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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Second Quarter 2006

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EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the second quarter of 2006 could be directly linked with INL Site activities. Levels of 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 second quarter of 2006 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, 2006. All sample types (media) and the sampling schedule followed during 2006 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including air filters and charcoal cartridges, atmospheric moisture, and 10-micron particulate matter (PM_{10})
- Precipitation sampling
- Surface Water sampling
- Drinking water sampling
- Milk sampling
- Large game animal sampling
- Environmental Radiation

Gross alpha and gross beta measurements are used as general indicators of the presence of radionuclides. Gross alpha and gross beta results were found to have no discernable statistical distribution during the second quarter of 2006. Because of this, these data were statistically analyzed using nonparametric methods, including the use of the median to represent central tendency. At no time during the second quarter were monthly or quarterly gross alpha or gross beta concentrations in air collected at Boundary locations statistically greater than corresponding data for Distant locations, as one would expect if the INL Site were a significant source of radionuclide contamination. Gross alpha activity was greater at Distant locations, when grouped quarterly and during the months of May and June. Weekly comparisons of gross alpha concentrations at Distant and Boundary locations showed statistical differences during the weeks of April 12th, May 24th, June 14th, and June 21st. In all four cases, the Distant locations were statistically greater than the Boundary locations. These differences appear to be due to random variability in the data.

There were no statistical differences between gross beta results when grouped by location on quarterly, monthly and weekly bases.

Iodine-131 (^{131}I) was not detected in any batch of charcoal cartridges during the second quarter.

Selected quarterly composite filter samples were analyzed for gamma emitting radionuclides, strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu) and americium-241 (^{241}Am). No manmade gamma-emitting radionuclides were detected. Strontium-90 was detected at three locations within the range of historical measurements and well below the DOE Derived Concentration Guide (DCG).

A total of nine detections of transuranic radionuclides (two of ^{241}Am, five of ^{238}Pu and two of $^{239/240}$Pu) were reported for the second quarter. Detections were reported at Distant, Boundary and INL Site locations. All concentrations were near detection levels and well within historical values and below DOE DCGs. No specific source could be identified for the detected measurements and they appear to be associated with background levels of historic fallout from nuclear weapons testing.

Seven atmospheric moisture samples were obtained during the second quarter of 2006 and analyzed for tritium. Two each from Atomic City and Blackfoot, and three from Idaho Falls exceeded their respective 3s levels. The maximum value was well below the DOE DCG for tritium in air.

The ESER Program operates three PM_{10} samplers for particulate sampling, one each at Rexburg, Blackfoot, and Atomic City. Sampling of PM_{10} is primarily informational as no analyses are conducted for contaminants. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour particulate concentration was 43.7 µg/m^3 on May 16, 2006, at Rexburg. This is well below the EPA Air Quality Standard of 150 µg/m^3.

Storm events in the second quarter of 2006 produced sufficient precipitation to yield 10 samples –two from Idaho Falls, three from CFA, and five weekly samples from the EFS. One of the samples, collected at the CFA, contained a detectable concentration of tritium, within the range reported by the EPA across the western United States.

Milk samples were collected weekly in Ucon and monthly at nine other locations around the INL Site. All samples were analyzed for manmade gamma-emitting radionuclides. Iodine-131 was not detected in any sample. Cesium-137 was detected in one sample at background level. Low levels of ^{90}Sr were found in all samples. Tritium was detected on one of five samples. Results were within historical measurements.

Cesium-137 was detected in the muscle tissue of the only game animal killed on an INL Site road. The detected concentration was similar to those found in both onsite and offsite tissues during recent years.

Table E-1 Summary of results for the second quarter of 2006.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	There were no statistical differences noted for weekly, monthly or quarterly gross beta concentrations measured at INL Site, Boundary and Distant locations. Quarterly and monthly (May and June) and some weekly statistical differences were found for gross alpha activity. In each case, Distant concentrations were greater than Boundary results. INL Site releases are thus not implicated. 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	Detectable ^{90}Sr was found at three locations, well below DOE limits. Nine detections of the three actinides were reported, scattered among INL Site, Boundary, and Distant locations. The detections were well within the historical range measured for these radionuclides and well below DCGs.
	Charcoal Cartridge	Iodine-131	No detections of ^{131}I were made during the second quarter.
	PM_{10}	Particulate matter	Forty-five valid samples were collected from three locations. No regulatory limits were exceeded.
Atmospheric Moisture	Liquid	Tritium	A total of 23 samples were collected. Seven of these samples had tritium results greater than the 3s uncertainty. Concentrations were consistent with those reported across the region and with previous results.
Precipitation	Liquid	Tritium	Ten samples were collected. One of the results from CFA was greater than the 3s uncertainty. No sample result exceeded the DCG for tritium in air.
Drinking Water	Liquid	Gross alpha, gross beta, tritium	Gross alpha activity was detected in one sample from Howe. Gross beta activity was measured in 13 of 15 samples collected (including duplicate). The maximum was well below the EPA Safe Drinking Water Act limits. Tritium was not detected in any sample.
Surface Water	Liquid	Gross alpha, gross beta, tritium	No tritium was detected in any of the seven samples (including a duplicate) collected. Gross alpha activity was measured above the 3s values in one sample. Gross beta activity was measured above the 3s values in all samples. All concentrations were below EPA and DOE limits, and were within historical measurements.
Milk	Liquid	Iodine-131, gamma-emitting radionuclides, and ^{90}Sr & tritium (select samples only)	Cesium-137 was detected in one of ten samples analyzed for gamma-emitting radionuclides.. Iodine-131 was not found in any sample. Strontium-90 was detected at low levels in all five samples analyzed for ^{90}Sr and tritium. Tritium was detected on one of five samples. Results were within historical measurements.

Sheep	Tissue	Iodine-131, gamma emitting radionuclides	Cesium-137 was detected in one muscle sample from one sheep collected from the Northern grazing allotment. The value was within the historical range of measurements and may be attributed to fallout in the environment.
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides	Cesium-137 was found in the muscle sample from the game animal available for sampling during the second quarter. The detected value was well within the range of historical values.
Environmental Radiation	TLD	Ambient ionizing radiation	Values were consistent with expected exposures given the altitude and location of the TLD's. There were no statistical differences between Boundary and Distant location results.

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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
INEEL	Idaho National Engineering and Environmental Laboratory
ISU	Idaho State University
LCS	Laboratory Control Standard
MAPEP	Mixed Analyte Performance Evaluation Program
MDC	minimum detectable concentration
NIST	National Institute of Standard and Technology
NRTS	National Reactor Testing Station
PM_{10}	particulate matter less than 10 micrometers in diameter
QA	Quality Assurance
QAPP	Quality Assurance Project Plan

LIST OF UNITS

Bq	becquerel
Ci	curie
g	gram
L	liter
µCi	microcurie
mL	milliliter
mR	milliroentgens
mrem	millirem (rem = unit of dose equivalent [roentgen-equivalent-man])
mSv	millisieverts
pCi	picocurie
R	Roentgen
µSv	microsieverts

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 2006, 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. The ESER 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 ESER Program for samples collected during the second quarter of 2006 (April 1 –June 30, 2006).

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
- surface water at five locations on the Snake River
- drinking water at 14 locations around the INL Site
- agricultural products, including milk at 10 dairies around the INL Site, potatoes from at least five local producers, wheat from approximately 10 local producers, lettuce from approximately nine home-owned and portable gardens on and around the INL, and four sheep from two operators which graze their sheep on the INL Site
- 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), waterfowl and doves 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 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/).

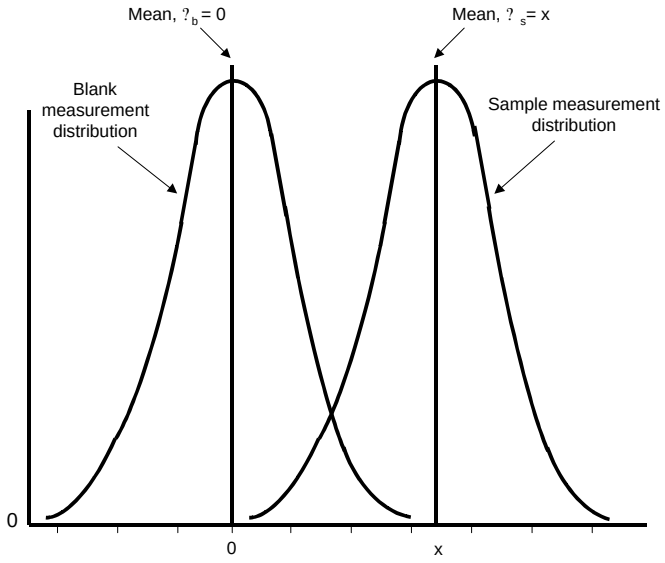
Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data and for preparing quarterly reports on results from the environmental surveillance program. The quarterly reports are then consolidated into the INL Site Environmental Report for each 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 (? ??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.



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 ± 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 mi^2 (2,300 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.

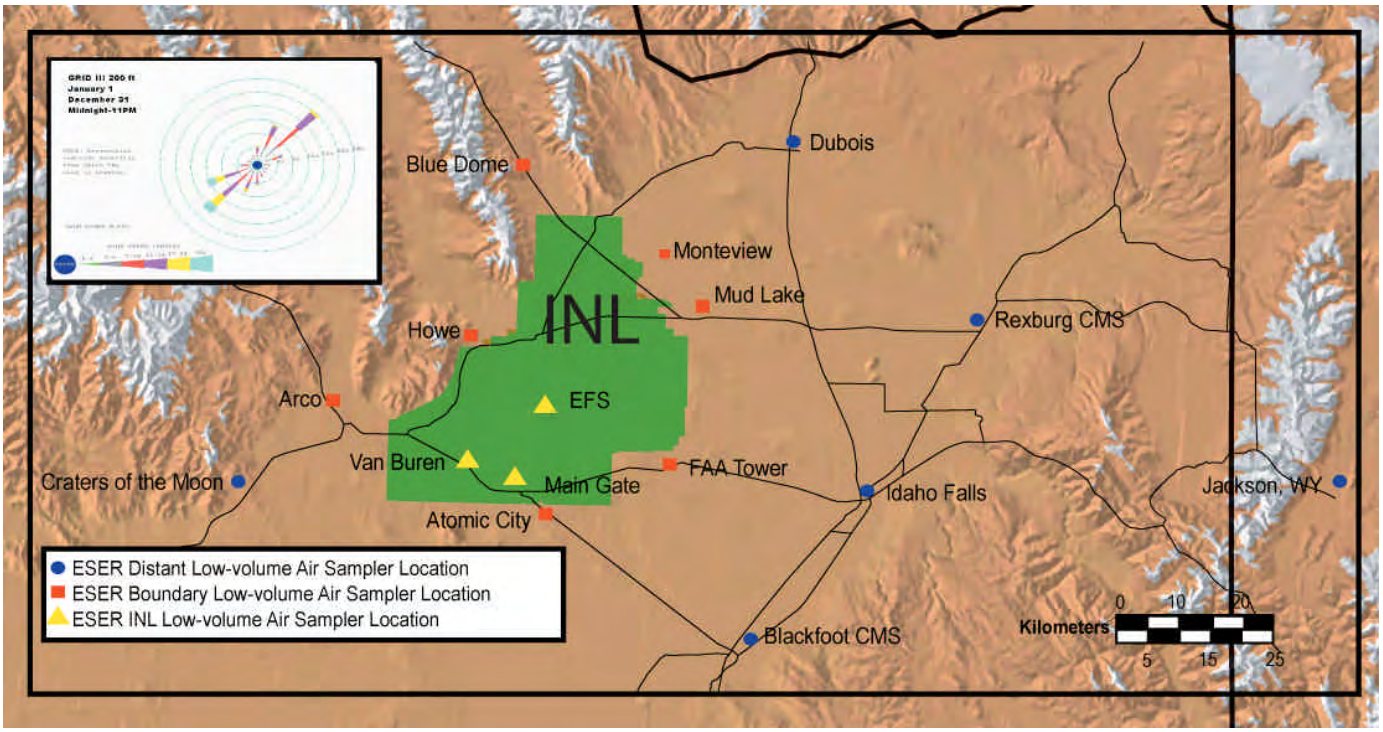
The cleanup operation, the ICP, is now a separately managed effort. The ICP is charged with safely and cost-effectively completing the majority of cleanup work from past laboratory missions by 2012.

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. Concentrations of airborne particulates less than 10 micrometers in diameter (PM_{10}) were measured for comparison with EPA standards at three locations. Air sampling activities and results for the second quarter of 2006 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 2006 (Figure 2). Four of these samplers are located on the INL Site, eight 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 year to a new location. One replicate sampler was placed at Mud Lake (a Boundary location) and one at the Experimental Field Station (an INL Site location) during 2006. An average of 16,148 ft^3 (457 m^3) of air was sampled at each location, each week, at an average flow rate of 1.60 ft^3/min (0.05 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.



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.

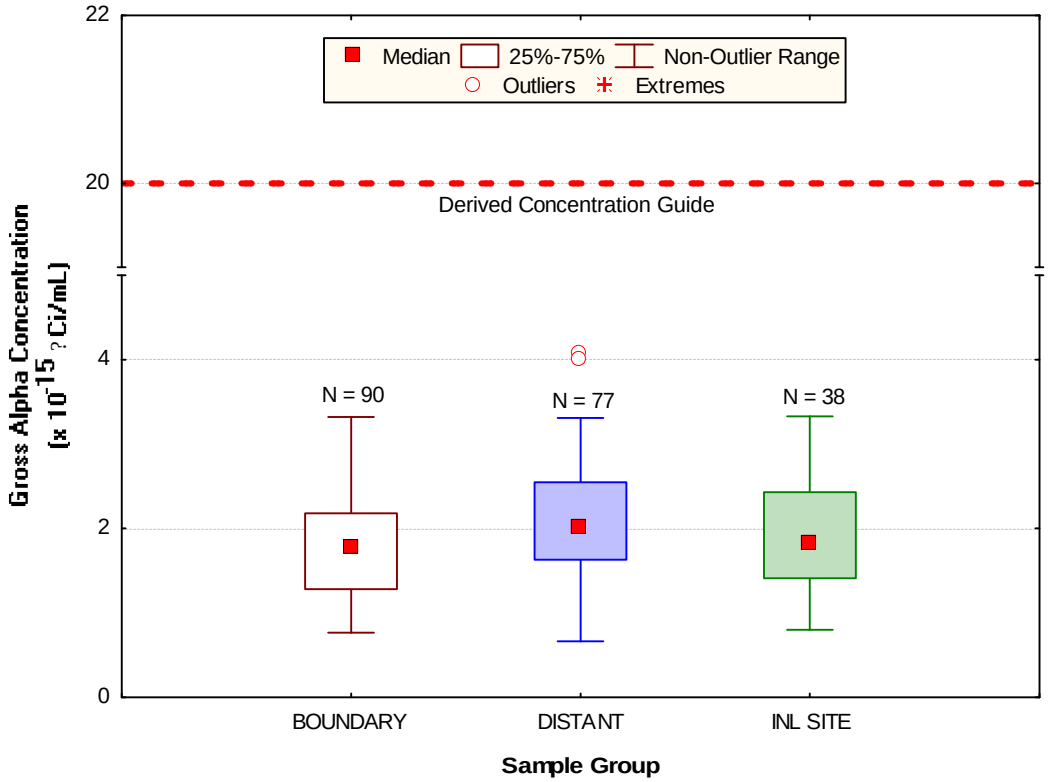
The weekly particulate filters collected during the quarter for each location were composited and analyzed for gamma-emitting radionuclides. Composites were also analyzed by location for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$ and ^{241}Am as determined by a rotating quarterly schedule.

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.

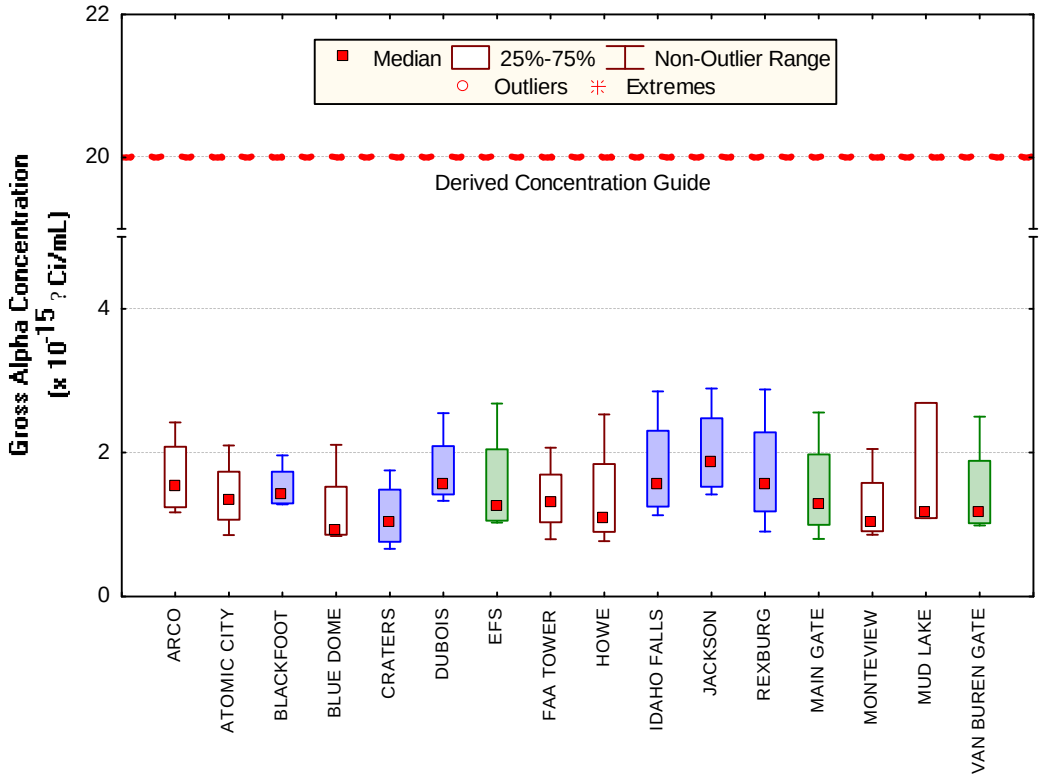
Gross alpha results are reported in Table C-1. Median gross alpha concentrations in air for INL Site, Boundary, and Distant locations for the second quarter of 2006 are shown in Figure 3. Gross alpha data are tested for normality prior to statistical analyses, and generally show no consistent discernable 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 second 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.

Figure 3 graphically shows that the gross alpha measurements made at INL Site, Boundary and Distant locations are similar for the second 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. 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. There was a statistical difference in gross alpha concentrations between location groups during the second quarter of 2006. Further examination (see monthly and weekly discussions below) indicates that the difference is due to some distant weekly results that were statistically higher at Distant locations than at Boundary locations.

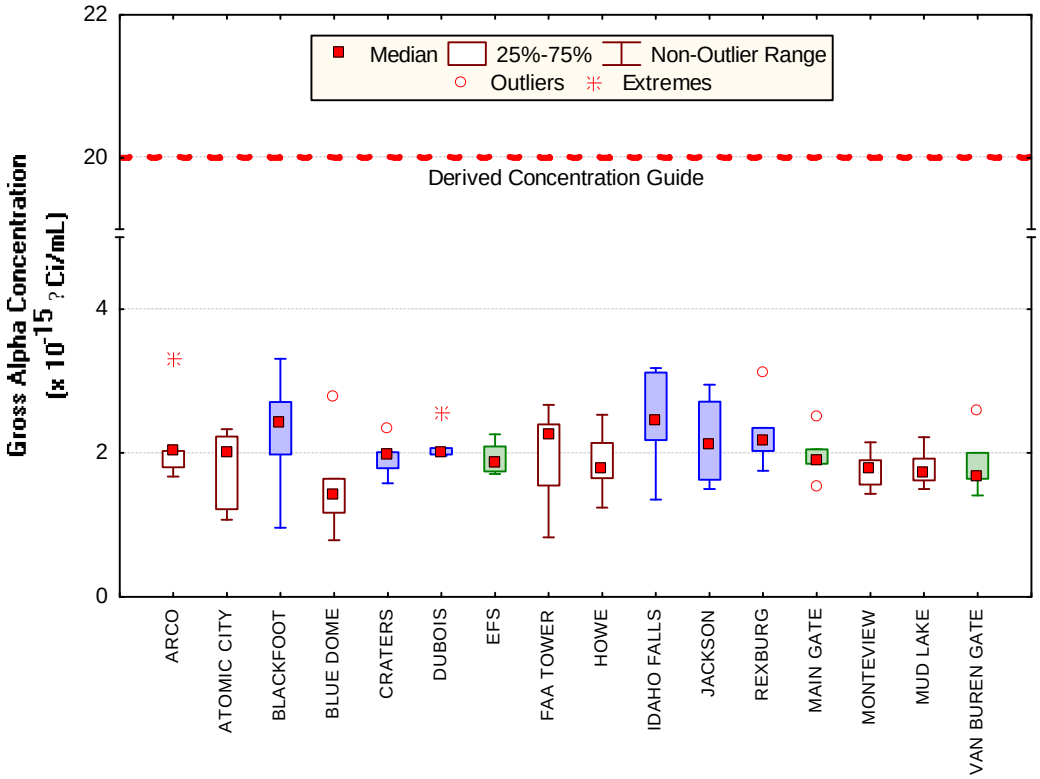
Comparisons of gross alpha concentrations were made for each month of the quarter (Figures 4 – 6). Again the Kruskal-Wallis test of multiple independent groups was used to determine if statistical differences exist between INL Site, Boundary and Distant data groups.



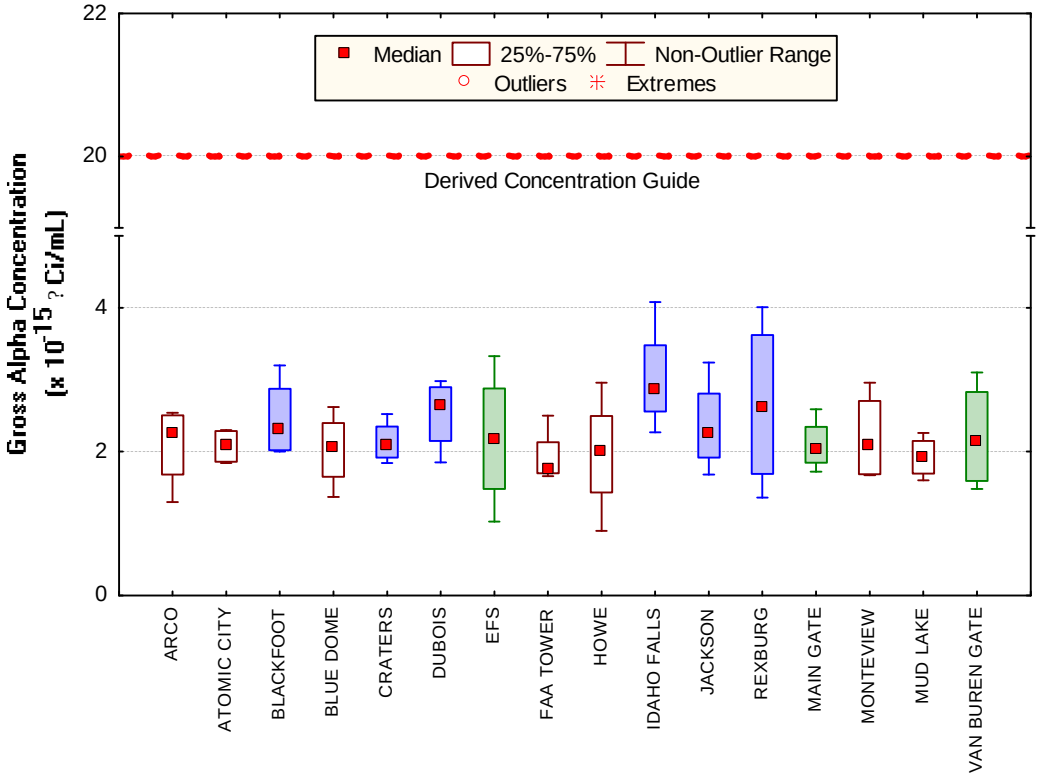
Gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations for the second quarter of 2006.



April gross alpha concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except Mud Lake, where N=3.



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



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

There were statistically higher gross alpha concentrations at Distant locations than at Boundary locations during May and June during the second 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 were four weeks (April 12, May 24, June 14, and June 21) where a statistical difference existed between the two sample groups (Table D-2). In all four weeks, the gross alpha concentrations measured at Distant locations were statistically greater than those measured at Boundary locations, not indicative of an impact from the INL Site.

Gross beta results are presented in Table C-1. Gross beta concentrations in air for INL Site, Boundary and Distant locations for the second quarter of 2006 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-Wallace 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 (Table D-1).

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

No ^{131}I was detected in any of the charcoal cartridge batches collected during the second quarter of 2006. 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 near the detection limit in 8 of the 26 measured batches of cartridges. The analytical laboratory considers these detections a result of the materials used in the charcoal filters.

Weekly filters for the second quarter of 2006 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs. Composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu and ^{241}Am (see Table C-3, Appendix C.) No manmade gamma-emitting radionuclides were detected. Three composites, from Atomic City, Blue Dome and Jackson, had detectable ^{90}Sr. The respective measured concentrations of (89.6 ± 29.5) x 10^{-18} ?Ci/mL, (49.3 ± 15.9) x 10^{-18} ?Ci/mL, and (64.2 ± 17.0) x 10^{-18} ?Ci/mL are within historical measurements and substantially below the Derived Concentration Guide of 9,000,000 x 10^{-18} ?Ci/mL.

Americium-241 was detected at two locations (one INL Site and one Boundary location), ^{238}Pu was detected at five locations (two INL Site, one Bounday and two Distant locations), and $^{239/240}$Pu was detected at two location (one INL Site and one Boundary location). All results are within historical measurements and substantially below the Derived Concentration Guides of 20,000 x 10^{-18} ?Ci/mL (^{241}Am), 30,000 x 10^{-18} ?Ci/mL (^{238}Pu), and 20,000 x 10^{-18} ?Ci/mL ($^{239/240}$Pu).

ATMOSPHERIC MOISTURE SAMPLING

Twenty-three atmospheric moisture samples were obtained during the second quarter of 2006 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.

Seven samples exceeded the 3s uncertainty level for tritium—two each from Atomic City and Blackfoot, and three from Idaho Falls. All samples with detectable tritium were significantly below the DOE DCG for tritium in air of 1 ? 10^{-7} ?Ci/mL, ranging from (4.5 ± 1.5) x 10^{-13} ?Ci/mL_{air} at Atomic City in April/May to (11.0 ± 2.5) x 10^{-13} ?Ci/mL_{air}, at Blackfoot in May/June. All results are shown in Table C-4, Appendix C.

PM_{10} AIR SAMPLING

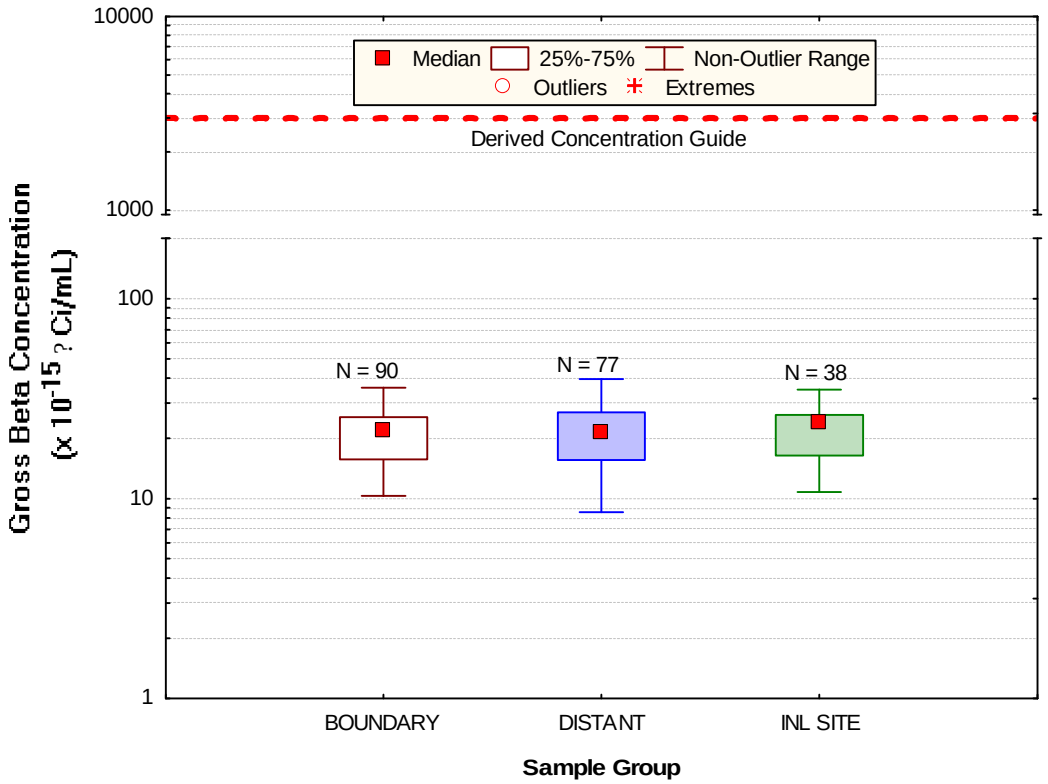
The EPA began using a standard for concentrations of airborne particulate matter (PM) less than 10 micrometers in diameter (PM_{10}) in 1987 (40 CFR 50.6 [CFR 2006]). Particles of this size can be inhaled deep into the lungs and are considered to be responsible for most of the adverse health effects associated with airborne particulate pollution. The air quality standards for these particulates are an annual average of 50 µg/m^3, with a maximum 24-hour concentration of 150 µg/m^3.

The ESER Program operates three PM_{10} particulate samplers, one each at the Rexburg CMS and Blackfoot CMS, and one in Atomic City. Sampling of PM_{10} is informational only as no chemical analyses are conducted for contaminants. A twenty-four hour sampling period is scheduled to run once every six days. The maximum 24-hour particulate concentration was 43.7 µg/m^3 on May 16, 2006, at Rexburg. The average, maximum, and minimum results of the 24-hour samples are shown are shown in Table 1. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

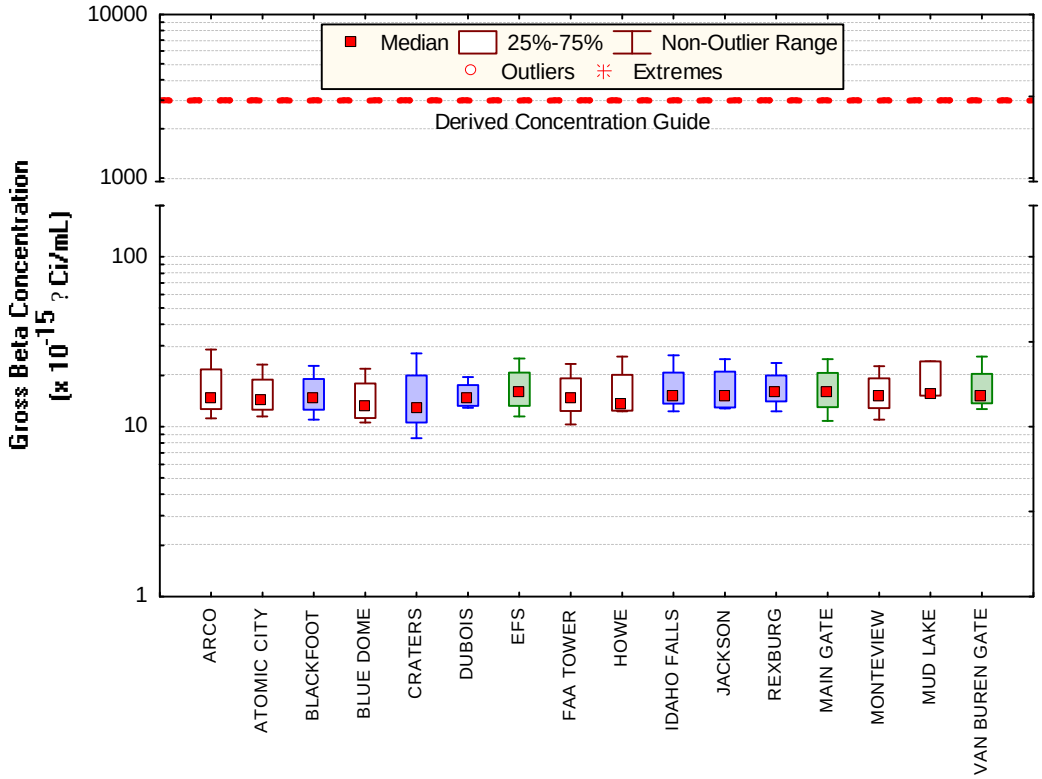
Table 1. Summary of 24-hour PM_{10} values.

	Concentration[a]		
Location	**Minimum**	**Maximum**	**Average**
Atomic City	0.0	38.2	12.1
Blackfoot, CMS	0.9	26.7	12.3
Rexburg, CMS	0.3	43.7	16.5

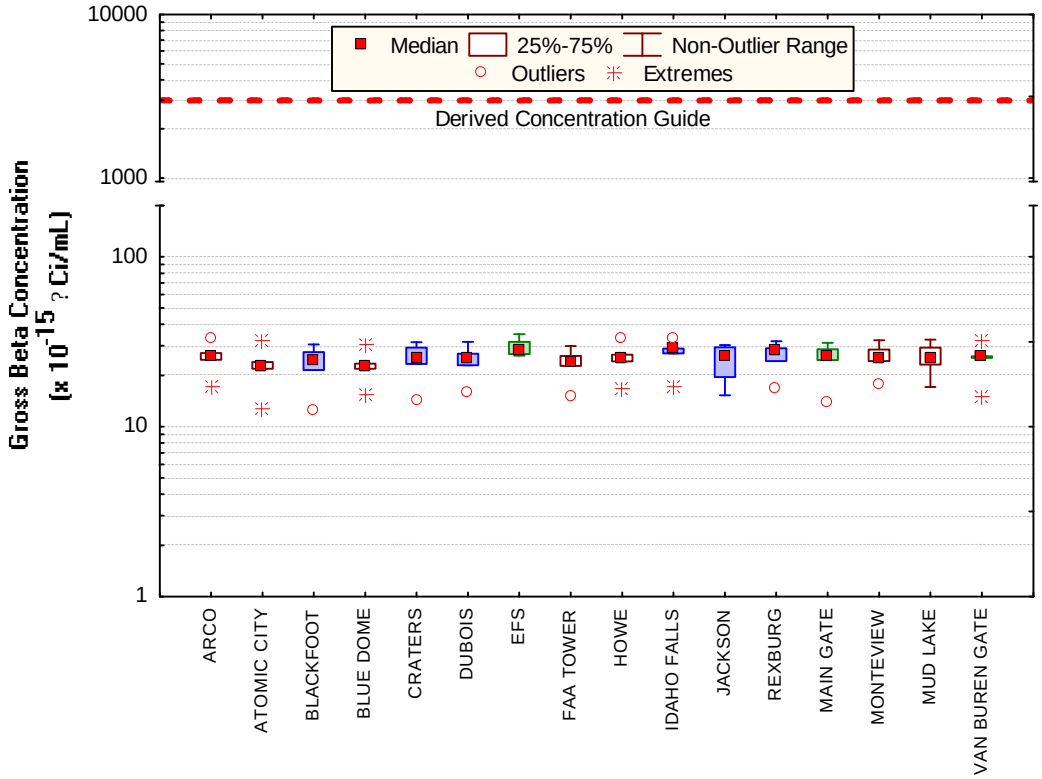
a. All concentrations are in (µg/m^3).



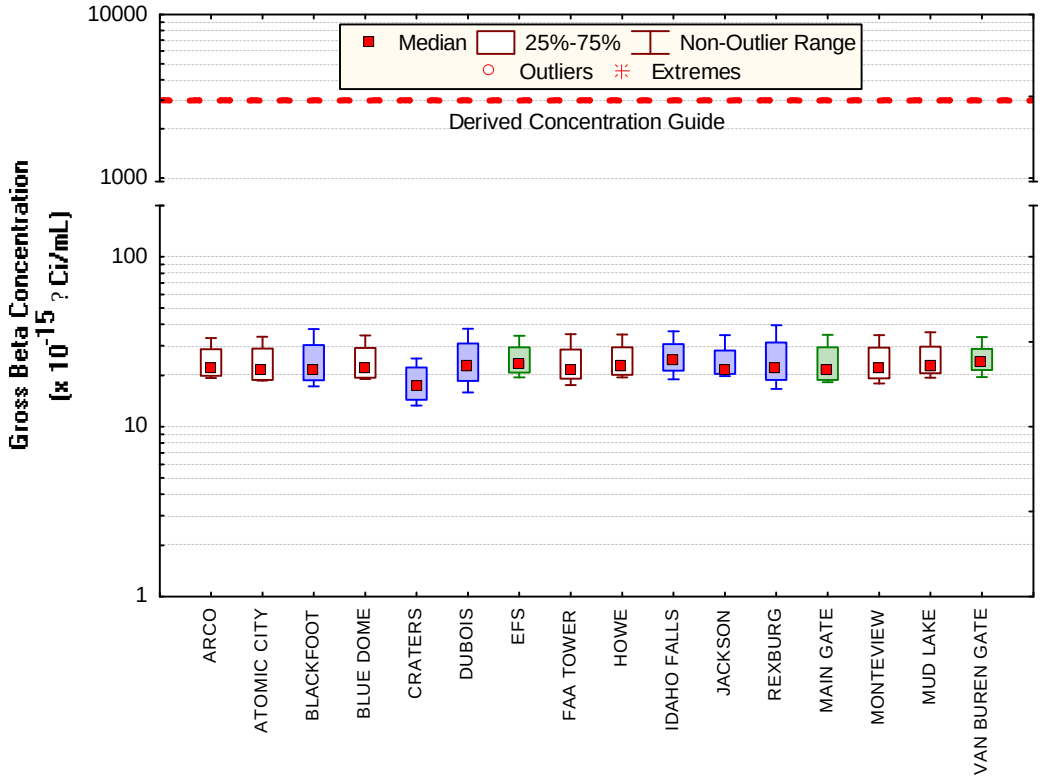
Gross beta concentrations in air at ESER INL Site, Boundary and Distant locations for the second quarter 2006.



April gross beta concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 4 at each location, except at Mud Lake, where N = 3.



May gross beta concentrations in air at ESER INL Site, Boundary and Distant locations. Number of samples (N) = 5 at each location, except at EFS and Jackson, where N = 4.



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

4. WATER SAMPLING

The ESER program samples precipitation, surface water and drinking water. Monthly composite precipitation samples are collected from Idaho Falls and the Central Facilities Area (CFA) on the INL Site. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INL Site. Surface and/or drinking water are sampled twice each year at 19 locations around the INL Site. This occurs during the second and fourth quarters.

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 second quarter of 2006 produced sufficient precipitation to yield 10 samples –two from Idaho Falls, three from CFA, and five weekly samples from the EFS.

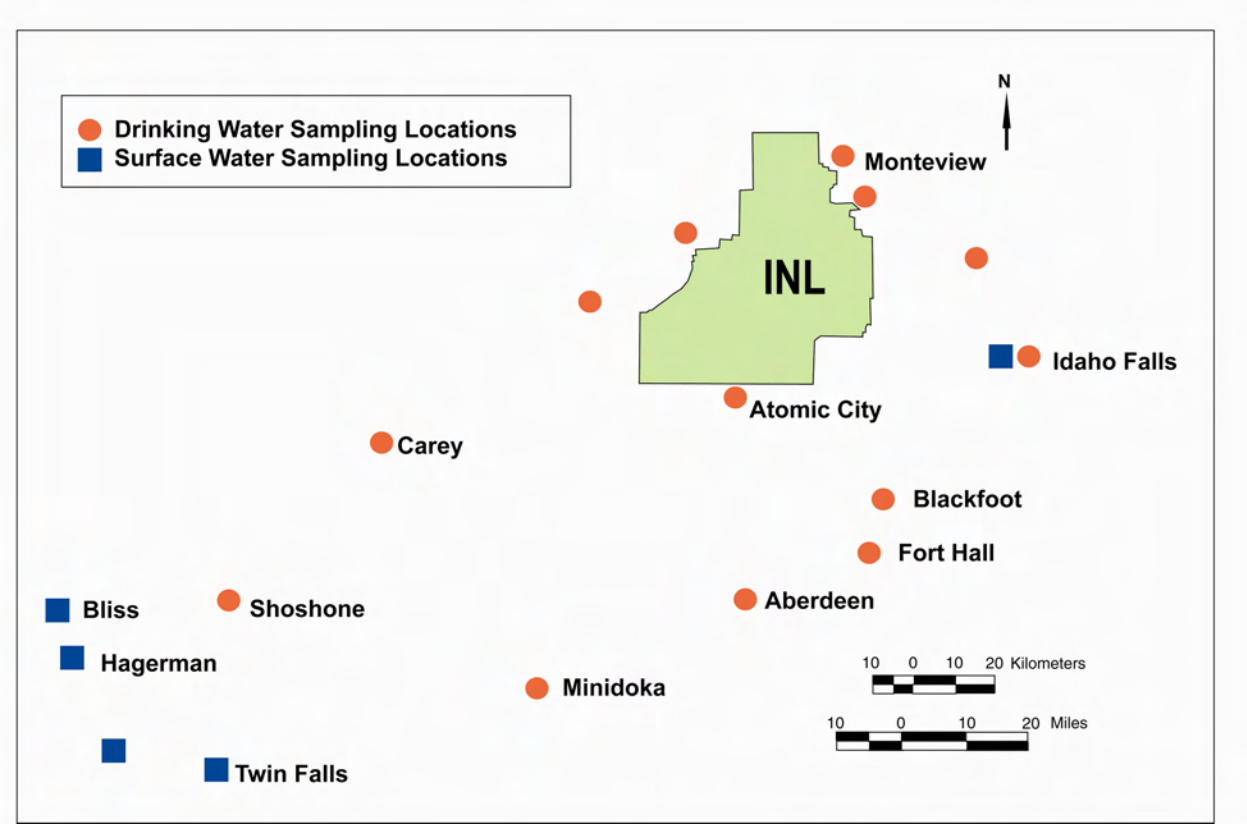
Tritium was measured above the 3s value in only one of the 10 samples collected during the second quarter of 2006. Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere. The EPA's RadNet program collects precipitation 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 2006). Tritium measured in all second quarter ESER samples were within this range, with a maximum of 274.0 ± 33.9 pCi/L at CFA. Data for all second quarter 2006 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

DRINKING WATER

Fourteen drinking water samples and one duplicate were collected from selected taps throughout southeast Idaho (Figure 11). Samples were analyzed for gross alpha, gross beta, and tritium (^{3}H).

One of the samples exceeded the 3s value for gross alpha. Tritium was not detected in any sample. It is not unusual to detect these constituents in water of the Snake River Plain. They tend to be related to natural production from the basalts that make up the aquifer. The sample from Howe had a gross alpha concentration of 1.58 ± 0.41 pCi/L which is below the EPA and DOE limits for gross alpha in drinking water of 15 pCi/L and 30 pCi/L, respectively.

Of the fifteen drinking water samples (including the duplicate) collected, all samples but three exceeded their 3s value for gross beta (Table 2). The EPA Safe Drinking Water Act (SDWA) limits gross beta in drinking water based on an annual exposure of 4 mrem/yr. Since data are reported from the laboratory as a concentration (i.e., pCi/L) a screening concentration of 50 pCi/L is used to meet this level (Appendix B-1). The maximum concentration of gross beta detected was from Moreland and was lower than the SDWA screening value. Levels of gross beta observed in drinking water are not unusual given the basaltic terrain (USGS 2003). All values are similar to those recorded in previous years, and are well below the levels outlined for drinking water protection (Table B-1). All drinking water sample results may be found in Appendix C, Table C-7.



Drinking and Surface Water Sampling locations.

Table 2. Drinking water results greater than (>) 3s.

Location	Sample Results[a]	Limits for Comparison[a]	
	Result ± 1s	SDWA[b]	DOE DCG[c]
Gross Alpha			
Howe	1.58 ± 0.41	8	30
Gross Beta			
Aberdeen	4.79 ± 0.58	50	100
Atomic City	4.87 ± 0.55	50	100
Fort Hall	7.83 ± 0.64	50	100
Howe	2.45 ± 0.49	50	100
Idaho Falls	2.45 ± 0.49	50	100
Minidoka	3.12 ± 0.55	50	100
Monteview	3.31 ± 0.56	50	100
Moreland	5.07 ± 0.61	50	100
Mud Lake	3.83 ± 0.55	50	100
Roberts	2.73 ± 0.54	50	100
Shoshone	2.51 ± 0.53	50	100
Taber	3.34 ± 0.53	50	100

a. All values shown are in picocuries per liter (pCi/L).
b. SDWA = Safe Drinking Water Act.
c. DCG – Derived Concentration Guide.

SURFACE WATER

Five surface water samples and one duplicate sample were collected from locations throughout southeast Idaho and were analyzed for tritium, gross alpha, and gross beta. One of samples had measurable gross alpha activity greater than 3s. None of the samples had measurable tritium activity (all results were less than 3s).

Five of six surface water samples were greater than their associated 3s values for gross beta activity (Table 3). Even at reported levels, the gross beta values are lower than the SDWA screening value of 50 pCi/L and the DCG values (Table B-1).

Table 3. Surface water gross beta results greater than (>) 3s.

Location	Result ± 1s	Limits for Comparison[a] SDWA	DOE DCG
Bliss	4.80 ± 0.53	50	100
Buhl	3.95 ± 0.53	50	100
EFS	8.82 ± 0.57	50	100
Hagerman	2.12 ± 0.48	50	100
Idaho Falls	1.64 ± 0.52	50	100
Twin Falls	6.89 ± 0.60	50	100
Twin Falls duplicate	6.14 ± 0.60	50	100

a. All values shown are in picocuries per liter (pCi/L).

The presence of gross alpha and gross beta in surface water (particularly the springs) is typically related to dissolution of naturally occurring radionuclides (i.e., uranium, radium, potassium) by groundwater as it flows through the surrounding basalts (Twinning and Rattray 2003). Levels of gross alpha and gross beta in all samples are similar to results from recent years. All gross alpha and gross beta results can be found in Appendix C, Table C-7.

5. AGRICULTURAL PRODUCT AND WILDLIFE 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, sheep, big game, doves and waterfowl are sampled. Milk is sampled throughout the year and large game animals are sampled whenever available. Sheep are sampled during the second quarter. Lettuce, wheat and waterfowl are sampled during the third quarter, while potatoes are collected during the fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk, sheep, and large game animals sampled during the second quarter of 2006.

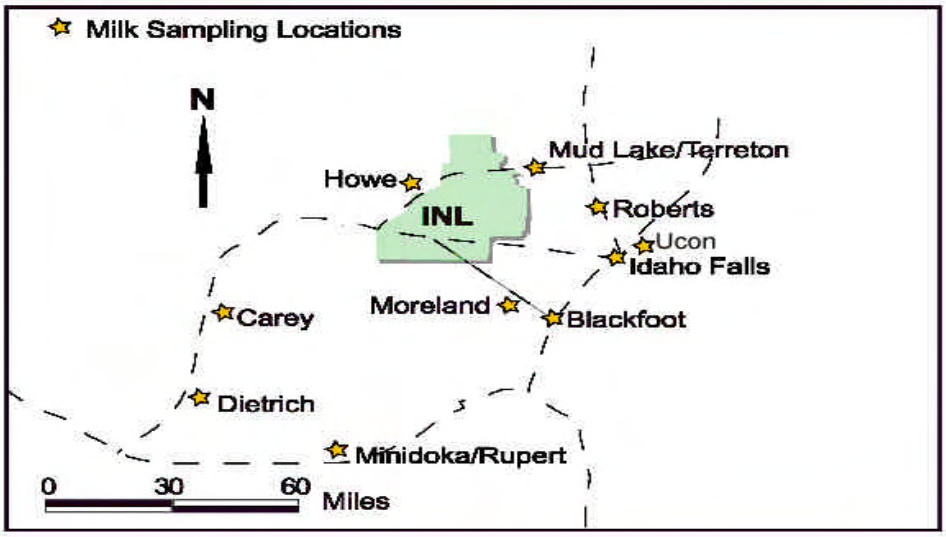
MILK SAMPLING

Milk samples were collected weekly in Ucon and monthly at nine other locations around the INL Site (Figure 12) during the second quarter of 2006. All samples were analyzed for gamma emitting radionuclides. Samples are analyzed for ^{90}Sr and tritium during the second and fourth quarters.

Cesium-137 was detected in one of the samples, collected at Moreland in June, during the second quarter. Iodine-131 was not detected in any sample. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-8.

Strontium-90 was detected in all samples analyzed at levels within historical measurements (Table C-9 in Appendix C). Tritium was detected in one sample analyzed (Table C-9).

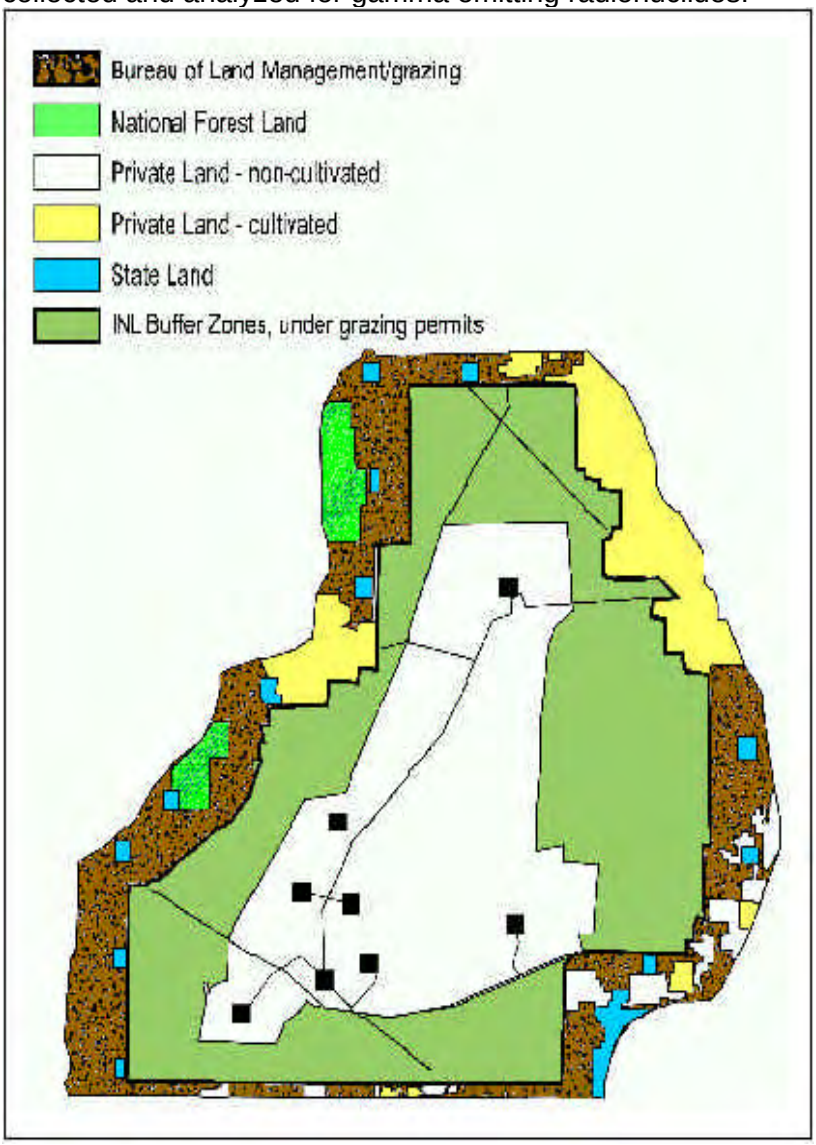
ESER **milk**



sampling locations.

SHEEP SAMPLING

Certain areas of the INL are open to grazing under lease agreements managed by the Bureau of Land Management (Figure 13). Every year ESER Program personnel collect samples of sheep that have grazed on these leased areas, either just before or shortly after the sheep leave the INL. This occurs during the second quarter of the year. For the calendar year 2006, sheep were collected from the selected INL allotments before they were moved off site. Three flocks were sampled, including a control flock in Dubois from the Experimental Sheep Station, a flock from a southern INL allotment, and a flock from a northern INL allotment. Two sheep were taken from each flock for tissue analysis. Thyroid, muscle, and liver tissue were collected and analyzed for gamma emitting radionuclides.



Grazing and land ownership on and around the INL.

Levels of ^{131}I are of particular interest in thyroids because of this organ's ability to accumulate iodine. No ^{131}I was found in thyroids from any of the animals.

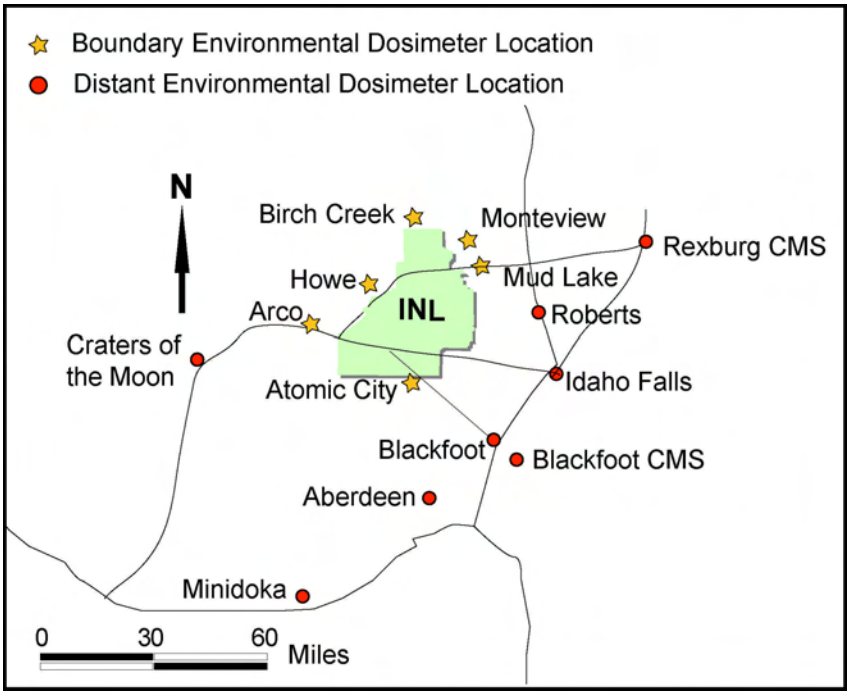
Analysis for ^{137}Cs showed results greater than the 3s analytical uncertainty in one muscle sample collected from a sheep in the Northern allotment. Both concentrations of ^{137}Cs were similar to those found in both onsite and offsite sheep samples during recent years. Data for all sheep samples are listed in Appendix C, Table C-10.

LARGE GAME ANIMAL SAMPLING

One large game animal (a pronghorn) were sampled during the second quarter of 2006. No human-made gamma-emitting radionuclide was detected in any tissue of the pronghorn. The data for ^{137}Cs and ^{131}I are listed in Appendix C, Table C-11.

6. ENVIRONMENTAL RADIATION

An array of thermoluminescent dosimeters (TLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation (Figure 14). TLDs are changed out in May and again in November after six months in the field. The results of the spring sampling of TLDs exposed from November 2005 to May 2006 are discussed below.



TLD sampling 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 0.27 mR/day at Blue Dome to a high of 0.32 mR/day at Mud Lake. The overall Boundary average was 0.29 mR/day. The Distant group had a high of 0.36 mR/day at Rexburg and a low of 0.26 mR/day at the Dubois location. The overall average Distant value was 0.31 mR/day. There was no statistical difference between Boundary and Distant locations. Furthermore, all values are consistent with past readings. Table 4 lists the range and average for both groups over a six-month period. All results are listed in Appendix C, Table C-11.

Table 4. TLD Exposures from November 2005 to May 2006.

	Total Exposure[a]	
Location	**Boundary**	**Distant**
Minimum	49.80	47.60
Maximum	57.90	64.30
Average	53.10	56.86

a All values shown are in milliRoentgens (mR).

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.

The following discussion briefly summarizes the results of the quality assurance program for the period from April 1 to June 30, 2006.

DATA COMPLETENESS

The Quality Assurance Project Plan specifies a 98 percent completeness goal for all regularly scheduled sample types. This goal does not include variable sample types such as game animals and precipitation, where the ability to produce a sample is not controllable. Data completeness for sample collection and delivery was 100 percent during the second quarter for all samples types with the following exceptions.

There was one air sample that had a volume below the 7,000 ft^3 or 200 m^3 threshold listed in the air sampling procedure as being a valid sample. This sample was from Mud Lake on April 12 and the low volume was due to a tripped breaker. The completeness of the air filter data set is therefore 99.6 percent for the second quarter.

The liver was not obtained from the one game animal sampled during the second quarter.

No samples were lost in analysis during the second quarter.

DATA ACCURACY

Accuracy is a measure of the degree to which a measured value agrees with the "true" value for a given parameter; accuracy includes elements of both bias and precision.

SPIKE SAMPLE RESULTS

The ESER obtains spike samples from the Department of Energy's Radiological and Environmental Sciences Laboratory, which prepares the spikes and issues data reports with the results. During the second quarter of 2006, data were obtained for the following spikes:

- Quarterly composite spike analyzed for gamma-emitting radionuclides by the EAL.
- Low-volume charcoal cartridge analyzed for Iodine-131 by the EAL.
- Strontium-90 quarterly composite spike analyzed by Teledyne Brown.
- Three actinide quarterly composite spikes analyzed by Teledyne Brown.

Results are shown in Tables 5-10.

Table 5. Low-volume Air Filter Spike-Sample ID 06-QT-0021

Constituent	RESL Activity (pCi/filter ± 1s)	EAL Activity (pCi/filter ± 1s)	Ratio	AGREEMENT?
Co-57	71 ± 2	63.1 ± 1.6	0.88 ± 0.04	Warning
Co-60	68 ± 2	62.6 ± 1.7	0.92 ± 0.04	Yes
Cs-134	76 ± 2	69.3 ± 1.2	0.91 ± 0.03	Yes
Cs-137	85 ± 3	76 ± 2	0.89 ± 0.04	Warning
Mn-54	56.1 ± 1.9	53.6 ± 1.8	0.96 ± 0.04	Yes
Zn-65	45.2 ± 1.5	41 ± 2	0.91 ± 0.05	Yes

Note: Activities are as of 6/1/06

Table 6. Charcoal Cartridge Spike-Sample ID 06-LV-3041

Constituent	ERA Activity (pCi/filter ± 1s)	EAL Activity (pCi/filter ± 1s)	percent Deviation	WITHIN 3S CRITERION?
Iodine-131	10.0 ± 1.7	7.02 ± 1.10	-29.8	Yes

Note: Activities are as of 4/12/06

EAL counted this cartridge as a face-loaded sample. The laboratory reported that the distribution of activity on this sample was questionable.

Table 7. Low-volume Air Filter Composite Spike-Sample ID 06-QT-0084

Constituent	RESL Activity (pCi/filter ± 1s)	Severn-Trent Activity (pCi/filter ± 1s)	Ratio	AGREEMENT?
Sr-90	5.93 ± 0.10	3.97 ± 0.11	0.67 ± 0.02	No

Table 8. Low-volume air Filter Composite Spike-Sample ID06-QT-0085

Constituent	RESL Activity (pCi/sample ± 1s)	Teledyne Brown Activity (pCi/sample ± 1s)	Ratio	AGREEMENT?
Am-241	1.53 ± 0.03	1.06 ± 0.10	0.69 ± 0.07	No
Pu-238	1.27 ± 0.02	1.80 ± 0.10	1.42 ± 0.08	No
Pu-239/240	Blank	0.062 ± 0.012		No-false positive

Table 9. Low-volume Air Filter Composite Spike-Sample ID 06-QT-0086

Constituent	RESL Activity (pCi/sample ± 1s)	Teledyne Brown Activity (pCi/sample ± 1s)	Ratio	AGREEMENT?
Am-241	Blank	0.042 ± 0.010		No-false positive
Pu-238	0.819 ± 0.016	0.83 ± 0.12	1.01 ± 0.15	Yes
Pu-239/240	Blank	0.06 ± 0.03		Yes

Table 10. Low-volume Air Filter Composite Spike-Sample ID 06-QT-0087

Constituent	RESL Activity (pCi/sample ± 1s)	Teledyne Brown Activity (pCi/sample ± 1s)	Ratio	AGREEMENT?
Am-241	1.53 ± 0.03	1.44 ± 0.06	0.94 ± 0.04	Yes
Pu-238	1.27 ± 0.02	0.9 ± 0.2	0.71 ± 0.16	Yes
Pu-239/240	Blank	0.07 ± 0.05		Yes

PERFORMANCE EVALUATION SAMPLE RESULTS

The QAP program was discontinued following the March 2004 distribution. Performance evaluation samples are now prepared through the Mixed Analyte Performance Evaluation Program (MAPEP), administered by the Department of Energy's Radiological and Environmental Sciences Laboratory. DOE has mandated that all laboratories performing analyses in support of the Office of Environmental Management shall participate in MAPEP. The program distributes samples of air, water, vegetation and soil for analysis in approximately January and June. Both radiological and nonradiological constituents are included in the program.

Both the Idaho State University EAL and Teledyne Brown Engineering participated in the MAPEP Study reported in May 2006. Results are tabulated below for those analyses performed by each laboratory. (A = Acceptable, W = Acceptable with warning, N = Not acceptable)

Table 11. MAPEP Study Results

IDAHO STATE UNIVERSITY ENVIRONMENTAL ASSESSMENT LABORATORY

Analyte	EAL Result	MAPEP Result	Bias (percent)	Acceptable Range	Evaluation
Matrix: Air (Bq)					
Cesium-134	2.5	2.934	-14.8	2.054-3.814	A
Cesium-137	2.3	2.531	-9.1	1.772-3.290	A
Cobalt-57	3.9	4.096	-4.8	2.867-5.325	A
Cobalt-60	2.1	2.186	-3.9	1.530-2.842	A
Manganese-54	NR	--[a]			
Zinc-65	3.3	3.423	-3.6	2.396-4.450	A
Gross alpha	0.23	0.361	-36.3	0.0-0.722	A
Gross beta	0.38	0.481	-21.0	0.241-0.722	A
Matrix: Water (Bq/L)					
Cesium-134	83.9	95.10	-11.8	66.57-123.63	A
Cesium-137	NR	--[a]			
Cobalt-57	164.7	166.12	-0.9	116.28-215.96	A
Cobalt-60	156.8	153.50	+2.2	107.45-199.55	A
Tritium	883.1	952.01	-7.2	666.41-1237.61	A
Manganese-54	326.1	315.00	+3.5	220.50-409.50	A
Zinc-65	245.8	228.16	+7.7	159.71-296.61	A
Gross alpha	0.33	0.581	-43.2	0.0-1.162	A
Gross beta	1.49	1.13	+31.9	0.56-1.70	A
Matrix: Soil (Bq/kg)					

Analyte	EAL Result	MAPEP Result	Bias (percent)	Acceptable Range	Evaluation
Cesium-134	NR	--[a]			
Cesium-137	290.1	339.69	-14.6	237.78-441.60	A
Cobalt-57	503.5	656.29	-23.3	459.40-853.18	W
Cobalt-60	383.7	447.10	-14.2	312.97-581.23	A
Manganese-54	292.2	346.77	-15.7	242.74-450.80	A
Potassium-40	501.9	604	-16.9	423-785	W
Zinc-65	563.8	657.36	-14.2	460.15-854.57	A

TELEDYNE BROWN ENGINEERING

Matrix: Air (Bq)

Analyte	TBE Result	MAPEP Result	Bias (percent)	Acceptable Range	Evaluation
Americium-241	0.0850	0.093	-8.6	0.065-0.121	A
Cesium-134	2.34	2.934	-20.2	2.054-3.814	W
Cesium-137	2.45	2.531	-3.2	1.772-3.290	A
Cobalt-57	3.87	4.096	-5.5	2.867-5.325	A
Cobalt-60	2.12	2.186	-3.0	1.530-2.842	A
Manganese-54	0.0206	--[b]			A
Plutonium-238	0.0766	0.067	+14.3	0.047-0.087	A
Plutonium-239/240	0.00520	--[b]			A
Strontium-90	0.761	0.792	-3.9	0.554-1.030	A
Uranium-234/233	0.0217	0.020	+8.5	0.014-0.026	A
Uranium-238	0.0220	0.021	+4.8	0.015-0.027	A
Zinc-65	3.86	3.423	+12.8	2.396-4.450	A
Gross Alpha	0.257	0.361	-28.8	0.0-0.722	A

Analyte	EAL Result	MAPEP Result	Bias (percent)	Acceptable Range	Evaluation
Gross Beta	0.398	0.481	-17.3	0.241-0.722	A
Matrix: Water (Bq/L)					
Americium-241	1.29	1.30	-0.8	0.91-1.69	A
Cesium-134	79.2	95.10	-16.7	66.57-123.63	A
Cesium-137	-0.188	--[b]			A
Cobalt-57	151	166.12	-9.1	116.28-215.96	A
Cobalt-60	141	153.50	-8.1	107.45-199.55	A
Tritium	988	952.01	+3.8	666.41-1237.61	A
Iron-55	106	129.60	-18.2	90.72-168.48	A
Manganese-54	297	315.00	-5.7	220.50-409.50	A
Plutonium-238	0.961	0.91	+5.6	0.64-1.18	A
Plutonium-239/240	0.00965	--[b]			A
Strontium-90	12.6	13.16	-4.3	9.21-17.11	A
Technetium-99	22.5	23.38	-3.8	16.37-30.39	A
Uranium-234/233	2.20	2.09	+5.3	1.46-2.72	A
Uranium-238	2.23	2.17	+2.8	1.52-2.82	A
Zinc-65	219	228.16	-4.0	159.71-296.61	A
Gross Alpha	0.575	0.581	-1.0	0.0-1.162	A
Gross Beta	1.52	1.13	+34.5	0.56-1.70	A
Matrix: Soil (Bq/kg)					
Americium-241	48.8	57.08	-14.5	39.96-74.20	A
Cesium-134	15.9	--[c]			N
Cesium-137	370	339.69	+8.9	237.78-441.60	A
Cobalt-57	667	656.29	+1.6	459.40-853.18	A

Analyte	EAL Result	MAPEP Result	Bias (percent)	Acceptable Range	Evaluation
Cobalt-60	478	447.10	+6.9	312.97-581.23	A
Manganese-54	384	346.77	+10.7	242.74-450.80	A
Nickel-63	394	323.51	+21.8	226.46-420.56	W
Potassium-40	667	604	+10.4	423-785	A
Strontium-90	253	314.35	-19.5	220.04-408.66	A
Technetium-99	146	154.76	-5.7	108.33-201.19	A
Zinc-65	740	657.36	+12.6	460.15-854.57	A
Matrix: Vegetation (Bq)					
Americium-241	0.156	0.156	0.0	0.109-0.203	A
Cesium-134	0.369	--[b]			A
Cesium-137	3.15	3.074	+2.5	2.152-3.996	A
Cobalt-57	10.1	8.578	+17.7	6.005-11.151	A
Cobalt-60	4.69	4.520	+3.8	3.164-5.876	A
Manganese-54	6.53	6.247	+4.5	4.373-8.121	A
Plutonium-238	0.183	0.137	+33.6	0.096-0.178	N
Plutonium-239/240	0.111	0.164	-32.3	0.115-0.213	N
Strontium-90	2.22	1.561	+42.2	1.093-2.029	N
Uranium-234/233	0.208	0.208	0.0	0.146-0.270	A
Uranium-238	0.176	0.216	-18.5	0.151-0.281	A
Zinc-65	10.5	9.798	+7.2	6.859-12.737	A

a. False positive test. Value not reported by laboratory.

b. False positive test. Value reported by laboratory was statistically zero.

c. Laboratory reported false positive.

INTERNAL LABORATORY SPIKES

The Idaho State University Environmental Assessment Laboratory uses NIST standards to prepare spiked water samples and uses commercially prepared calibration standards as NIST-traceable spiked samples. ISU considers a performance to be acceptable if results pass either the ±20 percent test specified by the ESER program or the three-sigma test described in the data precision section. A variety of checks are made each quarter on different geometries.

During the second quarter of 2006, 18 analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. The geometries tested were single and ten charcoal cartridge screening, low-volume composite, 500-mL 1.0 g/cc and 1 L 1.0 g/cc. A total of 108 analytical results were generated. All of the results were within the ±20 percent range.

Water samples spiked with tritium received 16 analyses during the quarterly reporting period. All were well within the ±20 percent criterion and within the three standard deviation criterion. A tritium in milk spike was measured within approximately 6 percent of the known value.

Teledyne Brown analyzed a laboratory control sample (LCS) with each batch of samples submitted by the ESER. During the second quarter this consisted of strontium-90 and actinides in air and strontium-90 in milk.

Table 12. Internal Laboratory Spike Results

Media	Analyte	QAPjP Accuracy	LCS Result	Within Criterion?
Air	Strontium-90	±10 percent		Yes
Air	Americium-241	±10 percent		Yes
Air	Plutonium-239/240	±10 percent		Yes
Milk	Strontium-90	±25 percent		Yes

DATA PRECISION

Data precision is measured using duplicate samples, split samples, and recounts. The Quality Assurance Project Plan specifies that sample results should agree within ±20 percent or 3s, whichever is greater. For environmental samples at levels that are within the normal range found by the ESER, the 3 standard deviation criterion is the one that applies in nearly all cases. The standard deviation criterion is considered to be met if the values of the duplicate samples differ by less than the root mean square of three standard deviations of each sample result. Mathematically, this is expressed as:

$|X-Y| < 3 (\text{sqrt}(s_x^2 + s_y^2))$,

where:

X is the result of the regular sample

Y is the result of the duplicate sample

s_x is the uncertainty of the regular sample

s_y is the uncertainty of the duplicate sample

Another measure of duplicate sample results is the relative percent difference. This value is the difference in the two results divided by the mean of the two results. The following sections of this report first check the sample results using the 3 standard deviation criterion. If this criterion is not met, the results are then listed for the relative percent difference. Other pertinent information that may have affected the sample analysis is also included under Notes.

FIELD DUPLICATE SAMPLES

Duplicate milk samples were collected from Dietrich on June 6 and analyzed for gamma-emitting radionuclides. The following results were reported.

Table 13. Dietrich duplicate milk sample results.

Nuclide	Dietrich result ±1s (pCi/L)	Duplicate result ±1s (pCi/L)	Within 3s criterion?	Notes
Iodine-131	-0.79 ± 1.40	0.75 ± 2.45	Yes	
Cesium-137	-0.29 ± 1.20	-3.32 ± 3.02	Yes	
Potassium-40	322 ± 57	398 ± 88	Yes	

Duplicate milk samples were collected from Howe on June 6 and analyzed for gamma-emitting radionuclides. The following results were reported.

Table 14. Howe duplicate milk sample results.

Nuclide	Howe result ±1s (pCi/L)	Duplicate result ±1s (pCi/L)	Within 3s criterion?	Notes
Iodine-131	-0.33 ± 0.91	0.14 ± 0.91	Yes	
Cesium-137	0.39 ± 1.04	-0.56 ± 1.22	Yes	
Potassium-40	280 ± 43	319 ± 57	Yes	

Duplicate drinking water samples were obtained from Arco on May 10 and analyzed for gross alpha, gross beta and tritium. Results for this sample were as follows.

Table 15. Arco duplicate milk sample results.

Nuclide	Arco result ±1s (pCi/L)	Duplicate result ±1s (pCi/L)	Within 3s criterion?	Notes
Gross alpha	0.61 ± 0.43	0.74 ± 0.43	Yes	
Gross beta	0.40 ± 0.49	0.37 ± 0.48	Yes	
Tritium	-11 ± 30	57 ± 31	Yes	

Duplicate surface water samples were obtained from Twin Falls on May 9 and analyzed for gross alpha, gross beta, and tritium. Results for this sample were as follows.

Table 16. Twin Falls duplicate milk sample results.

Nuclide	Twin Falls result ±1s (pCi/L)	Duplicate result ±1s (pCi/L)	Within 3s criterion?	Notes
Gross alpha	0.59 ± 0.45	0.26 ± 0.53	Yes	
Gross beta	6.89 ± 0.60	6.14 ± 0.60	Yes	
Tritium	-20 ± 30	21 ± 30	Yes	

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the second quarter of 2006 these samplers, designated as QA-1 and QA-2, were in operation at the Experimental Field Station and Mud Lake, respectively. Particulate filters receive the standard analysis for gross alpha and gross beta; charcoal cartridges are analyzed specifically for iodine-131. The following table presents gross alpha and gross beta results for the co-located samplers. Charcoal cartridge results are difficult to present because cartridges are counted in batches of ten.

Table 17. Gross alpha and gross beta results for duplicate air samples.

Gross Alpha				
Week Ending	**EFS result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-1 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
4/5	1.08 ± 0.26	1.09 ± 0.18	Yes	
4/12	1.41 ± 0.28	0.66 ± 0.23	Yes	
4/19	1.03 ± 0.26	1.23 ± 0.22	Yes	
4/26	2.68 ± 0.28	1.89 ± 0.26	Yes	
5/3	1.78 ± 0.44	2.94 ± 0.40	Yes	
5/10	1.92 ± 0.35	1.69 ± 0.31	Yes	
5/17	2.26 ± 0.45	2.45 ± 0.37	Yes	
5/24	1.71 ± 0.41	3.19 ± 0.41	Yes	
5/31	2.65 ± 0.75	1.94 ± 0.44	Yes	EFS had a low volume due to power problem
6/7	1.93 ± 0.42	1.82 ± 0.36	Yes	
6/14	3.33 ± 0.45	2.73 ± 0.40	Yes	
6/21	1.03 ± 0.35	1.31 ± 0.34	Yes	
6/28	2.43 ± 0.30	2.61 ± 0.32	Yes	
Week Ending	**Mud Lake result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-2 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
4/5	1.09 ± 0.20	1.09 ± 0.25	Yes	
4/12	0.32 ± 2.55	0.98 ± 0.32	Yes	Mud Lake invalid due to

Gross Alpha				
Week Ending	**EFS result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-1 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
				tripped breaker
4/19	1.17 ± 0.21	1.37 ± 0.26	Yes	
4/26	2.69 ± 0.28	2.62 ± 0.34	Yes	
5/3	1.92 ± 0.36	2.62 ± 0.46	Yes	
5/10	1.62 ± 0.33	1.40 ± 0.37	Yes	
5/17	2.22 ± 0.36	3.45 ± 0.48	Yes	
5/24	1.73 ± 0.33	2.37 ± 0.41	Yes	
5/31	1.50 ± 0.33	1.73 ± 0.41	Yes	
6/7	1.79 ± 0.40	1.98 ± 0.44	Yes	
6/14	2.26 ± 0.37	3.35 ± 0.53	Yes	
6/21	1.60 ± 0.33	1.78 ± 0.38	Yes	
6/28	2.04 ± 0.25	2.26 ± 0.30	Yes	

Gross beta				
Week Ending	**EFS result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-1 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
4/5	15.0 ± 0.7	14.4 ± 0.5	Yes	
4/12	11.5 ± 0.6	10.5 ± 0.6	Yes	
4/19	16.4 ± 0.7	14.2 ± 0.6	Yes	
4/26	25.2 ± 0.7	25.5 ± 0.8	Yes	
5/3	28.3 ± 1.1	26.9 ± 0.9	Yes	
5/10	26.2 ± 0.9	24.7 ± 0.8	Yes	
5/17	35.0 ± 1.2	32.4 ± 1.0	Yes	

Gross beta				
Week Ending	**EFS result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-1 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
5/24	27.4 ± 1.1	37.8 ± 1.2	No	
5/31	23.0 ± 1.7	18.0 ± 1.0	Yes	EFS had a low volume due to power problem
6/7	19.5 ± 0.8	18.6 ± 0.7	Yes	
6/14	22.1 ± 0.9	21.0 ± 0.8	Yes	
6/21	24.3 ± 0.9	24.3 ± 0.9	Yes	
6/28	34.3 ± 1.0	35.8 ± 1.0	Yes	
Week Ending	**Mud Lake result ±1s ($\times 10^{-15}$ µCi/mL)**	**QA-2 result ±1s ($\times 10^{-15}$ µCi/mL)**	**Within 3s criterion?**	**Notes**
4/5	15.2 ± 0.6	15.4 ± 0.7	Yes	
4/12	9.3 ± 6.2	11.9 ± 0.8	Yes	Mud Lake invalid due to tripped breaker
4/19	15.4 ± 0.6	15.3 ± 0.7	Yes	
4/26	24.2 ± 0.7	27.7 ± 0.9	No	
5/3	29.2 ± 0.9	30.9 ± 1.1	Yes	
5/10	25.0 ± 0.9	25.9 ± 1.0	Yes	
5/17	32.6 ± 1.0	35.7 ± 1.2	Yes	
5/24	23.2 ± 0.8	26.5 ± 1.0	Yes	
5/31	17.1 ± 0.8	15.8 ± 1.0	Yes	
6/7	19.4 ± 0.8	20.1 ± 0.9	Yes	
6/14	21.8 ± 0.8	21.5 ± 1.0	Yes	
6/21	23.3 ± 0.8	25.2 ± 0.9	Yes	
6/28	35.9 ± 0.9	39.7 ± 1.0	Yes	

Composites from the two QA samplers are submitted for analysis at the end of the quarter for gamma spectrometry. One set of composites was submitted for strontium analysis and one set was submitted for actinide analysis following return from the EAL.

Table 18. Table 18. Gamma spectrometry results for duplicate air samples.

Nuclide	EFS result ±1s (uCi/m^3 or pCi/mL)	QA-1 result ±1s (uCi/m^3 or pCi/mL)	Within 3s criterion?	Notes
Be-7	$(293 \pm 10) \times 10^{-9}$	$(281 \pm 10) \times 10^{-9}$	Yes	
Cs-137	$(-2.06 \pm 1.28) \times 10^{-10}$	$(2.35 \pm 2.34) \times 10^{-10}$	Yes	
Pu-238	$(9.60 \pm 1.90) \times 10^{-12}$	$(13.5 \pm 2.52) \times 10^{-12}$	Yes	
Pu-239/240	$(3.56 \pm 1.14) \times 10^{-12}$	$(1.32 \pm 1.04) \times 10^{-12}$	Yes	
Am-241	$(3.97 \pm 0.82) \times 10^{-12}$	$(0.21 \pm 0.50) \times 10^{-12}$	No	

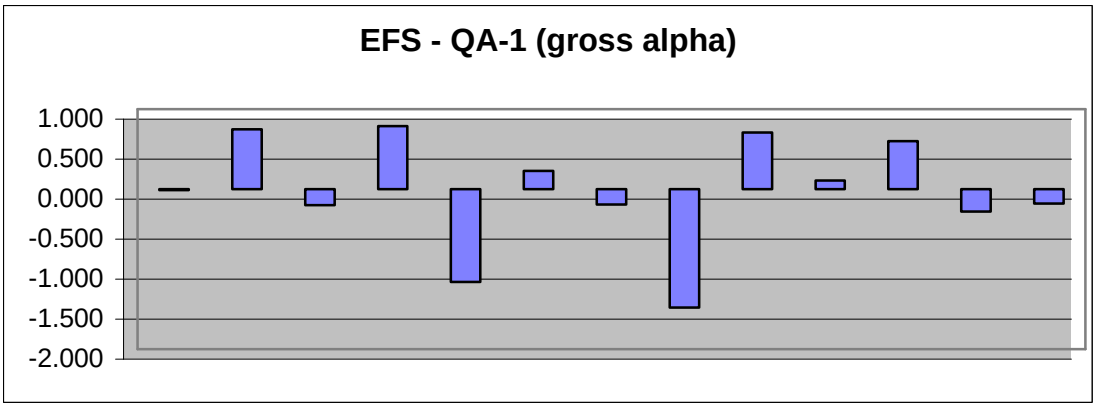
Nuclide	Mud Lake result ±1s (uCi/m^3 or pCi/mL)	QA-2 result ±1s (uCi/m^3 or pCi/mL)	Within 3s criterion?	Notes
Be-7	$(322 \pm 11) \times 10^{-9}$	$(300 \pm 10) \times 10^{-9}$	Yes	
Cs-137	$(0.08 \pm 1.30) \times 10^{-10}$	$(0.21 \pm 1.45) \times 10^{-10}$	Yes	
Sr-90	$(-3.99 \pm 2.16) \times 10^{-11}$	$(-4.78 \pm 2.91) \times 10^{-11}$	Yes	

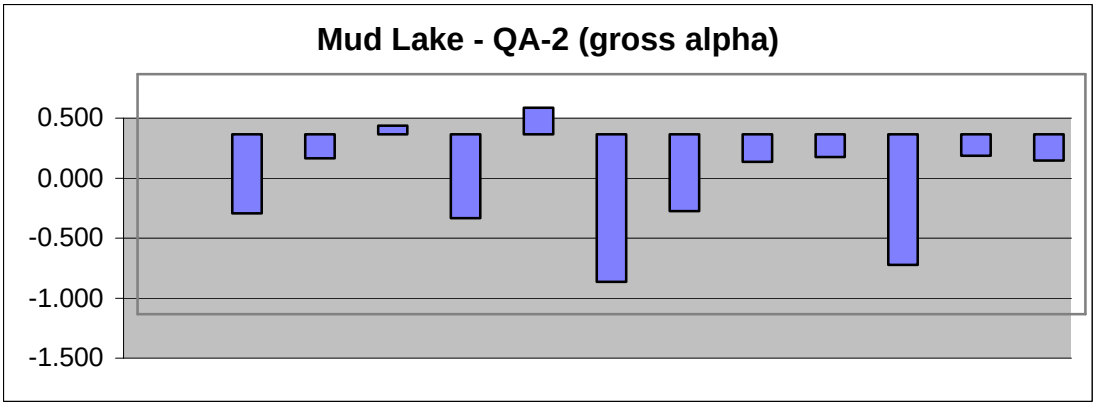
A comparison of duplicate results can also show bias in the sampling system, such as if one set of results is consistently lower or higher than the other. For air sampling equipment this bias can result from a leak in the system or variations in the calibration of the flow meter. The following figures show graphs comparing the difference in the gross alpha and gross beta results for the second quarter of 2006.

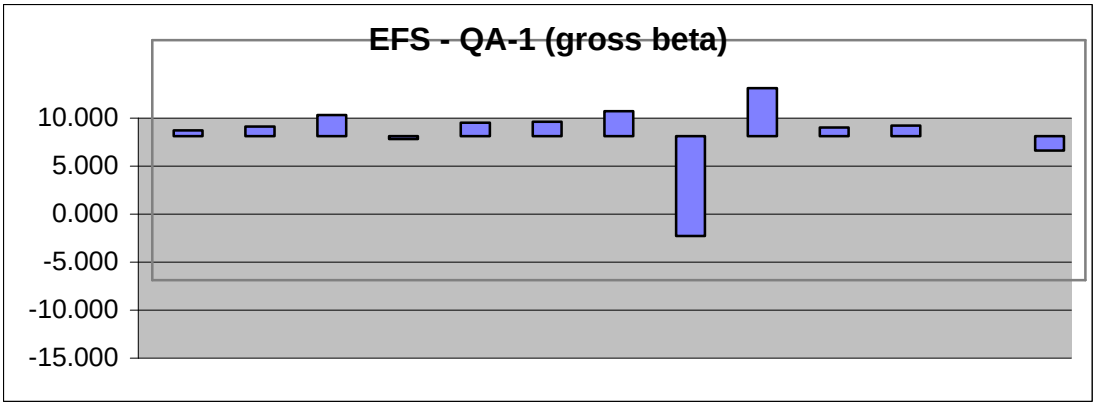
LAB SPLIT SAMPLES

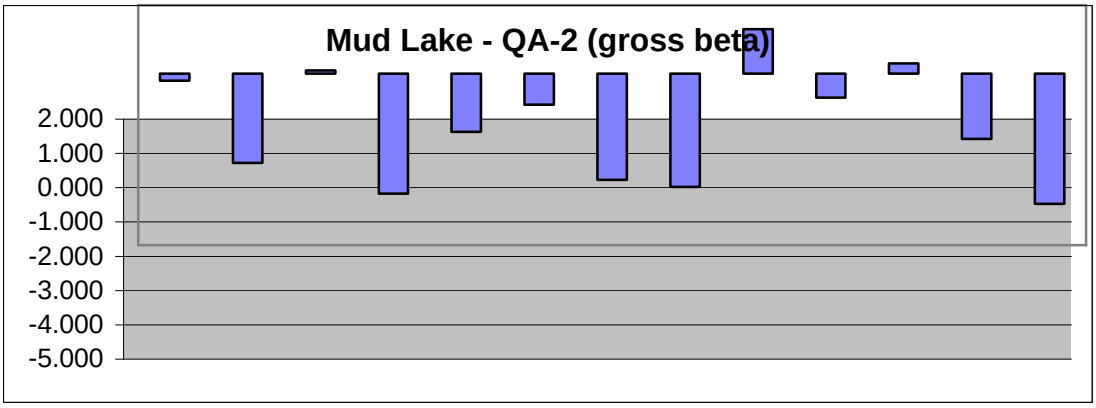
Idaho State University splits and analyzes a number of milk, precipitation, and atmospheric moisture samples each quarter. The laboratory tests each result using both the ±20 percent criterion and the 3s criterion, although it considers the former test meaningless for analyses producing fewer than 15 total counts and questionable even where counts are on the order of 100. The latter criterion is applied in nearly all cases at the levels seen in environmental samples analyzed for the ESER program.

The ISU Quality Assurance Report contains spreadsheets that analyze split and recount data using a logical equation that tests for the above two criteria. The spreadsheet first tests for the ±20 percent criterion; if this test is not met, the 3s criterion is used. Acceptable performance is considered if either test is passed.









Duplicate samplers gross alpha and gross beta results for the second quarter of 2006.

Table 19. Results of EAL split sample analyses-second quarter 2006

Media	Analyte	# Split Samples	# not meeting 3s criterion	Notes
Milk	Potassium-40	8	0	
Water	Tritium	7	0	
Precipitation	Tritium	2	0	
Atmospheric Moisture	Tritium	4	1	Difference in results was 18.8 percent

SAMPLE RECOUNTS

The ISU EAL recounts a number of samples of each media type. The lab tests each recount using both the 20 percent criterion and the 3s criterion, subject to the limitations described in the previous section.

A summary of the recount results for the second quarter is presented below.

- 48 low-volume air filters were recounted for alpha activity. All results were within the 3s criterion.
- 48 low-volume air filters were recounted for beta activity. One result was outside the 3s criterion but within the 20 percent criterion.
- 11 milk samples were recounted for potassium-40; one was recounted twice. All results were within the 3s criterion.
- 5 groups of charcoal cartridges were recounted for iodine-131. All results were within the 3s criterion.
- 5 tissue samples were recounted for cesium-137. All results were within the 3s criterion.
- 5 quarterly composites were recounted for beryllium-7. All results were within the 3s criterion.
- 2 water samples were recounted for tritium activity. Both results were within the 3s criterion.
- 3 milk samples were recounted for tritium activity. The results were within the 3s criterion.

BLANKS

FIELD BLANKS

The ESER program submits field blanks along with the regular samples to test for the introduction of contamination during the process of field collection, laboratory preparation, and laboratory analysis. The current program includes the use of two field blanks, designated as Blank A and Blank B, that each accompanies one of the air filter routes. Quarterly composites of the blanks are also submitted. After gamma spectrometry analysis, one of the blanks is analyzed for Sr-90 and the other for transuranics.

Ideally, blank results should be within ±2s of zero and preferably within ±1s of zero on most analyses. It would be expected, based on counting statistics for a sample that was truly a blank (i.e., the true value of the analyte was zero), that 68.3 percent of analyses would fall within one standard deviation, 95.5 percent would fall within two standard deviations, and 99.7 percent would fall within three standard deviations.

The following tables contain the results of second quarter field blanks. The significance level describes the multiple of the uncertainty that the result lies from zero. Those designated as <1 are within ±1s, those designated as 1 are between ±1s and ±2s, and so forth.

Table 20. Results for Blank A weekly analyses

Date	Gross alpha result (x 10^{-7} uCi/filter)	Alpha significance level	Gross beta result (x 10^{-7} uCi/filter)	Beta significance level
4/5	0.36 ± 0.59	<1	0.00 ± 1.39	<1
4/12	0.28 ± 0.82	<1	-0.07 ± 1.89	<1
4/19	0.81 ± 0.69	1	1.00 ± 1.51	<1
4/26	0.41 ± 0.54	<1	1.14 ± 1.43	<1
5/3	-0.79 ± 0.92	<1	-2.01 ± 1.89	1
5/10	1.98 ± 1.05	1	3.98 ± 1.92	2
5/17	0.45 ± 0.80	<1	0.27 ± 1.88	<1
5/24	0.66 ± 0.89	<1	-0.85 ± 1.83	<1
5/31	0.04 ± 0.84	<1	-3.87 ± 1.86	2
6/7	0.12 ± 1.08	<1	-1.90 ± 1.79	1
6/14	-1.20 ± 0.98	1	0.84 ± 1.79	<1
6/21	-0.29 ± 0.99	<1	-0.13 ± 1.92	<1
6/28	0.28 ± 0.55	<1	-0.16 ± 1.47	<1

Table 21. Results for Blank B weekly analyses

Date	Gross alpha result (x 10^{-7} uCi/filter)	Alpha significance level	Gross beta result (x 10^{-7} uCi/filter)	Beta significance level
4/5	0.03 ± 0.56	<1	1.34 ± 1.43	<1
4/12	-0.45 ± 0.75	<1	-0.64 ± 1.87	<1
4/19	0.48 ± 0.66	<1	-0.30 ± 1.47	<1
4/26	1.33 ± 0.63	2	0.81 ± 1.43	<1
5/3	-0.67 ± 0.93	<1	0.80 ± 1.95	<1
5/10	-0.34 ± 0.87	<1	1.98 ± 1.87	1
5/17	0.90 ± 0.84	1	-0.59 ± 1.86	<1
5/24[a]	6.07 ± 1.31	4	82.8 ± 3.3	25
5/31	1.92 ± 0.99	1	-1.48 ± 1.92	<1
6/7	0.45 ± 1.10	<1	-4.50 ± 1.74	2
6/14	-0.80 ± 1.00	<1	-3.15 ± 1.70	1
6/21	1.74 ± 1.14	1	1.25 ± 1.95	<1
6/28	-0.37 ± 0.49	<1	-0.30 ± 1.46	<1

a. It appears the results for this blank were switched with the results for the filter that follows in the numbering sequence (Jackson). The blank was recounted twice with similar results. The Jackson filter showed <1 standard deviation results for both gross alpha and gross beta.

Table 22. Results for quarterly air filter composite blanks-ISU

Blank	**Be-7 result (uCi/m^3)**	**Be-7 significance level**	**Cs-137 result (uCi/m^3)**	**Cs-137 significance level**
Blank A	(1.10 ± 3.29) x 10^{-9}	<1	(2.22 ± 1.27) x 10^{-10}	1
Blank B	(3.55 ± 3.74) x 10^{-9}	<1	(3.57 ± 2.29) x 10^{-10}	<1

Table 23. Results for quarterly air filter composite blanks-Teledyne Brown

Nuclide	Result (pCi/mL)	Significance level
Strontium-90	$(-0.27 \pm 1.29) \times 10^{-11}$	<1
Plutonium-238	$(-0.41 \pm 1.50) \times 10^{-12}$	<1
Plutonium-239/240	$(13.2 \pm 1.9) \times 10^{-12}$	6
Americium-241	$(-13.9 \pm 5.32) \times 10^{-12}$	2

Table 24. Results for Iodine-131 in milk blanks

Date	Iodine-131 result (pCi/L)	Significance level
4/4	-0.02 ± 1.39	<1
5/2	2.85 ± 2.99	<1
6/6	-2.00 ± 1.43	1

REAGENT BLANKS

The Environmental Assessment Laboratory prepares and analyzes reagent blanks to help determine if the analysis will yield a zero result when no activity is present. ISU considers the result within specification if the concentration is less than the minimum detectable concentration (MDC) for the analysis. Three such blanks were analyzed for tritium in the second quarter (two for water and one for milk). The blanks were well below the MDC for the analysis and also less than three standard deviations.

Teledyne Brown analyzes a blank with each set of results. All blanks for second quarter samples met Teledyne Brown's acceptance limits.

METHOD QUALITY OBJECTIVES

The Multi-Agency Radiological Laboratory Analytical Protocol (MARLAP) process recommends that performance-based data quality indicators be established as Method Quality Objectives (MQOs). Since the primary concern is with detection, the lower bound for the method uncertainty is set at zero. The upper bound is defined by the ESER program as the maximum concentration for the range of data over the past ten years, excepting those values determined to be extremes using box plots generated by a statistical data program. Each individual result is checked for acceptance on the basis of the result, whether it is below the lower limit (i.e., a negative value), greater than the upper limit, or between the lower and upper limit (the most common occurrence). The calculated method uncertainty is then compared to the 1s measured uncertainty. A sample is deemed acceptable when the measured 1s uncertainty is less than the calculated uncertainty. The upper bound values were recently re-

evaluated and revised. Preliminary results indicate that more calculated method uncertainties for detected results were acceptable. The following table for the second quarter of 2006 shows the number and percentage of results that were determined to be unacceptable using the MARLAP process.

Table 25. Number and percentage of results that were determined to be unacceptable using the MARLAP process.

Media	Analyte	# Results	# Not Acceptable	Percent Not Acceptable
LV	Gross Alpha	364	2	0.5
	Gross Beta	354	0	0
CC	Cesium-137	300	0	0
	Iodine-131	300	40	13.3
MI	Cesium-137	66	14	21.2
	Iodine-131	66	19	28.8
	Tritium	8	0	0
	Strontium-90	5	0	0
DW	Gross Alpha	25	0	0
	Gross Beta	23	0	0
	Tritium	17	0	0
SW	Gross Alpha	14	0	0
	Gross Beta	14	0	0
	Tritium	8	0	0
PC	Tritium	13	0	0
AM	Tritium	27	0	0
QT	Americium-241	10	0	0
	Cesium-137	20	0	0
	Plutonium-238	10	6	60.0
	Plutonium-239/240	10	1	10.0

Media	Analyte	# Results	# Not Acceptable	Percent Not Acceptable
	Strontium-90	11	0	0
SH	Cesium-137	23	0	0
	Iodine-131	23	4	17.4
GA	Cesium-137	2	0	0
	Iodine-131	2	1	50.0

OTHER QA PROBLEMS NOTED

There were no additional QA problems noted in the second quarter.

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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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	4 to 13 weeks	Blackfoot, Idaho Falls, Rexburg	Atomic City	None
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	CFA
Tritium	weekly	None	None	EFS
PM-10				
Particulate Mass	every 6th day	Rexburg, Blackfoot	Atomic City	None
WATER SAMPLING				
SURFACE WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Twin Falls, Buhl, Hagerman, Idaho Falls, Bliss	None	None
DRINKING WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Aberdeen, Carey, Fort Hall, Idaho Falls, Minidoka, Moreland, Roberts, Shoshone, Taber	Arco, Atomic City, Howe, Monteview, Mud Lake	None
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, 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	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	Ucon	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Moreland, Roberts	Howe, Terreton	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Moreland, Roberts	Howe, Terreton	None
POTATOES				
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
WHEAT				
Gamma Spec, ^{90}Sr	annually	American Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Taber, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL Site roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois	None	N. INL Site (Circular Butte), S. INL Site (Tractor Flats)
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Heise, Firth, Fort Hall, Mud Lake and Market Lake	None	Wastewater disposal ponds
MARMOTS				
Gamma Spec	varies	Pocatello Zoo, Tie Canyon	None	RWMC

APPENDIX B

SUMMARY OF MDCs AND DCGs

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Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Second quarter 2006

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	5.15×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.19×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	9.60×10^{-17} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	1.33×10^{-17} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}$Pu	5.20×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	4.96×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	4.24×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.17×10^{-15} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	1.05×10^{-7} µCi/mL$_{water}$	1×10^{-7} µCi/mL$_{air}$
Air (precipitation)	^{3}H	9.34×10^{-8} µCi/mL	2×10^{-3} µCi/mL
Milk	^{131}I	0.61 pCi/L	--
	^{137}Cs	2.64 pCi/L	--
Game Animal Tissue[g]	^{137}Cs	0.88 pCi/kg	--

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.

f The approximate MDC is expressed for tritium (as tritiated water) in air, and is based on an average filtered air volume of 39 m^3, assuming an average sampling period of eight weeks.

g The approximate MDC assumes a sample size of 500 g.

APPENDIX C

SAMPLE ANALYSIS RESULTS

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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	04/05/2006	1.17 ± 0.24	4.33 ± 0.89	Y	14.20 ± 0.65	52.54 ± 2.41	Y
	04/12/2006	1.31 ± 0.31	4.85 ± 1.14	Y	11.20 ± 0.71	41.44 ± 2.61	Y
	04/19/2006	1.74 ± 0.28	6.44 ± 1.05	Y	15.00 ± 0.67	55.50 ± 2.47	Y
	04/26/2006	2.42 ± 0.29	8.95 ± 1.05	Y	28.50 ± 0.77	105.45 ± 2.85	Y
	05/03/2006	1.67 ± 0.41	6.18 ± 1.52	Y	24.80 ± 1.00	91.76 ± 3.69	Y
	05/10/2006	2.03 ± 0.41	7.51 ± 1.50	Y	27.10 ± 0.99	100.27 ± 3.67	Y
	05/17/2006	3.32 ± 0.42	12.28 ± 1.56	Y	33.20 ± 1.01	122.84 ± 3.74	Y
	05/24/2006	2.02 ± 0.36	7.47 ± 1.32	Y	25.70 ± 0.89	95.09 ± 3.30	Y
	05/31/2006	1.80 ± 0.42	6.66 ± 1.57	Y	17.40 ± 0.99	64.38 ± 3.66	Y
	06/07/2006	2.06 ± 0.40	7.62 ± 1.49	Y	19.30 ± 0.78	71.41 ± 2.87	Y
	06/14/2006	2.47 ± 0.40	9.14 ± 1.49	Y	20.50 ± 0.81	75.85 ± 3.00	Y
	06/21/2006	1.30 ± 0.35	4.81 ± 1.31	Y	23.90 ± 0.89	88.43 ± 3.27	Y
	06/28/2006	2.54 ± 0.33	9.40 ± 1.21	Y	33.30 ± 1.00	123.21 ± 3.70	Y
ATOMIC CITY	04/05/2006	1.28 ± 0.20	4.74 ± 0.73	Y	13.70 ± 0.52	50.69 ± 1.92	Y
	04/12/2006	0.85 ± 0.22	3.16 ± 0.81	Y	11.50 ± 0.56	42.55 ± 2.08	Y
	04/19/2006	1.37 ± 0.23	5.07 ± 0.83	Y	14.70 ± 0.57	54.39 ± 2.10	Y
	04/26/2006	2.10 ± 0.27	7.77 ± 1.01	Y	23.20 ± 0.73	85.84 ± 2.68	Y
	05/03/2006	1.07 ± 0.29	3.96 ± 1.07	Y	24.00 ± 0.79	88.80 ± 2.90	Y
	05/10/2006	2.33 ± 0.40	8.62 ± 1.49	Y	22.40 ± 0.90	82.88 ± 3.32	Y
	05/17/2006	2.23 ± 0.32	8.25 ± 1.17	Y	32.10 ± 0.85	118.77 ± 3.15	Y
	05/24/2006	2.01 ± 0.35	7.44 ± 1.31	Y	21.90 ± 0.94	81.03 ± 3.47	Y
	05/31/2006	1.22 ± 0.24	4.51 ± 0.90	Y	12.80 ± 0.58	47.36 ± 2.15	Y
	06/07/2006	1.84 ± 0.35	6.81 ± 1.30	Y	18.90 ± 0.70	69.93 ± 2.58	Y
	06/14/2006	2.27 ± 0.35	8.40 ± 1.28	Y	18.70 ± 0.70	69.19 ± 2.58	Y
	06/21/2006	2.30 ± 0.39	8.51 ± 1.44	Y	23.90 ± 0.86	88.43 ± 3.18	Y
	06/28/2006	1.88 ± 0.22	6.96 ± 0.83	Y	33.80 ± 0.78	125.06 ± 2.87	Y
BLUE DOME	04/05/2006	0.88 ± 0.17	3.25 ± 0.64	Y	14.10 ± 0.51	52.17 ± 1.89	Y
	04/12/2006	0.84 ± 0.27	3.11 ± 0.98	Y	10.60 ± 0.66	39.22 ± 2.45	Y
	04/19/2006	0.94 ± 0.20	3.47 ± 0.73	Y	11.90 ± 0.52	44.03 ± 1.93	Y
	04/26/2006	2.11 ± 0.26	7.81 ± 0.97	Y	21.90 ± 0.68	81.03 ± 2.50	Y
	05/03/2006	1.17 ± 0.30	4.33 ± 1.10	Y	22.80 ± 0.78	84.36 ± 2.88	Y
	05/10/2006	1.64 ± 0.39	6.07 ± 1.44	Y	23.50 ± 0.96	86.95 ± 3.53	Y
	05/17/2006	2.79 ± 0.36	10.32 ± 1.32	Y	30.60 ± 0.88	113.22 ± 3.24	Y
	05/24/2006	1.42 ± 0.32	5.25 ± 1.19	Y	21.90 ± 0.84	81.03 ± 3.11	Y
	05/31/2006	0.79 ± 0.24	2.91 ± 0.88	Y	15.50 ± 0.66	57.35 ± 2.46	Y
	06/07/2006	1.93 ± 0.47	7.14 ± 1.75	Y	19.10 ± 0.91	70.67 ± 3.38	Y
	06/14/2006	2.62 ± 0.36	9.69 ± 1.34	Y	19.80 ± 0.72	73.26 ± 2.65	Y
	06/21/2006	1.37 ± 0.37	5.07 ± 1.36	Y	23.70 ± 0.91	87.69 ± 3.35	Y
	06/28/2006	2.18 ± 0.29	8.07 ± 1.07	Y	34.40 ± 0.95	127.28 ± 3.52	Y
FAA TOWER	04/05/2006	1.27 ± 0.23	0.87 ± 0.87	Y	15.00 ± 0.63	55.50 ± 2.33	Y
	04/12/2006	0.80 ± 0.22	0.80 ± 0.80	Y	10.30 ± 0.55	38.11 ± 2.03	Y
	04/19/2006	1.32 ± 0.26	0.94 ± 0.94	Y	14.40 ± 0.65	53.28 ± 2.39	Y
	04/26/2006	2.07 ± 0.26	0.94 ± 0.94	Y	23.40 ± 0.68	86.58 ± 2.52	Y
	05/03/2006	2.40 ± 0.40	1.47 ± 1.47	Y	26.10 ± 0.91	96.57 ± 3.35	Y
	05/10/2006	1.55 ± 0.34	1.26 ± 1.26	Y	22.80 ± 0.85	84.36 ± 3.15	Y
	05/17/2006	2.67 ± 0.40	1.48 ± 1.48	Y	29.90 ± 0.99	110.63 ± 3.66	Y
	05/24/2006	2.25 ± 0.32	1.18 ± 1.18	Y	24.10 ± 7.63	89.17 ± 28.23	Y
	05/31/2006	0.83 ± 0.31	1.15 ± 1.15		15.10 ± 0.83	55.87 ± 3.06	Y
	06/07/2006	1.66 ± 0.36	1.32 ± 1.32	Y	17.60 ± 0.71	65.12 ± 2.63	Y
	06/14/2006	2.50 ± 0.40	1.49 ± 1.49	Y	20.70 ± 0.81	76.59 ± 3.00	Y
	06/21/2006	1.76 ± 0.33	1.23 ± 1.23	Y	21.80 ± 0.77	80.66 ± 2.86	Y
	06/28/2006	1.74 ± 0.24	0.88 ± 0.88	Y	35.00 ± 0.86	129.50 ± 3.16	Y
HOWE	04/05/2006	1.03 ± 0.19	3.81 ± 0.71	Y	14.70 ± 0.55	54.39 ± 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
	04/12/2006	0.77 ± 0.23	2.84 ± 0.85	Y	12.30 ± 0.61	45.51 ± 2.27	Y
	04/19/2006	1.15 ± 0.22	4.26 ± 0.82	Y	12.60 ± 0.56	46.62 ± 2.08	Y
	04/26/2006	2.53 ± 0.29	9.36 ± 1.08	Y	25.80 ± 0.75	95.46 ± 2.77	Y
	05/03/2006	2.53 ± 0.39	9.36 ± 1.45	Y	26.50 ± 0.89	98.05 ± 3.28	Y
	05/10/2006	1.77 ± 0.35	6.55 ± 1.28	Y	25.00 ± 0.87	92.50 ± 3.21	Y
	05/17/2006	2.14 ± 0.33	7.92 ± 1.22	Y	33.10 ± 0.91	122.47 ± 3.37	Y
	05/24/2006	1.65 ± 0.33	6.11 ± 1.22	Y	24.20 ± 0.86	89.54 ± 3.17	Y
	05/31/2006	1.24 ± 0.28	4.59 ± 1.04	Y	16.90 ± 0.72	62.53 ± 2.67	Y
	06/07/2006	1.97 ± 0.37	7.29 ± 1.38	Y	19.50 ± 0.73	72.15 ± 2.72	Y
	06/14/2006	2.96 ± 0.38	10.95 ± 1.39	Y	21.00 ± 0.73	77.70 ± 2.72	Y
	06/21/2006	0.90 ± 0.31	3.32 ± 1.14		23.80 ± 0.83	88.06 ± 3.08	Y
	06/28/2006	2.03 ± 0.26	7.51 ± 0.94	Y	34.90 ± 0.87	129.13 ± 3.20	Y
MONTEVIEW	04/05/2006	0.95 ± 0.20	3.52 ± 0.75	Y	15.70 ± 0.60	58.09 ± 2.23	Y
	04/12/2006	0.86 ± 0.25	3.18 ± 0.93	Y	11.00 ± 0.63	40.70 ± 2.33	Y
	04/19/2006	1.11 ± 0.23	4.11 ± 0.85	Y	14.70 ± 0.61	54.39 ± 2.26	Y
	04/26/2006	2.05 ± 0.28	7.59 ± 1.02	Y	22.70 ± 0.73	83.99 ± 2.70	Y
	05/03/2006	2.15 ± 0.35	7.96 ± 1.29	Y	28.40 ± 0.85	105.08 ± 3.14	Y
	05/10/2006	1.56 ± 0.35	5.77 ± 1.30	Y	24.40 ± 0.89	90.28 ± 3.31	Y
	05/17/2006	1.90 ± 0.34	7.03 ± 1.25	Y	32.20 ± 0.96	119.14 ± 3.53	Y
	05/24/2006	1.79 ± 0.34	6.62 ± 1.24	Y	25.50 ± 0.87	94.35 ± 3.21	Y
	05/31/2006	1.43 ± 0.28	5.29 ± 1.05	Y	17.80 ± 0.71	65.86 ± 2.62	Y
	06/07/2006	1.70 ± 0.43	6.29 ± 1.58	Y	18.00 ± 0.84	66.60 ± 3.10	Y
	06/14/2006	2.96 ± 0.37	10.95 ± 1.35	Y	20.40 ± 0.71	75.48 ± 2.62	Y
	06/21/2006	1.67 ± 0.33	6.18 ± 1.24	Y	23.80 ± 0.81	88.06 ± 2.98	Y
	06/28/2006	2.45 ± 0.26	9.07 ± 0.98	Y	34.60 ± 0.84	128.02 ± 3.11	Y
MUD LAKE	04/05/2006	1.09 ± 0.20	4.03 ± 0.75	Y	15.20 ± 0.58	56.24 ± 2.13	Y
a	04/12/2006	0.32 ± 2.55	1.19 ± 9.44		9.34 ± 6.20	34.56 ± 22.94	
	04/19/2006	1.17 ± 0.21	4.33 ± 0.78	Y	15.40 ± 0.57	56.98 ± 2.11	Y
	04/26/2006	2.69 ± 0.28	9.95 ± 1.05	Y	24.20 ± 0.70	89.54 ± 2.58	Y
	05/03/2006	1.92 ± 0.36	7.10 ± 1.34	Y	29.20 ± 0.91	108.04 ± 3.37	Y
	05/10/2006	1.62 ± 0.33	5.99 ± 1.22	Y	25.00 ± 0.85	92.50 ± 3.13	Y
	05/17/2006	2.22 ± 0.36	8.21 ± 1.34	Y	32.60 ± 0.98	120.62 ± 3.62	Y
	05/24/2006	1.73 ± 0.33	6.40 ± 1.22	Y	23.20 ± 0.84	85.84 ± 3.09	Y
	05/31/2006	1.50 ± 0.33	5.55 ± 1.22	Y	17.10 ± 0.80	63.27 ± 2.97	Y
	06/07/2006	1.79 ± 0.40	6.62 ± 1.47	Y	19.40 ± 0.79	71.78 ± 2.94	Y
	06/14/2006	2.26 ± 0.37	8.36 ± 1.35	Y	21.80 ± 0.77	80.66 ± 2.86	Y
	06/21/2006	1.60 ± 0.33	5.92 ± 1.22	Y	23.30 ± 0.80	86.21 ± 2.94	Y
	06/28/2006	2.04 ± 0.25	7.55 ± 0.91	Y	35.90 ± 0.85	132.83 ± 3.13	Y
QA-2	04/05/2006	1.09 ± 0.25	4.03 ± 0.94	Y	15.40 ± 0.72	56.98 ± 2.65	Y
	04/12/2006	0.98 ± 0.32	3.61 ± 1.17	Y	11.90 ± 0.78	44.03 ± 2.90	Y
	04/19/2006	1.37 ± 0.26	5.07 ± 0.95	Y	15.30 ± 0.66	56.61 ± 2.43	Y
	04/26/2006	2.62 ± 0.34	9.69 ± 1.25	Y	27.70 ± 0.88	102.49 ± 3.26	Y
	05/03/2006	2.62 ± 0.46	9.69 ± 1.70	Y	30.90 ± 1.07	114.33 ± 3.96	Y
	05/10/2006	1.40 ± 0.37	5.18 ± 1.36	Y	25.90 ± 0.97	95.83 ± 3.59	Y
	05/17/2006	3.45 ± 0.48	12.77 ± 1.76	Y	35.70 ± 1.15	132.09 ± 4.26	Y
	05/24/2006	2.37 ± 0.41	8.77 ± 1.52	Y	26.50 ± 0.98	98.05 ± 3.64	Y
	05/31/2006	1.73 ± 0.41	6.40 ± 1.52	Y	15.80 ± 0.95	58.46 ± 3.50	Y
	06/07/2006	1.98 ± 0.44	7.33 ± 1.64	Y	20.10 ± 0.87	74.37 ± 3.21	Y
	06/14/2006	3.35 ± 0.53	12.40 ± 1.96	Y	21.50 ± 0.99	79.55 ± 3.65	Y
	06/21/2006	1.78 ± 0.38	6.59 ± 1.42	Y	25.20 ± 0.92	93.24 ± 3.39	Y
	06/28/2006	2.26 ± 0.30	8.36 ± 1.12	Y	39.70 ± 1.04	146.89 ± 3.85	Y
DISTANT							
BLACKFOOT CMS	04/05/2006	1.28 ± 0.21	4.74 ± 0.78	Y	15.40 ± 0.57	56.98 ± 2.11	Y
	04/12/2006	1.31 ± 0.26	4.85 ± 0.97	Y	11.00 ± 0.59	40.70 ± 2.19	Y
	04/19/2006	1.51 ± 0.23	5.59 ± 0.85	Y	14.20 ± 0.56	52.54 ± 2.07	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
	04/26/2006	1.96 ± 0.25	7.25 ± 0.91	Y	22.80 ± 0.67	84.36 ± 2.46	Y
	05/03/2006	2.71 ± 0.39	10.03 ± 1.43	Y	27.50 ± 0.87	101.75 ± 3.22	Y
	05/10/2006	1.98 ± 0.31	7.33 ± 1.16	Y	24.80 ± 0.76	91.76 ± 2.82	Y
	05/17/2006	3.31 ± 0.37	12.25 ± 1.37	Y	30.50 ± 0.86	112.85 ± 3.17	Y
	05/24/2006	2.41 ± 0.35	8.92 ± 1.28	Y	21.50 ± 0.78	79.55 ± 2.87	Y
	05/31/2006	0.96 ± 0.25	3.56 ± 0.93	Y	12.40 ± 0.63	45.88 ± 2.33	Y
	06/07/2006	2.04 ± 0.36	7.55 ± 1.32	Y	17.30 ± 0.68	64.01 ± 2.50	Y
	06/14/2006	3.20 ± 0.40	11.84 ± 1.47	Y	23.00 ± 0.78	85.10 ± 2.88	Y
	06/21/2006	2.00 ± 0.35	7.40 ± 1.29	Y	20.20 ± 0.76	74.74 ± 2.82	Y
	06/28/2006	2.55 ± 0.28	9.44 ± 1.02	Y	37.50 ± 0.89	138.75 ± 3.30	Y
CRATERS OF	04/05/2006	0.86 ± 0.22	3.18 ± 0.82	Y	13.10 ± 0.64	48.47 ± 2.36	Y
THE MOON	04/12/2006	1.22 ± 0.24	4.51 ± 0.90	Y	8.55 ± 0.53	31.64 ± 1.95	Y
	04/19/2006	0.66 ± 0.22	2.46 ± 0.80	Y	12.60 ± 0.62	46.62 ± 2.31	Y
	04/26/2006	1.75 ± 0.27	6.48 ± 1.00	Y	27.00 ± 0.81	99.90 ± 2.99	Y
	05/03/2006	1.79 ± 0.38	6.62 ± 1.42	Y	23.40 ± 0.91	86.58 ± 3.36	Y
	05/10/2006	1.96 ± 0.37	7.25 ± 1.36	Y	25.50 ± 0.90	94.35 ± 3.32	Y
	05/17/2006	2.34 ± 0.38	8.66 ± 1.42	Y	31.40 ± 1.01	116.18 ± 3.74	Y
	05/24/2006	2.01 ± 0.37	7.44 ± 1.37	Y	29.20 ± 0.96	108.04 ± 3.56	Y
	05/31/2006	1.58 ± 0.38	5.85 ± 1.39	Y	14.30 ± 0.86	52.91 ± 3.19	Y
	06/07/2006	2.18 ± 0.39	8.07 ± 1.45	Y	15.50 ± 0.70	57.35 ± 2.60	Y
	06/14/2006	2.52 ± 0.39	9.32 ± 1.44	Y	19.40 ± 0.77	71.78 ± 2.83	Y
	06/21/2006	1.84 ± 0.40	6.81 ± 1.47	Y	13.30 ± 0.78	49.21 ± 2.89	Y
	06/28/2006	1.99 ± 0.29	7.36 ± 1.06	Y	25.20 ± 0.86	93.24 ± 3.20	Y
DUBOIS	04/05/2006	1.33 ± 0.21	4.92 ± 0.77	Y	15.60 ± 0.56	57.72 ± 2.09	Y
	04/12/2006	1.63 ± 0.33	6.03 ± 1.22	Y	13.60 ± 0.75	50.32 ± 2.76	Y
	04/19/2006	1.51 ± 0.24	5.59 ± 0.89	Y	12.90 ± 0.57	47.73 ± 2.09	Y
	04/26/2006	2.55 ± 0.38	9.44 ± 1.42	Y	19.60 ± 0.91	72.52 ± 3.35	Y
	05/03/2006	1.98 ± 0.34	7.33 ± 1.25	Y	25.20 ± 0.81	93.24 ± 2.99	Y
	05/10/2006	1.96 ± 0.32	7.25 ± 1.18	Y	23.00 ± 0.76	85.10 ± 2.80	Y
	05/17/2006	2.57 ± 0.33	9.51 ± 1.23	Y	31.60 ± 0.85	116.92 ± 3.14	Y
	05/24/2006	2.07 ± 0.36	7.66 ± 1.33	Y	26.90 ± 0.91	99.53 ± 3.36	Y
	05/31/2006	1.99 ± 0.29	7.36 ± 1.08	Y	16.10 ± 0.64	59.57 ± 2.38	Y
	06/07/2006	2.98 ± 0.51	11.03 ± 1.88	Y	15.90 ± 0.85	58.83 ± 3.13	Y
	06/14/2006	2.81 ± 0.38	10.40 ± 1.39	Y	21.30 ± 0.75	78.81 ± 2.76	Y
	06/21/2006	1.85 ± 0.37	6.85 ± 1.37	Y	24.20 ± 0.87	89.54 ± 3.21	Y
	06/28/2006	2.45 ± 0.25	9.07 ± 0.94	Y	37.70 ± 0.83	139.49 ± 3.09	Y
IDAHO FALLS	04/05/2006	1.37 ± 0.24	5.07 ± 0.88	Y	15.00 ± 0.63	55.50 ± 2.33	Y
	04/12/2006	1.13 ± 0.30	4.18 ± 1.09	Y	12.30 ± 0.72	45.51 ± 2.65	Y
	04/19/2006	1.76 ± 0.29	6.51 ± 1.08	Y	15.40 ± 0.69	56.98 ± 2.54	Y
	04/26/2006	2.85 ± 0.32	10.55 ± 1.17	Y	26.30 ± 0.78	97.31 ± 2.89	Y
	05/03/2006	2.18 ± 0.42	8.07 ± 1.56	Y	28.80 ± 1.01	106.56 ± 3.74	Y
	05/10/2006	3.12 ± 0.42	11.54 ± 1.54	Y	27.00 ± 0.90	99.90 ± 3.33	Y
	05/17/2006	3.18 ± 0.43	11.77 ± 1.59	Y	33.10 ± 1.04	122.47 ± 3.85	Y
	05/24/2006	2.44 ± 0.40	9.03 ± 1.48	Y	28.70 ± 0.98	106.19 ± 3.61	Y
	05/31/2006	1.35 ± 0.33	5.00 ± 1.21	Y	17.20 ± 0.82	63.64 ± 3.03	Y
	06/07/2006	2.85 ± 0.46	10.55 ± 1.70	Y	19.00 ± 0.81	70.30 ± 3.01	Y
	06/14/2006	4.08 ± 0.52	15.10 ± 1.91	Y	24.90 ± 0.96	92.13 ± 3.54	Y
	06/21/2006	2.27 ± 0.44	8.40 ± 1.64	Y	23.70 ± 0.97	87.69 ± 3.59	Y
	06/28/2006	2.88 ± 0.32	10.66 ± 1.20	Y	36.40 ± 0.99	134.68 ± 3.64	Y
JACKSON	04/05/2006	1.63 ± 0.25	6.03 ± 0.91	Y	17.20 ± 0.65	63.64 ± 2.39	Y
	04/12/2006	2.07 ± 0.36	7.66 ± 1.34	Y	12.80 ± 0.75	47.36 ± 2.77	Y
	04/19/2006	1.42 ± 0.27	5.25 ± 1.00	Y	13.10 ± 0.65	48.47 ± 2.41	Y
	04/26/2006	2.89 ± 0.31	10.69 ± 1.14	Y	25.00 ± 0.74	92.50 ± 2.73	Y
	05/03/2006	2.48 ± 0.38	9.18 ± 1.40	Y	28.40 ± 0.88	105.08 ± 3.27	Y
	05/10/2006	1.76 ± 0.36	6.51 ± 1.32	Y	23.90 ± 0.88	88.43 ± 3.25	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
	05/17/2006	2.95 ± 0.38	10.92 ± 1.40	Y	30.20 ± 0.91	111.74 ± 3.36	Y
a	05/24/2006	-0.02 ± 0.19	-0.08 ± 0.70		0.30 ± 0.43	1.11 ± 1.60	
	05/31/2006	1.50 ± 0.30	5.55 ± 1.09	Y	15.30 ± 0.70	56.61 ± 2.58	Y
	06/07/2006	1.68 ± 0.44	6.22 ± 1.64	Y	19.80 ± 0.89	73.26 ± 3.30	Y
	06/14/2006	3.24 ± 0.42	11.99 ± 1.54	Y	21.60 ± 0.80	79.92 ± 2.94	Y
	06/21/2006	2.15 ± 0.38	7.96 ± 1.41	Y	21.20 ± 0.83	78.44 ± 3.06	Y
	06/28/2006	2.37 ± 0.26	8.77 ± 0.98	Y	34.60 ± 0.85	128.02 ± 3.15	Y
REXBURG CMS	04/05/2006	0.90 ± 0.22	3.34 ± 0.81	Y	16.30 ± 0.66	60.31 ± 2.44	Y
	04/12/2006	1.46 ± 0.32	5.40 ± 1.17	Y	12.30 ± 0.71	45.51 ± 2.64	Y
	04/19/2006	1.68 ± 0.28	6.22 ± 1.03	Y	15.90 ± 0.68	58.83 ± 2.50	Y
	04/26/2006	2.88 ± 0.32	10.66 ± 1.20	Y	23.70 ± 0.77	87.69 ± 2.83	Y
	05/03/2006	2.03 ± 0.37	7.51 ± 1.36	Y	28.90 ± 0.91	106.93 ± 3.36	Y
	05/10/2006	3.10 ± 0.46	11.47 ± 1.69	Y	24.30 ± 0.95	89.91 ± 3.53	Y
	05/17/2006	2.17 ± 0.37	8.03 ± 1.37	Y	31.80 ± 1.00	117.66 ± 3.70	Y
	05/24/2006	2.35 ± 0.37	8.70 ± 1.36	Y	28.30 ± 0.91	104.71 ± 3.36	Y
	05/31/2006	1.75 ± 0.39	6.48 ± 1.42	Y	16.60 ± 0.89	61.42 ± 3.30	Y
	06/07/2006	1.36 ± 0.35	5.03 ± 1.29	Y	16.70 ± 0.71	61.79 ± 2.63	Y
	06/14/2006	4.01 ± 0.53	14.84 ± 1.97	Y	23.10 ± 0.97	85.47 ± 3.58	Y
	06/21/2006	2.02 ± 0.37	7.47 ± 1.38	Y	20.90 ± 0.82	77.33 ± 3.02	Y
	06/28/2006	3.23 ± 0.31	11.95 ± 1.14	Y	39.60 ± 0.93	146.52 ± 3.44	Y
INL SITE							
EFS	04/05/2006	1.08 ± 0.26	4.00 ± 0.97	Y	15.00 ± 0.73	55.50 ± 2.70	Y
	04/12/2006	1.41 ± 0.28	5.22 ± 1.04	Y	11.50 ± 0.63	42.55 ± 2.33	Y
	04/19/2006	1.03 ± 0.26	3.81 ± 0.94	Y	16.40 ± 0.71	60.68 ± 2.64	Y
	04/26/2006	2.68 ± 0.28	9.92 ± 1.04	Y	25.20 ± 0.70	93.24 ± 2.59	Y
	05/03/2006	1.78 ± 0.44	6.59 ± 1.64	Y	28.30 ± 1.09	104.71 ± 4.03	Y
	05/10/2006	1.92 ± 0.35	7.10 ± 1.31	Y	26.20 ± 0.88	96.94 ± 3.24	Y
	05/17/2006	2.26 ± 0.45	8.36 ± 1.65	Y	35.00 ± 1.22	129.50 ± 4.51	Y
	05/24/2006	1.71 ± 0.41	6.33 ± 1.51	Y	27.40 ± 1.07	101.38 ± 3.96	Y
a	05/31/2006	2.65 ± 0.75	9.81 ± 2.76	Y	23.00 ± 1.70	85.10 ± 6.29	Y
	06/07/2006	1.93 ± 0.42	7.14 ± 1.55	Y	19.50 ± 0.82	72.15 ± 3.04	Y
	06/14/2006	3.33 ± 0.45	12.32 ± 1.66	Y	22.10 ± 0.85	81.77 ± 3.15	Y
	06/21/2006	1.03 ± 0.35	3.81 ± 1.31		24.30 ± 0.92	89.91 ± 3.41	Y
	06/28/2006	2.43 ± 0.30	8.99 ± 1.12	Y	34.30 ± 0.96	126.91 ± 3.53	Y
QA-1	04/05/2006	1.09 ± 0.18	4.03 ± 0.68	Y	14.40 ± 0.52	53.28 ± 1.91	Y
	04/12/2006	0.66 ± 0.23	2.43 ± 0.84		10.50 ± 0.60	38.85 ± 2.22	Y
	04/19/2006	1.23 ± 0.22	4.55 ± 0.81	Y	14.20 ± 0.57	52.54 ± 2.09	Y
	04/26/2006	1.89 ± 0.26	6.99 ± 0.98	Y	25.50 ± 0.75	94.35 ± 2.78	Y
	05/03/2006	2.94 ± 0.40	10.88 ± 1.49	Y	26.90 ± 0.88	99.53 ± 3.25	Y
	05/10/2006	1.69 ± 0.31	6.25 ± 1.13	Y	24.70 ± 0.78	91.39 ± 2.87	Y
	05/17/2006	2.45 ± 0.37	9.07 ± 1.38	Y	32.40 ± 0.98	119.88 ± 3.62	Y
	05/24/2006	3.19 ± 0.49	11.80 ± 1.81	Y	37.80 ± 1.20	139.86 ± 4.44	Y
	05/31/2006	1.94 ± 0.44	7.18 ± 1.63	Y	18.00 ± 1.01	66.60 ± 3.74	Y
	06/07/2006	1.82 ± 0.36	6.73 ± 1.32	Y	18.60 ± 0.71	68.82 ± 2.62	Y
	06/14/2006	2.73 ± 0.40	10.10 ± 1.46	Y	21.00 ± 0.78	77.70 ± 2.90	Y
	06/21/2006	1.31 ± 0.34	4.85 ± 1.24	Y	24.30 ± 0.85	89.91 ± 3.15	Y
	06/28/2006	2.61 ± 0.32	9.66 ± 1.17	Y	35.80 ± 0.99	132.46 ± 3.66	Y
MAIN GATE	04/05/2006	1.19 ± 0.22	4.40 ± 0.80	Y	16.40 ± 0.62	60.68 ± 2.28	Y
	04/12/2006	0.80 ± 0.25	2.96 ± 0.92	Y	10.80 ± 0.63	39.96 ± 2.33	Y
	04/19/2006	1.39 ± 0.24	5.14 ± 0.89	Y	15.30 ± 0.61	56.61 ± 2.26	Y
	04/26/2006	2.56 ± 0.30	9.47 ± 1.10	Y	25.00 ± 0.75	92.50 ± 2.76	Y
	05/03/2006	2.51 ± 0.45	9.29 ± 1.68	Y	28.60 ± 1.04	105.82 ± 3.85	Y
	05/10/2006	1.54 ± 0.38	5.70 ± 1.40	Y	24.60 ± 0.96	91.02 ± 3.54	Y
	05/17/2006	1.90 ± 0.34	7.03 ± 1.25	Y	31.10 ± 0.95	115.07 ± 3.50	Y
	05/24/2006	2.05 ± 0.37	7.59 ± 1.37	Y	25.90 ± 0.92	95.83 ± 3.41	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
	05/31/2006	1.85 ± 0.35	6.85 ± 1.29	Y	13.70 ± 0.76	50.69 ± 2.80	Y
	06/07/2006	1.72 ± 0.40	6.36 ± 1.48	Y	18.30 ± 0.79	67.71 ± 2.92	Y
	06/14/2006	2.59 ± 0.41	9.58 ± 1.52	Y	19.40 ± 0.80	71.78 ± 2.97	Y
	06/21/2006	1.97 ± 0.34	7.29 ± 1.27	Y	23.90 ± 0.79	88.43 ± 2.94	Y
	06/28/2006	2.10 ± 0.28	7.77 ± 1.02	Y	34.70 ± 0.92	128.39 ± 3.40	Y
VAN BUREN GATE	04/05/2006	1.05 ± 0.23	3.89 ± 0.86	Y	14.70 ± 0.65	54.39 ± 2.42	Y
	04/12/2006	0.99 ± 0.29	3.66 ± 1.07	Y	12.70 ± 0.73	46.99 ± 2.69	Y
	04/19/2006	1.27 ± 0.26	4.70 ± 0.97	Y	15.10 ± 0.68	55.87 ± 2.50	Y
	04/26/2006	2.50 ± 0.32	9.25 ± 1.19	Y	25.90 ± 0.83	95.83 ± 3.08	Y
	05/03/2006	1.41 ± 0.38	5.22 ± 1.40	Y	25.70 ± 0.97	95.09 ± 3.57	Y
	05/10/2006	1.64 ± 0.37	6.07 ± 1.36	Y	25.40 ± 0.93	93.98 ± 3.45	Y
	05/17/2006	2.58 ± 0.51	9.55 ± 1.87	Y	32.50 ± 1.30	120.25 ± 4.81	Y
	05/24/2006	2.00 ± 0.38	7.40 ± 1.41	Y	26.00 ± 0.95	96.20 ± 3.53	Y
	05/31/2006	1.67 ± 0.38	6.18 ± 1.39	Y	14.90 ± 0.86	55.13 ± 3.18	Y
	06/07/2006	1.48 ± 0.38	5.48 ± 1.39	Y	19.60 ± 0.78	72.52 ± 2.90	Y
	06/14/2006	3.10 ± 0.49	11.47 ± 1.79	Y	23.40 ± 0.95	86.58 ± 3.51	Y
	06/21/2006	1.70 ± 0.36	6.29 ± 1.32	Y	23.70 ± 0.85	87.69 ± 3.14	Y
	06/28/2006	2.56 ± 0.30	9.47 ± 1.10	Y	33.70 ± 0.92	124.69 ± 3.40	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	04/05/2006	36.25	±	71.97	134.12	±	266.28	
	04/12/2006	-4.20	±	3.79	-15.53	±	14.00	
	04/19/2006	0.13	±	1.41	0.50	±	5.21	
	04/26/2006	-1.12	±	3.36	-4.16	±	12.44	
	05/03/2006	-1.17	±	5.25	-4.34	±	19.43	
	05/10/2006	-2.14	±	4.71	-7.92	±	17.43	
	05/17/2006	-1.04	±	3.96	-3.86	±	14.63	
	05/24/2006	-0.55	±	3.78	-2.03	±	13.99	
	05/31/2006	-10.32	±	5.43	-38.19	±	20.10	
	06/07/2006	-1.67	±	4.82	-6.17	±	17.82	
	06/14/2006	-0.88	±	3.93	-3.24	±	14.56	
	06/21/2006	2.61	±	3.78	9.67	±	13.98	
	06/28/2006	-2.62	±	1.71	-9.69	±	6.31	
ATOMIC CITY	04/05/2006	26.02	±	51.67	96.28	±	191.16	
	04/12/2006	-3.03	±	2.73	-11.20	±	10.10	
	04/19/2006	0.11	±	1.11	0.39	±	4.12	
	04/26/2006	-1.17	±	3.50	-4.33	±	12.94	
	05/03/2006	-0.82	±	3.70	-3.05	±	13.68	
	05/10/2006	-2.03	±	4.48	-7.53	±	16.56	
	05/17/2006	-0.81	±	3.08	-3.01	±	11.40	
	05/24/2006	-0.54	±	3.76	-2.02	±	13.90	
	05/31/2006	-5.52	±	2.90	-20.41	±	10.74	
	06/07/2006	-1.43	±	4.14	-5.31	±	15.33	
	06/14/2006	-0.73	±	3.29	-2.72	±	12.19	
	06/21/2006	2.50	±	3.61	9.24	±	13.37	
	06/28/2006	-1.67	±	1.09	-6.20	±	4.04	
BLUE DOME	04/05/2006	-0.37	±	1.12	-1.37	±	4.13	
	04/12/2006	0.68	±	1.29	2.51	±	4.76	
	04/19/2006	-1.70	±	3.15	-6.28	±	11.64	
	04/26/2006	-1.40	±	3.68	-5.17	±	13.61	
	05/03/2006	2.58	±	1.38	9.54	±	5.09	
	05/10/2006	-1.02	±	1.69	-3.77	±	6.24	
	05/17/2006	-0.18	±	1.21	-0.66	±	4.48	
	05/24/2006	-1.04	±	1.39	-3.85	±	5.13	
	05/31/2006	-1.81	±	1.11	-6.71	±	4.11	
	06/07/2006	-1.81	±	2.01	-6.71	±	7.44	
	06/14/2006	0.00	±	1.19	0.01	±	4.39	
	06/21/2006	0.85	±	1.47	3.16	±	5.45	
	06/28/2006	-0.80	±	4.08	-2.96	±	15.10	
FAA TOWER	04/05/2006	-0.50	±	1.50	-1.85	±	5.55	
	04/12/2006	0.53	±	1.00	1.95	±	3.70	
	04/19/2006	-2.12	±	3.93	-7.84	±	14.54	
	04/26/2006	-1.35	±	3.56	-5.00	±	13.16	
	05/03/2006	3.01	±	1.61	11.14	±	5.95	
	05/10/2006	-0.87	±	1.43	-3.20	±	5.30	
	05/17/2006	-0.22	±	1.50	-0.82	±	5.53	
	05/24/2006	-0.85	±	1.13	-3.13	±	4.17	
	05/31/2006	-2.51	±	1.54	-9.28	±	5.68	

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								
	06/07/2006	-1.31	±	1.45	-4.85	±	5.38	
	06/14/2006	0.00	±	1.40	0.01	±	5.18	
	06/21/2006	0.70	±	1.20	2.58	±	4.44	
	06/28/2006	-0.66	±	3.36	-2.43	±	12.43	
HOWE	04/05/2006	-0.41	±	1.22	-1.50	±	4.51	
	04/12/2006	0.57	±	1.09	2.12	±	4.04	
	04/19/2006	-1.84	±	3.42	-6.82	±	12.65	
	04/26/2006	-1.49	±	3.92	-5.50	±	14.49	
	05/03/2006	2.89	±	1.54	10.68	±	5.70	
	05/10/2006	-0.85	±	1.40	-3.13	±	5.18	
	05/17/2006	-0.18	±	1.23	-0.67	±	4.56	
	05/24/2006	-1.02	±	1.36	-3.77	±	5.02	
	05/31/2006	-1.96	±	1.20	-7.26	±	4.45	
	06/07/2006	-1.31	±	1.45	-4.84	±	5.37	
	06/14/2006	0.00	±	1.19	0.01	±	4.41	
	06/21/2006	0.75	±	1.29	2.77	±	4.77	
	06/28/2006	-0.67	±	3.44	-2.50	±	12.74	
MONTEVIEW	04/05/2006	-0.45	±	1.36	-1.68	±	5.05	
	04/12/2006	0.62	±	1.19	2.31	±	4.39	
	04/19/2006	-1.94	±	3.59	-7.16	±	13.28	
	04/26/2006	-1.55	±	4.08	-5.73	±	15.09	
	05/03/2006	2.59	±	1.38	9.58	±	5.11	
	05/10/2006	-0.90	±	1.49	-3.34	±	5.52	
	05/17/2006	-0.20	±	1.36	-0.74	±	5.01	
	05/24/2006	-1.01	±	1.34	-3.72	±	4.96	
	05/31/2006	-1.86	±	1.14	-6.90	±	4.22	
	06/07/2006	-1.64	±	1.82	-6.08	±	6.74	
	06/14/2006	0.00	±	1.14	0.01	±	4.22	
	06/21/2006	0.71	±	1.22	2.62	±	4.52	
	06/28/2006	-0.64	±	3.28	-2.38	±	12.13	
MUD LAKE	04/05/2006	-0.43	±	1.29	-1.59	±	4.78	
a	04/12/2006	8.88	±	16.87	32.86	±	62.43	
	04/19/2006	-1.69	±	3.13	-6.24	±	11.57	
	04/26/2006	-1.37	±	3.60	-5.06	±	13.33	
	05/03/2006	2.86	±	1.53	10.57	±	5.64	
	05/10/2006	-0.81	±	1.35	-3.01	±	4.98	
	05/17/2006	-0.21	±	1.40	-0.76	±	5.16	
	05/24/2006	-1.00	±	1.33	-3.70	±	4.93	
	05/31/2006	-2.28	±	1.40	-8.45	±	5.18	
	06/07/2006	-1.47	±	1.63	-5.45	±	6.05	
	06/14/2006	0.00	±	1.26	0.01	±	4.67	
	06/21/2006	0.70	±	1.21	2.60	±	4.49	
	06/28/2006	-0.63	±	3.23	-2.34	±	11.94	
QA-2	04/05/2006	-0.60	±	1.80	-2.21	±	6.65	
	04/12/2006	0.81	±	1.55	3.01	±	5.72	
	04/19/2006	-2.12	±	3.93	-7.83	±	14.52	
	04/26/2006	-1.86	±	4.89	-6.87	±	18.10	
	05/03/2006	3.56	±	1.90	13.17	±	7.03	

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								
	05/10/2006	-0.99	±	1.64	-3.67	±	6.08	
	05/17/2006	-0.25	±	1.71	-0.94	±	6.34	
	05/24/2006	-1.20	±	1.59	-4.42	±	5.89	
	05/31/2006	-2.96	±	1.82	-10.97	±	6.72	
	06/07/2006	-1.65	±	1.83	-6.10	±	6.76	
	06/14/2006	0.00	±	1.83	0.02	±	6.77	
	06/21/2006	0.84	±	1.45	3.10	±	5.35	
	06/28/2006	-0.84	±	4.28	-3.10	±	15.82	
DISTANT								
BLACKFOOT CMS	04/05/2006	28.30	±	56.19	104.71	±	207.89	
	04/12/2006	-3.32	±	2.99	-12.27	±	11.07	
	04/19/2006	0.11	±	1.11	0.39	±	4.09	
	04/26/2006	-1.02	±	3.06	-3.79	±	11.34	
	05/03/2006	-0.89	±	4.01	-3.31	±	14.83	
	05/10/2006	-1.48	±	3.26	-5.48	±	12.05	
	05/17/2006	-0.85	±	3.22	-3.14	±	11.90	
	05/24/2006	-0.49	±	3.35	-1.80	±	12.38	
	05/31/2006	-6.31	±	3.32	-23.35	±	12.29	
	06/07/2006	-1.43	±	4.13	-5.28	±	15.27	
	06/14/2006	-0.77	±	3.47	-2.86	±	12.85	
	06/21/2006	2.26	±	3.27	8.37	±	12.11	
	06/28/2006	-1.97	±	1.28	-7.28	±	4.75	
CRATERS	04/05/2006	36.56	±	72.59	135.28	±	268.58	
	04/12/2006	-3.11	±	2.80	-11.50	±	10.37	
	04/19/2006	0.13	±	1.39	0.49	±	5.13	
	04/26/2006	-1.27	±	3.80	-4.71	±	14.07	
	05/03/2006	-1.05	±	4.69	-3.87	±	17.35	
	05/10/2006	-1.89	±	4.16	-6.99	±	15.38	
	05/17/2006	-1.08	±	4.10	-4.01	±	15.18	
	05/24/2006	-0.57	±	3.96	-2.12	±	14.64	
	05/31/2006	-9.21	±	4.85	-34.09	±	17.94	
	06/07/2006	-1.59	±	4.60	-5.89	±	17.03	
	06/14/2006	-0.83	±	3.72	-3.06	±	13.75	
	06/21/2006	2.84	±	4.11	10.50	±	15.20	
	06/28/2006	-2.44	±	1.59	-9.04	±	5.89	
DUBOIS	04/05/2006	-0.41	±	1.23	-1.52	±	4.56	
	04/12/2006	0.61	±	1.15	2.24	±	4.25	
	04/19/2006	-1.84	±	3.41	-6.80	±	12.62	
	04/26/2006	-2.38	±	6.26	-8.79	±	23.16	
	05/03/2006	2.57	±	1.37	9.50	±	5.07	
	05/10/2006	-0.72	±	1.19	-2.65	±	4.39	
	05/17/2006	-0.17	±	1.13	-0.62	±	4.18	
	05/24/2006	-1.05	±	1.39	-3.87	±	5.16	
	05/31/2006	-1.69	±	1.04	-6.27	±	3.84	
	06/07/2006	-1.74	±	1.93	-6.45	±	7.15	
	06/14/2006	0.00	±	1.21	0.01	±	4.48	
	06/21/2006	0.79	±	1.36	2.92	±	5.03	
	06/28/2006	-0.60	±	3.04	-2.20	±	11.24	

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								
IDAHO FALLS	04/05/2006	-0.50	±	1.50	-1.84	±	5.54	
	04/12/2006	0.71	±	1.35	2.63	±	4.99	
	04/19/2006	-2.25	±	4.18	-8.33	±	15.45	
	04/26/2006	-1.57	±	4.14	-5.81	±	15.31	
	05/03/2006	3.39	±	1.81	12.55	±	6.70	
	05/10/2006	-0.86	±	1.42	-3.17	±	5.25	
	05/17/2006	-0.23	±	1.53	-0.83	±	5.65	
	05/24/2006	-1.13	±	1.50	-4.18	±	5.57	
	05/31/2006	-2.34	±	1.43	-8.66	±	5.30	
	06/07/2006	-1.54	±	1.71	-5.69	±	6.31	
	06/14/2006	0.00	±	1.63	0.01	±	6.04	
	06/21/2006	0.94	±	1.63	3.49	±	6.02	
	06/28/2006	-0.81	±	4.15	-3.01	±	15.35	
JACKSON	04/05/2006	32.20	±	63.93	119.14	±	236.54	
	04/12/2006	-4.32	±	3.90	-15.98	±	14.41	
	04/19/2006	0.14	±	1.45	0.51	±	5.37	
	04/26/2006	-1.14	±	3.42	-4.23	±	12.65	
	05/03/2006	-0.90	±	4.03	-3.33	±	14.91	
	05/10/2006	-1.90	±	4.18	-7.03	±	15.46	
	05/17/2006	-0.94	±	3.56	-3.48	±	13.17	
	05/24/2006	-0.50	±	3.46	-1.86	±	12.81	
	05/31/2006	-6.64	±	3.50	-24.57	±	12.93	
	06/07/2006	-2.01	±	5.82	-7.46	±	21.54	
	06/14/2006	-0.83	±	3.72	-3.07	±	13.77	
	06/21/2006	2.50	±	3.61	9.24	±	13.37	
	06/28/2006	-1.93	±	1.25	-7.12	±	4.64	
REXBURG CMS	04/05/2006	-0.51	±	1.54	-1.90	±	5.70	
	04/12/2006	0.71	±	1.35	2.62	±	4.98	
	04/19/2006	-2.16	±	4.01	-8.00	±	14.84	
	04/26/2006	-1.63	±	4.29	-6.03	±	15.89	
	05/03/2006	2.86	±	1.53	10.58	±	5.65	
	05/10/2006	-0.99	±	1.65	-3.68	±	6.09	
	05/17/2006	-0.22	±	1.47	-0.80	±	5.44	
	05/24/2006	-1.03	±	1.37	-3.80	±	5.07	
	05/31/2006	-2.67	±	1.64	-9.90	±	6.06	
	06/07/2006	-1.34	±	1.49	-4.96	±	5.50	
	06/14/2006	0.00	±	1.72	0.01	±	6.36	
	06/21/2006	0.77	±	1.34	2.86	±	4.94	
	06/28/2006	-0.69	±	3.52	-2.56	±	13.04	
INL SITE								
EFS	04/05/2006	41.95	±	83.29	155.22	±	308.17	
	04/12/2006	-3.55	±	3.20	-13.14	±	11.85	
	04/19/2006	0.14	±	1.49	0.53	±	5.52	
	04/26/2006	-1.04	±	3.11	-3.85	±	11.52	
	05/03/2006	-1.26	±	5.66	-4.67	±	20.93	
	05/10/2006	-1.80	±	3.96	-6.65	±	14.63	
	05/17/2006	-1.37	±	5.19	-5.07	±	19.20	
	05/24/2006	-0.70	±	4.86	-2.61	±	17.98	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
a	05/31/2006	-19.40	±	10.21	-71.79	±	37.78	
	06/07/2006	-1.80	±	5.21	-6.67	±	19.29	
	06/14/2006	-0.91	±	4.08	-3.36	±	15.10	
	06/21/2006	2.76	±	3.99	10.20	±	14.76	
	06/28/2006	-2.36	±	1.54	-8.72	±	5.69	
QA-1	04/05/2006	25.05	±	49.73	92.68	±	184.02	
	04/12/2006	-3.44	±	3.10	-12.74	±	11.49	
	04/19/2006	0.11	±	1.13	0.40	±	4.17	
	04/26/2006	-1.16	±	3.48	-4.31	±	12.89	
	05/03/2006	-0.92	±	4.13	-3.41	±	15.28	
	05/10/2006	-1.53	±	3.36	-5.65	±	12.44	
	05/17/2006	-1.01	±	3.84	-3.75	±	14.22	
	05/24/2006	-0.70	±	4.85	-2.60	±	17.95	
	05/31/2006	-10.56	±	5.56	-39.07	±	20.56	
	06/07/2006	-1.49	±	4.29	-5.50	±	15.88	
	06/14/2006	-0.82	±	3.69	-3.04	±	13.66	
	06/21/2006	2.45	±	3.54	9.05	±	13.09	
	06/28/2006	-2.43	±	1.58	-8.99	±	5.86	
MAIN GATE	04/05/2006	30.77	±	61.10	113.87	±	226.07	
	04/12/2006	-3.64	±	3.29	-13.48	±	12.16	
	04/19/2006	0.12	±	1.22	0.43	±	4.52	
	04/26/2006	-1.17	±	3.49	-4.32	±	12.93	
	05/03/2006	-1.16	±	5.19	-4.29	±	19.22	
	05/10/2006	-2.14	±	4.70	-7.90	±	17.38	
	05/17/2006	-0.99	±	3.75	-3.66	±	13.87	
	05/24/2006	-0.57	±	3.96	-2.13	±	14.66	
	05/31/2006	-7.82	±	4.12	-28.94	±	15.23	
	06/07/2006	-1.75	±	5.05	-6.46	±	18.68	
	06/14/2006	-0.89	±	3.99	-3.29	±	14.77	
	06/21/2006	2.20	±	3.19	8.16	±	11.80	
	06/28/2006	-2.20	±	1.43	-8.13	±	5.30	
VAN BUREN GATE	04/05/2006	35.96	±	71.39	133.04	±	264.14	
	04/12/2006	-4.18	±	3.77	-15.48	±	13.96	
	04/19/2006	0.14	±	1.43	0.51	±	5.31	
	04/26/2006	-1.37	±	4.09	-5.06	±	15.14	
	05/03/2006	-1.10	±	4.91	-4.05	±	18.17	
	05/10/2006	-2.02	±	4.44	-7.47	±	16.43	
	05/17/2006	-1.58	±	5.98	-5.84	±	22.13	
	05/24/2006	-0.60	±	4.16	-2.23	±	15.41	
	05/31/2006	-9.03	±	4.75	-33.39	±	17.58	
	06/07/2006	-1.68	±	4.86	-6.22	±	17.97	
	06/14/2006	-1.04	±	4.67	-3.85	±	17.29	
	06/21/2006	2.45	±	3.55	9.08	±	13.14	
	06/28/2006	-2.24	±	1.46	-8.27	±	5.39	

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 ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	6/30/2006	CESIUM-137	182.00	±	120.00	673.40	±	444.00	
		STRONTIUM-90	50.80	±	20.50	187.96	±	75.85	
ATOMIC CITY	6/30/2006	CESIUM-137	189.00	±	102.00	699.30	±	377.40	
		STRONTIUM-90	89.60	±	29.50	331.52	±	109.15	Y
BLUE DOME	6/30/2006	CESIUM-137	647.00	±	230.00	2393.90	±	851.00	
		STRONTIUM-90	49.30	±	15.90	182.41	±	58.83	Y
FAA TOWER	6/30/2006	AMERICIUM-241	0.63	±	0.54	2.33	±	2.01	
		CESIUM-137	130.00	±	231.00	481.00	±	854.70	
		PLUTONIUM-238	3.08	±	0.99	11.40	±	3.66	Y
		PLUTONIUM-239/40	0.77	±	0.39	2.85	±	1.43	
HOWE	6/30/2006	AMERICIUM-241	15.50	±	2.10	57.35	±	7.77	Y
		CESIUM-137	155.00	±	219.00	573.50	±	810.30	
		PLUTONIUM-238	2.31	±	0.78	8.55	±	2.89	
		PLUTONIUM-239/40	7.65	±	1.22	28.31	±	4.51	Y
MONTEVIEW	6/30/2006	AMERICIUM-241	1.57	±	0.72	5.81	±	2.68	
		CESIUM-137	-3.69	±	116.00	-13.65	±	429.20	
		PLUTONIUM-238	2.54	±	1.80	9.40	±	6.66	
		PLUTONIUM-239/40	1.70	±	1.04	6.29	±	3.85	
MUD LAKE	6/30/2006	CESIUM-137	8.46	±	130.00	31.30	±	481.00	
		STRONTIUM-90	-39.90	±	21.60	-147.63	±	79.92	
MUD LAKE (QA-2)	6/30/2006	CESIUM-137	21.30	±	145.00	78.81	±	536.50	
		STRONTIUM-90	-47.80	±	29.10	-176.86	±	107.67	
DISTANT									
BLACKFOOT	6/30/2006	CESIUM-137	58.60	±	95.00	216.82	±	351.50	
		STRONTIUM-90	13.90	±	13.20	51.43	±	48.84	
CRATERS	6/30/2006	AMERICIUM-241	3.58	±	1.23	13.25	±	4.55	
		CESIUM-137	28.50	±	129.00	105.45	±	477.30	
		PLUTONIUM-238	70.50	±	9.77	260.85	±	36.15	Y
		PLUTONIUM-239/40	13.00	±	5.15	48.10	±	19.06	

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 ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
DUBOIS	6/30/2006	CESIUM-137	25.70	±	106.00	95.09	±	392.20	
		STRONTIUM-90	4.00	±	17.80	14.80	±	65.86	
IDAHO FALLS	6/30/2006	AMERICIUM-241	0.77	±	0.60	2.84	±	2.21	
		CESIUM-137	-79.80	±	133.00	-295.26	±	492.10	
		PLUTONIUM-238	1.32	±	0.82	4.88	±	3.05	
		PLUTONIUM-239/40	1.32	±	0.70	4.88	±	2.58	
JACKSON	6/30/2006	CESIUM-137	-155.00	±	133.00	-573.50	±	492.10	
		STRONTIUM-90	64.20	±	17.00	237.54	±	62.90	Y
REXBURG CMS	6/30/2006	AMERICIUM-241	-1.02	±	2.00	-3.77	±	7.40	
		CESIUM-137	-159.00	±	119.00	-588.30	±	440.30	
		PLUTONIUM-238	21.20	±	3.39	78.44	±	12.54	Y
		PLUTONIUM-239/40	2.17	±	1.30	8.03	±	4.81	
INL SITE									
EFS	6/30/2006	AMERICIUM-241	3.97	±	0.82	14.69	±	3.02	Y
		CESIUM-137	-206.00	±	128.00	-762.20	±	473.60	
		PLUTONIUM-238	9.60	±	1.90	35.52	±	7.03	Y
		PLUTONIUM-239/40	3.56	±	1.14	13.17	±	4.22	Y
EFS (QA-1)	6/30/2006	AMERICIUM-241	0.21	±	0.50	0.78	±	1.84	
		CESIUM-137	235.00	±	234.00	869.50	±	865.80	
		PLUTONIUM-238	13.50	±	2.52	49.95	±	9.32	Y
		PLUTONIUM-239/40	1.32	±	1.04	4.88	±	3.85	
MAIN GATE	6/30/2006	CESIUM-137	-37.70	±	115.00	-139.49	±	425.50	
		STRONTIUM-90	-15.50	±	13.80	-57.35	±	51.06	
VAN BUREN GATE	6/30/2006	AMERICIUM-241	1.10	±	0.41	4.07	±	1.53	
		CESIUM-137	134.00	±	125.00	495.80	±	462.50	
		PLUTONIUM-238	-0.46	±	1.03	-1.71	±	3.81	
		PLUTONIUM-239/40	15.30	±	2.85	56.61	±	10.55	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	03/21/2006	04/19/2006	5.40	±	1.34	19.99	±	4.94	Molecular Sieve	Y
ATOMIC CITY	04/19/2006	05/10/2006	4.54	±	1.51	16.79	±	5.57	Molecular Sieve	Y
ATOMIC CITY	05/10/2006	05/30/2006	2.62	±	1.82	9.70	±	6.74	Molecular Sieve	
ATOMIC CITY	05/30/2006	06/14/2006	-1.10	±	2.36	-4.07	±	8.73	Molecular Sieve	
ATOMIC CITY	06/14/2006	06/30/2006	0.57	±	2.15	2.12	±	7.96	Molecular Sieve	
DISTANT										
BLACKFOOT	03/15/2006	04/05/2006	8.63	±	1.79	31.95	±	6.61	Molecular Sieve	Y
BLACKFOOT	04/05/2006	04/26/2006	3.85	±	1.71	14.24	±	6.32	Molecular Sieve	
BLACKFOOT	04/26/2006	05/15/2006	1.92	±	1.59	7.12	±	5.88	Molecular Sieve	
BLACKFOOT	05/15/2006	05/30/2006	5.48	±	2.39	20.29	±	8.84	Molecular Sieve	
BLACKFOOT	05/30/2006	06/14/2006	10.96	±	2.48	40.56	±	9.16	Molecular Sieve	Y
BLACKFOOT	06/14/2006	06/30/2006	4.36	±	2.24	16.12	±	8.29	Molecular Sieve	
IDAHO FALLS	02/27/2006	04/03/2006	5.73	±	1.32	21.19	±	4.88	Molecular Sieve	Y
IDAHO FALLS	03/23/2006	04/11/2006	3.59	±	1.63	13.30	±	6.03	Molecular Sieve	
IDAHO FALLS	04/11/2006	05/04/2006	3.63	±	1.52	13.44	±	5.62	Molecular Sieve	
IDAHO FALLS	05/04/2006	05/23/2006	0.71	±	1.90	2.61	±	7.04	Molecular Sieve	
IDAHO FALLS	05/23/2006	06/05/2006	9.25	±	2.44	34.22	±	9.04	Molecular Sieve	Y
IDAHO FALLS	06/05/2006	06/15/2006	9.60	±	3.30	35.53	±	12.20	Molecular Sieve	
IDAHO FALLS	06/15/2006	06/29/2006	8.32	±	2.61	30.80	±	9.64	Molecular Sieve	Y
REXBURG CMS	03/24/2006	04/11/2006	1.22	±	1.73	4.52	±	6.38	Molecular Sieve	
REXBURG CMS	04/11/2006	05/04/2006	2.83	±	1.53	10.47	±	5.68	Molecular Sieve	
REXBURG CMS	05/04/2006	05/25/2006	2.06	±	1.68	7.63	±	6.21	Molecular Sieve	
REXBURG CMS	05/25/2006	06/08/2006	6.10	±	2.53	22.58	±	9.37	Molecular Sieve	
REXBURG CMS	06/08/2006	06/22/2006	5.23	±	2.54	19.34	±	9.42	Molecular Sieve	

TABLE C-5. PM_{10} Concentrations at Atomic City, Blackfoot CMS and Rexburg CMS

Location	Sampling Date	Concentration ($\mu g/m^3$)	Comments
ATOMIC CITY	4/4/2006	1.61	
	4/10/2006	0.84	
	4/16/2006	3.21	
	4/22/2006	38.23	
	4/28/2006	9.29	
	5/4/2006	18.78	
	5/10/2006	15.87	
	5/16/2006	21.51	
	5/22/2006	12.08	
	5/28/2006	0.00	Pre-weight > Post-weight
	6/3/2006	2.88	
	6/9/2006	4.83	
	6/15/2006	2.11	
	6/21/2006	26.63	
	6/27/2006	16.92	
BLACKFOOT	4/4/2006	3.12	
	4/10/2006	2.77	
	4/16/2006	2.79	
	4/22/2006	24.05	
	4/28/2006	25.25	
	5/4/2006	13.13	
	5/10/2006	12.16	
	5/16/2006	26.70	
	5/22/2006	20.62	
	5/28/2006	0.90	
	6/3/2006	10.00	
	6/9/2006	4.28	
	6/15/2006	8.18	
	6/21/2006	20.43	
	6/27/2006	22.96	
REXBURG	4/4/2006	3.32	
	4/10/2006	0.49	
	4/16/2006	1.20	
	4/22/2006	33.27	
	4/28/2006	31.04	
	5/4/2006	25.70	
	5/10/2006	19.48	
	5/16/2006	43.68	
	5/22/2006	20.86	
	5/28/2006	0.28	
	6/3/2006	8.69	
	6/9/2006	5.00	
	6/15/2006	2.87	
	6/21/2006	21.89	
	6/27/2006	29.44	

TABLE C-6. 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	3/31/2006	5/1/2006	32.90	±	30.20	1.22	±	1.12	
	5/1/2006	6/1/2006	9.95	±	29.80	0.37	±	1.10	
CFA	3/1/2006	4/3/2006	274.00	±	33.90	10.14	±	1.25	Y
	4/3/2006	5/1/2006	-11.70	±	29.70	-0.43	±	1.10	
	5/1/2006	6/1/2006	55.20	±	29.00	2.04	±	1.07	
EFS	3/29/2006	4/5/2006	-10.20	±	29.30	-0.38	±	1.08	
	4/5/2006	4/12/2006	44.30	±	30.40	1.64	±	1.12	
	4/12/2006	4/19/2006	39.60	±	30.50	1.47	±	1.13	
	5/24/2006	5/31/2006	0.36	±	29.60	0.01	±	1.10	
	6/7/2006	6/14/2006	29.20	±	30.20	1.08	±	1.12	

Table C-7 Gross Alpha, Gross Beta and Tritium Concentrations in Drinking and Surface Water

Sampling Type and Location	Analyte	Sampling Date	Concentration Result ± 1s Uncertainty (pCi/L)			Concentration Result ± 1s Uncertainty (Bq/L)			Result > 3s
DRINKING WATER									
ABERDEEN									
	GROSS ALPHA	5/12/06	1.50	±	0.67	0.06	±	0.02	
	GROSS BETA		4.79	±	0.58	0.18	±	0.02	Y
	TRITIUM		4.85	±	29.80	0.18	±	1.10	
ARCO									
	GROSS ALPHA	5/10/06	0.61	±	0.43	0.02	±	0.02	
	GROSS BETA		0.40	±	0.49	0.01	±	0.02	
	TRITIUM		-10.60	±	29.50	-0.39	±	1.09	
ARCO									
DUPLICATE	GROSS ALPHA	5/10/06	0.74	±	0.43	0.03	±	0.02	
	GROSS BETA		0.37	±	0.48	0.01	±	0.02	
	TRITIUM		56.80	±	30.90	2.10	±	1.14	
ATOMIC CITY									
	GROSS ALPHA	5/16/06	0.49	±	0.41	0.02	±	0.02	
	GROSS BETA		4.87	±	0.55	0.18	±	0.02	Y
	TRITIUM		27.00	±	29.60	1.00	±	1.10	
CAREY									
	GROSS ALPHA	5/10/06	0.27	±	0.39	0.01	±	0.01	
	GROSS BETA		1.19	±	0.49	0.04	±	0.02	
	TRITIUM		-28.00	±	30.00	-1.04	±	1.11	
FORT HALL									
	GROSS ALPHA	5/12/06	0.46	±	0.55	0.02	±	0.02	
	GROSS BETA		7.83	±	0.64	0.29	±	0.02	Y
	TRITIUM		-13.40	±	30.30	-0.50	±	1.12	
HOWE									
	GROSS ALPHA	5/11/06	1.58	±	0.41	0.06	±	0.02	Y
	GROSS BETA		2.45	±	0.49	0.09	±	0.02	Y
	TRITIUM		41.80	±	30.00	1.55	±	1.11	
IDAHO FALLS									
	GROSS ALPHA	5/11/06	0.08	±	0.47	0.00	±	0.02	
	GROSS BETA		2.45	±	0.49	0.09	±	0.02	Y
	TRITIUM		-18.10	±	30.20	-0.67	±	1.12	

Table C-7 Gross Alpha, Gross Beta and Tritium Concentrations in Drinking and Surface Water

MINIDOKA									
	GROSS ALPHA	5/9/06	-0.16	±	0.48	-0.01	±	0.02	
	GROSS BETA		3.12	±	0.55	0.12	±	0.02	Y
	TRITIUM		9.00	±	29.30	0.33	±	1.09	
MONTEVIEW									
	GROSS ALPHA	5/11/06	-0.40	±	0.48	-0.01	±	0.02	
	GROSS BETA		3.31	±	0.56	0.12	±	0.02	Y
	TRITIUM		-21.60	±	28.70	-0.80	±	1.06	
MORELAND									
	GROSS ALPHA	5/12/06	-0.05	±	0.55	0.00	±	0.02	
	GROSS BETA		5.07	±	0.61	0.19	±	0.02	Y
	TRITIUM		48.30	±	30.10	1.79	±	1.11	
MUD LAKE									
	GROSS ALPHA	5/16/06	-0.27	±	0.34	-0.01	±	0.01	
	GROSS BETA		3.83	±	0.55	0.14	±	0.02	Y
	TRITIUM		30.80	±	30.30	1.14	±	1.12	
ROBERTS									
	GROSS ALPHA	5/11/06	-0.55	±	0.43	-0.02	±	0.02	
	GROSS BETA		2.73	±	0.54	0.10	±	0.02	Y
	TRITIUM		-36.80	±	29.80	-1.36	±	1.10	
SHOSHONE									
	GROSS ALPHA	5/9/06	0.46	±	0.47	0.02	±	0.02	
	GROSS BETA		2.51	±	0.53	0.09	±	0.02	Y
	TRITIUM		-37.90	±	29.30	-1.40	±	1.09	
TABER									
	GROSS ALPHA	5/10/06	0.12	±	0.38	0.00	±	0.01	
	GROSS BETA		3.34	±	0.53	0.12	±	0.02	Y
	TRITIUM		8.17	±	30.30	0.30	±	1.12	
SURFACE WATER									
BLISS									
	GROSS ALPHA	5/9/06	0.80	±	0.38	0.03	±	0.01	
	GROSS BETA		4.80	±	0.53	0.18	±	0.02	Y
	TRITIUM		29.20	±	29.60	1.08	±	1.10	
BUHL									
	GROSS ALPHA	5/9/06	0.43	±	0.37	0.02	±	0.01	
	GROSS BETA		3.95	±	0.53	0.15	±	0.02	Y
	TRITIUM		48.60	±	30.00	1.80	±	1.11	

Table C-7 Gross Alpha, Gross Beta and Tritium Concentrations in Drinking and Surface Water

EFS									
	GROSS ALPHA	5/25/06	3.77	±	0.61	0.14	±	0.02	Y
	GROSS BETA		8.82	±	0.57	0.33	±	0.02	Y
	TRITIUM		8.05	±	29.00	0.30	±	1.07	
HAGERMAN									
	GROSS ALPHA	5/9/06	0.96	±	0.34	0.04	±	0.01	
	GROSS BETA		2.12	±	0.48	0.08	±	0.02	Y
	TRITIUM		45.40	±	30.10	1.68	±	1.11	
IDAHO FALLS									
	GROSS ALPHA	5/11/06	0.32	±	0.42	0.01	±	0.02	
	GROSS BETA		1.64	±	0.52	0.06	±	0.02	Y
	TRITIUM		25.50	±	29.60	0.94	±	1.10	
TWIN FALLS									
	GROSS ALPHA	5/9/06	0.59	±	0.45	0.02	±	0.02	
	GROSS BETA		6.89	±	0.60	0.26	±	0.02	Y
	TRITIUM		-20.20	±	30.30	-0.75	±	1.12	
TWIN FALLS									
DUPLICATE	GROSS ALPHA	5/9/06	0.26	±	0.53	0.01	±	0.02	
	GROSS BETA		6.14	±	0.60	0.23	±	0.02	Y
	TRITIUM		20.80	±	29.50	0.77	±	1.09	

TABLE C-8. 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															
	04/04/2006	0.04	±	1.39	0.001	±	0.051		1.68	±	0.93	0.062	±	0.034	
	05/02/2006	2.96	±	1.27	0.110	±	0.047		0.99	±	0.95	0.037	±	0.035	
	06/06/2006	-0.22	±	1.24	-0.008	±	0.046		0.71	±	0.92	0.026	±	0.034	
CAREY															
	04/04/2006	-0.17	±	1.63	-0.006	±	0.060		0.04	±	1.35	0.001	±	0.050	
	05/02/2006	0.09	±	0.82	0.003	±	0.030		-0.26	±	1.05	-0.010	±	0.039	
	No Sample		±		0.000	±	0.000			±		0.000	±	0.000	
DIETRICH															
	04/04/2006	0.05	±	0.77	0.002	±	0.028		1.35	±	1.00	0.050	±	0.037	
	05/02/2006	1.24	±	1.39	0.046	±	0.051		-1.76	±	1.33	-0.065	±	0.049	
	06/06/2006	-0.79	±	1.40	-0.029	±	0.052		-0.29	±	1.20	-0.011	±	0.044	
Duplicate	06/06/2006	0.75	±	2.45	0.028	±	0.091		-3.32	±	3.02	-0.123	±	0.112	
HOWE															
	04/04/2006	-2.06	±	1.61	-0.076	±	0.060		0.29	±	1.25	0.011	±	0.046	
	05/02/2006	0.11	±	1.38	0.004	±	0.051		-0.27	±	0.96	-0.010	±	0.036	
	06/06/2006	-0.33	±	0.91	-0.012	±	0.034		0.39	±	1.04	0.014	±	0.039	
Duplicate	06/06/2006	0.14	±	1.71	0.005	±	0.063		-0.56	±	1.22	-0.021	±	0.045	
IDAHO FALLS															
	04/04/2006	3.23	±	2.39	0.120	±	0.089		0.33	±	3.04	0.012	±	0.113	
	05/02/2006	0.76	±	1.36	0.028	±	0.050		-1.59	±	0.94	-0.059	±	0.035	
	06/06/2006	-0.96	±	3.08	-0.036	±	0.114		-2.20	±	2.94	-0.081	±	0.109	
MORELAND															
	04/04/2006	2.70	±	2.97	0.100	±	0.110		5.03	±	3.07	0.186	±	0.114	
	05/02/2006	-0.49	±	0.77	-0.018	±	0.028		1.22	±	1.01	0.045	±	0.037	
	06/06/2006	0.40	±	0.76	0.015	±	0.028		3.24	±	0.95	0.120	±	0.035	Y
ROBERTS															
	04/04/2006	1.12	±	1.82	0.041	±	0.067		-2.34	±	1.28	-0.087	±	0.047	
	05/02/2006	-1.69	±	1.55	-0.063	±	0.057		-2.07	±	1.25	-0.077	±	0.046	
	06/06/2006	2.41	±	2.68	0.089	±	0.099		1.28	±	3.00	0.047	±	0.111	

TABLE C-8. 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
RUPERT															
	04/04/2006	0.12	±	1.16	0.004	±	0.043		-0.70	±	0.97	-0.026	±	0.036	
	05/02/2006	-0.01	±	1.15	0.000	±	0.043		-0.93	±	0.93	-0.034	±	0.035	
	06/06/2006	-1.04	±	0.84	-0.039	±	0.031		-0.85	±	1.05	-0.031	±	0.039	
TERRETON															
	04/04/2006	-2.08	±	3.21	-0.077	±	0.119		-0.41	±	3.02	-0.015	±	0.112	
	05/02/2006	-2.36	±	1.76	-0.087	±	0.065		0.69	±	1.23	0.025	±	0.046	
	06/06/2006	0.18	±	2.93	0.006	±	0.109		1.50	±	3.04	0.056	±	0.113	
UCON															
	04/04/2006	-1.31	±	1.26	-0.049	±	0.047		-1.37	±	0.93	-0.051	±	0.034	
	04/11/2006	-0.63	±	1.23	-0.023	±	0.046		-0.28	±	0.93	-0.010	±	0.034	
	04/18/2006	3.80	±	1.27	0.141	±	0.047		-0.12	±	0.93	-0.005	±	0.035	
	04/25/2006	3.11	±	1.24	0.115	±	0.046		1.00	±	0.94	0.037	±	0.035	
	05/02/2006	-0.41	±	0.92	-0.015	±	0.034		-0.16	±	1.06	-0.006	±	0.039	
	05/09/2006	1.69	±	1.24	0.063	±	0.046		1.36	±	0.92	0.050	±	0.034	
	05/16/2006	-1.18	±	2.87	-0.044	±	0.106		1.74	±	3.06	0.064	±	0.113	
	05/23/2006	0.66	±	1.29	0.024	±	0.048		0.95	±	0.93	0.035	±	0.035	
	05/30/2006	-1.52	±	1.23	-0.056	±	0.046		-0.86	±	0.93	-0.032	±	0.035	
	06/06/2006	3.13	±	1.73	0.116	±	0.064		-1.31	±	1.24	-0.049	±	0.046	
	06/13/2006	1.17	±	2.67	0.043	±	0.099		-1.72	±	2.99	-0.064	±	0.111	
	06/20/2006	0.67	±	1.25	0.025	±	0.046		0.82	±	0.93	0.030	±	0.035	
	06/27/2006	0.07	±	1.25	0.003	±	0.046		-0.19	±	0.92	-0.007	±	0.034	

Table C-9. Strontium-90 and Tritium Concentrations in Milk

Strontium-90								
Location	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BLACKFOOT	05/02/2006	0.31	±	0.04	0.011	±	0.001	Y
CAREY	05/02/2006	1.05	±	0.06	0.039	±	0.002	Y
RUPERT	05/02/2006	0.54	±	0.07	0.020	±	0.002	Y
TERRETON	05/02/2006	0.38	±	0.04	0.014	±	0.002	Y
UCON	05/02/2006	0.49	±	0.03	0.018	±	0.001	Y
Tritium								
		Concentration ± 1s (pCi/L)			Concentration ± 1s (Bq/L)			Result > 3s
DIETRICH	05/02/2006	98.30	±	30.50	3.641	±	1.130	Y
HOWE	05/02/2006	50.10	±	29.70	1.856	±	1.100	
IDAHO FALLS	05/02/2006	59.60	±	29.80	2.207	±	1.104	
MORELAND	05/02/2006	64.90	±	29.90	2.404	±	1.107	
ROBERTS	05/02/2006	71.60	±	30.20	2.652	±	1.119	

Table C-10. Cesium-137 and Iodine-131 Concentrations in Sheep

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
INL SITE NORTH										
Animal #1	LIVER	CESIUM-137	05/09/2006	6.35	±	3.37	23.52	±	12.48	
		IODINE-131		-0.57	±	3.38	-2.10	±	12.52	
	MUSCLE	CESIUM-137		1.90	±	0.91	7.04	±	3.36	
		IODINE-131		2.11	±	1.34	7.81	±	4.96	
	THYROID	CESIUM-137		68.59	±	80.77	254.04	±	299.15	
		IODINE-131		-73.08	±	50.13	-270.66	±	185.66	
Animal # 2	LIVER	CESIUM-137	05/09/2006	5.53	±	3.35	20.48	±	12.41	
		IODINE-131		1.60	±	2.66	5.93	±	9.85	
	MUSCLE	CESIUM-137		5.58	±	0.98	20.67	±	3.63	Y
		IODINE-131		0.78	±	1.17	2.88	±	4.33	
	THYROID	CESIUM-137		-53.90	±	83.55	-199.63	±	309.43	
		IODINE-131		157.45	±	123.97	583.14	±	459.15	
INL SITE SOUTH										
Animal # 1	LIVER	CESIUM-137	05/19/2006	0.12	±	1.13	0.43	±	4.19	
		IODINE-131		3.13	±	2.33	11.59	±	8.63	
	MUSCLE	CESIUM-137		7.28	±	3.68	26.96	±	13.63	
		IODINE-131		0.24	±	3.94	0.89	±	14.59	
	THYROID	CESIUM-137		-63.95	±	77.53	-236.85	±	287.15	
		IODINE-131		68.15	±	127.16	252.40	±	470.96	
Animal # 2	LIVER	CESIUM-137	05/19/2006	1.30	±	1.18	4.81	±	4.37	
		IODINE-131		4.10	±	3.35	15.19	±	12.41	
	MUSCLE	CESIUM-137		0.52	±	1.03	1.93	±	3.81	
		IODINE-131		0.84	±	0.89	3.11	±	3.28	
	THYROID	CESIUM-137		-28.63	±	38.38	-106.02	±	142.13	
		IODINE-131		21.88	±	58.06	81.02	±	215.05	
DUBOIS										
Animal # 1	LIVER	CESIUM-137	05/19/2006	4.08	±	4.19	15.11	±	15.52	
		IODINE-131		-4.06	±	6.34	-15.04	±	23.48	
	MUSCLE	CESIUM-137		0.54	±	0.98	1.99	±	3.61	
		IODINE-131		3.39	±	3.13	12.56	±	11.59	
	THYROID	CESIUM-137		29.21	±	63.56	108.18	±	235.42	
		IODINE-131		112.87	±	73.86	418.04	±	273.56	
Animal # 2	LIVER	CESIUM-137	05/19/2006	1.76	±	1.08	6.52	±	4.00	
		IODINE-131		1.94	±	2.54	7.19	±	9.41	
	MUSCLE	CESIUM-137		6.42	±	3.88	23.78	±	14.37	
		IODINE-131		-1.17	±	6.25	-4.33	±	23.15	
	THYROID	CESIUM-137		150.19	±	95.09	556.25	±	352.20	
		IODINE-131		126.79	±	70.72	469.60	±	261.91	

Table C-11. Cesium-137 and Iodine-131 Concentrations in Large Game Animals

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
PRONGHORN	5/18/2006	Muscle	^{131}I	21.97	±	21.77	81.29	±	80.55	
			^{137}Cs	7.87	±	4.01	29.12	±	14.85	
		Thyroid	^{131}I	135.53	±	154.04	501.47	±	569.96	
			^{137}Cs	-16.55	±	125.32	-61.25	±	463.68	

Table C-12. Environmental Radiation Results

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR	Exposure mR/day
BOUNDARY				
ARCO	11/2/2005	5/3/2006	52.80 ± 10.30	0.29
ATOMIC CITY	11/2/2005	5/3/2006	56.50 ± 11.10	0.31
BIRCH CREEK	11/1/2005	5/3/2006	51.00 ± 10.00	0.28
BLUE DOME	11/2/2005	5/3/2006	49.80 ± 9.80	0.27
HOWE	11/1/2005	5/3/2006	52.10 ± 10.20	0.28
MONTEVIEW	11/1/2005	5/2/2006	51.60 ± 10.10	0.28
MUD LAKE	11/1/2005	5/3/2006	57.90 ± 11.40	0.32
			Boundary Average	**0.29**
DISTANT				
ABERDEEN	11/1/2005	5/2/2006	63.20 ± 12.40	0.35
BLACKFOOT	11/7/2005	5/3/2006	57.30 ± 11.20	0.32
BLACKFOOT CMS	11/2/2005	5/3/2006	54.10 ± 10.60	0.30
CRATERS	11/2/2005	5/3/2006	52.40 ± 10.20	0.29
DUBOIS	11/2/2005	5/3/2006	47.60 ± 9.30	0.26
IDAHO FALLS	11/2/2005	5/3/2006	59.00 ± 11.60	0.32
MINIDOKA	11/1/2005	5/2/2006	52.40 ± 10.30	0.29
REXBURG	11/7/2005	5/3/2006	64.30 ± 12.60	0.36
ROBERTS	11/1/2005	5/3/2006	61.40 ± 12.00	0.34
			Distant Average	**0.31**
OUT-OF-STATE				
JACKSON	11/3/2005	5/3/2006	45.30 ± 8.90	0.25

APPENDIX D

STATISTICAL ANALYSIS RESULTS

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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	0.0052
April	0.12
May	0.029
June	0.033
Gross Beta	
Quarter	0.65
April	0.65
May	0.44
June	0.86

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 5	0.28
	April 12	0.01
	April 19	0.15
	April 26	0.39
	May 3	0.25
	May 10	0.09
	May 17	0.32
	May 24	0.02
	May 31	0.17
	June 7	0.32
	June 14	0.02
	June 21	0.03
	June 28	0.07
Gross Beta		
	April 5	0.17
	April 12	0.23
	April 19	1.00
	April 26	0.77
	May 3	0.43
	May 10	0.67
	May 17	0.28
	May 24	0.09
	May 31	0.32
	June 7	0.12
	June 14	0.06
	June 21	0.10
	June 28	0.13

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