


Figure 6. September gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except FAA Tower and Idaho Falls (N = 3).

No statistical differences in gross alpha concentrations between groups were noted during any month of the quarter (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL Site sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL Site and would not aid in determining offsite impacts. In the third quarter, there were two weeks (August 6 and September 10) where a statistical difference existed between the two sample groups (Table D-2). The Distant group was statistically greater than the Boundary group in both cases.

Gross beta results are presented in Table C-1. Gross beta concentrations in air for INL Site, Boundary and Distant locations for the third quarter of 2008 are shown in Figure 7. 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. The quarterly data for each group appear to be similar and were determined using the Kruskal-Wallis test to be statistically the same (Table D-1).

Monthly median gross beta concentrations in air for each sampling group are shown in Figures 8 – 10. Statistical data are presented in Table D-1. There were no statistical differences in gross beta between groups for any month during the quarter.

Comparison of weekly Boundary and Distant gross beta data sets, using the Mann Whitney U test, showed no statistical difference between Boundary and Distant measurements during any week in the third quarter (Table D-2).

No ^{131}I was detected in any of the charcoal cartridge batches collected during the third quarter of 2008. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C. Gamma spectrographic analysis is also done with the ^{131}I analysis. Cesium-137 was detected in one of the 26 measured batches of cartridges. The analytical laboratory considers occasional detections of this nuclide a result of the materials used in the charcoal filters.

Weekly filters for the third quarter of 2008 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs (see Table C-3, Appendix C). No manmade gamma-emitting radionuclides were detected.

Composites were also analyzed for ^{90}Sr , ^{238}Pu , $^{239/240}\text{Pu}$ and ^{241}Am (see Table C-3, Appendix C). None of these radionuclides were detected in third quarter composites.

ATMOSPHERIC MOISTURE SAMPLING

Twenty-one atmospheric moisture samples were obtained during the third quarter of 2008 from Atomic City, Blackfoot CMS, Idaho Falls and Rexburg CMS. 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.

Eleven of the 21 samples exceeded the 3s uncertainty level for tritium, with similar results reported from all four locations. All samples were significantly below the DOE DCG for tritium in air of $1 \times 10^{-7} \mu\text{Ci}/\text{mL}_{\text{air}}$ with a maximum reported value of $(18.9 \pm 2.8) \times 10^{-13} \mu\text{Ci}/\text{mL}_{\text{air}}$. All results are shown in Table C-4, Appendix C.

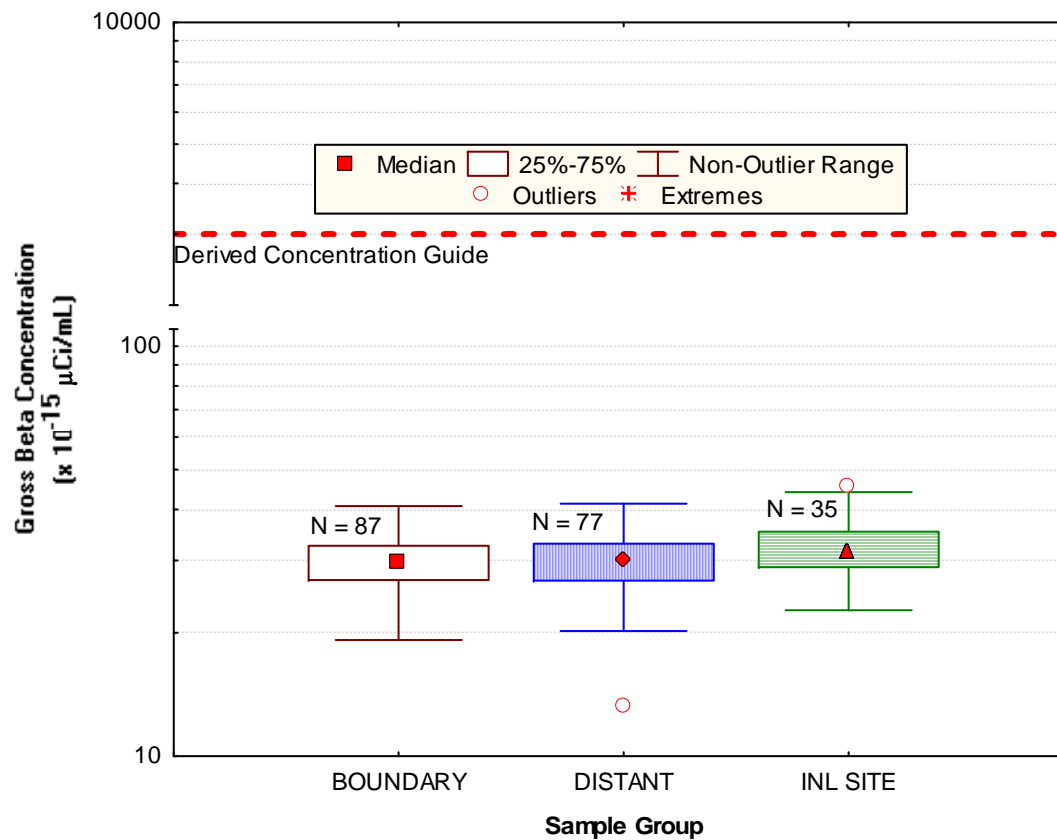


Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary and Distant locations for the third quarter of 2008.

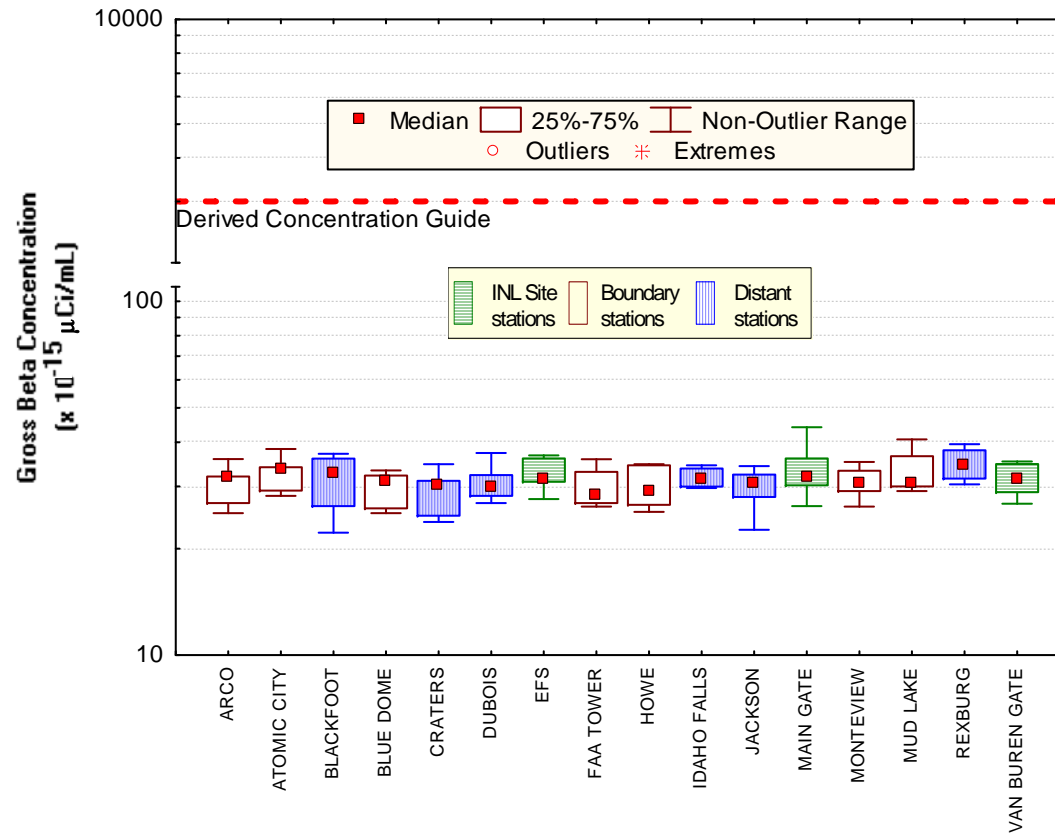


Figure 8. July gross beta concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 5 at each location, except Idaho Falls and Rexburg (N = 4).

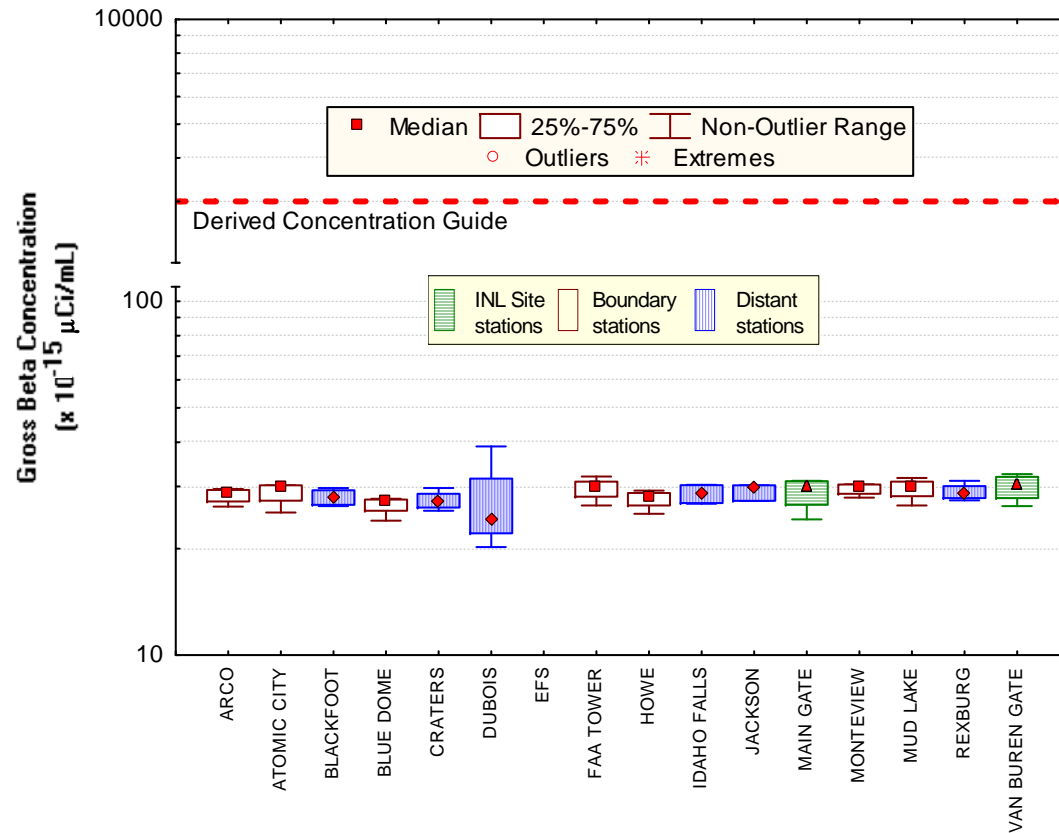


Figure 9. August gross beta concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except Jackson (N = 3) and EFS (N = 0).

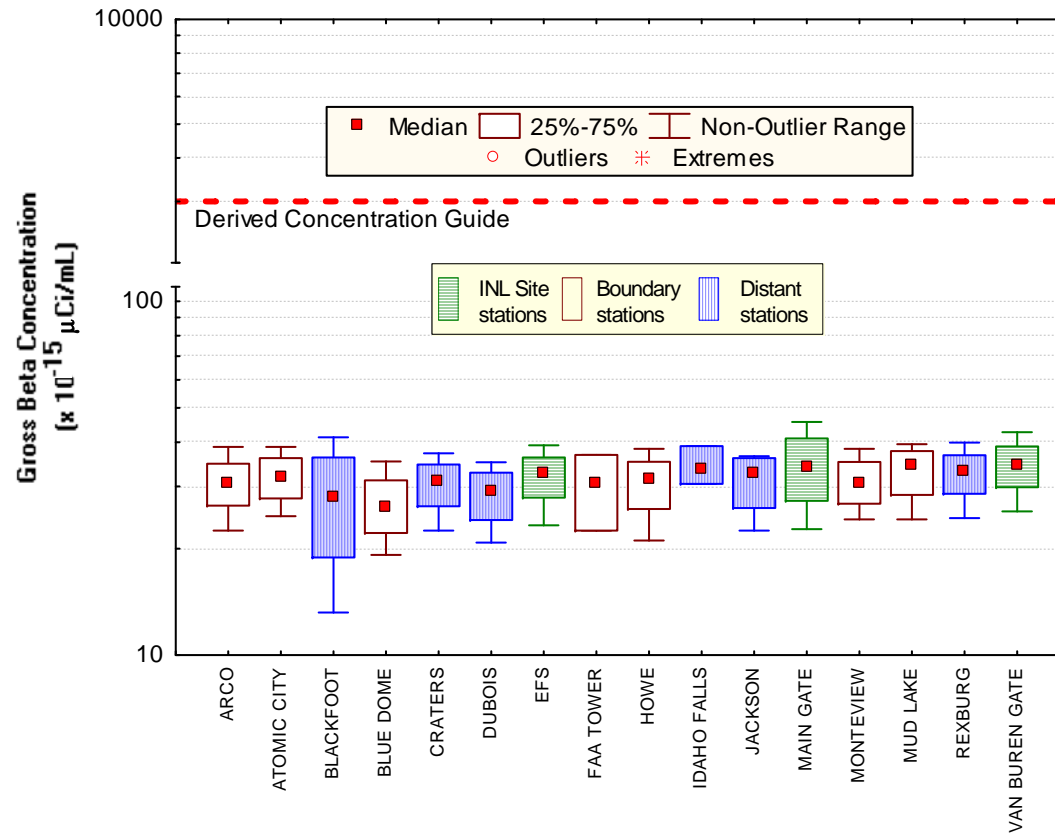


Figure 10. September gross beta concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except FAA Tower and Idaho Falls (N = 3).

4. PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 20 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the third quarter of 2008 produced sufficient precipitation to yield only three samples.

Tritium was measured above the 3s value in one of the three samples collected during the third quarter of 2008. 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 2005, tritium measured in samples from Region 10 (which includes Idaho) ranged from -200 to 7500 pCi/L (EPA 2007). Data for all third quarter 2008 precipitation samples collected by the ESER Program were at the low end of this range and are listed in Table C-5 (Appendix C).



5. AGRICULTURAL PRODUCT, WILDLIFE AND SOIL SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL Site and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, big game, 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 wheat 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, lettuce, wheat and large game animals sampled during the third quarter of 2008.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at seven other locations around the INL Site (Figure 11) during the third quarter of 2008. All samples were analyzed for gamma emitting radionuclides. During the second quarter, samples from half of the locations are analyzed for ^{90}Sr and half are analyzed for tritium. In the fourth quarter the analyses are reversed, so that each location receives one analysis for ^{90}Sr and tritium each year.

No Iodine-131 or other gamma-emitting radionuclides were detected in any sample. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-6.

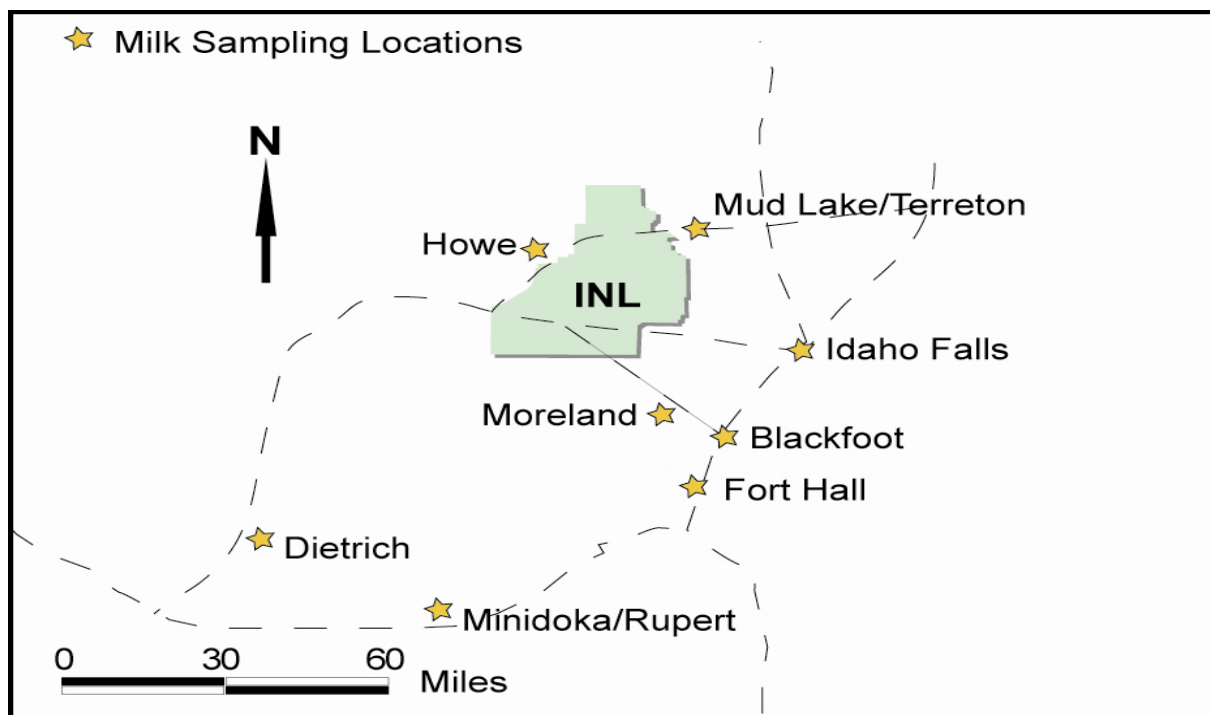


Figure 11. ESER milk sampling locations.

LETTUCE SAMPLING

In 2004 the ESER Program tested two prototype self-contained lettuce planters at the sampling locations in Atomic City and at the EFS on the INL. These locations were relatively remote and had no access to water, requiring that a self-watering system be developed. This prototype method allows for the placement and collection of lettuce at areas previously unavailable to the public (i.e., on the INL). The planters are set out in the spring with the lettuce

grown from seed. This new method also allows for the accumulation of deposited radionuclides on the plant surface throughout the growth cycle.

Four lettuce samples were collected from prototype planters and six samples were collected from private gardens. Each sample was analyzed for gamma-emitting radionuclides and ^{90}Sr . No gamma results were measured above the 3s uncertainty value. Strontium-90 was reported in six of the samples. The quantities detected are consistent with those found in previous years, which are attributed to uptake of soil with residual ^{90}Sr from nuclear weapons testing that took place between 1945 and 1980.

Data for ^{137}Cs and ^{90}Sr in all lettuce samples taken during the third quarter are listed in Table C-7 (Appendix C).

WHEAT SAMPLING

A total of eight wheat samples (including one duplicate) were collected from local grain growers. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr . No manmade radionuclides were detected in any wheat sample. Data for ^{137}Cs and ^{90}Sr in all wheat samples taken during the third quarter are listed in Appendix C, Table C-8.

LARGE GAME ANIMAL SAMPLING

Three large game animals were sampled on the INL Site during the third quarter of 2008. No manmade radionuclides were found in any of the thyroid samples or in the muscle and liver of one of the animals. One mule deer had detectable ^{137}Cs in the muscle tissue at 7.25 pCi/kg. This is well within the normal range found during the past few years.

Another mule deer collected immediately adjacent to the Radioactive Waste Management Complex had detectable ^{137}Cs in the muscle tissue at 167 pCi/kg and in the liver at 80.2 pCi/kg. While these concentrations are within the range of historical concentrations, they are considerably higher than the range of the past several years. The last time ^{137}Cs concentrations at these levels were detected in game tissues was 1988. Areas of soil contamination exist on the INL Site and past detections in this range have been attributed to ingestion of plants growing in the soil contamination areas. Mule deer have tended to have higher concentrations of radionuclides than pronghorn because they tend to congregate closer to facilities.

A potential dose of 0.23 mrem was calculated for a person consuming the entire muscle and liver masses of this mule deer. This value is equal to approximately the dose the average person receives from natural background sources over a period of about six hours.

The data for ^{137}Cs and ^{131}I are listed in Appendix C, Table C-9.

6. QUALITY ASSURANCE

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

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

Sample results are compared to criteria described in the Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program (Stoller 2007). The following table summarizes the results of the quality assurance program for the third quarter of 2008.

QA Sample Type	Number of Sample Results	Number of Results Meeting Criteria	Percentage Meeting Criteria
Spikes/Laboratory Control Samples	271	261	96.3
Field Duplicates	75	70	93.3
Laboratory Splits	31	31	100.0
Recounts	182	182	100.0
Blanks	68	67	98.5
Method Uncertainty	1773	1701	95.9

7. 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.
- Code of Federal Regulations (CFR), 2007, 40 CFR 50.6, "National Primary and Secondary Ambient Air Quality Standards for Particulate Matter," Code of Federal Regulations, Office of the Federal Register, July 1, 2007.
- 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, 2007, RadNet—Tracking Environmental Radiation Nationwide, Web-page: <http://www.epa.gov/narel/radnet/>
- Stoller, 2007, *Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program*, Environmental Surveillance, Education and Research Program, February 2007.

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				
<i>LOW-VOLUME AIR</i>				
Gross Alpha, Gross Beta, ¹³¹ I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Rexburg	Arco, Atomic City, FAA Tower, Howe, Montevieu, 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, Montevieu, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
⁹⁰ Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
<i>ATMOSPHERIC MOISTURE</i>				
Tritium	2 to 13 weeks	Blackfoot, Idaho Falls, Rexburg	Atomic City	None
<i>PRECIPITATION</i>				
Tritium	monthly	Idaho Falls	None	CFA
Tritium	weekly	None	None	EFS
ENVIRONMENTAL RADIATION SAMPLING				
<i>TLDs</i>				
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, Montevieu, Mud Lake	None
SOIL SAMPLING				
<i>SOIL</i>				
Gamma Spec, ⁹⁰ Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Montevieu, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek	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				
<i>MILK</i>				
Gamma Spec (¹³¹ I)	weekly	Idaho Falls	None	None
Gamma Spec (¹³¹ I)	monthly	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka, Moreland	Howe, Terreton	None
Tritium, ⁹⁰ Sr	Semi-annually	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka, Moreland	Howe, Terreton	None
<i>POTATOES</i>				
Gamma Spec, ⁹⁰ Sr	annually	Aberdeen, Blackfoot, Fort Hall, Idaho Falls, Rupert, Taber, occasional samples across the U.S.	Arco, Monteview, Mud Lake, Terreton	None
<i>WHEAT</i>				
Gamma Spec, ⁹⁰ Sr	annually	American Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Taber, Terreton	None
<i>LETTUCE</i>				
Gamma Spec, ⁹⁰ Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, FAA Tower, Howe, Monteview	EFS
<i>BIG GAME</i>				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL Site roads
<i>WATERFOWL</i>				
Gamma Spec, ⁹⁰ Sr, Transuranics	annually	Varies among: Heise, Firth, Fort Hall, Mud Lake, Market Lake, and American Falls	None	Wastewater disposal ponds

APPENDIX B
SUMMARY OF MDCs AND DCGs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Third Quarter 2008

Sample Type	Analysis	Approximate Minimum Detectable Concentration ^a (MDC)	Derived Concentration Guide ^b (DCG)
Air (particulate filter) ^e	Gross alpha ^c	5.07×10^{-16} $\mu\text{Ci/mL}$	2×10^{-14} $\mu\text{Ci/mL}$
	Gross beta ^d	1.57×10^{-15} $\mu\text{Ci/mL}$	3×10^{-12} $\mu\text{Ci/mL}$
	Specific gamma (¹³⁷ Cs)	1.99×10^{-16} $\mu\text{Ci/mL}$	4×10^{-10} $\mu\text{Ci/mL}$
	²³⁸ Pu	3.06×10^{-18} $\mu\text{Ci/mL}$	3×10^{-14} $\mu\text{Ci/mL}$
	^{239/240} Pu	1.76×10^{-18} $\mu\text{Ci/mL}$	2×10^{-14} $\mu\text{Ci/mL}$
	²⁴¹ Am	1.26×10^{-17} $\mu\text{Ci/mL}$	2×10^{-14} $\mu\text{Ci/mL}$
	⁹⁰ Sr	4.03×10^{-17} $\mu\text{Ci/mL}$	9×10^{-12} $\mu\text{Ci/mL}$
Air (charcoal cartridge) ^e	¹³¹ I	3.53×10^{-16} $\mu\text{Ci/mL}$	4×10^{-10} $\mu\text{Ci/mL}$
Air (atmospheric moisture)	³ H	111.3 pCi/L _{water}	1×10^{-7} $\mu\text{Ci/mL}_{\text{air}}$
Air (precipitation)	³ H	112.7 pCi/L	2×10^{-3} $\mu\text{Ci/mL}$
Milk	¹³¹ I	0.72 pCi/L	--
	¹³⁷ Cs	1.53 pCi/L	--
Lettuce	⁹⁰ Sr	0.026 pCi/g	--
Wheat	¹³⁷ Cs	4.43 pCi/kg	--
	⁹⁰ Sr	0.008 pCi/g	--
<p>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.</p> <p>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.</p> <p>c The DCG for gross alpha is equivalent to the DCGs for ^{239,240}Pu and ²⁴¹Am.</p> <p>d The DCG for gross beta is equivalent to the DCGs for ²²⁸Ra</p> <p>e The approximate MDC is based on an average filtered air volume (pressure corrected) of 445 m³/week.</p>			

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						GROSS BETA					
		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s		
ARCO	7/2/2008	1.58 ± 0.29	5.85 ± 1.08	Y	26.90 ± 0.99	99.53 ± 3.65	Y						
	7/9/2008	3.29 ± 0.42	12.17 ± 1.54	Y	32.00 ± 1.17	118.40 ± 4.33	Y						
	7/16/2008	1.67 ± 0.29	6.18 ± 1.06	Y	25.20 ± 0.95	93.24 ± 3.52	Y						
	7/23/2008	2.36 ± 0.36	8.73 ± 1.31	Y	31.90 ± 1.11	118.03 ± 4.11	Y						
	7/30/2008	2.85 ± 0.36	10.56 ± 1.34	Y	35.84 ± 1.13	132.61 ± 4.16	Y						
	8/6/2008	1.55 ± 0.24	5.74 ± 0.88	Y	28.10 ± 0.87	103.97 ± 3.21	Y						
	8/13/2008	1.45 ± 0.20	5.37 ± 0.75	Y	29.10 ± 0.78	107.67 ± 2.89	Y						
	8/20/2008	1.36 ± 0.20	5.03 ± 0.73	Y	29.50 ± 0.81	109.15 ± 2.98	Y						
	8/27/2008	2.32 ± 0.25	8.58 ± 0.93	Y	26.30 ± 0.78	97.31 ± 2.87	Y						
	9/3/2008	1.82 ± 0.31	6.73 ± 1.16	Y	22.50 ± 1.01	83.25 ± 3.74	Y						
	9/10/2008	1.98 ± 0.29	7.33 ± 1.06	Y	30.70 ± 0.98	113.59 ± 3.64	Y						
	9/17/2008	1.91 ± 0.30	7.07 ± 1.10	Y	30.40 ± 1.03	112.48 ± 3.81	Y						
	9/24/2008	2.82 ± 0.31	10.43 ± 1.16	Y	38.80 ± 1.07	143.56 ± 3.96	Y						
	ATOMIC CITY	7/2/2008	1.91 ± 0.37	7.07 ± 1.35	Y	33.70 ± 1.25	124.69 ± 4.63	Y					
7/9/2008		2.37 ± 0.35	8.77 ± 1.31	Y	29.20 ± 1.06	108.04 ± 3.92	Y						
7/16/2008		1.80 ± 0.34	6.66 ± 1.26	Y	28.20 ± 1.14	104.34 ± 4.22	Y						
7/23/2008		1.90 ± 0.34	7.03 ± 1.25	Y	34.00 ± 1.13	125.80 ± 4.18	Y						
7/30/2008		2.85 ± 0.41	10.53 ± 1.53	Y	38.26 ± 1.31	141.56 ± 4.84	Y						
8/6/2008		1.79 ± 0.25	6.62 ± 0.94	Y	30.20 ± 0.91	111.74 ± 3.35	Y						
8/13/2008		1.53 ± 0.22	5.66 ± 0.83	Y	29.40 ± 0.86	108.78 ± 3.16	Y						
8/20/2008		1.60 ± 0.20	5.92 ± 0.74	Y	30.20 ± 0.77	111.74 ± 2.85	Y						
8/27/2008		1.85 ± 0.24	6.85 ± 0.90	Y	25.30 ± 0.82	93.61 ± 3.03	Y						
9/3/2008		1.77 ± 0.30	6.55 ± 1.11	Y	24.70 ± 1.01	91.39 ± 3.74	Y						
9/10/2008		1.31 ± 0.30	4.85 ± 1.11	Y	33.30 ± 1.17	123.21 ± 4.33	Y						
9/17/2008		1.87 ± 0.28	6.92 ± 1.03	Y	30.80 ± 0.98	113.96 ± 3.64	Y						
9/24/2008		2.87 ± 0.36	10.62 ± 1.33	Y	38.80 ± 1.24	143.56 ± 4.59	Y						
QA-1 (ATOMIC CITY)		7/2/2008	0.23 ± 0.25	0.85 ± 0.92		-1.30 ± 0.69	-4.81 ± 2.55						
	7/9/2008	2.79 ± 0.39	10.32 ± 1.43	Y	29.10 ± 1.11	107.67 ± 4.11	Y						
	7/16/2008	1.96 ± 0.34	7.25 ± 1.25	Y	28.50 ± 1.12	105.45 ± 4.14	Y						
	7/23/2008	2.32 ± 0.41	8.58 ± 1.51	Y	32.30 ± 1.27	119.51 ± 4.70	Y						
	7/30/2008	2.65 ± 0.39	9.81 ± 1.43	Y	39.54 ± 1.26	146.28 ± 4.67	Y						
	8/6/2008	2.14 ± 0.27	7.92 ± 1.00	Y	29.50 ± 0.89	109.15 ± 3.30	Y						
	8/13/2008	1.57 ± 0.23	5.81 ± 0.84	Y	30.50 ± 0.87	112.85 ± 3.23	Y						
	8/20/2008	1.40 ± 0.21	5.18 ± 0.77	Y	28.50 ± 0.84	105.45 ± 3.09	Y						
	8/27/2008	1.73 ± 0.24	6.40 ± 0.89	Y	25.70 ± 0.83	95.09 ± 3.07	Y						
	9/3/2008	1.54 ± 0.30	5.70 ± 1.10	Y	22.70 ± 1.01	83.99 ± 3.74	Y						
	9/10/2008	1.35 ± 0.29	5.00 ± 1.06	Y	32.70 ± 1.10	120.99 ± 4.07	Y						
	9/17/2008	1.84 ± 0.32	6.81 ± 1.17	Y	33.60 ± 1.15	124.32 ± 4.26	Y						
	9/24/2008	2.28 ± 0.34	8.44 ± 1.27	Y	40.30 ± 1.28	149.11 ± 4.74	Y						
	BLUE DOME	7/2/2008	0.90 ± 0.25	3.32 ± 0.94	Y	25.20 ± 0.95	93.24 ± 3.51	Y					
7/9/2008		1.89 ± 0.32	6.99 ± 1.17	Y	31.20 ± 1.03	115.44 ± 3.81	Y						
7/16/2008		1.49 ± 0.27	5.51 ± 1.01	Y	26.00 ± 0.95	96.20 ± 3.50	Y						
7/23/2008		1.87 ± 0.37	6.92 ± 1.36	Y	32.20 ± 1.21	119.14 ± 4.48	Y						
7/30/2008		2.59 ± 0.34	9.58 ± 1.26	Y	33.27 ± 1.06	123.11 ± 3.93	Y						
8/6/2008		1.60 ± 0.23	5.92 ± 0.84	Y	27.70 ± 0.82	102.49 ± 3.02	Y						
8/13/2008		1.72 ± 0.23	6.36 ± 0.83	Y	27.20 ± 0.80	100.64 ± 2.97	Y						
8/20/2008		1.04 ± 0.16	3.85 ± 0.59	Y	27.40 ± 0.70	101.38 ± 2.58	Y						
8/27/2008		1.33 ± 0.21	4.92 ± 0.79	Y	24.00 ± 0.80	88.80 ± 2.95	Y						
9/3/2008		1.46 ± 0.25	5.40 ± 0.93	Y	19.20 ± 0.83	71.04 ± 3.06	Y						
9/10/2008		1.18 ± 0.24	4.37 ± 0.88	Y	25.10 ± 0.89	92.87 ± 3.30	Y						
9/17/2008		1.10 ± 0.24	4.07 ± 0.88	Y	27.10 ± 0.94	100.27 ± 3.46	Y						
9/24/2008		2.09 ± 0.28	7.73 ± 1.02	Y	35.10 ± 1.02	130.61 ± 3.77	Y						
QA-2		7/2/2008	2.47 ± 0.38	9.14 ± 1.40	Y	26.50 ± 1.13	98.05 ± 4.18	Y					

TABLE C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

Sampling Group and Location	Sampling Date	GROSS ALPHA			GROSS BETA		
		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)	Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)	Result > 3s	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)	Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)	Result > 3s
(BLUE DOME)	7/9/2008	2.81 ± 0.40	10.40 ± 1.49	Y	30.60 ± 1.17	113.22 ± 4.33	Y
	7/16/2008	1.35 ± 0.28	5.00 ± 1.02	Y	25.60 ± 0.98	94.72 ± 3.62	Y
	7/23/2008	2.58 ± 0.44	9.55 ± 1.63	Y	36.10 ± 1.38	133.57 ± 5.11	Y
	7/30/2008	2.86 ± 0.36	10.58 ± 1.31	Y	33.65 ± 1.08	124.52 ± 3.99	Y
	8/6/2008	1.91 ± 0.30	7.07 ± 1.11	Y	28.60 ± 1.04	105.82 ± 3.85	Y
	8/13/2008	1.71 ± 0.23	6.33 ± 0.86	Y	28.20 ± 0.84	104.34 ± 3.12	Y
	8/20/2008	1.47 ± 0.22	5.44 ± 0.81	Y	32.40 ± 0.91	119.88 ± 3.35	Y
	8/27/2008	1.58 ± 0.22	5.85 ± 0.83	Y	25.60 ± 0.80	94.72 ± 2.97	Y
	9/3/2008	1.35 ± 0.30	5.00 ± 1.11	Y	21.00 ± 1.03	77.70 ± 3.81	Y
	9/10/2008	1.40 ± 0.28	5.18 ± 1.03	Y	27.40 ± 1.01	101.38 ± 3.74	Y
	9/17/2008	1.34 ± 0.29	4.96 ± 1.08	Y	30.70 ± 1.12	113.59 ± 4.14	Y
	9/24/2008	2.53 ± 0.33	9.36 ± 1.21	Y	39.30 ± 1.18	145.41 ± 4.37	Y
FAA TOWER	7/2/2008	1.63 ± 0.31	6.03 ± 1.15	Y	26.90 ± 1.03	99.53 ± 3.81	Y
	7/9/2008	2.68 ± 0.37	9.92 ± 1.36	Y	28.40 ± 1.06	105.08 ± 3.92	Y
	7/16/2008	1.84 ± 0.30	6.81 ± 1.12	Y	26.30 ± 1.00	97.31 ± 3.68	Y
	7/23/2008	2.82 ± 0.50	10.43 ± 1.85	Y	35.80 ± 1.53	132.46 ± 5.66	Y
	7/30/2008	2.55 ± 0.30	9.42 ± 1.11	Y	32.95 ± 0.94	121.91 ± 3.48	Y
	8/6/2008	1.76 ± 0.27	6.51 ± 0.99	Y	32.00 ± 0.98	118.40 ± 3.63	Y
	8/13/2008	1.48 ± 0.22	5.48 ± 0.80	Y	29.90 ± 0.85	110.63 ± 3.13	Y
	8/20/2008	1.80 ± 0.23	6.66 ± 0.86	Y	26.50 ± 0.82	98.05 ± 3.04	Y
	8/27/2008	1.89 ± 0.24	6.99 ± 0.88	Y	29.60 ± 0.83	109.52 ± 3.09	Y
	9/3/2008	1.68 ± 0.31	6.22 ± 1.15	Y	22.50 ± 1.03	83.25 ± 3.81	Y
	9/10/2008	1.25 ± 0.56	4.63 ± 2.06	Y	41.40 ± 2.18	153.18 ± 8.07	Y
	9/17/2008	1.19 ± 0.30	4.40 ± 1.12	Y	30.70 ± 1.19	113.59 ± 4.40	Y
9/24/2008	1.84 ± 0.27	6.81 ± 1.01	Y	36.80 ± 1.06	136.16 ± 3.92	Y	
HOWE	7/2/2008	1.72 ± 0.29	6.36 ± 1.07	Y	26.60 ± 0.95	98.42 ± 3.51	Y
	7/9/2008	2.18 ± 0.30	8.07 ± 1.10	Y	28.90 ± 0.92	106.93 ± 3.40	Y
	7/16/2008	1.40 ± 0.25	5.18 ± 0.94	Y	25.40 ± 0.89	93.98 ± 3.30	Y
	7/23/2008	2.31 ± 0.38	8.55 ± 1.39	Y	34.40 ± 1.20	127.28 ± 4.44	Y
	7/30/2008	2.61 ± 0.35	9.65 ± 1.31	Y	34.64 ± 1.11	128.17 ± 4.12	Y
	8/6/2008	1.73 ± 0.23	6.40 ± 0.85	Y	27.90 ± 0.80	103.23 ± 2.97	Y
	8/13/2008	1.44 ± 0.26	5.33 ± 0.97	Y	29.20 ± 1.03	108.04 ± 3.81	Y
	8/20/2008	1.44 ± 0.18	5.33 ± 0.65	Y	28.30 ± 0.69	104.71 ± 2.55	Y
	8/27/2008	1.40 ± 0.21	5.18 ± 0.78	Y	25.10 ± 0.78	92.87 ± 2.88	Y
	9/3/2008	1.86 ± 0.25	6.88 ± 0.91	Y	21.10 ± 0.77	78.07 ± 2.86	Y
	9/10/2008	1.64 ± 0.32	6.07 ± 1.19	Y	32.10 ± 1.17	118.77 ± 4.33	Y
	9/17/2008	1.48 ± 0.23	5.48 ± 0.86	Y	30.70 ± 0.88	113.59 ± 3.26	Y
9/24/2008	2.07 ± 0.27	7.66 ± 1.00	Y	38.30 ± 1.03	141.71 ± 3.81	Y	
MONTEVIEW	7/2/2008	1.90 ± 0.36	7.03 ± 1.35	Y	29.10 ± 1.19	107.67 ± 4.40	Y
	7/9/2008	2.73 ± 0.36	10.10 ± 1.32	Y	30.60 ± 1.04	113.22 ± 3.85	Y
	7/16/2008	2.09 ± 0.32	7.73 ± 1.18	Y	26.30 ± 1.01	97.31 ± 3.74	Y
	7/23/2008	2.34 ± 0.35	8.66 ± 1.28	Y	33.20 ± 1.09	122.84 ± 4.03	Y
	7/30/2008	2.28 ± 0.43	8.43 ± 1.58	Y	35.16 ± 1.39	130.10 ± 5.15	Y
	8/6/2008	2.18 ± 0.27	8.07 ± 0.99	Y	30.40 ± 0.89	112.48 ± 3.30	Y
	8/13/2008	1.80 ± 0.23	6.66 ± 0.84	Y	30.30 ± 0.83	112.11 ± 3.07	Y
	8/20/2008	1.65 ± 0.20	6.11 ± 0.74	Y	29.30 ± 0.76	108.41 ± 2.80	Y
	8/27/2008	1.95 ± 0.27	7.22 ± 0.99	Y	27.90 ± 0.92	103.23 ± 3.39	Y
	9/3/2008	1.73 ± 0.29	6.40 ± 1.08	Y	24.20 ± 0.97	89.54 ± 3.60	Y
	9/10/2008	1.54 ± 0.33	5.70 ± 1.22	Y	32.00 ± 1.21	118.40 ± 4.48	Y
	9/17/2008	1.53 ± 0.28	5.66 ± 1.05	Y	29.40 ± 1.04	108.78 ± 3.85	Y
9/24/2008	2.26 ± 0.31	8.36 ± 1.13	Y	38.30 ± 1.13	141.71 ± 4.18	Y	
MUD LAKE	7/2/2008	1.65 ± 0.33	6.11 ± 1.21	Y	29.10 ± 1.11	107.67 ± 4.11	Y
	7/9/2008	1.99 ± 0.33	7.36 ± 1.21	Y	30.80 ± 1.05	113.96 ± 3.89	Y
	7/16/2008	1.61 ± 0.31	5.96 ± 1.15	Y	30.00 ± 1.09	111.00 ± 4.03	Y
	7/23/2008	3.02 ± 0.37	11.17 ± 1.38	Y	36.50 ± 1.13	135.05 ± 4.18	Y

TABLE C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

Sampling Group and Location	Sampling Date	GROSS ALPHA						GROSS BETA					
		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s		
	7/30/2008	3.09 ± 0.38	11.43 ± 1.40	Y	40.74 ± 1.19	150.74 ± 4.42	Y						
	8/6/2008	1.61 ± 0.24	5.96 ± 0.90	Y	31.70 ± 0.91	117.29 ± 3.37	Y						
	8/13/2008	1.92 ± 0.24	7.10 ± 0.90	Y	29.80 ± 0.87	110.26 ± 3.20	Y						
	8/20/2008	1.50 ± 0.19	5.55 ± 0.71	Y	30.20 ± 0.75	111.74 ± 2.78	Y						
	8/27/2008	2.01 ± 0.26	7.44 ± 0.95	Y	26.50 ± 0.86	98.05 ± 3.17	Y						
	9/3/2008	2.10 ± 0.30	7.77 ± 1.11	Y	24.20 ± 0.95	89.54 ± 3.52	Y						
	9/10/2008	0.93 ± 0.26	3.43 ± 0.97	Y	32.60 ± 1.09	120.62 ± 4.03	Y						
	9/17/2008	1.88 ± 0.30	6.96 ± 1.09	Y	36.00 ± 1.09	133.20 ± 4.03	Y						
	9/24/2008	2.77 ± 0.32	10.25 ± 1.20	Y	39.50 ± 1.12	146.15 ± 4.14	Y						
DISTANT													
BLACKFOOT CMS	7/2/2008	1.86 ± 0.31	6.88 ± 1.16	Y	22.20 ± 0.96	82.14 ± 3.54	Y						
	7/9/2008	2.44 ± 0.35	9.03 ± 1.29	Y	32.70 ± 1.08	120.99 ± 4.00	Y						
	7/16/2008	1.95 ± 0.28	7.22 ± 1.05	Y	26.40 ± 0.92	97.68 ± 3.40	Y						
	7/23/2008	3.29 ± 0.44	12.17 ± 1.62	Y	37.10 ± 1.30	137.27 ± 4.81	Y						
	7/30/2008	2.90 ± 0.40	10.73 ± 1.47	Y	35.95 ± 1.23	133.02 ± 4.54	Y						
	8/6/2008	1.89 ± 0.25	6.99 ± 0.93	Y	29.70 ± 0.87	109.89 ± 3.23	Y						
	8/13/2008	1.37 ± 0.20	5.07 ± 0.74	Y	28.80 ± 0.79	106.56 ± 2.92	Y						
	8/20/2008	1.54 ± 0.20	5.70 ± 0.75	Y	26.40 ± 0.76	97.68 ± 2.79	Y						
	8/27/2008	1.64 ± 0.22	6.07 ± 0.80	Y	26.80 ± 0.78	99.16 ± 2.88	Y						
	9/3/2008	1.41 ± 0.25	5.22 ± 0.93	Y	24.60 ± 0.89	91.02 ± 3.30	Y						
	9/10/2008	2.16 ± 0.31	7.99 ± 1.15	Y	31.10 ± 1.04	115.07 ± 3.85	Y						
	9/17/2008	0.45 ± 0.18	1.67 ± 0.68	Y	13.20 ± 0.72	48.84 ± 2.65	Y						
	9/24/2008	2.94 ± 0.38	10.88 ± 1.40	Y	41.30 ± 1.31	152.81 ± 4.85	Y						
CRATERS OF THE MOON	7/2/2008	2.06 ± 0.35	7.62 ± 1.29	Y	24.80 ± 1.07	91.76 ± 3.96	Y						
	7/9/2008	2.81 ± 0.46	10.40 ± 1.71	Y	30.10 ± 1.34	111.37 ± 4.96	Y						
	7/16/2008	1.70 ± 0.34	6.29 ± 1.24	Y	23.80 ± 1.10	88.06 ± 4.07	Y						
	7/23/2008	2.59 ± 0.44	9.58 ± 1.61	Y	31.10 ± 1.31	115.07 ± 4.85	Y						
	7/30/2008	2.07 ± 0.37	7.68 ± 1.36	Y	34.67 ± 1.23	128.27 ± 4.56	Y						
	8/6/2008	1.94 ± 0.29	7.18 ± 1.07	Y	26.70 ± 0.96	98.79 ± 3.55	Y						
	8/13/2008	2.31 ± 0.26	8.55 ± 0.97	Y	29.70 ± 0.87	109.89 ± 3.20	Y						
	8/20/2008	2.16 ± 0.28	7.99 ± 1.02	Y	27.50 ± 0.94	101.75 ± 3.46	Y						
	8/27/2008	1.75 ± 0.24	6.48 ± 0.89	Y	25.60 ± 0.83	94.72 ± 3.07	Y						
	9/3/2008	2.69 ± 0.39	9.95 ± 1.46	Y	22.50 ± 1.14	83.25 ± 4.22	Y						
	9/10/2008	1.66 ± 0.31	6.14 ± 1.14	Y	30.20 ± 1.10	111.74 ± 4.07	Y						
	9/17/2008	1.56 ± 0.32	5.77 ± 1.17	Y	32.00 ± 1.18	118.40 ± 4.37	Y						
	9/24/2008	1.79 ± 0.30	6.62 ± 1.11	Y	37.20 ± 1.19	137.64 ± 4.40	Y						
DUBOIS	7/2/2008	1.23 ± 0.32	4.55 ± 1.20	Y	28.20 ± 1.16	104.34 ± 4.29	Y						
	7/9/2008	2.04 ± 0.28	7.55 ± 1.04	Y	29.80 ± 0.89	110.26 ± 3.29	Y						
	7/16/2008	2.34 ± 0.36	8.66 ± 1.32	Y	26.90 ± 1.10	99.53 ± 4.07	Y						
	7/23/2008	2.15 ± 0.38	7.96 ± 1.39	Y	32.30 ± 1.20	119.51 ± 4.44	Y						
	7/30/2008	2.84 ± 0.42	10.51 ± 1.56	Y	37.30 ± 1.32	138.01 ± 4.89	Y						
	8/6/2008	1.88 ± 0.21	6.96 ± 0.79	Y	24.00 ± 0.69	88.80 ± 2.55	Y						
	8/13/2008	2.77 ± 0.36	10.25 ± 1.32	Y	38.90 ± 1.23	143.93 ± 4.55	Y						
	8/20/2008	1.38 ± 0.16	5.11 ± 0.60	Y	20.20 ± 0.57	74.74 ± 2.09	Y						
	8/27/2008	1.53 ± 0.20	5.66 ± 0.74	Y	24.20 ± 0.70	89.54 ± 2.60	Y						
	9/3/2008	1.23 ± 0.22	4.55 ± 0.81	Y	20.80 ± 0.78	76.96 ± 2.87	Y						
	9/10/2008	1.59 ± 0.31	5.88 ± 1.16	Y	27.40 ± 1.11	101.38 ± 4.11	Y						
	9/17/2008	1.78 ± 0.26	6.59 ± 0.96	Y	30.50 ± 0.93	112.85 ± 3.44	Y						
	9/24/2008	2.28 ± 0.28	8.44 ± 1.02	Y	35.10 ± 0.99	129.87 ± 3.65	Y						
IDAHO FALLS	7/2/2008	1.45 ± 0.35	5.37 ± 1.31	Y	30.20 ± 1.24	111.74 ± 4.59	Y						
	7/9/2008	2.09 ± 0.38	7.73 ± 1.41	Y	33.00 ± 1.22	122.10 ± 4.51	Y						
	7/16/2008	1.73 ± 0.35	6.40 ± 1.30	Y	29.70 ± 1.20	109.89 ± 4.44	Y						
	7/23/2008	2.57 ± 0.41	9.51 ± 1.53	Y	34.40 ± 1.28	127.28 ± 4.74	Y						
a	7/30/2008	3.87 ± 1.01	14.30 ± 3.75	Y	39.72 ± 2.99	146.97 ± 11.07	Y						
	8/6/2008	2.10 ± 0.27	7.77 ± 1.01	Y	30.30 ± 0.92	112.11 ± 3.40	Y						

TABLE C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

Sampling Group and Location	Sampling Date	GROSS ALPHA					GROSS BETA						
		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s		
a	8/13/2008	1.83 ± 0.23	6.77 ± 0.85	Y	27.00 ± 0.80	99.90 ± 2.96	Y						
	8/20/2008	1.63 ± 0.21	6.03 ± 0.78	Y	30.20 ± 0.81	111.74 ± 3.00	Y						
	8/27/2008	1.82 ± 0.24	6.73 ± 0.90	Y	26.80 ± 0.84	99.16 ± 3.10	Y						
	9/3/2008	6.21 ± 2.20	22.98 ± 8.14	Y	39.40 ± 6.70	145.78 ± 24.79	Y						
	9/10/2008	2.46 ± 0.38	9.10 ± 1.39	Y	30.50 ± 1.21	112.85 ± 4.48	Y						
	9/17/2008	2.85 ± 0.37	10.55 ± 1.36	Y	33.60 ± 1.17	124.32 ± 4.33	Y						
	9/24/2008	2.67 ± 0.36	9.88 ± 1.33	Y	39.00 ± 1.27	144.30 ± 4.70	Y						
JACKSON	7/2/2008	2.05 ± 0.35	7.59 ± 1.28	Y	28.00 ± 1.09	103.60 ± 4.03	Y						
	7/9/2008	2.09 ± 0.36	7.73 ± 1.34	Y	32.40 ± 1.15	119.88 ± 4.26	Y						
	7/16/2008	1.72 ± 0.30	6.36 ± 1.11	Y	30.60 ± 1.04	113.22 ± 3.85	Y						
	7/23/2008	1.92 ± 0.31	7.10 ± 1.16	Y	22.60 ± 0.94	83.62 ± 3.46	Y						
	7/30/2008	2.14 ± 0.40	7.92 ± 1.47	Y	34.22 ± 1.31	126.60 ± 4.86	Y						
	8/6/2008	2.50 ± 0.46	9.25 ± 1.69	Y	33.00 ± 1.52	122.10 ± 5.62	Y						
	8/13/2008	1.82 ± 0.25	6.73 ± 0.91	Y	29.90 ± 0.89	110.63 ± 3.29	Y						
	8/20/2008	1.42 ± 0.20	5.25 ± 0.75	Y	27.30 ± 0.79	101.01 ± 2.93	Y						
	8/27/2008	1.94 ± 0.24	7.18 ± 0.88	Y	30.20 ± 0.83	111.74 ± 3.07	Y						
	9/3/2008	1.83 ± 0.29	6.77 ± 1.08	Y	22.50 ± 0.94	83.25 ± 3.49	Y						
	9/10/2008	1.92 ± 0.30	7.10 ± 1.11	Y	29.60 ± 1.02	109.52 ± 3.77	Y						
	9/17/2008	2.21 ± 0.31	8.18 ± 1.14	Y	35.60 ± 1.08	131.72 ± 4.00	Y						
	9/24/2008	2.59 ± 0.31	9.58 ± 1.15	Y	36.50 ± 1.08	135.05 ± 4.00	Y						
REXBURG CMS a	7/2/2008	1.70 ± 2.14	6.29 ± 7.92	Y	24.80 ± 6.62	91.76 ± 24.49	Y						
	7/9/2008	2.86 ± 0.34	10.58 ± 1.27	Y	32.70 ± 1.02	120.99 ± 3.77	Y						
	7/16/2008	1.43 ± 0.26	5.29 ± 0.97	Y	30.40 ± 0.97	112.48 ± 3.57	Y						
	7/23/2008	2.66 ± 0.35	9.84 ± 1.29	Y	36.40 ± 1.10	134.68 ± 4.07	Y						
	7/30/2008	2.90 ± 0.37	10.75 ± 1.37	Y	39.46 ± 1.18	146.00 ± 4.35	Y						
	8/6/2008	2.43 ± 0.26	8.99 ± 0.97	Y	31.10 ± 0.84	115.07 ± 3.12	Y						
	8/13/2008	1.72 ± 0.21	6.36 ± 0.77	Y	27.40 ± 0.73	101.38 ± 2.72	Y						
	8/20/2008	1.84 ± 0.21	6.81 ± 0.77	Y	28.20 ± 0.74	104.34 ± 2.72	Y						
	8/27/2008	2.20 ± 0.23	8.14 ± 0.86	Y	29.00 ± 0.77	107.30 ± 2.83	Y						
	9/3/2008	1.85 ± 0.28	6.85 ± 1.04	Y	24.40 ± 0.92	90.28 ± 3.40	Y						
	9/10/2008	1.84 ± 0.28	6.81 ± 1.03	Y	33.60 ± 1.01	124.32 ± 3.74	Y						
	9/17/2008	1.56 ± 0.26	5.77 ± 0.97	Y	32.80 ± 1.00	121.36 ± 3.69	Y						
		9/24/2008	2.52 ± 0.29	9.32 ± 1.08	Y	39.90 ± 1.05	147.63 ± 3.89	Y					
	INL SITE												
EFS	7/2/2008	2.04 ± 0.36	7.55 ± 1.34	Y	31.50 ± 1.19	116.55 ± 4.40	Y						
	7/9/2008	2.39 ± 0.38	8.84 ± 1.39	Y	30.90 ± 1.14	114.33 ± 4.22	Y						
	7/16/2008	1.66 ± 0.32	6.14 ± 1.18	Y	27.60 ± 1.09	102.12 ± 4.03	Y						
	7/23/2008	2.33 ± 0.38	8.62 ± 1.41	Y	36.00 ± 1.23	133.20 ± 4.55	Y						
	7/30/2008	2.80 ± 0.38	10.35 ± 1.39	Y	36.70 ± 1.18	135.77 ± 4.37	Y						
	8/6/2008	2.41 ± 0.53	8.92 ± 1.96	Y	34.00 ± 1.81	125.80 ± 6.70	Y						
	8/13/2008	3.00 ± 0.53	11.10 ± 1.94	Y	35.90 ± 1.76	132.83 ± 6.51	Y						
	8/20/2008	±	±		±	±							
	8/27/2008	8.98 ± 3.09	33.23 ± 11.43	Y	41.50 ± 9.67	153.55 ± 35.78	Y						
	9/3/2008	2.06 ± 0.33	7.62 ± 1.24	Y	23.30 ± 1.05	86.21 ± 3.89	Y						
	9/10/2008	1.93 ± 0.32	7.14 ± 1.17	Y	32.50 ± 1.10	120.25 ± 4.07	Y						
	9/17/2008	1.90 ± 0.31	7.03 ± 1.16	Y	33.20 ± 1.12	122.84 ± 4.14	Y						
	9/24/2008	2.30 ± 0.32	8.51 ± 1.18	Y	39.20 ± 1.19	145.04 ± 4.40	Y						
MAIN GATE	7/2/2008	1.92 ± 0.36	7.10 ± 1.33	Y	30.20 ± 1.18	111.74 ± 4.37	Y						
	7/9/2008	2.61 ± 0.39	9.66 ± 1.44	Y	31.80 ± 1.17	117.66 ± 4.33	Y						
	7/16/2008	1.83 ± 0.32	6.77 ± 1.17	Y	26.40 ± 1.04	97.68 ± 3.85	Y						
	7/23/2008	2.81 ± 0.45	10.40 ± 1.67	Y	36.00 ± 1.38	133.20 ± 5.11	Y						
	7/30/2008	2.95 ± 0.58	10.92 ± 2.14	Y	44.07 ± 1.86	163.05 ± 6.90	Y						
	8/6/2008	1.90 ± 0.26	7.03 ± 0.96	Y	31.10 ± 0.92	115.07 ± 3.40	Y						
	8/13/2008	1.24 ± 0.21	4.59 ± 0.78	Y	29.00 ± 0.86	107.30 ± 3.19	Y						
	8/20/2008	2.55 ± 0.26	9.44 ± 0.95	Y	31.00 ± 0.83	114.70 ± 3.07	Y						

TABLE C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

Sampling Group and Location	Sampling Date	GROSS ALPHA				GROSS BETA			
		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)	
	8/27/2008	1.46 ± 0.23	5.40 ± 0.84	Y	24.20 ± 0.82	89.54 ± 3.05	Y		
	9/3/2008	2.38 ± 0.35	8.81 ± 1.28	Y	22.70 ± 1.04	83.99 ± 3.85	Y		
	9/10/2008	1.41 ± 0.32	5.22 ± 1.18	Y	31.90 ± 1.20	118.03 ± 4.44	Y		
	9/17/2008	1.98 ± 0.35	7.33 ± 1.28	Y	36.40 ± 1.25	134.68 ± 4.63	Y		
	9/24/2008	2.86 ± 0.39	10.58 ± 1.44	Y	45.60 ± 1.41	168.72 ± 5.22	Y		
VAN BUREN GATE	7/2/2008	1.81 ± 0.39	6.70 ± 1.44	Y	28.90 ± 1.28	106.93 ± 4.74	Y		
	7/9/2008	2.93 ± 0.44	10.84 ± 1.63	Y	31.40 ± 1.27	116.18 ± 4.70	Y		
	7/16/2008	1.09 ± 0.30	4.03 ± 1.10	Y	26.80 ± 1.10	99.16 ± 4.07	Y		
	7/23/2008	3.21 ± 0.46	11.88 ± 1.70	Y	35.30 ± 1.35	130.61 ± 5.00	Y		
	7/30/2008	2.39 ± 0.39	8.83 ± 1.43	Y	34.70 ± 1.24	128.39 ± 4.61	Y		
	8/6/2008	2.29 ± 0.29	8.47 ± 1.08	Y	31.30 ± 0.96	115.81 ± 3.57	Y		
	8/13/2008	1.69 ± 0.24	6.25 ± 0.90	Y	29.20 ± 0.89	108.04 ± 3.30	Y		
	8/20/2008	1.70 ± 0.23	6.29 ± 0.86	Y	32.50 ± 0.91	120.25 ± 3.36	Y		
	8/27/2008	1.75 ± 0.24	6.48 ± 0.90	Y	26.40 ± 0.85	97.68 ± 3.13	Y		
	9/3/2008	2.85 ± 0.37	10.55 ± 1.37	Y	25.50 ± 1.08	94.35 ± 4.00	Y		
	9/10/2008	1.65 ± 0.32	6.11 ± 1.18	Y	35.10 ± 1.19	129.87 ± 4.40	Y		
	9/17/2008	1.68 ± 0.32	6.22 ± 1.19	Y	34.20 ± 1.20	126.54 ± 4.44	Y		
	9/24/2008	2.04 ± 0.32	7.55 ± 1.19	Y	42.70 ± 1.27	157.99 ± 4.70	Y		
a. Invalid Sample Result									

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)			Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)			Result > 3s
BOUNDARY								
ARCO	07/02/2008	0.59	±	1.49	2.20	±	5.50	
	07/09/2008	0.23	±	1.79	0.86	±	6.62	
	07/16/2008	0.84	±	1.48	3.11	±	5.48	
	07/23/2008	0.48	±	1.61	1.79	±	5.96	
	07/30/2008	-1.69	±	1.47	-6.25	±	5.44	
	08/06/2008	-1.79	±	1.79	-6.61	±	6.62	
	08/13/2008	3.57	±	2.23	13.21	±	8.23	
	08/20/2008	-0.60	±	1.51	-2.24	±	5.59	
	08/27/2008	-0.82	±	1.54	-3.03	±	5.68	
	09/03/2008	1.11	±	1.73	4.11	±	6.39	
	09/10/2008	-0.92	±	1.43	-3.40	±	5.27	
	09/17/2008	2.90	±	1.65	10.72	±	6.09	
	09/24/2008	0.95	±	1.47	3.52	±	5.44	
ATOMIC CITY	07/02/2008	0.75	±	1.88	2.79	±	6.97	
	07/09/2008	0.21	±	1.62	0.78	±	6.00	
	07/16/2008	1.04	±	1.83	3.85	±	6.79	
	07/23/2008	0.48	±	1.61	1.79	±	5.97	
	07/30/2008	-2.06	±	1.79	-7.60	±	6.62	
	08/06/2008	-1.82	±	1.83	-6.74	±	6.75	
	08/13/2008	4.13	±	2.57	15.26	±	9.52	
	08/20/2008	-0.55	±	1.38	-2.04	±	5.09	
	08/27/2008	-0.92	±	1.73	-3.41	±	6.40	
	09/03/2008	1.06	±	1.65	3.92	±	6.10	
	09/10/2008	-1.14	±	1.77	-4.23	±	6.56	
	09/17/2008	2.68	±	1.52	9.91	±	5.63	
	09/24/2008	1.19	±	1.84	4.41	±	6.82	
QA-1	07/02/2008	0.72	±	1.80	2.66	±	6.65	
	07/09/2008	0.23	±	1.73	0.83	±	6.40	
	07/16/2008	1.01	±	1.78	3.73	±	6.57	
	07/23/2008	0.59	±	1.96	2.18	±	7.27	
	07/30/2008	-1.91	±	1.67	-7.08	±	6.17	
	08/06/2008	-1.81	±	1.81	-6.69	±	6.70	
	08/13/2008	4.18	±	2.60	15.46	±	9.64	
	08/20/2008	-0.66	±	1.65	-2.44	±	6.09	
	08/27/2008	-0.94	±	1.75	-3.46	±	6.48	
	09/03/2008	1.11	±	1.73	4.11	±	6.39	
	09/10/2008	-1.06	±	1.65	-3.93	±	6.10	
	09/17/2008	3.25	±	1.85	12.02	±	6.84	
	09/24/2008	1.24	±	1.92	4.58	±	7.09	
BLUE DOME	07/02/2008	-0.74	±	1.34	-2.75	±	4.95	
	07/09/2008	0.08	±	1.41	0.30	±	5.21	
	07/16/2008	-1.11	±	1.33	-4.12	±	4.93	
	07/23/2008	1.24	±	1.71	4.59	±	6.31	
	07/30/2008	0.20	±	1.43	0.73	±	5.29	
	08/06/2008	0.71	±	1.52	2.62	±	5.63	
	08/13/2008	-2.44	±	1.35	-9.04	±	5.00	
	08/20/2008	2.10	±	1.18	7.75	±	4.37	
	08/27/2008	0.94	±	1.59	3.47	±	5.88	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)			Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)			Result > 3s
BOUNDARY								
	09/03/2008	-0.64	±	1.27	-2.39	±	4.71	
	09/10/2008	-0.63	±	1.26	-2.32	±	4.66	
	09/17/2008	-0.24	±	1.36	-0.88	±	5.02	
	09/24/2008	0.39	±	1.31	1.44	±	4.84	
QA-2	07/02/2008	-0.93	±	1.67	-3.43	±	6.17	
	07/09/2008	0.10	±	1.71	0.36	±	6.33	
	07/16/2008	-1.18	±	1.41	-4.36	±	5.23	
	07/23/2008	1.43	±	1.96	5.27	±	7.25	
	07/30/2008	0.20	±	1.45	0.75	±	5.38	
	08/06/2008	1.02	±	2.20	3.78	±	8.12	
	08/13/2008	-2.59	±	1.43	-9.59	±	5.30	
	08/20/2008	2.90	±	1.63	10.74	±	6.05	
	08/27/2008	0.91	±	1.55	3.37	±	5.72	
	09/03/2008	-0.84	±	1.67	-3.13	±	6.17	
	09/10/2008	-0.72	±	1.46	-2.68	±	5.39	
	09/17/2008	-0.29	±	1.67	-1.09	±	6.18	
	09/24/2008	0.46	±	1.55	1.71	±	5.75	
FAA TOWER	07/02/2008	-0.82	±	1.47	-3.02	±	5.44	
	07/09/2008	0.09	±	1.53	0.33	±	5.66	
	07/16/2008	-1.19	±	1.43	-4.41	±	5.28	
	07/23/2008	1.65	±	2.27	6.12	±	8.41	
	07/30/2008	0.16	±	1.19	0.61	±	4.40	
	08/06/2008	0.87	±	1.87	3.22	±	6.92	
	08/13/2008	-2.51	±	1.39	-9.29	±	5.14	
	08/20/2008	2.81	±	1.59	10.41	±	5.87	
	08/27/2008	0.88	±	1.50	3.26	±	5.54	
	09/03/2008	-0.82	±	1.62	-3.04	±	6.01	
a	09/10/2008	-1.81	±	3.64	-6.70	±	13.46	
	09/17/2008	-0.32	±	1.84	-1.19	±	6.79	
	09/24/2008	0.41	±	1.37	1.50	±	5.05	
HOWE	07/02/2008	-0.72	±	1.30	-2.67	±	4.80	
	07/09/2008	0.07	±	1.23	0.26	±	4.54	
	07/16/2008	-1.03	±	1.23	-3.81	±	4.56	
	07/23/2008	1.19	±	1.63	4.39	±	6.04	
	07/30/2008	0.21	±	1.50	0.77	±	5.56	
	08/06/2008	0.68	±	1.47	2.53	±	5.43	
	08/13/2008	-3.51	±	1.94	-12.99	±	7.19	
	08/20/2008	1.99	±	1.12	7.37	±	4.15	
	08/27/2008	0.88	±	1.49	3.25	±	5.52	
	09/03/2008	-0.56	±	1.10	-2.07	±	4.08	
	09/10/2008	-0.83	±	1.67	-3.08	±	6.18	
	09/17/2008	-0.20	±	1.16	-0.75	±	4.28	
	09/24/2008	0.38	±	1.27	1.40	±	4.69	
MONTEVIEW	07/02/2008	-0.96	±	1.73	-3.56	±	6.41	
	07/09/2008	0.08	±	1.44	0.31	±	5.35	
	07/16/2008	-1.22	±	1.46	-4.52	±	5.42	
	07/23/2008	1.05	±	1.45	3.90	±	5.35	
	07/30/2008	0.29	±	2.09	1.07	±	7.73	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)			Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)			Result > 3s
BOUNDARY								
	08/06/2008	0.77	±	1.65	2.84	±	6.10	
	08/13/2008	-2.41	±	1.33	-8.91	±	4.93	
	08/20/2008	2.29	±	1.29	8.48	±	4.77	
	08/27/2008	1.07	±	1.81	3.95	±	6.71	
	09/03/2008	-0.73	±	1.45	-2.71	±	5.35	
	09/10/2008	-0.88	±	1.77	-3.26	±	6.54	
	09/17/2008	-0.27	±	1.53	-1.00	±	5.66	
	09/24/2008	0.44	±	1.48	1.63	±	5.46	
MUD LAKE								
	07/02/2008	-0.87	±	1.57	-3.23	±	5.82	
	07/09/2008	0.08	±	1.46	0.31	±	5.39	
	07/16/2008	-1.29	±	1.54	-4.77	±	5.71	
	07/23/2008	1.05	±	1.44	3.89	±	5.35	
	07/30/2008	0.21	±	1.53	0.79	±	5.67	
	08/06/2008	0.78	±	1.67	2.87	±	6.17	
	08/13/2008	-2.60	±	1.44	-9.64	±	5.33	
	08/20/2008	2.21	±	1.25	8.19	±	4.61	
	08/27/2008	0.99	±	1.68	3.67	±	6.22	
	09/03/2008	-0.71	±	1.40	-2.62	±	5.17	
	09/10/2008	-0.75	±	1.51	-2.77	±	5.57	
	09/17/2008	-0.26	±	1.48	-0.96	±	5.47	
	09/24/2008	0.43	±	1.43	1.57	±	5.29	
DISTANT								
BLACKFOOT CMS								
	07/02/2008	0.62	±	1.55	2.29	±	5.73	
	07/09/2008	0.20	±	1.56	0.75	±	5.78	
	07/16/2008	0.78	±	1.38	2.89	±	5.10	
	07/23/2008	0.57	±	1.89	2.10	±	6.99	
	07/30/2008	-1.93	±	1.68	-7.13	±	6.21	
	08/06/2008	-1.73	±	1.73	-6.41	±	6.42	
	08/13/2008	3.65	±	2.28	13.51	±	8.42	
	08/20/2008	-0.58	±	1.46	-2.16	±	5.41	
	08/27/2008	-0.82	±	1.53	-3.02	±	5.65	
	09/03/2008	0.89	±	1.38	3.29	±	5.12	
	09/10/2008	-0.99	±	1.54	-3.68	±	5.70	
	09/17/2008	2.45	±	1.39	9.05	±	5.15	
	09/24/2008	1.27	±	1.96	4.68	±	7.25	
CRATERS								
	07/02/2008	0.69	±	1.73	2.57	±	6.41	
	07/09/2008	0.29	±	2.23	1.07	±	8.24	
	07/16/2008	1.05	±	1.86	3.90	±	6.88	
	07/23/2008	0.62	±	2.08	2.31	±	7.69	
	07/30/2008	-1.98	±	1.72	-7.31	±	6.36	
	08/06/2008	-2.17	±	2.17	-8.03	±	8.04	
	08/13/2008	4.18	±	2.61	15.47	±	9.64	
	08/20/2008	-0.81	±	2.03	-3.00	±	7.49	
	08/27/2008	-0.93	±	1.75	-3.46	±	6.48	
	09/03/2008	1.31	±	2.04	4.86	±	7.56	
	09/10/2008	-1.09	±	1.70	-4.05	±	6.28	
	09/17/2008	3.47	±	1.97	12.83	±	7.30	
	09/24/2008	1.14	±	1.77	4.23	±	6.55	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)			Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)			Result > 3s
BOUNDARY								
DUBOIS	07/02/2008	-0.94	±	1.69	-3.47	±	6.25	
	07/09/2008	0.07	±	1.15	0.24	±	4.25	
	07/16/2008	-1.36	±	1.63	-5.03	±	6.03	
	07/23/2008	1.23	±	1.69	4.55	±	6.25	
	07/30/2008	0.26	±	1.88	0.97	±	6.96	
	08/06/2008	0.58	±	1.26	2.16	±	4.65	
	08/13/2008	-3.89	±	2.15	-14.39	±	7.96	
	08/20/2008	1.82	±	1.02	6.72	±	3.79	
	08/27/2008	0.76	±	1.29	2.81	±	4.78	
	09/03/2008	-0.57	±	1.12	-2.10	±	4.14	
	09/10/2008	-0.82	±	1.65	-3.04	±	6.12	
	09/17/2008	-0.22	±	1.26	-0.82	±	4.68	
	09/24/2008	0.37	±	1.25	1.38	±	4.63	
IDAHO FALLS	07/02/2008	-1.00	±	1.80	-3.71	±	6.68	
	07/09/2008	0.10	±	1.75	0.37	±	6.49	
	07/16/2008	-1.49	±	1.78	-5.51	±	6.60	
	07/23/2008	1.31	±	1.79	4.83	±	6.64	
	a 07/30/2008	0.78	±	5.64	2.89	±	20.86	
	08/06/2008	0.81	±	1.74	2.99	±	6.42	
	08/13/2008	-2.45	±	1.35	-9.05	±	5.01	
	08/20/2008	2.53	±	1.43	9.37	±	5.28	
	08/27/2008	0.95	±	1.62	3.52	±	5.98	
	a 09/03/2008	-7.29	±	14.39	-26.99	±	53.25	
	09/10/2008	-0.89	±	1.79	-3.29	±	6.61	
	09/17/2008	-0.30	±	1.70	-1.11	±	6.30	
	09/24/2008	0.52	±	1.74	1.92	±	6.44	
JACKSON	07/02/2008	0.68	±	1.70	2.52	±	6.29	
	07/09/2008	0.23	±	1.74	0.84	±	6.45	
	07/16/2008	0.88	±	1.55	3.25	±	5.73	
	07/23/2008	0.44	±	1.48	1.64	±	5.47	
	07/30/2008	-2.18	±	1.90	-8.08	±	7.04	
	a 08/06/2008	-3.95	±	3.96	-14.62	±	14.64	
	08/13/2008	4.35	±	2.71	16.08	±	10.03	
	08/20/2008	-0.62	±	1.55	-2.29	±	5.72	
	08/27/2008	-0.84	±	1.57	-3.09	±	5.79	
	09/03/2008	1.01	±	1.57	3.73	±	5.80	
	09/10/2008	-0.99	±	1.54	-3.67	±	5.70	
	09/17/2008	2.88	±	1.63	10.64	±	6.05	
	09/24/2008	1.00	±	1.55	3.70	±	5.72	
REXBURG CMS a	07/02/2008	-7.93	±	14.27	-29.33	±	52.79	
	07/09/2008	0.08	±	1.34	0.29	±	4.96	
	07/16/2008	-1.06	±	1.27	-3.93	±	4.71	
	07/23/2008	1.00	±	1.38	3.72	±	5.11	
	07/30/2008	0.21	±	1.52	0.78	±	5.64	
	08/06/2008	0.69	±	1.47	2.54	±	5.46	
	08/13/2008	-2.10	±	1.16	-7.76	±	4.29	
	08/20/2008	2.24	±	1.26	8.28	±	4.66	
	08/27/2008	0.77	±	1.31	2.85	±	4.84	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10 ⁻¹⁵ µCi/mL)		Result ± 1s Uncertainty (x 10 ⁻¹¹ Bq/mL)		Result > 3s
BOUNDARY						
	09/03/2008	-0.67	± 1.33	-2.49	± 4.91	
	09/10/2008	-0.65	± 1.30	-2.39	± 4.81	
	09/17/2008	-0.24	± 1.36	-0.88	± 5.02	
	09/24/2008	0.38	± 1.28	1.41	± 4.73	
INL SITE						
EFS	07/02/2008	0.73	± 1.81	2.68	± 6.71	
	07/09/2008	0.23	± 1.76	0.85	± 6.52	
	07/16/2008	0.98	± 1.73	3.63	± 6.40	
	07/23/2008	0.53	± 1.78	1.97	± 6.57	
	07/30/2008	-1.80	± 1.56	-6.64	± 5.78	
a	08/06/2008	-5.04	± 5.05	-18.65	± 18.68	
a	08/13/2008	11.38	± 7.10	42.12	± 26.26	
a	08/20/2008		±		±	
a	08/27/2008	-20.60	± 38.59	-76.20	± 142.77	
	09/03/2008	1.16	± 1.80	4.29	± 6.66	
	09/10/2008	-1.06	± 1.65	-3.93	± 6.10	
	09/17/2008	3.15	± 1.79	11.67	± 6.63	
	09/24/2008	1.11	± 1.72	4.12	± 6.38	
MAIN GATE	07/02/2008	0.74	± 1.84	2.72	± 6.81	
	07/09/2008	0.23	± 1.79	0.86	± 6.62	
	07/16/2008	0.94	± 1.66	3.48	± 6.13	
	07/23/2008	0.63	± 2.10	2.33	± 7.77	
	07/30/2008	-3.24	± 2.82	-12.00	± 10.44	
	08/06/2008	-1.83	± 1.83	-6.78	± 6.79	
	08/13/2008	4.22	± 2.63	15.61	± 9.73	
	08/20/2008	-0.61	± 1.52	-2.26	± 5.64	
	08/27/2008	-0.96	± 1.80	-3.55	± 6.65	
	09/03/2008	1.14	± 1.78	4.23	± 6.58	
	09/10/2008	-1.21	± 1.88	-4.49	± 6.96	
	09/17/2008	3.55	± 2.02	13.15	± 7.48	
	09/24/2008	1.33	± 2.06	4.92	± 7.62	
VAN BUREN GATE	07/02/2008	0.84	± 2.09	3.09	± 7.74	
	07/09/2008	0.27	± 2.03	0.98	± 7.52	
	07/16/2008	1.01	± 1.79	3.75	± 6.62	
	07/23/2008	0.62	± 2.06	2.28	± 7.62	
	07/30/2008	-2.01	± 1.75	-7.42	± 6.46	
	08/06/2008	-1.97	± 1.98	-7.30	± 7.32	
	08/13/2008	4.44	± 2.77	16.42	± 10.24	
	08/20/2008	-0.69	± 1.73	-2.56	± 6.41	
	08/27/2008	-0.95	± 1.78	-3.51	± 6.58	
	09/03/2008	1.16	± 1.80	4.29	± 6.67	
	09/10/2008	-1.15	± 1.78	-4.24	± 6.58	
	09/17/2008	3.42	± 1.94	12.65	± 7.19	
	09/24/2008	1.18	± 1.83	4.36	± 6.75	
a. Invalid Sample Result						

TABLE C-3. Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/240, and Strontium-90 Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result \pm 1s Uncertainty ($\times 10^{-18}$ μ Ci/mL)			Result \pm 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	9/29/2008	CESIUM-137	-60.08	\pm	78.09	-222.29	\pm	288.94	
ATOMIC CITY	9/29/2008	CESIUM-137	69.58	\pm	118.54	257.44	\pm	438.58	
		STRONTIUM-90	5.64	\pm	11.40	20.87	\pm	42.18	
ATOMIC CITY (QA-1)	9/29/2008	CESIUM-137	-160.13	\pm	298.29	-592.47	\pm	1103.68	
		STRONTIUM-90	5.81	\pm	8.40	21.50	\pm	31.08	
BLUE DOME	9/29/2008	CESIUM-137	-125.51	\pm	84.78	-464.40	\pm	313.68	
		STRONTIUM-90	17.00	\pm	8.45	62.90	\pm	31.27	
BLUE DOME (QA-2)	9/29/2008	CESIUM-137	65.60	\pm	136.01	242.72	\pm	503.23	
		STRONTIUM-90	13.10	\pm	8.70	48.47	\pm	32.19	
FAA TOWER	9/29/2008	AMERICIUM-241	-2.64	\pm	5.31	-9.77	\pm	19.65	
		CESIUM-137	-122.28	\pm	92.23	-452.42	\pm	341.26	
		PLUTONIUM-238	0.00	\pm	0.00	0.00	\pm	0.00	
		PLUTONIUM-239/40	1.11	\pm	1.28	4.11	\pm	4.74	
HOWE	9/29/2008	CESIUM-137	30.07	\pm	99.44	111.24	\pm	367.92	
		STRONTIUM-90	-11.60	\pm	13.75	-42.92	\pm	50.88	
MONTEVIEW	9/29/2008	CESIUM-137	-157.69	\pm	262.47	-583.45	\pm	971.14	
MUD LAKE	9/29/2008	AMERICIUM-241	0.55	\pm	0.66	2.02	\pm	2.42	
		CESIUM-137	86.06	\pm	112.38	318.43	\pm	415.82	
		PLUTONIUM-238	-0.47	\pm	2.08	-1.72	\pm	7.70	
		PLUTONIUM-239/40	-0.47	\pm	0.93	-1.72	\pm	3.44	

TABLE C-3. Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/240, and Strontium-90 Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty (x 10 ⁻¹⁸ µCi/mL)			Result ± 1s Uncertainty (x 10 ⁻¹³ Bq/mL)			Result > 3s
DISTANT									
BLACKFOOT	9/29/2008	CESIUM-137	-77.38	±	242.39	-286.29	±	896.84	
CRATERS	9/29/2008	CESIUM-137	-16.76	±	130.75	-62.01	±	483.78	
DUBOIS	9/29/2008	CESIUM-137	-66.80	±	124.55	-247.16	±	460.84	
IDAHO FALLS	9/29/2008	AMERICIUM-241	1.68	±	3.37	6.22	±	12.47	
		CESIUM-137	-121.57	±	319.10	-449.80	±	1180.69	
		PLUTONIUM-238	0.00	±	0.00	0.00	±	0.00	
		PLUTONIUM-239/40	0.00	±	0.00	0.00	±	0.00	
JACKSON	9/29/2008	CESIUM-137	19.27	±	124.42	71.29	±	460.36	
REXBURG CMS	9/29/2008	CESIUM-137	-150.47	±	126.30	-556.75	±	467.30	
		STRONTIUM-90	-9.10	±	8.70	-33.67	±	32.19	
INL SITE									
EFS	9/29/2008	CESIUM-137	-45.86	±	112.42	-169.69	±	415.96	
		STRONTIUM-90	21.40	±	12.30	79.18	±	45.51	
MAIN GATE	9/29/2008	AMERICIUM-241	-2.47	±	3.50	-9.14	±	12.95	
		CESIUM-137	98.21	±	134.73	363.39	±	498.52	
		PLUTONIUM-238	0.00	±	0.00	0.00	±	0.00	
		PLUTONIUM-239/40	1.20	±	1.48	4.44	±	5.48	
VAN BUREN GATE	9/29/2008	AMERICIUM-241	0.00	±	0.00	0.00	±	0.00	
		CESIUM-137	238.98	±	157.33	884.21	±	582.10	
		PLUTONIUM-238	0.00	±	0.00	0.00	±	0.00	
		PLUTONIUM-239/40	-0.41	±	1.41	-1.50	±	5.22	

TABLE C-4. Tritium Concentrations in Atmospheric Moisture.

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty		Result ± 1s Uncertainty		Collection Medium	Result > 3s
			(x 10 ⁻¹³ μCi/mL _{air})		(x 10 ⁻⁹ Bq/mL _{air})			
BOUNDARY								
ATOMIC CITY	06/25/2008	07/09/2008	5.11	± 2.72	18.92	± 10.06	Molecular Sieve	
ATOMIC CITY	07/09/2008	07/23/2008	1.12	± 2.21	4.16	± 8.18	Molecular Sieve	
ATOMIC CITY	07/23/2008	08/13/2008	8.37	± 2.28	30.98	± 8.44	Molecular Sieve	Y
ATOMIC CITY	08/13/2008	09/03/2008	7.00	± 2.11	25.90	± 7.82	Molecular Sieve	Y
DISTANT								
BLACKFOOT	06/18/2008	07/02/2008	5.74	± 2.96	21.25	± 10.94	Molecular Sieve	
BLACKFOOT	07/02/2008	07/16/2008	3.65	± 1.97	13.51	± 7.30	Molecular Sieve	
BLACKFOOT	07/16/2008	07/30/2008	18.92	± 2.78	70.02	± 10.28	Molecular Sieve	Y
BLACKFOOT	07/30/2008	09/03/2008	4.07	± 0.92	15.07	± 3.40	Molecular Sieve	Y
BLACKFOOT	09/03/2008	09/19/2008	5.53	± 1.80	20.48	± 6.68	Molecular Sieve	Y
IDAHO FALLS	06/18/2008	07/02/2008	5.68	± 2.83	21.02	± 10.46	Molecular Sieve	
IDAHO FALLS	07/02/2008	07/16/2008	4.59	± 2.61	16.98	± 9.65	Molecular Sieve	
IDAHO FALLS	07/16/2008	07/28/2008	10.93	± 3.07	40.43	± 11.35	Molecular Sieve	Y
IDAHO FALLS	07/28/2008	08/11/2008	14.58	± 2.68	53.95	± 9.90	Molecular Sieve	Y
IDAHO FALLS	08/11/2008	08/27/2008	8.01	± 2.33	29.65	± 8.64	Molecular Sieve	Y
IDAHO FALLS	08/27/2008	09/10/2008	8.09	± 2.26	29.93	± 8.38	Molecular Sieve	Y
REXBURG CMS	06/18/2008	07/02/2008	7.30	± 2.83	27.01	± 10.48	Molecular Sieve	
REXBURG CMS	07/02/2008	07/16/2008	3.73	± 2.78	13.82	± 10.30	Molecular Sieve	
REXBURG CMS	07/16/2008	07/31/2008	6.84	± 2.52	25.30	± 9.33	Molecular Sieve	
REXBURG CMS	07/31/2008	08/13/2008	9.31	± 2.95	34.44	± 10.93	Molecular Sieve	Y
REXBURG CMS	08/14/2008	08/27/2008	5.79	± 2.47	21.43	± 9.13	Molecular Sieve	
REXBURG CMS	08/27/2008	09/11/2008	10.47	± 2.44	38.74	± 9.03	Molecular Sieve	Y

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

Location	Start Date	End Date	Result \pm 1s Uncertainty			Result \pm 1s Uncertainty			Result > 3s
			(pCi/L)			(Bq/L)			
CFA	6/2/2008	7/1/2008	42.00	\pm	32.80	1.55	\pm	1.21	
	8/1/2008	9/2/2008	135.00	\pm	33.70	5.00	\pm	1.25	Y
EFS	8/27/2008	9/3/2008	91.80	\pm	34.00	3.40	\pm	1.26	

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

Location	Sampling Date	Iodine-131				Cesium-137				
		Result ± 1s Uncertainty (pCi [†] /L)		Result ± 1s Uncertainty (Bq [†] /L)		Result ± 1s Uncertainty (pCi/L)		Result ± 1s Uncertainty (Bq/L)		Result > 3s
BLACKFOOT										
	07/10/2008	-1.66 ± 1.26	-0.061 ± 0.047		1.21 ± 0.91	0.045 ± 0.034				
	08/14/2008	1.25 ± 2.29	0.046 ± 0.085		2.94 ± 2.70	0.109 ± 0.100				
	09/11/2008	-1.93 ± 1.57	-0.071 ± 0.058		-0.52 ± 0.84	-0.019 ± 0.031				
Duplicate	09/11/2008	-0.29 ± 0.72	-0.011 ± 0.027		1.19 ± 1.37	0.044 ± 0.051				
DIETRICH										
	07/01/2008	-0.50 ± 1.08	-0.018 ± 0.040		1.12 ± 0.93	0.041 ± 0.034				
	08/05/2008	-0.88 ± 1.60	-0.033 ± 0.059		-0.11 ± 1.44	-0.004 ± 0.053				
	09/02/2008	-0.13 ± 1.11	-0.005 ± 0.041		0.45 ± 0.90	0.017 ± 0.033				
FORT HALL										
	07/14/2008	0.44 ± 0.70	0.016 ± 0.026		1.40 ± 0.81	0.052 ± 0.030				
	08/11/2008	0.98 ± 0.71	0.036 ± 0.026		0.10 ± 0.80	0.004 ± 0.029				
Duplicate	08/11/2008	-0.80 ± 1.47	-0.030 ± 0.054		-2.47 ± 1.40	-0.091 ± 0.052				
	09/08/2008	0.13 ± 0.83	0.005 ± 0.031		0.25 ± 0.79	0.009 ± 0.029				
HOWE										
	07/01/2008	1.28 ± 1.19	0.047 ± 0.044		0.47 ± 0.89	0.018 ± 0.033				
	08/05/2008	-1.35 ± 2.37	-0.050 ± 0.088		2.17 ± 2.70	0.080 ± 0.100				
	09/02/2008	0.49 ± 1.67	0.018 ± 0.062		1.62 ± 1.29	0.060 ± 0.048				
IDAHO FALLS										
	07/01/2008	-0.03 ± 0.74	-0.001 ± 0.027		-0.13 ± 0.81	-0.005 ± 0.030				
	07/08/2008	-0.37 ± 0.76	-0.014 ± 0.028		0.63 ± 0.79	0.023 ± 0.029				
	07/15/2008	-0.29 ± 0.75	-0.011 ± 0.028		0.85 ± 0.81	0.031 ± 0.030				
	07/22/2008	-0.14 ± 0.74	-0.005 ± 0.027		-0.42 ± 0.79	-0.016 ± 0.029				
	07/29/2008	0.21 ± 0.73	0.008 ± 0.027		0.27 ± 0.78	0.010 ± 0.029				
	08/05/2008	0.74 ± 0.74	0.027 ± 0.027		-0.75 ± 0.76	-0.028 ± 0.028				
	08/12/2008	-0.28 ± 0.72	-0.011 ± 0.027		-1.00 ± 0.79	-0.037 ± 0.029				
	08/19/2008	1.01 ± 1.10	0.037 ± 0.041		0.56 ± 0.89	0.021 ± 0.033				
	08/26/2008	0.27 ± 0.72	0.010 ± 0.027		1.92 ± 0.78	0.071 ± 0.029				
	09/02/2008	0.46 ± 0.75	0.017 ± 0.028		1.26 ± 0.80	0.047 ± 0.030				
	09/02/2008	-0.32 ± 1.17	-0.012 ± 0.043		0.37 ± 0.90	0.014 ± 0.033				
	09/09/2008	2.88 ± 1.47	0.107 ± 0.054		-0.58 ± 1.49	-0.022 ± 0.055				
	09/16/2008	-3.45 ± 1.77	-0.128 ± 0.066		0.57 ± 1.44	0.021 ± 0.053				

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

	09/23/2008	-0.08	±	0.73	-0.003	±	0.027	-0.38	±	0.81	-0.014	±	0.030
	09/30/2008	-0.31	±	0.76	-0.011	±	0.028	-0.01	±	0.79	0.000	±	0.029
MORELAND													
	07/01/2008	0.29	±	0.79	0.011	±	0.029	0.76	±	0.78	0.028	±	0.029
	08/05/2008	1.36	±	0.81	0.050	±	0.030	1.64	±	0.81	0.061	±	0.030
	09/02/2008	-1.38	±	1.94	-0.051	±	0.072	1.05	±	1.40	0.039	±	0.052
RUPERT													
	07/01/2008	-0.41	±	2.18	-0.015	±	0.081	2.29	±	2.68	0.085	±	0.099
	08/05/2008	-2.81	±	2.23	-0.104	±	0.083	-2.18	±	2.69	-0.081	±	0.100
	09/02/2008	-0.81	±	2.19	-0.030	±	0.081	2.30	±	2.68	0.085	±	0.099
TERRETON													
	07/01/2008	-1.94	±	2.40	-0.072	±	0.089	1.12	±	2.63	0.041	±	0.097
	08/05/2008	0.00	±	0.88	0.000	±	0.033	1.20	±	0.79	0.044	±	0.029
	09/02/2008	0.77	±	0.81	0.028	±	0.030	0.45	±	0.82	0.017	±	0.030

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

		Cesium-137						
Location	Sampling Date	Result ± 1s Uncertainty			Result ± 1s Uncertainty			Result > 3s
		pCi/g			(x 10 ⁻² Bq/g)			
ARCO	09/03/2008	-0.42	±	0.42	-1.55	±	1.55	
ATOMIC CITY	10/01/2008	0.23	±	0.22	0.85	±	0.83	
BASALT	09/10/2008	0.10	±	0.19	0.38	±	0.70	
BLACKFOOT	09/19/2008	0.04	±	0.12	0.14	±	0.43	
CAREY	08/25/2008	0.48	±	0.19	1.77	±	0.70	
EFS	10/01/2008	-1.35	±	0.63	-4.99	±	2.34	
FAA TOWER	09/03/2008	0.08	±	0.23	0.30	±	0.84	
HOWE	08/13/2008	-0.02	±	0.18	-0.09	±	0.68	
HOWE (DUPLICATE)	08/13/2008	0.01	±	0.14	0.05	±	0.53	
IDAHO FALLS	08/20/2008	-0.04	±	0.10	-0.14	±	0.38	
MONTEVIEW	08/13/2008	0.01	±	0.13	0.04	±	0.49	
		Strontium-90						
Location	Sampling Date	Result ± 1s Uncertainty			Result ± 1s Uncertainty			Result > 3s
		pCi/g			(x 10 ⁻² Bq/g)			
ARCO	09/03/2008	0.022	±	0.007	0.08	±	0.03	
ATOMIC CITY	10/01/2008	0.090	±	0.015	0.33	±	0.05	Y
BASALT	09/10/2008	0.027	±	0.003	0.10	±	0.01	Y
BLACKFOOT	09/19/2008	0.022	±	0.004	0.08	±	0.01	Y
CAREY	08/25/2008	0.018	±	0.004	0.07	±	0.02	Y
EFS	10/01/2008	0.017	±	0.028	0.06	±	0.10	
FAA TOWER	09/03/2008	0.070	±	0.011	0.26	±	0.04	Y
HOWE	08/13/2008	0.014	±	0.007	0.05	±	0.03	
HOWE (DUPLICATE)	08/13/2008	0.045	±	0.005	0.17	±	0.02	Y
IDAHO FALLS	08/20/2008	0.018	±	0.006	0.07	±	0.02	
MONTEVIEW	08/13/2008	-0.005	±	0.004	-0.02	±	0.01	

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

		Cesium-137						
Location	Sampling Date	Result ± 1s Uncertainty			Result ± 1s Uncertainty			Result > 3s
		pCi/kg			Bq/kg			
ARCO	10/15/08	2.23	±	3.29	0.08	±	0.12	
BLACKFOOT	09/19/08	-4.12	±	2.39	-0.15	±	0.09	
CAREY	10/17/08	-0.07	±	1.43	0.00	±	0.05	
CAREY (DUP)	10/17/08	-0.04	±	2.25	0.00	±	0.08	
HOWE	09/30/08	2.54	±	1.18	0.09	±	0.04	
IDAHO FALLS	09/11/08	1.87	±	1.43	0.07	±	0.05	
MINIDOKA	10/10/08	-1.06	±	1.45	-0.04	±	0.05	
TERRETON	09/30/08	-1.37	±	1.67	-0.05	±	0.06	
		Strontium-90						
		Result ± 1s Uncertainty			Result ± 1s Uncertainty			Result > 3s
		pCi/kg			Bq/kg			
ARCO	10/15/08	-1.66	±	2.15	-0.06	±	0.08	
BLACKFOOT	09/19/08	4.38	±	2.32	0.16	±	0.09	
CAREY	10/17/08	1.74	±	2.43	0.06	±	0.09	
CAREY (DUP)	10/17/08	0.27	±	2.60	0.01	±	0.10	
HOWE	09/30/08	1.44	±	2.84	0.05	±	0.11	
IDAHO FALLS	09/11/08	5.53	±	1.98	0.20	±	0.07	
MINIDOKA	10/10/08	7.47	±	2.70	0.28	±	0.10	
TERRETON	09/30/08	2.08	±	2.06	0.08	±	0.08	

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

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty			Result ± 1s Uncertainty			Result > 3s
				(pCi/kg wet weight)			(x 10 ⁻² Bq/kg wet weight)			
PRONGHORN	9/5/2008	Muscle	¹³¹ I	-0.63	±	1.68	-2.31	±	6.23	
			¹³⁷ Cs	3.15	±	1.15	11.64	±	4.24	
MULE DEER	9/15/2008	Muscle	¹³¹ I	1.64	±	1.77	6.09	±	6.54	
			¹³⁷ Cs	167.00	±	4.45	617.90	±	16.47	Y
MULE DEER	9/18/2008	Muscle	¹³¹ I	0.15	±	1.86	0.54	±	6.88	
			¹³⁷ Cs	7.25	±	1.57	26.81	±	5.81	Y
MULE DEER	9/15/2008	Liver	¹³¹ I	6.92	±	12.59	25.61	±	46.57	
			¹³⁷ Cs	80.15	±	10.86	296.54	±	40.20	Y
MULE DEER	9/18/2008	Liver	¹³¹ I	3.74	±	8.48	13.83	±	31.36	
			¹³⁷ Cs	7.93	±	5.68	29.35	±	21.00	
PRONGHORN	9/5/2008	Thyroid	¹³¹ I	42.55	±	122.80	157.43	±	454.37	
			¹³⁷ Cs	-30.45	±	94.65	-112.65	±	350.20	
MULE DEER	9/15/2008	Thyroid	¹³¹ I	74.09	±	246.84	274.12	±	913.32	
			¹³⁷ Cs	521.59	±	283.72	1929.90	±	1049.77	

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	0.03
July	0.58
August	0.14
September	0.16
Gross Beta	
Quarter	0.12
July	0.55
August	0.31
September	0.40

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.

Parameter	Mann-Whitney U test	
	Week	P ^a
Gross Alpha		
	July 2	0.57
	July 9	0.89
	July 16	0.48
	July 23	0.48
	July 30	0.81
	August 6	0.03
	August 13	0.17
	August 20	0.39
	August 27	0.67
	September 3	0.94
	September 10	0.04
	September 17	0.48
	September 24	0.78
Gross Beta		
	July 2	0.57
	July 9	0.06
	July 16	0.20
	July 23	0.83
	July 30	0.57
	August 6	0.37
	August 13	0.72
	August 20	0.15
	August 27	0.39
	September 3	0.81
	September 10	0.34
	September 17	0.39
	September 24	0.78
a. A 'p' value greater than 0.05 signifies no statistical difference between data groups.		