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Idaho National Engineering and Environmental Laboratory Offsite Environmental Surveillance Program Report: Third Quarter 2003

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EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the third quarter of 2003 could be directly linked with INEEL 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 INEEL. 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 (See Table E-1.).

This report for the third quarter, 2003, contains results from the Environmental Surveillance, Education and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Engineering and Environmental Laboratory's (INEEL) offsite environment, July 1 through September 30, 2003. All sample types (media) and the sampling schedule followed during 2003 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}) (Section 3);
- Water sampling, specifically collection of precipitation (Section 4); and
- Agricultural product sampling, including milk, lettuce, wheat, large game animals, and marmots (Section 5).

Gross alpha and gross beta measurements are used as general indicators of the presence of alpha-emitting and beta-emitting radionuclides in air. Gross alpha and gross beta results were found to have no discernable statistical distribution during the third quarter of 2003. 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 third quarter were gross alpha or gross beta concentrations from Boundary locations statistically higher than corresponding data sets for Distant locations, as one would expect if the INEEL were a significant source of radionuclide contamination. There were no statistical differences between gross alpha or gross beta results when grouped by location on a quarterly basis. Statistical analysis by month also showed no statistical difference between locations for gross alpha or gross beta.

Weekly comparisons of gross alpha and gross beta concentrations at Distant and Boundary locations showed statistical differences for three weeks. Gross alpha had a statistical difference between Boundary locations and Distant locations for the week of September 10, 2003. The Distant location was higher than the Boundary location, suggesting natural variations, probably due to atmospheric conditions (i.e., an inversion or resuspended particulates from harvesting/plowing). Gross beta statistical analysis had significant deviations for the weeks of July 16, and September 17, 2003. Analysis of stations within each group showed the Mud Lake station to be unusually low as compared to the other sites for the week of July 10, 2003. Similar analysis for the week of September 17, 2003 showed no statistical differences. As with the gross alpha result, gross beta concentrations at the Distant locations were higher than the Boundary locations, again suggesting natural variations.

During the third quarter, none of two ten-cartridge batches analyzed had iodine-131 (^{131}I) concentrations greater than the associated 3s value.

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). Strontium-90 was detected in two composite samples collected from Dubois and Mud Lake. The composite sample collected from Howe had ^{238}Pu and $^{239/240}Pu$ concentration greater than 3s. Four samples collected from air monitoring stations located at Craters of the Moon, Idaho Falls, Monteview, and the Rexburg Community Monitoring Stations (CMS) had ^{241}Am concentrations greater than associated 3s uncertainty values. With the exception of the $^{239/240}Pu$ concentration measured at Howe, these values are within the range of those measured in the past and are likely due to resuspension of particulates associated with fallout from past nuclear weapons testing. The $^{239/240}Pu$ concentration measured at Howe appears to be the result of cross-contamination with a spiked quality control sample in the analytical laboratory. All results were far less than their respective DOE Derived Concentration Guide (DCG) values.

Thirty-three atmospheric moisture samples were obtained during the third quarter of 2003 and analyzed fro tritium. Twenty-four samples were collected from Atomic City using silica gel and nine were collected from Idaho Falls using molecular sieve material. A total of 11 samples (seven from Atomic City and four from Idaho Falls) exceeded their respective 3s values. All sample results were well below the DOE DCG for tritium in air.

The ESER Program operates three PM_{10} samplers, one each at Rexburg, Blackfoot, and Atomic City. Sampling of PM_{10} is 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 concentration of particulates was 60.2 $\mu g/m^3$ on August 18, 2003, from Rexburg.

Sufficient precipitation occurred to allow collection of only four samples: one from Idaho Falls, and one from the Central Facilities Area and two from the EFS. Tritium was detected above the 3s values in two of the samples, one from Idaho Falls and one from the EFS. The maximum concentration was below any comparison standards.

Milk samples were collected weekly in Idaho Falls and monthly at nine other locations around the INEEL. All samples were analyzed for gamma emitting radionuclides. Iodine-131 and ^{137}Cs was not detected above 3s in any sample collected during the quarter.

Nine lettuce samples (including one duplicate) were collected from area gardens around the INEEL. Only the man-made gamma-emitting radionuclides ^{137}Cs and ^{90}Sr were measured. One sample (from Idaho Falls) had detectable ^{90}Sr concentrations above the 3s uncertainty. One additional sample (from EFS) had ^{137}Cs measured above its 3s value. The maximum concentration is consistent with concentrations seen in the recent past.

Early in the third quarter of 2003 thirteen wheat samples were collected from area grain elevators. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr. No radionuclides were detected above the 3s level in any sample.

Six large game animals were sampled during the third quarter of 2003. All were killed as a result of vehicular collisions. These accidents all involved pronghorn antelope (*Antilocapra americana*). Every effort was made to collect thyroid, liver, and muscle tissue from each animal. However, certain tissues could not be collected from all animals due to their condition at the time of collection. Cesium-137 appeared in the muscle and liver tissues above the 3s value in one pronghorn. Iodine was also measured above between the 2s and 3s range in the thyroid of the same animal . However, immediate recounting could not support this as a true detection.

A total of five marmots were collected for radionuclide analysis. One sample from Pocatello was also use as a duplicate. Cesium-137 and ^{90}Sr were the only radionuclides identified above the 3s level in edible tissue. Other tissues contained measurable concentrations of other various radionuclides. The potential dose from eating the most contaminated portion of a marmot collected in 2003 was estimated to be 0.006 mrem.

Table E-1 Summary of results for the third quarter of 2003.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Independent statistical comparisons of gross alpha and gross beta data indicate no differences between INEEL, Boundary, and Distant locations. Statistical differences in both gross alpha and gross beta results were observed in three separate weeks. However, these differences can be attributed to natural variation in the data. All gross alpha and gross beta results were within historical levels and were far less than applicable DOE DCGs.
		Gamma emitting radionuclides (including ^{137}Cs), select actinides (^{238}Pu, $^{239,240}Pu$, & ^{241}Am) and ^{90}Sr	Eight quarterly composite samples had levels of ^{90}Sr, ^{241}Am, ^{238}Pu and/or $^{239/240}Pu$ greater than 3s. The results were well below DOE DCGs and within historical measurements. A high result for $^{239/240}Pu$ is believed to be due to laboratory cross-contamination with a spiked quality control sample.
	Charcoal Cartridge	Iodine-131	No measurable ^{131}I was found in any sample.
	PM_{10}	Particulate matter	No regulatory limits were exceeded for atmospheric particulates.
Atmospheric Moisture	Liquid	Tritium	Eleven of 33 atmospheric moisture samples had tritium measured in them above their respective 3s values. No sample result exceeded the DCG for tritium in air.
Precipitation	Liquid	Tritium	Two of four samples had detectable concentrations of tritium. All samples were well below regulatory limits for tritium in drinking water.
Milk	Liquid	Iodine-131, gamma emitting radionuclides (including ^{137}Cs)	Neither ^{131}I nor ^{137}Cs was measured in any milk sample above their 3s value.
Lettuce	Solid	Gamma emitting radionuclides (including ^{137}Cs), and ^{90}Sr	Cesium-137 and strontium-90 were detected in one sample each above the 3s value. All values were within the range of historical concentrations.
Wheat	Solid	Gamma emitting radionuclides (including ^{137}Cs), and ^{90}Sr	Twelve wheat samples were collected. No radionuclides were detected above their 3s value.

Media	Sample Type	Analysis	Results
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides (including ^{137}Cs)	Cesium-137 was reported above the 3s value in muscle and liver tissues taken from a single pronghorn. No man-made radionuclides were measured in any of the other animals sampled. All concentrations were within the range of historical values for game animals.
Marmots	Tissue	Gamma emitting radionuclides (including ^{137}Cs), select actinides (^{238}Pu, $^{239,240}Pu$, & ^{241}Am) and ^{90}Sr	Cesium-137 was reported in the edible tissue from two samples from the RWMC. Strontium-90 was detected in the edible tissue of all samples. Other minor radionuclides were measured above their 2s values. The potential dose from consumption of a contaminated marmot for 2003 was estimated to be 0.006 mrem.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
ISU	Idaho State University
MDC	minimum detectable concentration
M&O	Management and Operating
NRTS	National Reactor Testing Station
PM	particulate matter
PM_{10}	particulate matter less than 10 micrometers in diameter
TLDs	thermoluminescent dosimeters
UI	University of Idaho
WSU	Washington State University

LIST OF UNITS

Bq	becquerel
cm	centimeters
Ci	curie
g	gram
in.	inch
L	liter
μCi	microcurie
m	meter
mL	milliliter
mR	milliroentgens
mrem	millirem
mSv	millisieverts
pCi	picocurie
R	Roentgen
μSv	microseiverts

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Engineering and Environmental Laboratory (INEEL) 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 2003, environmental monitoring within the INEEL boundaries was primarily the responsibility of the INEEL Management and Operating (M&O) contractor, while monitoring outside the INEEL 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 (UI) and Washington State University (WSU) for research, and MWH Global, Inc. and North Wind Environmental, Inc. for technical support. This report contains monitoring results from the ESER Program for samples collected during the third quarter of 2003 (July 1 – September 30, 2003).

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 INEEL;
- Assess the potential radiation dose to members of the public from INEEL effluents, and;
- 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 INEEL;
- moisture in air at four locations around the INEEL;
- surface water at five locations on the Snake River;
- drinking water at 14 locations around the INEEL;
- agricultural products, including milk at 10 dairies around the INEEL, potatoes from at least five local producers, wheat from approximately 10 local producers, lettuce from approximately nine home-owned gardens around the INEEL, and sheep from two operators which graze their sheep on the INEEL;
- soil from 12 locations around the INEEL biennially;
- environmental dosimeters from 15 locations semi-annually; and
- various numbers of wildlife including big game (pronghorn, mule deer, and elk), waterfowl, doves, and marmots sampled on and near the INEEL. Fish are also sampled as available (i.e., when there is flow in the Big Lost River).

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 Idaho State University (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 Severn-Trent, Inc of Richland, WA.

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 INEEL 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 the Environmental Radiation Ambient Monitoring System (ERAMS) network (EPA 2003). 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 is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, 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 ERAMS data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA ERAMS website (http://www.epa.gov/enviro/html/erams/).

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 INEEL Annual Site Environmental Report for each calendar year. Annual reports also include data collected by other INEEL 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 INEEL releases, meteorological data, and worldwide events that might conceivably have an effect on the INEEL 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 an estimated sample standard deviation (σ), assuming a Guassian 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 (Bartholmay, 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 the USGS report.

Laboratory measurements involve the analysis of a target sample and the analysis of a prepared laboratory blank (i.e., a sample which is identical to the sample collected in the environment, except that the radionuclide of interest is absent). Instrument signals for the target and blank vary randomly about the true signals and may overlap making it difficult to distinguish between radionuclide activities in blank and in environmental samples (Figure 1). That is, the variability around the sample result may substantially overlap the variability around a net activity of zero for samples with no radioactivity. In order to conclude that a radionuclide has been detected, it is essential to consider two fundamental aspects of the problem of detection: (1) the instrument signal for the sample must be greater than that observed for the blank before the decision can be made that the radionuclide has been detected; and (2) an estimate must be made of the minimum radionuclide concentration that will yield a sufficiently large observed signal before the correct decision can be made for detection or non-detection.

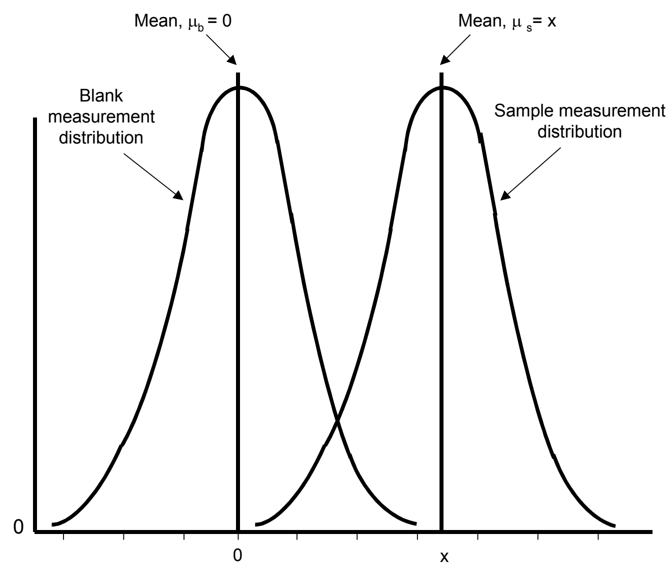

Figure 1. Example overlap of blank and sample measurement distributions.

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 estimation 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 usually 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. A more detailed discussion about confidence in detections may be found in Confidence in Detections under Helpful Information.

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 INEEL

The INEEL is a nuclear energy 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 INEEL 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 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. Other activities at the INEEL include environmental cleanup, subsurface research, and technology development.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INEEL is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INEEL. 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 INEEL 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 third quarter, 2003 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the third quarter of 2003 (Figure 1). Three of these samplers are located on the INEEL, nine are situated off the INEEL near the boundary, and six have been placed at locations distant to the INEEL. Samplers are divided into INEEL, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INEEL. Each replicate sampler is relocated every year to a new location. One replicate sampler was placed at the Blackfoot Community Monitoring Station (CMS) (Distant location) and one at Mud Lake (Boundary location) during 2003. An average of 14,412 ft^3 (408 m^3) of air was sampled at each location, each week, at an average flow rate of 1.44 ft^3/min (0.04 m^3/min). Particulates in air were collected on glass fiber particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

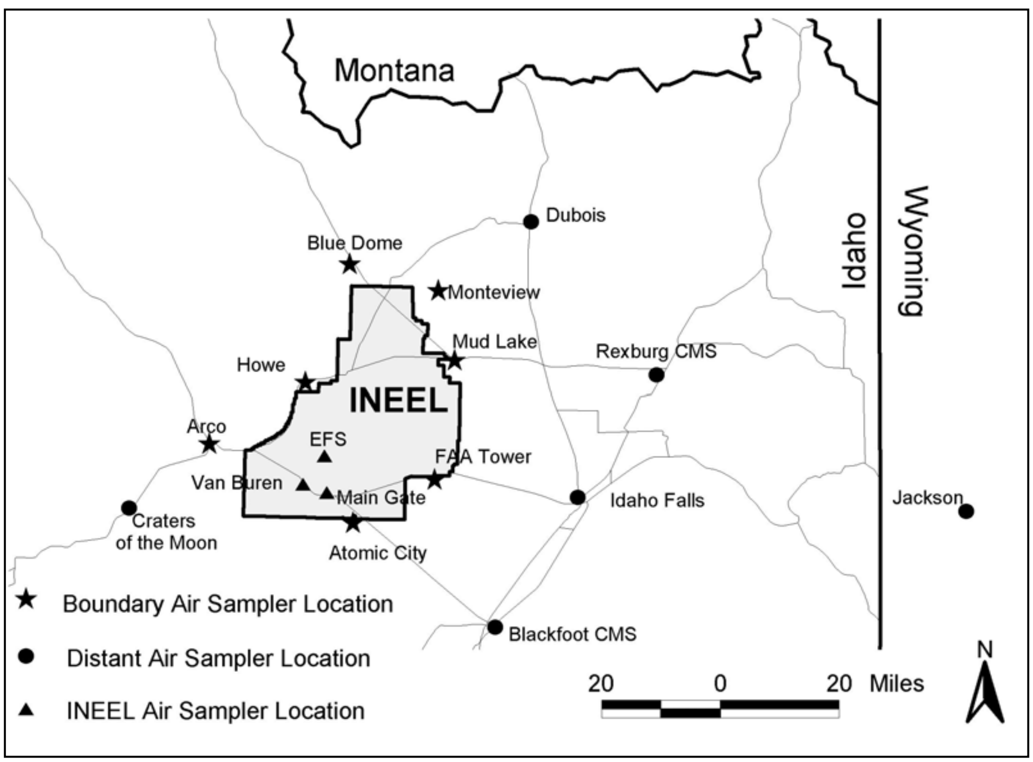

Figure 2. Low-volume air sampler locations.

Filters and charcoal cartridges were changed weekly at each station during the quarter. Each particulate filter was analyzed for gross alpha and gross beta radioactivity using thin-window gas flow proportional counting systems after waiting about four days for naturally-occurring daughter products of radon and thorium to decay. More information concerning gross alpha and beta radioactivity can be found in Gross versus Specific Analyses under Helpful Information.

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, or ^{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 ^{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 INEEL, Boundary, and Distant locations for the third quarter of 2003 are shown in Figure 3. The data were tested for normality prior to statistical analyses. For the most part the data showed no 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, a box enclosing values between the 25th and 75th percentiles, and whiskers representing the non-outlier range. Note that 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 third quarter indicates that the outliers and extreme values were not due to mistakes in collection, analysis, or reporting procedures, but reflect natural variability in the measurements. The outliers and extreme values lie within the range of measurements made within the past five years. Thus, rather than dismissing the outliers, they were included in the subsequent statistical analyses. Further discussion of box plots may be found in Determining Statistical Differences under Helpful Information.

Figure 3 graphically shows that the gross alpha measurements made at INEEL, Boundary, and Distant locations are similar for the third quarter. If the INEEL were a significant source of offsite contamination, concentrations of contaminants should 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 INEEL, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outliers 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 were no statistical differences in gross alpha concentrations between groups for the third quarter.

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 INEEL, Boundary, and Distant data groups. There were no statistical differences in gross alpha between groups for any month (Table D-1).

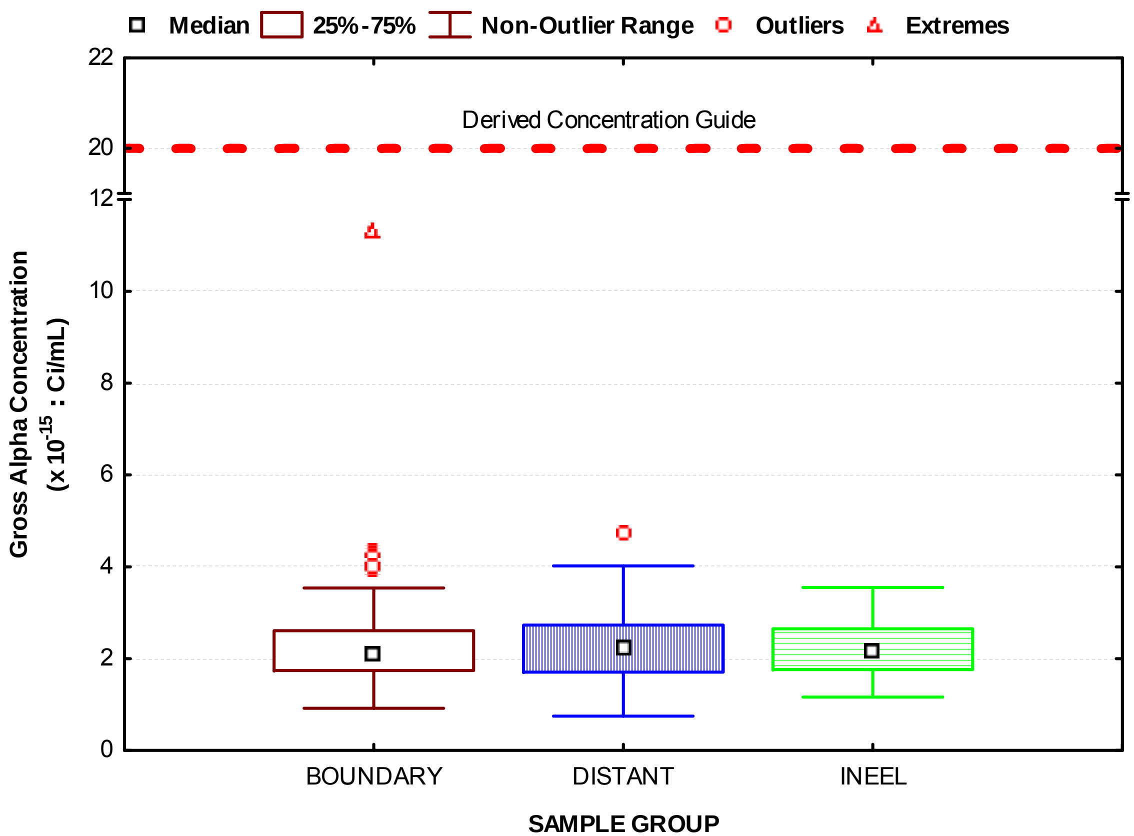

Figure 3. Gross alpha concentrations in air at ESER Program Boundary, Distant, and INEEL locations for the third quarter of 2003.

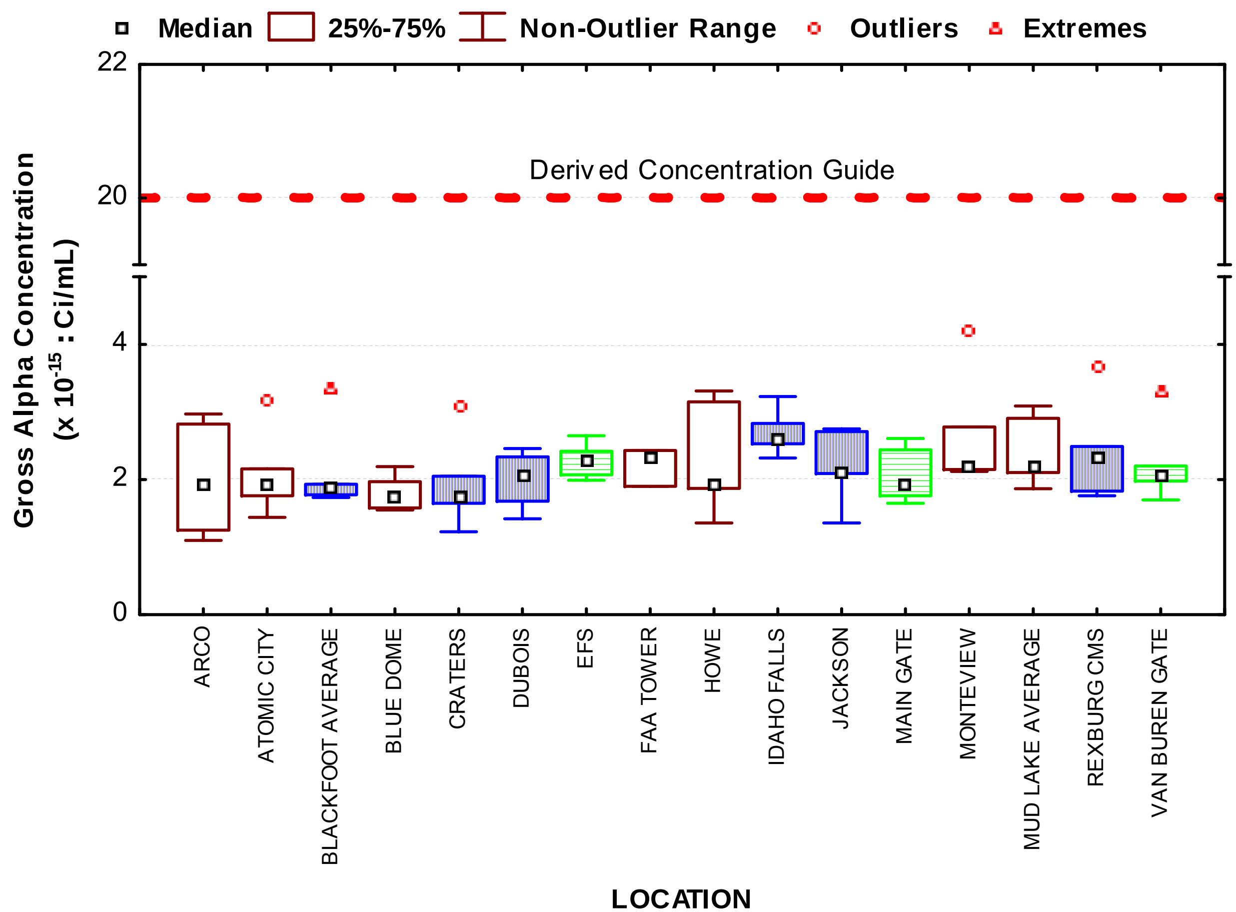

Figure 4. **July gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations**. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 for each location except for Dubois and FAA Tower, where N = 3.]

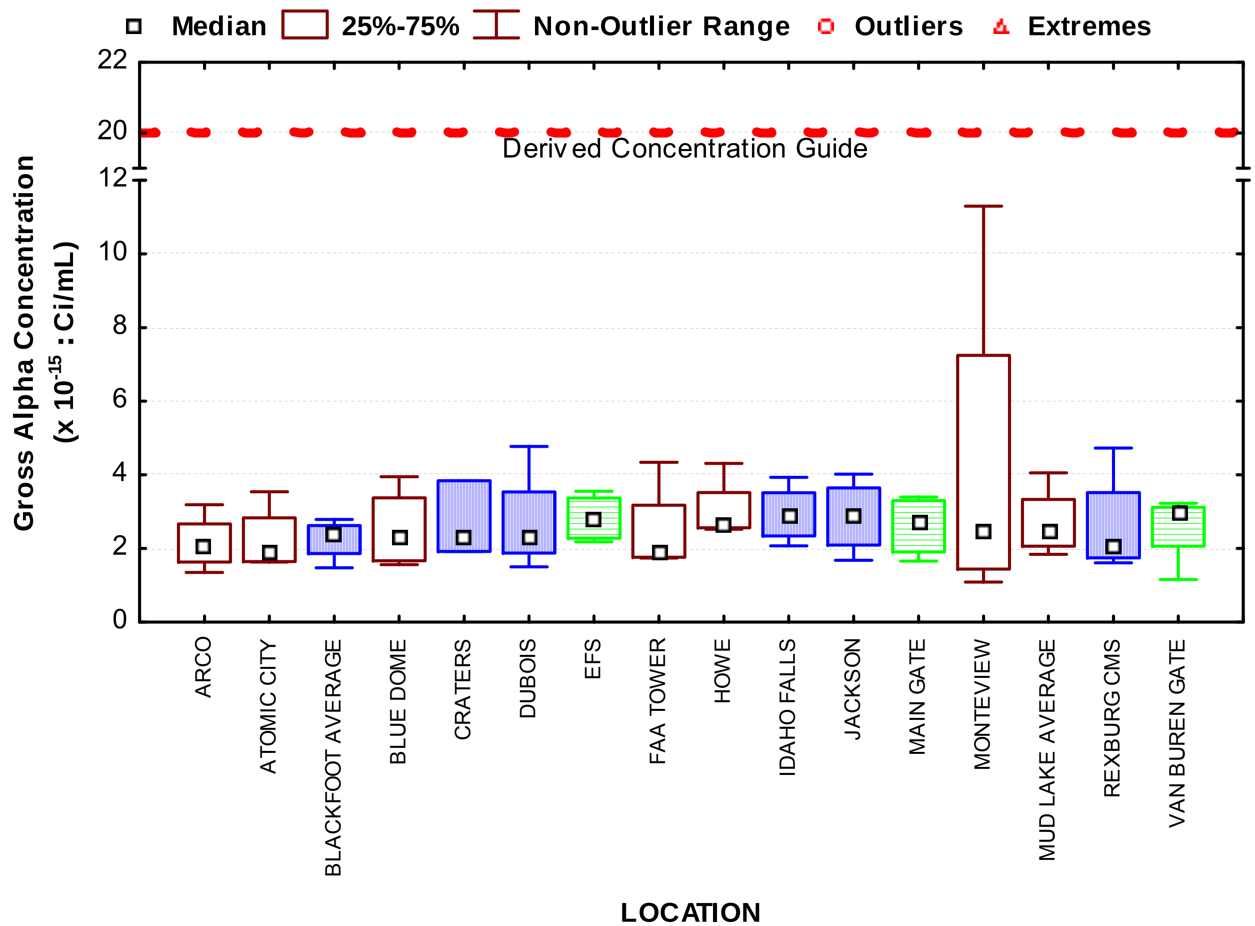

Figure 5. **August gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. Number of samples (N) = 4 at each location except for Craters where N = 3.

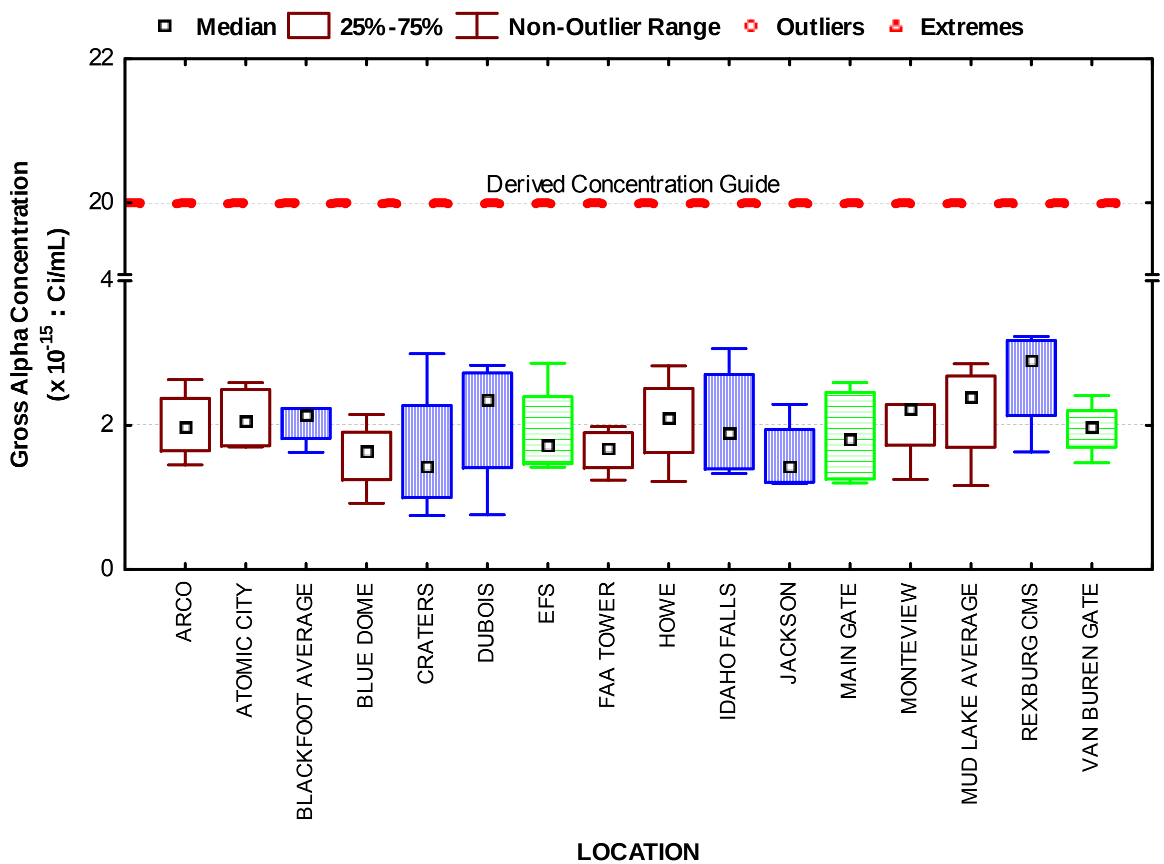

Figure 6. September gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. Number of samples (N) = 4 at each location.

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. INEEL sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INEEL and would not aid in determining offsite impacts. The gross alpha concentrations measured at Boundary locations were statistically different than those measured at Distant locations for the week of September 10, 2003 (Table D-2). Additional analysis of results for that week showed no statistical difference between Boundary locations or between Distant locations. Review of the box and whisker plot reveals that the Distant location group is higher than the Boundary location group. For this reason it is believed that the values reflect natural variability and not a potential release from the INEEL. More detail on the statistical tests used can be found in Determining Statistical Differences under Helpful Information.

Gross beta results are also presented in Table C-1. Gross beta concentrations in air for INEEL, Boundary, and Distant locations for the third quarter of 2003 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. As in the case of alpha activity, 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 data sets, using the Mann Whitney U test, indicates a difference between the two location groups for the weeks of July 16 and September 17, 2003 (Table D-2). As with gross alpha the Distant group was statistically greater than the Boundary group for the week of July 16. Analysis for that week showed a statistical difference between stations of the Boundary location group. Review showed the Mud Lake average was significantly less than the remaining stations. As no specific cause could be ascertained for this, it is attributed to natural variability. The week of September 17 showed the Boundary location group to be higher than the Distant location group. No statistical difference was found between stations of either the Boundary or Distant location groups. Thus, this also is interpreted as natural variability.

No ^{131}I was measured above the 3s value in any of the charcoal cartridge batches during the quarter. Two ten-cartridge batches had questionably detected ^{131}I. However, recounts of individual cartridges showed no evidence of ^{131}I in the weekly samples. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

Weekly filters for the third quarter of 2003 were composited by location and analyzed for gamma-emitting radionuclides, including cesium-137 (^{137}Cs). Selected composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am.

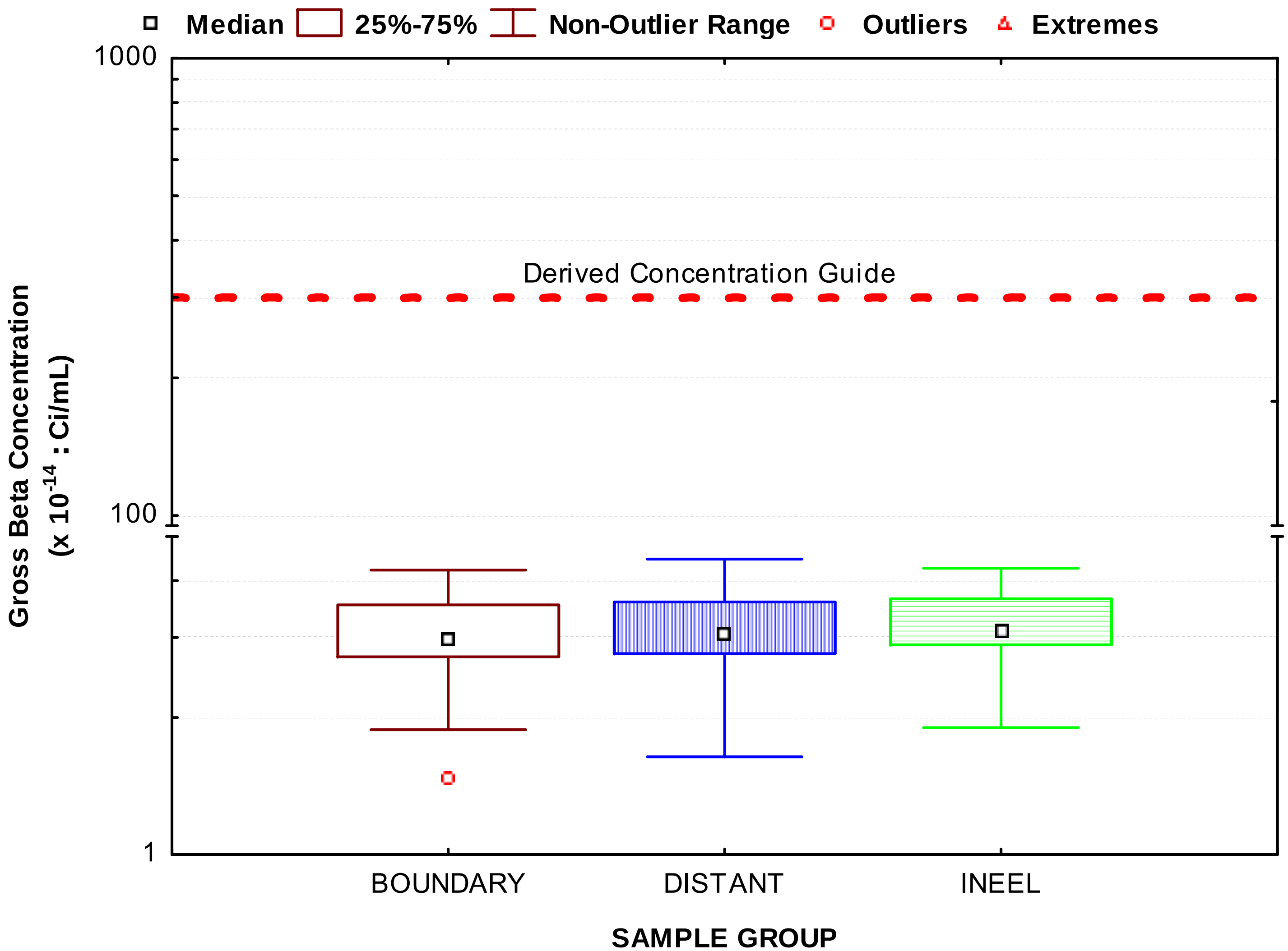

Figure 7. **Gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the third quarter 2003.**

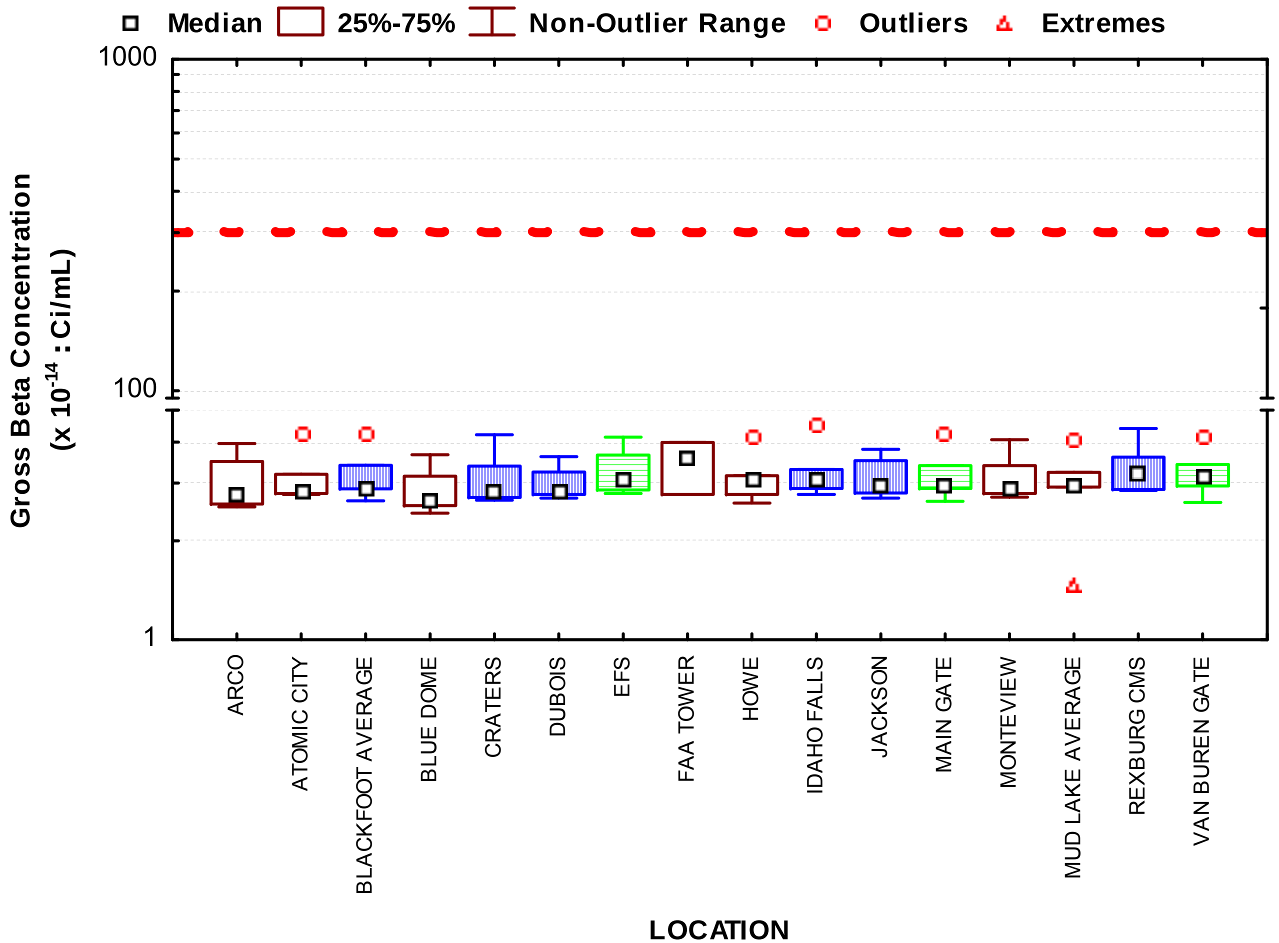

Figure 8. **July gross beta concentrations in air at ESER Program stations**. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 for each location except for Dubois and FAA Tower, where N = 3.]

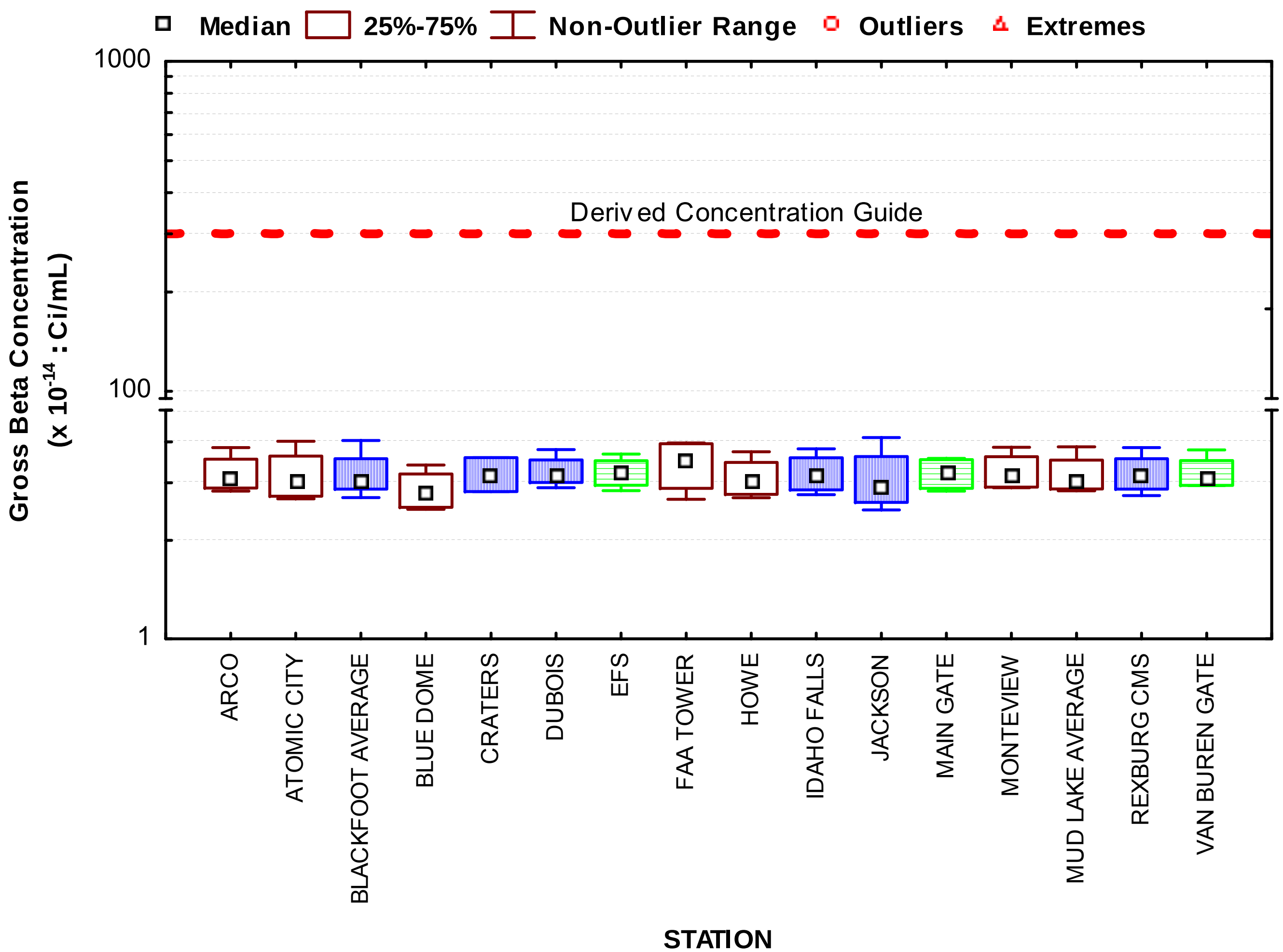

Figure 9. **August gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. Number of samples (N) = 4 at each location except for Craters where N = 3.

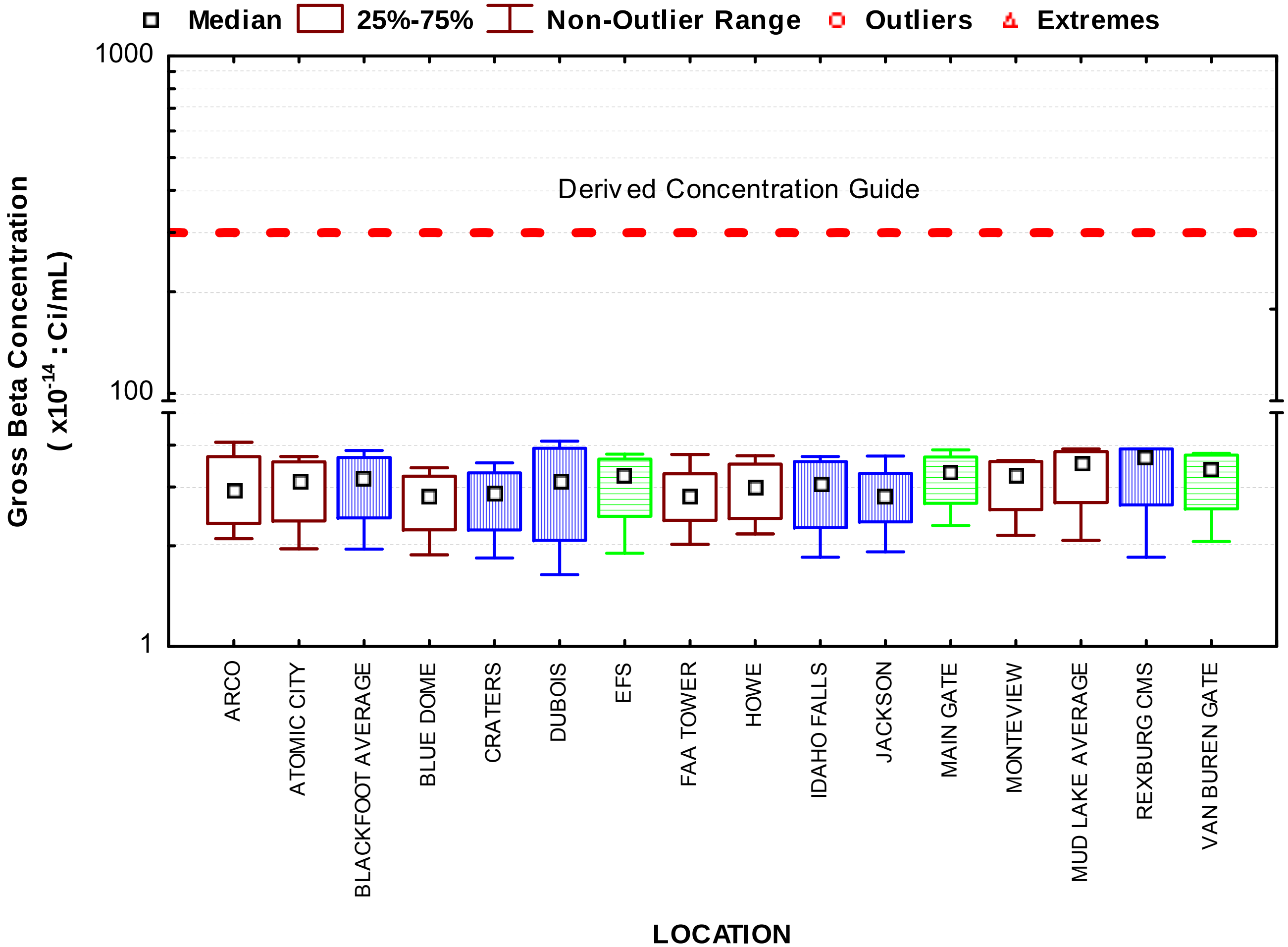

Figure 10. September gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. Number of samples (N) = 4 at each location.

Plutonium-238 was detected in one of the quarterly composites, at a concentration of (9.1 ± 2.8) x 10^{-18} µCi/mL ([3.1 ± 0.7] x 10^{-13} Bq/mL) collected at Rexburg CMS. Strontium-90, cesium-137, and ^{238}Pu were not detected in any sample. Occasional detection of human-made radionuclides is not unusual and represents natural variations in concentrations of radionuclides introduced by historical nuclear weapons testing. The $^{239/240}$ Pu concentration measured during this quarter is consistent with those recorded in the past and is far less than the DCG (2 x 10^{-14} µCI/mL). variations in concentrations of radionuclides introduced by historical nuclear weapons testing. The concentrations measured during this quarter are consistent with those recorded in the past. All results were far less than their respective DCGs. Only the Howe composite had ^{238}Pu measured above the 3s value. Figure 11 shows the ^{241}Am and ^{238}Pu, composite results that were greater than their 3s values. A large $^{239/240}$Pu result was measured in the Howe composite. Further investigation of this result revealed that it was close to the value of the QA spiked sample, and likely represents laboratory contamination rather than an actual detection. Figure 12 shows the same for the ^{90}Sr results. All results for composite filter samples are shown in Table C-3, Appendix C.

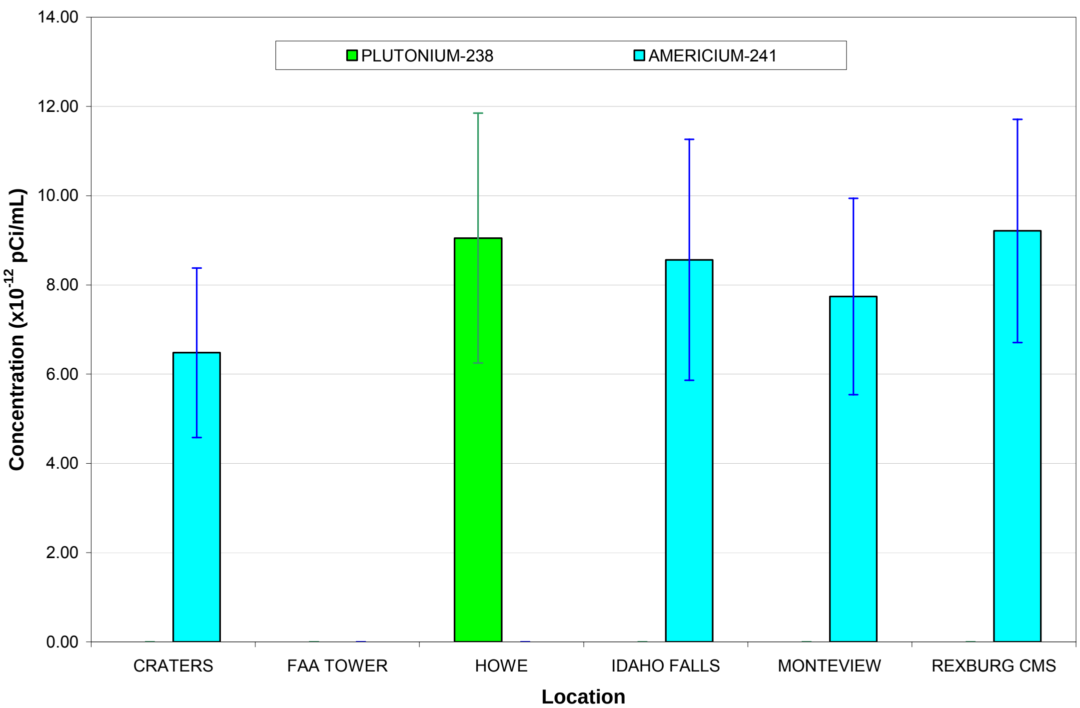

Figure 11. Specific radionuclide concentrations (± 1s) detected in quarterly composite air filters (by locations).
(The DGC for americium-241 is 2 x 10^{-8} pCi/mL, for plutonium-238 the DCG is 3 x 10^{-8} pCi/mL).

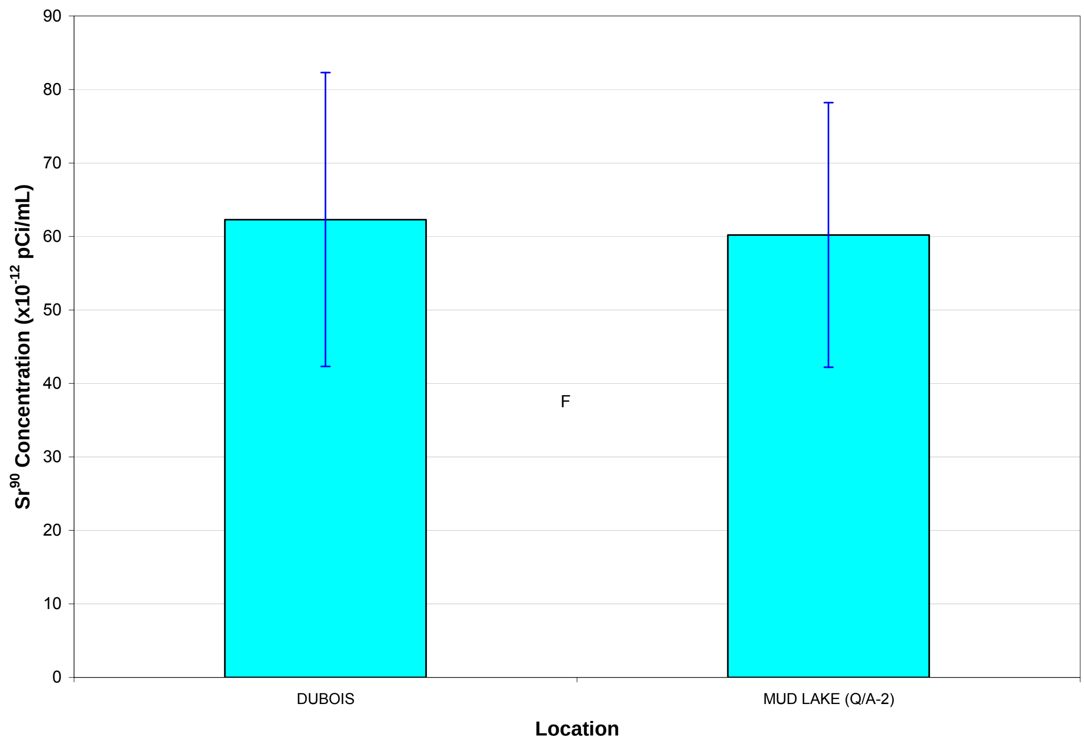

Figure 12. Strontium-90 concentrations (±1s) detected in quarterly composite air filters (by locations).
(The Derived Concentration Guide for strontium-90 is 5 x 10^{-5} pCi/mL).

ATMOSPHERIC MOISTURE SAMPLING

Twenty-four atmospheric moisture samples were collected using silica gel and nine samples using molecular sieve material during the third quarter of 2003. Samples were divided as follows: twenty four samples from Atomic City, and nine samples from Idaho Falls. Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., silica gel or molecular seive) to absorb water vapor. The water is then extracted from the absorbent material by heat distillation. The resulting water samples are then analyzed for tritium using liquid scintillation.

Eleven of the samples exceeded their respective 3s values (seven from Atomic City, four from Idaho Falls). All sample results were well below the DOE DCG for tritium in air of 1×10^{-7} µCi/mL (3.7×10^{-3} Bq/mL). The maximum value was $(4.91 \pm 0.51) \times 10^{-12}$ µCi/mL of air ($1.82 \pm 0.19 \times 10^{-7}$ Bq/mL of air).

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, 1996). 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} 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. Equipment problems nullified one sample from the Rexburg location. The maximum 24-hour concentration was 60.2 µg/m^3 on August 18, 2003, in Rexburg. This sample corresponds to the end of wheat harvest. The average, maximum, and minimum results of the 24-hour samples are summarized in Table 1. None of the results exceeds the maximum 24-hour air quality standard established by EPA. 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	2.1	59.7	24.1
Blackfoot, CMS	8.1	43.1	24.6
Rexburg, CMS	8.0	60.2	27.9

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

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 INEEL. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INEEL. Surface and/or drinking water are sampled twice each year at 19 locations around the INEEL. This occurs during the second and fourth quarters and is therefore not reported here. 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.

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 a monthly composite from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the third quarter of 2003 produced only enough precipitation for a total of four samples – one each from CFA and Idaho Falls, and two from the EFS.

Tritium was detected above the sample's 3s value in the July sample from Idaho Falls and the August sample from EFS. The maximum concentration of 194.0 ± 57.5 pCi/L (7.2 ± 2.1 Bq/L) from the EFS is well below the EPA limit for tritium in drinking water of 20,000 pCi/L.

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. Tritium measured in third quarter ESER samples were within the range of values measured elsewhere. The EPA's ERAMS program collects precipitation samples from across the United States. From 1978 to 2001 tritium measured in those samples ranged from -2.00 to 7.38×10^6 pCi/L (-7.4 to 2.7×10^4 Bq/L) (EPA 2003). Data for all third quarter 2003 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

5. AGRICULTURAL PRODUCTS 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 INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, doves, and marmots are sampled. Milk is sampled throughout the year. Sheep are sampled during the second quarter. Lettuce and wheat are sampled during the third quarter, while potatoes and waterfowl 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, lettuce, wheat, and large game sampled during the third quarter of 2003. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses is provided in Appendix B. There are no regulatory standards for radionuclide concentrations in agricultural products or wildlife tissues.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls and monthly at nine other locations around the INEEL (Figure 13) during the third quarter of 2003. All samples were analyzed for gamma emitting radionuclides. Samples are analyzed for ^{90}Sr during the second and fourth quarters.

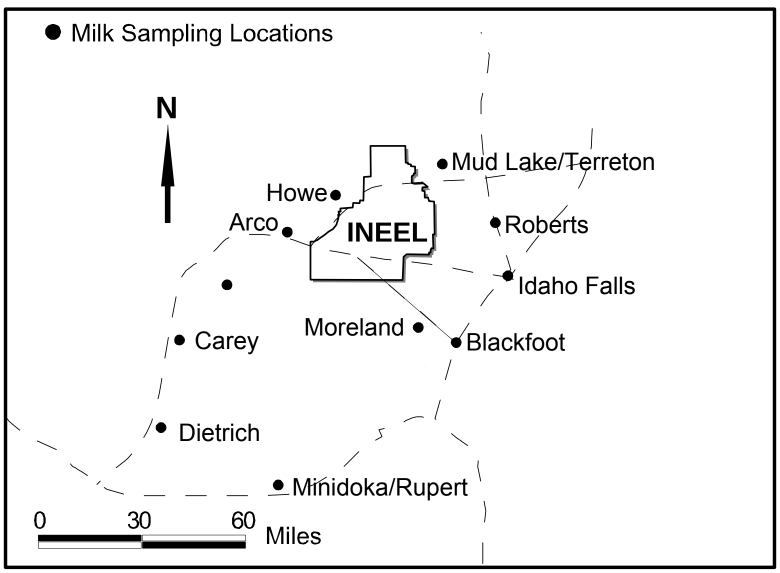

Figure 13. ESER Program milk sampling locations.

Data for ^{131}I and ^{137}Cs in milk samples are listed in Table C-7. Neither ^{131}I nor ^{137}Cs was detected (measured above the 3s value) in any milk sample during this quarter.

LETTUCE SAMPLING

In 2003 the ESER Program tested two prototype self-contained lettuce planters at the sampling locations in Atomic City and at the EFS on the INEEL. These locations were relatively remote and had no access to water, requiring that a self-watering system be developed. This prototype method allows for the placement and collection of lettuce at areas previously unavailable to the public (i.e., on the INEEL). The planters are set out in the spring with the lettuce grown from seed. This new method also allows for the accumulation of deposited radionuclides on the plant surface throughout the growth cycle.

Eight lettuce samples and one duplicate were collected from private gardens and the prototype planters. Each sample was analyzed for gamma emitting radionuclides and ^{90}Sr. The only man-made gamma emitting radionuclide detected in any of the samples was ^{137}Cs in the sample from Idaho Falls with a maximum concentration of 1.1 ± 0.3 pCi/g. Strontium-90 was measured in one sample collected from the EFS. The highest concentration of ^{90}Sr was measured in the sample from EFS sample at 4.4 ± 1.3 pCi/g (dry) (0.1 ± 0.06 Bq/g [dry]).

Data for ^{137}Cs and ^{90}Sr in all lettuce samples taken during the third quarter listed in Table C-8 (Appendix C).

WHEAT SAMPLING

A total of 12 wheat samples were collected from local grain elevators. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr. No man-made radionuclides were positively detected in wheat samples above their 3s levels during 2003. Data for ^{137}Cs and ^{90}Sr in all wheat samples taken during the third quarter are listed in Appendix C, Table C-9.

LARGE GAME ANIMAL SAMPLING

Six game animals were sampled during the third quarter of 2003. All were killed as a result of vehicular collisions. These accidents all involved pronghorn antelope (*Antilocapra americana*). Efforts were made to collect samples of thyroid, liver, and muscle tissue from each animal, but due to their condition at the time of sampling not all animals provided all samples. Cesium-137 and ^{131}I data for all big game samples are listed in Appendix C, Table C-10.

Each sample collected was analyzed for gamma emitting radionuclides. Liver and muscle tissue of all animals had detectable concentrations of naturally occurring potassium-40. Cesium-137 was detected in the liver and muscle tissue from an antelope sampled on September 25, 2003. Iodine-131 was also questionably detected in the muscle tissue of this animal.

The concentrations measured in the above samples are within the range of values for samples collected in the past. Likewise, the presence of ^{137}Cs is commonly associated with fallout from past weapons testing and nuclear accidents (i.e., Chernobyl).

MARMOTS

Marmots, otherwise known as rockchucks, are a large member of the squirrel family and are hunted and consumed by the Native American people in the area. A population of yellow-bellied marmots exists around and within the boundaries of the Radioactive Waste Management Complex (RWMC). During the second and third quarters of 2003, three marmots were collected from the Subsurface Disposal Area (SDA) of the RWMC. Two marmots were also collected as controls from the Pocatello Zoo and Tie Canyon near Blackfoot. Each marmot was dissected into three samples, the edible portion (muscle tissue), viscera, and the remainder (skin, fur, bones). All samples were analyzed for gamma-emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. Five samples of the edible portion of the marmot had results greater than their associated 3s for at least one radionuclide. One sample from the SDA had ^{241}Am above the 3s, while one sample from Tie Canyon had ^{137}Cs above the 2s.

Two samples, also from the SDA had detectable (above the 3s) ^{137}Cs. All samples had detectable ^{90}Sr in their edible tissue. These five samples, plus one additional sample also exceeded their 3s values for certain radionuclides in their viscera and remainder samples (Table 2). Results for all marmot samples are listed in Table C-11, Appendix C.

The potential dose from eating 225 g of the most contaminated edible portions of the marmots collected in 2003 is 0.006 mrem (0.06 µSv), which is well below the EPA limit of 10 mrem.

Table 2. Radionuclides detected in 2002 marmot samples.

Location	(Sample ID)	Analyte	Portion	Result[a]
SDA	(03-MAR-001C)	Americium-141	Edible	1.27 ± 0.58
SDA	(03-MAR-001C)	Cesium-134	Edible	4.22 ± 1.80
SDA	(03-MAR-002C)	Cesium-137	Edible	405.0 ± 24.0
SDA	(03-MAR-003C)	Cesium-137	Edible	366.0 ± 27.0
Tie Canyon	(03-MAR-004C)	Cesium-137	Edible	7.97 ± 4.0
SDA	(03-MAR-0001C)	Strontium-90	Edible	29.60 ± 5.70
SDA	(03-MAR-0002C)	Strontium-90	Edible	70.70 ± 9.50
SDA	(03-MAR-0003C)	Strontium-90	Edible	35.50 ± 6.30
Pocatello Zoo	(03-MAR-0006C)	Strontium-90	Edible	31.70 ± 6.10
Tie Canyon	(03-MAR-0004C)	Strontium-90	Edible	30.00 ± 5.90
SDA	(03-MAR-0002B)	Amercium-241	Viscera	2.74 ± 1.10
SDA	(03-MAR-0005B)	Cerium-141	Viscera	16.0 ± 5.80
SDA	(03-MAR-0001B)	Cesium-134	Viscera	11.10 ± 5.70
SDA	(03-MAR-0002B)	Cesium-137	Viscera	311.0 ± 22.0
SDA	(03-MAR-0003B)	Cesium-137	Viscera	403.0 ± 27.0
SDA	(03-MAR-0002B)	Plutonium-239/40	Viscera	1.74 ± 0.80
SDA	(03-MAR-0001B)	Strontium-90	Viscera	41.80 ± 9.80
SDA	(03-MAR-0002B)	Strontium-90	Viscera	1,520.00 ± 160.00
SDA	(03-MAR-0003B)	Strontium-90	Viscera	77.80 ± 12.00
Pocatello Zoo	(03-MAR-0005B)	Strontium-90	Viscera	53.70 ± 10.00
Pocatello Zoo	(03-MAR-0006B)	Strontium-90	Viscera	32.50 ± 8.00
Tie Canyon	(03-MAR-0004B)	Strontium-90	Viscera	57.50 ± 13.00
SDA	(03-MAR-0003A)	Americium-241	Remainder	2.28 ± 0.64
SDA	(03-MAR-0001A)	Americium-241	Remainder	1.39 ± 0.59
SDA	(03-MAR-0001A/dup)	Americium-241	Remainder	0.92 ± 0.42
SDA	(03-MAR-0002A)	Cesium-134	Remainder	6.14 ± 2.20
Pocatello	(03-MAR-0005A)	Cesium-134	Remainder	3.28 ± 1.50
SDA	(03-MAR-0002A)	Cesium-137	Remainder	373.0 ± 29.0
SDA	(03-MAR-0003A)	Cesium-137	Remainder	336.0 ± 21.0
SDA	(03-MAR-0003A/dup)	Cesium-137	Remainder	365.0 ± 30.0
SDA	(03-MAR-0003A)	Cobalt-60	Remainder	5.31 ± 1.80
Pocatello	(03-MAR-0006A)	Niobium-95	Remainder	8.37 ± 4.10
SDA	(03-MAR-0002A)	Plutonium-239/40	Remainder	0.95 ± 0.39
SDA	(03-MAR-0003A)	Plutonium-239/40	Remainder	0.97 ± 0.37
SDA	(03-MAR-0001A)	Strontium-90	Remainder	94.00 ± 12.00
SDA	(03-MAR-0002A)	Strontium-90	Remainder	3,350.0 ± 350.0
SDA	(03-MAR-0003A)	Strontium-90	Remainder	4,740.0 ± 490.0
Pocatello Zoo	(03-MAR-0005A)	Strontium-90	Remainder	52.20 ± 9.00
Pocatello Zoo	(03-MAR-0006A)	Strontium-90	Remainder	83.10 ± 14.00
Tie Canyon	(03-MAR-0004A)	Strontium-90	Remainder	197.0 ± 22.0

a. All results are times 10^{-3} picocuries per gram (x 10^{-3} pCi/g) ± one standard deviations.

6. QUALITY ASSURANCE

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

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

The following discussion summarizes the results of the quality assurance program for the period from July 1 to September 30, 2003.

METHOD UNCERTAINTY

The Quality Assurance Project Plan (QAPP) establishes data quality and method quality objectives for the ESER surveillance program (Stoller 2002). Since the primary concern is with detection, the lower bound for the method uncertainty is set at zero. The upper bound is established as the maximum concentration from the past seven years of applicable data. 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. Those results that did not meet this requirement are shown in Table 3.

DATA COMPLETENESS

The QAPP specifies a 98 percent completeness goal for all regularly scheduled sample types. Data completeness was 100 percent during the third quarter for all sample types with the exception of low volume air which was 92 percent. The August 20 sample for the Craters and the July 16 samples from Dubois and FAA Tower were invalid due to insufficient sample volume collection as a result of equipment failures. The July 2 FAA Tower was also invalid for insufficient sample volume collection as a result of a tripped circuit breaker.

DATA PRECISION

Data precision is a measure of the variability associated with a measurement system. Precision is measured using duplicate samples, split samples, and recounts. The QAPP 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 3s criterion is the one that applies in nearly all cases. Mathematically, the 3s criterion is expressed as:

$$|X-Y| < 3 \times (\mathrm{sqrt}(\sigma_x^2 + \sigma_y^2)),$$

where:

X is the result of the regular sample

Y is the result of the duplicate sample

Table 3. Analytical results determined to be unacceptable.

Media	Radionuclide	Number Unacceptable[a]
Air	Gross alpha	8 / 349[b]
filters and cartridges	Gross beta	0 / 349
	Cesium-137	122 / 418
	Iodine-131	378 / 419
	Americium-141	6 / 10
	Plutonium-238	9 / 10
	Plutonium-239/40	8/ 10
	Strontium-90	10 / 11
moisture in air	Tritium	0 / 48
Precipitation	Tritium	0 / 6
Milk	Cesium-137	0 / 72
	Iodine-131	1 / 74
Lettuce	Cesium-137	10 / 17
	Strontium-90	0 / 10
Wheat	Cesium-137	8 / 17
	Strontium-90	10 / 13
Game Animals	Cesium-137	9 / 25
	Iodine-131	9 / 25
Marmots	Americium-141	0 / 18
	Cesium-137	0 / 17
	Plutonium-238	0 / 18
	Plutonium-239/40	1 / 18
	Strontium-90	0 / 18

a. Format shown is number unacceptable / total number of analyses.
b. Total number of analyses varies due to different numbers of recounts for each radionuclide.

σ_x is the uncertainty of the regular sample

σ_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.

Revisions to the QAPP will establish Warning and Control limits for duplicate/recount analysis. This method will evaluate the absolute difference between the duplicate/recount when the original result is below the upper bound and the standard relative percent difference when the original result if greater than or equal to the upper bound.

Field Duplicate Samples

Duplicate milk samples were collected from Terreton on July 1 and analyzed for gamma-emitting radionuclides. Only the analysis of the naturally occurring radionuclide potassium-40 (^{40}K) was not within the ± 3s criterion. A second duplicate from Howe was also collected in July. All analyses were within the acceptable limits.

Duplicate analyses were also performed on wheat (Rupert) and lettuce (Arco) samples. Again only the naturally occurring potassium-40 result for the duplicate wheat sample did not meet the acceptability criteria.

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the fourth quarter of 2003 these samplers, designated as Q/A-1 and Q/A-2, were in operation at the Blackfoot CMS and Mud Lake, respectively. Particulate filters were analyzed for gross alpha and gross beta activity. All valid results from the duplicate samplers met the 3s criterion for both gross alpha and gross beta during the third quarter.

Composite air samples from the two QA samplers were submitted for analysis at the end of the fourth quarter for gamma spectrometry at the EAL and for ^{90}Sr at Severn-Trent. All analyses were within the 3s criterion.

A comparison of duplicate results can also show bias in the sampling system. For example, if one set of results is consistently lower or higher than the other one might suspect that this bias was due to a leak in the system or variations in the calibration of the flow meter. Figures 14 and 15 show the ratio of results (QA duplicate sampler/main sampler) over time. A ratio of one means that the results of both samplers are exactly the same. The figures show that the bias is small (<2) and not consistent, indicating that there is no obvious bias in the duplicate sampling systems. The average bias ratios during the fourth quarter are 1.2 and 1.0 for Blackfoot gross alpha and gross beta, respectively, and 1.1 and 1.0 for Mud Lake gross alpha and gross beta, respectively.

Lab Split Samples

The EAL 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. Results of the EAL split sample analyses met the criteria for acceptance during the third quarter 2003.

The EAL also recounts a number of samples of each media type. The lab tests each recount using both 20 percent criterion and the 3s criterion, subject to the limitations described in the previous paragraph. All third quarter 2003 results were within the criteria for acceptance.

Severn-Trent split one wheat and one lettuce sample for ^{90}Sr analysis and the results were within the 3s criterion.

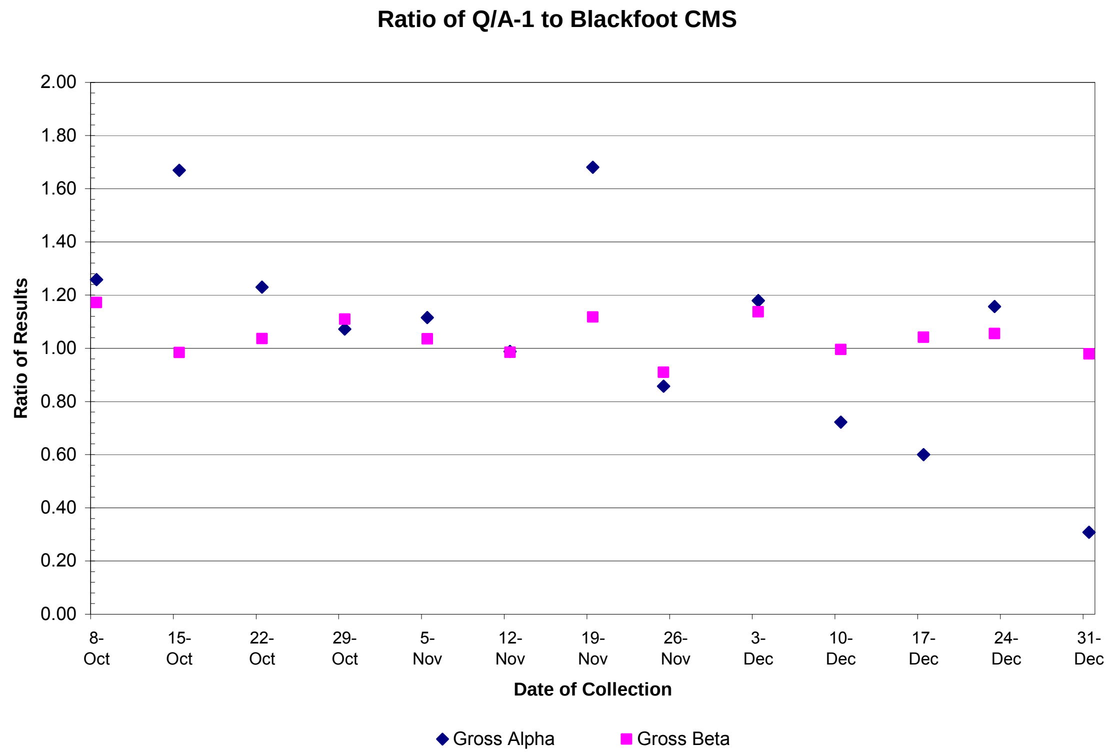

Figure 14. Ratio of QA-1/Blackfoot gross alpha and gross beta activities.

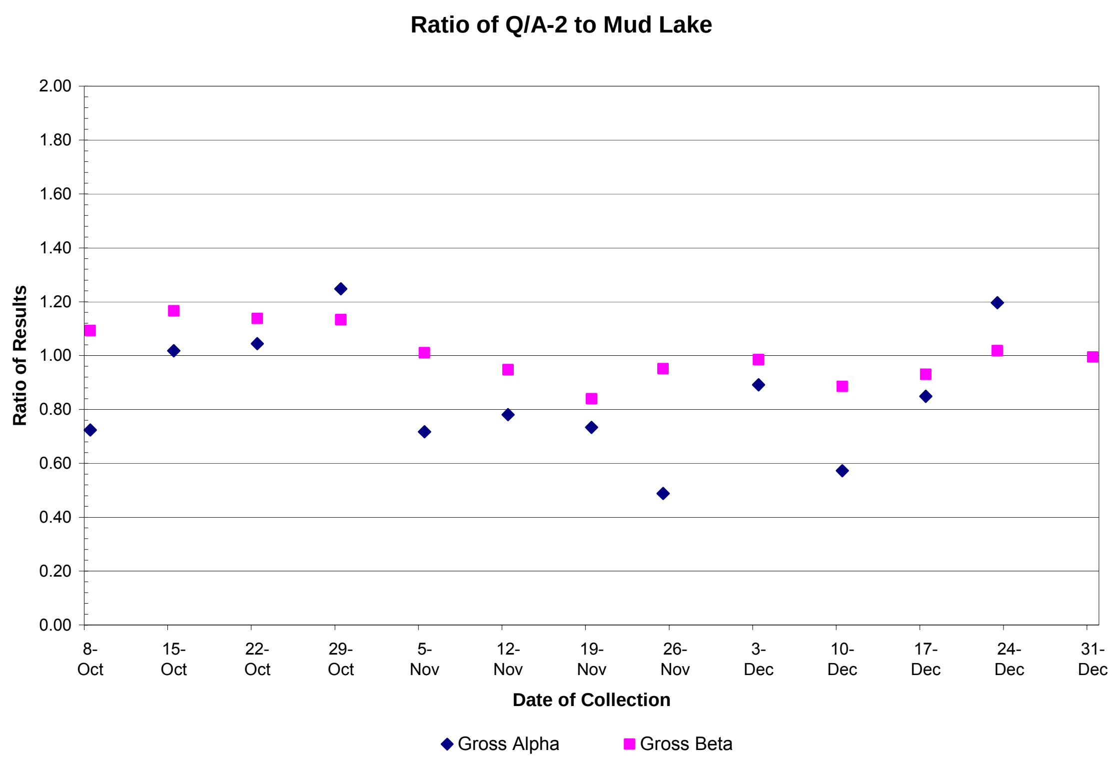

Figure 15. Ratio of QA-2/Mud Lake gross alpha and gross beta activities.

Sample Recounts

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

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

- Thirty-nine low-volume air filters were recounted for alpha activity. All were within the 3s criterion.
- Thirty-nine low-volume air filters were recounted for beta activity. All were within the 3s criterion.
- Eighteen milk samples were recounted for ^{40}K; three were recounted twice and one was recounted three times. Five were not within the 3s criterion. The EAL has started using ^{40}K instead of ^{131}I data for recount and split comparisons.
- Twelve groups of charcoal cartridges were recounted for ^{131}I. All were within the 3s criterion.
- Fifteen tissue samples were recounted for ^{137}Cs. All were within the 3s criterion.
- Sixteen low-volume composites were recounted for beryllium-7. All were within the 3s criterion.
- Four wheat samples were recounted for ^{40}K. Two were not within the 3s criterion, but were within the 20 percent criterion.
- Five lettuce samples were recounted for ^{40}K; three were recounted twice and two were recounted three times. Four of the comparisons were not within the 3s criterion or the 20 percent criterion.
- Six precipitation samples were recounted for tritium. The results were within the 3s criterion.
- Two water samples were recounted for tritium. The results were within the 3s criterion.
- Two milk samples were recounted for tritium. One result was not within the 3s criterion, but was within 20 percent.
- One atmospheric moisture samples was recounted for tritium. The result was within the 3s criterion.

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. During the third quarter of 2003, spikes of the following types were submitted for analyses by ESER:

- Milk sample spike analyzed for gamma-emitting radionuclides by the ISU EAL.
- Low-volume air filter composite analyzed for ^{241}Am, ^{238}Pu and $^{239/240}Pu$ by Severn-Trent.
- Results were reported in the third quarter for a tritium in precipitation spike submitted at the end of the second quarter.

The Quality Assurance Project Plan specifies a required accuracy of ±10% for tritium in precipitation, ±20% for gamma-emitting radionuclides in milk and ±25% for actinides in air. The tritium spike was the only sample to not meet the specified criteria. Revisions to the QAPP will require spikes to be within a certain calculated range based on the concentration of the spike added. The ^{90}Sr blank for the third quarter met also this new criterion.

Severn-Trent prepares an internal laboratory control sample (LCS) for analysis with each batch of samples submitted by the ESER. During the third quarter these consisted of ^{90}Sr, ^{241}Am, ^{238}Pu and $^{239/240}$Pu in air, and ^{90}Sr in wheat and lettuce. The QAPP specifies accuracies of ± 10 percent for ^{90}Sr and actinides in air and ± 25 percent for ^{90}Sr in wheat. Only the LCS for ^{90}Sr in air failed to meet the applicable criteria. All other air LCS results were within acceptable parameters. Since the ^{90}Sr LCS was higher than the acceptance criteria this would indicate a positive, or high, bias to the associated samples. Strontioum-90 was failed the revised LCS criteria for composite blanks and wheat. This issue is being resolved with the laboratory.

The ISU EAL also prepares internal laboratory spikes. During the third quarter of 2003, 16 analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. Geometries tested included low-volume air filter composites, 500 mL water spiked at 0.8 and 1.0 g/mL, and 1000 mL water sample spiked at 1.0 g/mL. A total of 66 analytical results were generated. All of the results within the ± 20 percent range.

Eighteen analyses of spiked tritium in water were also run during the quarter. All results met the ± 20 percent criterion. A gross alpha and gross beta water spike was analyzed and was within 20 percent of the known value.

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 low-volume air sampling program includes the use of two field blanks, designated as Blank A and Blank B, that each accompanies one of the air filter collection routes. These blank filters are also submitted as quarterly composites. After gamma spectrometry analysis, one of the blanks is analyzed for ^{90}Sr and the other for transuranics (^{241}Am, ^{238}Pu and $^{239/240}$Pu).

The QAPP also specifies that one milk sample blank will be submitted per year (although this is now being done monthly) and one precipitation blank for each month. The precipitation blanks are also used for atmospheric moisture samples collected during the month. Blanks for milk and gamma-emitting radionuclides were in control.

The QAPP does not specify requirements for blank performance, but ideally the result should be within ± 3s of zero on most analyses. Two gross alpha results were greater than the ± 3s criterion. For those weeks where the blank samples exceeded the ± 3s criterion calls into question the validity of the results from the associated field samples. An out-of-control blank could suggest significant filter contamination or laboratory contamination. Revisions to the QAPP will detail blank acceptance criteria, again based on the upper limit and method uncertainty. Using the revised criteria only the blanks for ^{131}I in charcoal cartridges and ^{241}Am and ^{90}Sr in wheat failed.

Using this method three gross alpha blank measurements were deemed to be at the warning level and two were considered out-of-control. These samples correlated with those that missed the ± 3s criterion. In addition to the gross alpha results six ^{131}I results received a warning and three were deemed out-of-control.

Blank analysis results for tritium in atmospheric moisture (water) blanks during the quarter both exceed the ± 3s criterion.

The EAL also analyzes reagent blanks to help determine if the analysis will yield a zero result when no activity is present. One such blank was analyzed for tritium in water during the third quarter. The results were less than the calculated MDCs or less than the 3s criterion. Severn-Trent also analyzes a laboratory blank with each sample set. Third quarter blanks were less than three standard deviations of zero for plutonium-238 and strontium-90 in air. Blanks for plutonium-239/240 and americium-241 were greater than three standard deviations. The laboratory blank for strontium-90 in wheat was high enough on the first run to have to re-analyze the samples. The blank on the re-run was less than one standard deviation of zero.

ASSESSMENTS

A schedule for routine surveillances of ESER program activities was initiated at the beginning of 2002 and most procedures were assessed during that year. One surveillance was conducted in the third quarter of 2003 on wheat sampling and preparation. The conclusion of the surveillance was that the procedure needed revision to reflect recent changes in the process. These included sample collection occurring directly from farm fields instead of grain elevators and sample processing being performed at the town office instead of the INEEL laboratory.

SUMMARY OF QUALITY ASSURANCE ACTIVITIES

There were no significant QA problems noted for the third quarter. A few recount and duplicate results did not meet the reproducibility criteria of the EAL. The laboratory has begun using potassium-40 for comparison purposes because this radionuclide is normally seen in samples. However, fluctuations in ambient background sometimes cause variations in reported concentrations.

In summary the quality assurance and data quality objectives for analyses were met in the third quarter of 2003 with the following exceptions:

- ^{131}I charcoal cartridges, failed both general and blanks;
- All analytes in quarterly composites;
    - ^{137}Cs also failed for recounts, and
    - ^{241}Am and ^{90}Sr failed in composite blanks;
- ^{137}Cs in lettuce; and
- ^{90}Sr in wheat.

All QA issues, particularly those associated with the quarterly composites are being resolved with the laboratory. As of the writing of this report the composite issue appaears to be related to laboratory contamination related to spiked samples.

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APPENDIX A

SUMMARY OF SAMPLING MEDIA AND SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INEEL
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Idaho Falls, 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, Idaho Falls, 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, Idaho Falls, Fort Hall, Minidoka, Moreland, Roberts, Shoshone, Tabor	Arco, Atomic City, Howe, Monteview, Mud Lake	None
ENVIRONMENTAL RADIATION SAMPLING				
TLDs				
Gamma Radiation	semiannual	Aberdeen, Blackfoot, Craters of the Moon, Idaho Falls, Minidoka, Jackson WY, Rexburg, Roberts	Arco, Atomic City, Birch Creek, Howe, Monteview, Mud Lake	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INEEL
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
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Mud Lake	None
WHEAT				
Gamma Spec, ^{90}Sr	annually	Am. Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Tabor, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	None
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INEEL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois	None	No. INEEL (Circular Butte), So. INEEL (Tractor Flats)
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Fort Hall, Hiese, Market Lake, Mud Lake	None	INEEL Waste disposal ponds
Marmots				
Gamma Spec, ^{90}Sr, Transuranics	varies	Pocatello zoo, Tie Canyon	None	RWMC

APPENDIX B

SUMMARY OF MDC'S AND DCG'S

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Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Third quarter 2003

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	1.01×10^{-15} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.94×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	3.06×10^{-16} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	1.95×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}Pu$	2.61×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	1.15×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	7.6×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.14×10^{-21} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	5.23×10^{-13} $\mu Ci/mL_{air}$	1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	1.15×10^{-13} µCi/mL	2×10^{-3} µCi/mL
Milk	^{131}I	1.0 pCi/L	--[g]
	^{137}Cs	4.8 pCi/L	--
Lettuce	^{137}Cs		--
	^{90}Sr		--
Wheat	^{137}Cs		--
	^{90}Sr		--
Game Animal Tissue[h]	^{137}Cs	6.09 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% level of confidence and precision of plus or minus 100% 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 570 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 -- means there is no established DCG for this media.

h. 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.

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	**Sampling Date**	**Result ± 1s Uncertainty x 10^{-15} µCi/mL**			**Result ± 1s Uncertainty x 10^{-11} Bq/mL**			**Result > 3s**	**Result ± 1s Uncertainty (x 10^{-15} µCi/mL)**			**Result ± 1s Uncertainty (x 10^{-11} Bq/mL)**			**Result > 3s**
BOUNDARY															
ARCO	07/02/2003	1.10	±	0.34	4.07	±	1.25	Y	25.90	±	0.96	95.83	±	3.54	Y
	07/09/2003	1.25	±	0.38	4.63	±	1.39	Y	27.50	±	1.16	101.75	±	4.29	Y
	07/16/2003	1.93	±	0.34	7.14	±	1.25	Y	25.40	±	0.91	93.98	±	3.37	Y
	07/23/2003	2.97	±	0.53	10.99	±	1.97	Y	39.60	±	1.43	146.52	±	5.29	Y
	07/30/2003	2.82	±	0.49	10.43	±	1.81	Y	34.90	±	1.27	129.13	±	4.70	Y
	08/06/2003	1.35	±	0.44	5.00	±	1.62	Y	28.30	±	1.22	104.71	±	4.51	Y
	08/13/2003	2.14	±	0.39	7.92	±	1.44	Y	32.50	±	1.11	120.25	±	4.11	Y
	08/20/2003	3.19	±	0.49	11.80	±	1.81	Y	38.40	±	1.26	142.08	±	4.66	Y
	08/27/2003	1.91	±	0.36	7.07	±	1.34	Y	29.50	±	1.02	109.15	±	3.77	Y
	09/03/2003	2.63	±	0.43	9.73	±	1.60	Y	40.80	±	1.17	150.96	±	4.33	Y
	09/10/2003	1.84	±	0.35	6.81	±	1.28	Y	33.10	±	1.03	122.47	±	3.81	Y
	09/17/2003	1.45	±	0.34	5.37	±	1.24	Y	21.00	±	0.92	77.70	±	3.39	Y
	09/24/2003	2.12	±	0.39	7.84	±	1.45	Y	25.70	±	0.99	95.09	±	3.65	Y
ATOMIC CITY	07/02/2003	1.44	±	0.36	5.33	±	1.32	Y	27.90	±	0.99	103.23	±	3.65	Y
	07/09/2003	1.76	±	0.35	6.51	±	1.31	Y	28.00	±	1.02	103.60	±	3.77	Y
	07/16/2003	2.16	±	0.36	7.99	±	1.34	Y	27.70	±	0.97	102.49	±	3.59	Y
	07/23/2003	3.16	±	0.55	11.69	±	2.05	Y	42.20	±	1.49	156.14	±	5.51	Y
	07/30/2003	1.93	±	0.40	7.14	±	1.49	Y	31.90	±	1.15	118.03	±	4.26	Y
	08/06/2003	1.66	±	0.48	6.14	±	1.79	Y	27.80	±	1.27	102.86	±	4.70	Y
	08/13/2003	2.13	±	0.38	7.88	±	1.41	Y	32.20	±	1.09	119.14	±	4.03	Y
	08/20/2003	3.54	±	0.54	13.10	±	2.00	Y	40.20	±	1.36	148.74	±	5.03	Y
	08/27/2003	1.63	±	0.33	6.03	±	1.23	Y	26.80	±	0.95	99.16	±	3.53	Y
	09/03/2003	2.40	±	0.43	8.88	±	1.58	Y	34.30	±	1.11	126.91	±	4.11	Y
	09/10/2003	2.59	±	0.41	9.58	±	1.51	Y	37.00	±	1.14	136.90	±	4.22	Y
	09/17/2003	1.70	±	0.38	6.29	±	1.39	Y	19.60	±	0.96	72.52	±	3.53	Y
	09/24/2003	1.73	±	0.35	6.40	±	1.28	Y	27.90		0.95	103.23	±	3.53	Y
BLUE DOME	07/02/2003	1.55	±	0.33	5.74	±	1.23	Y	26.70	±	0.90	98.79	±	3.34	Y
	07/09/2003	1.75	±	0.31	6.48	±	1.15	Y	25.60	±	0.89	94.72	±	3.28	Y
	07/16/2003	1.58	±	0.31	5.85	±	1.15	Y	24.30	±	0.88	89.91	±	3.24	Y
	07/23/2003	1.97	±	0.50	7.29	±	1.86	Y	36.60	±	1.46	135.42	±	5.40	Y
	07/30/2003	2.19	±	0.43	8.10	±	1.59	Y	31.50	±	1.18	116.55	±	4.37	Y
	08/06/2003	1.56	±	0.41	5.77	±	1.51	Y	25.60	±	1.08	94.72	±	4.00	Y
	08/13/2003	2.80	±	0.43	10.36	±	1.57	Y	29.80	±	1.07	110.26	±	3.96	Y
	08/20/2003	3.95	±	0.51	14.62	±	1.90	Y	34.00	±	1.18	125.80	±	4.37	Y
	08/27/2003	1.77	±	0.36	6.55	±	1.31	Y	24.90	±	0.96	92.13	±	3.56	Y
	09/03/2003	1.66	±	0.39	6.14	±	1.42	Y	34.20	±	1.10	126.54	±	4.07	Y
	09/10/2003	1.57	±	0.36	5.81	±	1.33	Y	30.40	±	1.07	112.48	±	3.96	Y
	09/17/2003	0.92	±	0.28	3.40	±	1.04	Y	18.80	±	0.84	69.56	±	3.10	Y
	09/24/2003	2.15	±	0.39	7.96	±	1.42	Y	25.90		0.97	95.83	±	3.58	Y
FAA TOWER	7/2/2003[a]	-0.99	±	2.39	-3.65	±	8.84		20.90	±	4.79	77.33	±	17.72	Y
	07/09/2003	2.43	±	0.49	8.99	±	1.82	Y	27.70	±	1.26	102.49	±	4.66	Y
	7/16/2003[b]	6.88	±	3.66	25.46	±	13.54		37.70	±	7.24	139.49	±	26.79	Y
	07/23/2003	2.33	±	0.55	8.62	±	2.02	Y	39.90	±	1.55	147.63	±	5.74	Y
	07/30/2003	1.90	±	0.50	7.03	±	1.84	Y	35.60	±	1.44	131.72	±	5.33	Y
	08/06/2003	2.01	±	0.55	7.44	±	2.03	Y	39.70	±	1.55	146.89	±	5.74	Y
	08/13/2003	1.78	±	0.40	6.59	±	1.47	Y	31.00	±	1.17	114.70	±	4.33	Y
	08/20/2003	4.34	±	0.65	16.06	±	2.41	Y	39.20	±	1.50	145.04	±	5.55	Y
	08/27/2003	1.74	±	0.42	6.44	±	1.55	Y	26.70	±	1.15	98.79	±	4.26	Y
	09/03/2003	1.98	±	0.48	7.33	±	1.78	Y	37.50	±	1.32	138.75	±	4.88	Y
	09/10/2003	1.58	±	0.36	5.85	±	1.31	Y	27.50	±	1.03	101.75	±	3.81	Y
	09/17/2003	1.81	±	0.39	6.70	±	1.45	Y	20.20	±	0.99	74.74	±	3.66	Y
	09/24/2003	1.24	±	0.38	4.59	±	1.41	Y	28.20		1.11	104.34	±	4.11	Y

TABLE C-1: Weekly Gross Alpha and Gross Beta Concentrations in Air (cont.).

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	**Sampling Date**	**Result ± 1s Uncertainty x 10^{-15} µCi/mL**			**Result ± 1s Uncertainty x 10^{-11} Bq/mL**			**Result > 3s**	**Result ± 1s Uncertainty (x 10^{-15} µCi/mL)**			**Result ± 1s Uncertainty (x 10^{-11} Bq/mL)**			**Result > 3s**
HOWE	07/02/2003	1.93	±	0.37	7.14	±	1.35	Y	30.90	±	0.99	114.33	±	3.65	Y
	07/09/2003	1.36	±	0.34	5.03	±	1.24	Y	26.10	±	1.02	96.57	±	3.77	Y
	07/16/2003	1.87	±	0.33	6.92	±	1.21	Y	27.70	±	0.92	102.49	±	3.39	Y
	07/23/2003	3.31	±	0.62	12.25	±	2.29	Y	41.00	±	1.60	151.70	±	5.92	Y
	07/30/2003	3.15	±	0.44	11.66	±	1.63	Y	31.60	±	1.08	116.92	±	4.00	Y
	08/06/2003	2.52	±	0.55	9.32	±	2.02	Y	27.00	±	1.29	99.90	±	4.77	Y
	08/13/2003	2.73	±	0.41	10.10	±	1.51	Y	31.90	±	1.07	118.03	±	3.96	Y
	08/20/2003	4.31	±	0.58	15.95	±	2.13	Y	37.30	±	1.32	138.01	±	4.88	Y
	08/27/2003	2.60	±	0.45	9.62	±	1.65	Y	28.30	±	1.12	104.71	±	4.14	Y
	09/03/2003	2.20	±	0.42	8.14	±	1.56	Y	37.20	±	1.16	137.64	±	4.29	Y
	09/10/2003	2.82	±	0.42	10.43	±	1.55	Y	33.00	±	1.09	122.10	±	4.03	Y
	09/17/2003	1.22	±	0.31	4.51	±	1.15	Y	21.70	±	0.91	80.29	±	3.36	Y
	09/24/2003	2.02	±	0.38	7.47	±	1.40	Y	26.60		0.98	98.42	±	3.61	Y
	07/02/2003	2.15	±	0.38	7.96	±	1.42	Y	27.20	±	0.96	100.64	±	3.53	Y
MONTEVIEW	07/09/2003	2.18	±	0.37	8.07	±	1.37	Y	27.90	±	1.00	103.23	±	3.70	Y
	07/16/2003	2.12	±	0.35	7.84	±	1.30	Y	28.70	±	0.96	106.19	±	3.54	Y
	07/23/2003	4.21	±	0.67	15.58	±	2.47	Y	40.70	±	1.60	150.59	±	5.92	Y
	07/30/2003	2.78	±	0.46	10.29	±	1.70	Y	33.90	±	1.20	125.43	±	4.44	Y
	08/06/2003	1.09	±	0.46	4.03	±	1.69		29.20	±	1.31	108.04	±	4.85	Y
	08/13/2003	11.30	±	1.05	41.81	±	3.89	Y	33.60	±	1.66	124.32	±	6.14	Y
	08/20/2003	3.19	±	0.57	11.80	±	2.11	Y	38.50	±	1.44	142.45	±	5.33	Y
	08/27/2003	1.79	±	0.34	6.62	±	1.27	Y	29.00	±	0.98	107.30	±	3.63	Y
	09/03/2003	2.28	±	0.41	8.44	±	1.53	Y	36.00	±	1.11	133.20	±	4.11	Y
	09/10/2003	2.20	±	0.36	8.14	±	1.32	Y	35.40	±	1.04	130.98	±	3.85	Y
	09/17/2003	1.25	±	0.35	4.63	±	1.29	Y	21.50	±	0.99	79.55	±	3.65	Y
	09/24/2003	2.29	±	0.37	8.47	±	1.37	Y	29.90		0.97	110.63	±	3.58	Y
MUD LAKE	07/02/2003	1.50	±	0.37	5.55	±	1.38	Y	29.90	±	1.04	110.63	±	3.85	Y
	07/09/2003	2.40	±	0.39	8.88	±	1.45	Y	30.80	±	1.06	113.96	±	3.92	Y
	07/16/2003	1.79	±	0.34	6.62	±	1.27	Y	29.20	±	0.99	108.04	±	3.66	Y
	07/23/2003	3.41	±	0.57	12.62	±	2.11	Y	39.10	±	1.45	144.67	±	5.37	Y
	07/30/2003	3.06	±	0.48	11.32	±	1.79	Y	34.50	±	1.23	127.65	±	4.55	Y
	08/06/2003	1.73	±	0.53	6.40	±	1.96	Y	28.20	±	1.36	104.34	±	5.03	Y
	08/13/2003	2.63	±	0.43	9.73	±	1.60	Y	31.90	±	1.14	118.03	±	4.22	Y
	08/20/2003	3.35	±	0.55	12.40	±	2.03	Y	36.50	±	1.35	135.05	±	5.00	Y
	08/27/2003	1.74	±	0.37	6.44	±	1.37	Y	31.00	±	1.09	114.70	±	4.03	Y
	09/03/2003	2.60	±	0.46	9.62	±	1.69	Y	37.00	±	1.19	136.90	±	4.40	Y
	09/10/2003	1.76	±	0.39	6.51	±	1.45	Y	37.90	±	1.22	140.23	±	4.51	Y
	09/17/2003	0.92	±	0.32	3.39	±	1.18		20.40	±	0.96	75.48	±	3.54	Y
	09/24/2003	3.64	±	0.50	13.47	±	1.84	Y	33.80		1.16	125.06	±	4.29	Y
MUD LAKE (Q/A-2)	07/02/2003	2.23	±	0.40	8.25	±	1.47	Y	28.40	±	0.99	105.08	±	3.67	Y
	07/09/2003	2.03	±	0.35	7.51	±	1.30	Y	28.00	±	0.98	103.60	±	3.61	Y
	07/16/2003	2.42	±	0.37	8.95	±	1.37	Y	0.41	±	0.41	1.51	±	1.53	
	07/23/2003	2.40	±	0.51	8.88	±	1.88	Y	42.60	±	1.48	157.62	±	5.48	Y
	07/30/2003	3.12	±	0.67	11.54	±	2.46	Y	30.20	±	1.56	111.74	±	5.77	Y
	08/06/2003	1.95	±	0.42	7.22	±	1.56	Y	28.50	±	1.11	105.45	±	4.11	Y
	08/13/2003	2.59	±	0.43	9.58	±	1.61	Y	31.50	±	1.15	116.55	±	4.26	Y
	08/20/2003	4.75	±	0.60	17.58	±	2.21	Y	40.80	±	1.37	150.96	±	5.07	Y
	08/27/2003	2.83	±	0.43	10.47	±	1.58	Y	27.20	±	1.03	100.64	±	3.81	Y
	09/03/2003	2.43	±	0.44	8.99	±	1.62	Y	38.20	±	1.18	141.34	±	4.37	Y
	09/10/2003	2.70	±	0.48	9.99	±	1.76	Y	40.00	±	1.33	148.00	±	4.92	Y
	09/17/2003	1.41	±	0.37	5.22	±	1.36	Y	21.10	±	1.00	78.07	±	3.70	Y
	09/24/2003	2.06	±	0.41	7.62	±	1.51	Y	32.50		1.12	120.25	±	4.14	Y

TABLE C-1: Weekly Gross Alpha and Gross Beta Concentrations in Air (cont.).

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL			Result ± 1s Uncertainty x 10^{-11} Bq/mL			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
MUD LAKE AVERAGE	07/02/2003	1.87	±	0.38	6.90	±	1.42	Y	29.15	±	1.02	107.86	±	3.76	Y
	07/09/2003	2.22	±	0.37	8.20	±	1.37	Y	29.40	±	1.02	108.78	±	3.76	Y
	07/16/2003	2.11	±	0.36	7.79	±	1.32	Y	14.80	±	0.70	54.78	±	2.59	
	07/23/2003	2.91	±	0.54	10.75	±	1.99	Y	40.85	±	1.47	151.15	±	5.42	Y
	07/30/2003	3.09	±	0.58	11.43	±	2.13	Y	32.35	±	1.40	119.70	±	5.16	Y
	08/06/2003	1.84	±	0.48	6.81	±	1.76	Y	28.35	±	1.24	104.90	±	4.57	Y
	08/13/2003	2.61	±	0.43	9.66	±	1.60	Y	31.70	±	1.15	117.29	±	4.24	Y
	08/20/2003	4.05	±	0.57	14.99	±	2.12	Y	38.65	±	1.36	143.01	±	5.03	Y
	08/27/2003	2.29	±	0.40	8.45	±	1.47	Y	29.10	±	1.06	107.67	±	3.92	Y
	09/03/2003	2.52	±	0.45	9.31	±	1.65	Y	37.60	±	1.19	139.12	±	4.38	Y
	09/10/2003	2.23	±	0.43	8.25	±	1.61	Y	38.95	±	1.28	144.12	±	4.72	Y
	09/17/2003	1.16	±	0.34	4.30	±	1.27	Y	20.75	±	0.98	76.78	±	3.62	Y
	09/24/2003	2.85	±	0.45	10.55	±	1.68	Y	33.15		1.14	122.66	±	4.22	Y
DISTANT															
BLACKFOOT CMS	07/02/2003	1.83	±	0.40	6.77	±	1.47	Y	26.90	±	1.01	99.53	±	3.74	Y
	07/09/2003	2.02	±	0.37	7.47	±	1.36	Y	28.30	±	1.02	104.71	±	3.77	Y
	07/16/2003	1.95	±	0.37	7.22	±	1.38	Y	28.40	±	1.03	105.08	±	3.81	Y
	07/23/2003	2.79	±	0.43	10.32	±	1.59	Y	41.20	±	1.22	152.44	±	4.51	Y
	07/30/2003	1.87	±	0.38	6.92	±	1.41	Y	33.10	±	1.12	122.47	±	4.14	Y
	08/06/2003	1.11	±	0.35	4.11	±	1.28	Y	28.90	±	1.05	106.93	±	3.89	Y
	08/13/2003	2.28	±	0.41	8.44	±	1.53	Y	30.50	±	1.12	112.85	±	4.14	Y
	08/20/2003	3.01	±	0.46	11.14	±	1.69	Y	41.60	±	1.24	153.92	±	4.59	Y
	08/27/2003	2.21	±	0.39	8.18	±	1.44	Y	27.00	±	1.01	99.90	±	3.74	Y
	09/03/2003	2.02	±	0.39	7.47	±	1.43	Y	38.30	±	1.11	141.71	±	4.11	Y
	09/10/2003	2.76	±	0.42	10.21	±	1.57	Y	33.60	±	1.11	124.32	±	4.11	Y
	09/17/2003	1.15	±	0.30	4.26	±	1.11	Y	20.60	±	0.87	76.22	±	3.23	Y
	09/24/2003	1.98	±	0.38	7.33	±	1.41	Y	27.60		1.00	102.12	±	3.70	Y
BLACKFOOT NOAA (Q/A-1)	07/02/2003	1.72	±	0.46	6.36	±	1.71	Y	26.10	±	1.15	96.57	±	4.26	Y
	07/09/2003	1.84	±	0.43	6.81	±	1.58	Y	29.30	±	1.22	108.41	±	4.51	Y
	07/16/2003	1.52	±	0.37	5.62	±	1.36	Y	29.20	±	1.09	108.04	±	4.03	Y
	07/23/2003	3.93	±	0.63	14.54	±	2.35	Y	42.70	±	1.59	157.99	±	5.88	Y
	07/30/2003	1.84	±	0.51	6.81	±	1.87	Y	34.90		1.41	129.13	±	5.22	Y
	08/06/2003	1.84	±	0.51	6.81	±	1.87	Y	32.40	±	1.36	119.88	±	5.03	Y
	08/13/2003	2.64	±	0.47	9.77	±	1.74	Y	30.20	±	1.21	111.74	±	4.48	Y
	08/20/2003	2.56	±	0.58	9.47	±	2.13	Y	39.20	±	1.55	145.04	±	5.74	Y
	08/27/2003	2.29	±	0.44	8.47	±	1.62	Y	27.10	±	1.12	100.27	±	4.14	Y
	09/03/2003	2.45	±	0.47	9.07	±	1.72	Y	38.80	±	1.25	143.56	±	4.63	Y
	09/10/2003	1.71	±	0.40	6.33	±	1.49	Y	36.40	±	1.24	134.68	±	4.59	Y
	09/17/2003	2.10	±	0.48	7.77	±	1.77	Y	18.50	±	1.12	68.45	±	4.14	Y
	09/24/2003	2.05	±	0.46	7.59	±	1.70	Y	30.30	±	1.21	112.11	±	4.48	Y
BLACKFOOT AVERAGE	07/02/2003	1.78	±	0.43	6.57	±	1.59	Y	26.50	±	1.08	98.05	±	4.00	Y
	07/09/2003	1.93	±	0.40	7.14	±	1.47	Y	28.80	±	1.12	106.56	±	4.14	Y
	07/16/2003	1.74	±	0.37	6.42	±	1.37	Y	28.80	±	1.06	106.56	±	3.92	Y
	07/23/2003	3.36	±	0.53	12.43	±	1.97	Y	41.95	±	1.41	155.22	±	5.20	Y
	07/30/2003	1.87	±	0.38	6.92	±	1.41		34.00	±	1.27	125.80	±	4.68	Y
	08/06/2003	1.48	±	0.43	5.46	±	1.58	Y	30.65	±	1.21	113.41	±	4.46	Y
	08/13/2003	2.46	±	0.44	9.10	±	1.64	Y	30.35	±	1.17	112.30	±	4.31	Y
	08/20/2003	2.79	±	0.52	10.30	±	1.91	Y	40.40	±	1.40	149.48	±	5.16	Y
	08/27/2003	2.25	±	0.41	8.33	±	1.53	Y	27.05	±	1.07	100.09	±	3.94	Y
	09/03/2003	2.24	±	0.43	8.27	±	1.58	Y	38.55	±	1.18	142.64	±	4.37	Y
	09/10/2003	2.24	±	0.41	8.27	±	1.53	Y	35.00	±	1.18	129.50	±	4.35	Y
	09/17/2003	1.63	±	0.39	6.01	±	1.44	Y	19.55	±	1.00	72.34	±	3.69	Y
	09/24/2003	2.02	±	0.42	7.46	±	1.56	Y	28.95		1.11	107.12	±	4.09	Y

TABLE C-1: Weekly Gross Alpha and Gross Beta Concentrations in Air (cont.).

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^-15 µCi/mL			Result ± 1s Uncertainty x 10^-11 Bq/mL			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^-15 µCi/mL)			Result ± 1s Uncertainty (x 10^-11 Bq/mL)			Result > 3s
CRATERS	07/02/2003	1.65	±	0.51	6.11	±	1.90	Y	27.10	±	1.28	100.27	±	4.74	Y
	07/09/2003	2.05	±	0.42	7.59	±	1.56	Y	26.60	±	1.13	98.42	±	4.18	Y
	07/16/2003	1.23	±	0.37	4.55	±	1.37	Y	28.10	±	1.13	103.97	±	4.18	Y
	07/23/2003	3.07	±	0.59	11.36	±	2.18	Y	42.10	±	1.58	155.77	±	5.85	Y
	07/30/2003	1.75	±	0.54	6.48	±	2.00	Y	33.80	±	1.54	125.06	±	5.70	Y
	08/06/2003	1.92	±	0.55	7.10	±	2.05	Y	28.20	±	1.39	104.34	±	5.14	Y
	08/13/2003	2.31	±	0.50	8.55	±	1.86	Y	31.70	±	1.36	117.29	±	5.03	Y
	08/20/2003	3.84	±	0.57	14.21	±	2.09	Y	35.80	±	1.33	132.46	±	4.92	Y
	8/27/2003[c]	-5.10	±	-2.69	-18.87	±	-9.95	Y	-82.50	±	-6.80	-305.25	±	-25.16	
	09/03/2003	1.25	±	0.41	4.63	±	1.50	Y	35.40	±	1.22	130.98	±	4.51	Y
	09/10/2003	2.99	±	0.47	11.06	±	1.75	Y	30.70	±	1.16	113.59	±	4.29	Y
	09/17/2003	1.56	±	0.35	5.77	±	1.31	Y	18.40	±	0.90	68.08	±	3.34	Y
	09/24/2003	0.75	±	0.37	2.77	±	1.37		26.20		1.14	96.94	±	4.22	Y
DUBOIS	07/02/2003	2.46	±	0.42	9.10	±	1.56	Y	28.40	±	1.02	105.08	±	3.77	Y
	07/09/2003	1.42	±	0.38	5.25	±	1.41	Y	27.00	±	1.13	99.90	±	4.18	Y
	07/16/2003	2.21	±	0.37	8.18	±	1.37	Y	28.70	±	1.00	106.19	±	3.68	Y
	7/23/2003[d]	5.98	±	1.67	22.13	±	6.18	Y	37.20	±	3.41	137.64	±	12.62	Y
	07/30/2003	1.94	±	0.54	7.18	±	2.00	Y	36.10	±	1.54	133.57	±	5.70	Y
	08/06/2003	1.50	±	0.56	5.55	±	2.07		29.00	±	1.47	107.30	±	5.44	Y
	08/13/2003	2.30	±	0.39	8.51	±	1.44	Y	32.50	±	1.08	120.25	±	4.00	Y
	08/20/2003	4.77	±	0.72	17.65	±	2.65	Y	37.90	±	1.58	140.23	±	5.85	Y
	08/27/2003	2.25	±	0.43	8.33	±	1.60	Y	31.10	±	1.17	115.07	±	4.33	Y
	09/03/2003	2.83	±	0.50	10.47	±	1.86	Y	37.20	±	1.26	137.64	±	4.66	Y
	09/10/2003	2.62	±	0.46	9.69	±	1.71	Y	41.10	±	1.32	152.07	±	4.88	Y
	09/17/2003	0.76	±	0.30	2.81	±	1.11		16.40	±	0.88	60.68	±	3.24	Y
	09/24/2003	2.06	±	0.37	7.62	±	1.38	Y	25.10		0.94	92.87	±	3.49	Y
IDAHO FALLS	07/02/2003	2.53	±	0.53	9.36	±	1.98	Y	28.90	±	1.25	106.93	±	4.63	Y
	07/09/2003	2.32	±	0.43	8.58	±	1.59	Y	27.70	±	1.13	102.49	±	4.18	Y
	07/16/2003	2.58	±	0.43	9.55	±	1.57	Y	30.90	±	1.11	114.33	±	4.11	Y
	07/23/2003	3.23	±	0.57	11.95	±	2.12	Y	44.60	±	1.56	165.02	±	5.77	Y
	07/30/2003	2.83	±	0.51	10.47	±	1.87	Y	33.00	±	1.29	122.10	±	4.77	Y
	08/06/2003	2.07	±	0.50	7.66	±	1.84	Y	27.60	±	1.25	102.12	±	4.63	Y
	08/13/2003	3.10	±	0.47	11.47	±	1.73	Y	33.40	±	1.19	123.58	±	4.40	Y
	08/20/2003	3.93	±	0.58	14.54	±	2.15	Y	38.10	±	1.38	140.97	±	5.11	Y
	08/27/2003	2.61	±	0.47	9.66	±	1.72	Y	29.50	±	1.18	109.15	±	4.37	Y
	09/03/2003	3.06	±	0.47	11.32	±	1.73	Y	37.00	±	1.16	136.90	±	4.29	Y
	09/10/2003	2.35	±	0.41	8.70	±	1.50	Y	34.50	±	1.13	127.65	±	4.18	Y
	09/17/2003	1.46	±	0.35	5.40	±	1.30	Y	18.50	±	0.92	68.45	±	3.39	Y
	09/24/2003	1.33	±	0.36	4.92	±	1.33	Y	26.80		1.03	99.16	±	3.81	Y
JACKSON	07/02/2003	1.36	±	0.34	5.03	±	1.27	Y	27.00	±	0.96	99.90	±	3.54	Y
	07/09/2003	2.09	±	0.36	7.73	±	1.32	Y	29.80	±	1.00	110.26	±	3.70	Y
	07/16/2003	2.75	±	0.40	10.18	±	1.47	Y	28.00	±	0.98	103.60	±	3.63	Y
	07/23/2003	2.71	±	0.41	10.03	±	1.50	Y	38.00	±	1.13	140.60	±	4.18	Y
	07/30/2003	2.09	±	0.36	7.73	±	1.34	Y	35.10	±	1.06	129.87	±	3.92	Y
	08/06/2003	1.68	±	0.39	6.22	±	1.46	Y	24.80	±	1.02	91.76	±	3.77	Y
	08/13/2003	3.27	±	0.45	12.10	±	1.65	Y	31.00	±	1.08	114.70	±	4.00	Y
	08/20/2003	4.02	±	0.51	14.87	±	1.88	Y	41.20	±	1.25	152.44	±	4.63	Y
	08/27/2003	2.51	±	0.42	9.29	±	1.57	Y	27.50	±	1.06	101.75	±	3.92	Y
	09/03/2003	1.23	±	0.46	4.55	±	1.71		28.00	±	1.23	103.60	±	4.55	Y
	09/10/2003	2.29	±	0.41	8.47	±	1.51	Y	37.10	±	1.18	137.27	±	4.37	Y
	09/17/2003	1.19	±	0.31	4.40	±	1.16	Y	19.20	±	0.88	71.04	±	3.24	Y
	09/24/2003	1.59	±	0.36	5.88	±	1.34	Y	28.70		1.02	106.19	±	3.77	Y

TABLE C-1: Weekly Gross Alpha and Gross Beta Concentrations in Air (cont.).

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	**Sampling Date**	**Result ± 1s Uncertainty x 10^{-15} µCi/mL**			**Result ± 1s Uncertainty x 10^{-11} Bq/mL**			**Result > 3s**	**Result ± 1s Uncertainty (x 10^{-15} µCi/mL)**			**Result ± 1s Uncertainty (x 10^{-11} Bq/mL)**			**Result > 3s**
REXBURG CMS	07/02/2003	1.76	±	0.41	6.51	±	1.50	Y	28.70	±	1.07	106.19	±	3.96	Y
	07/09/2003	1.83	±	0.34	6.77	±	1.27	Y	28.50	±	0.99	105.45	±	3.68	Y
	07/16/2003	2.32	±	0.38	8.58	±	1.41	Y	31.80	±	1.04	117.66	±	3.85	Y
	07/23/2003	3.68	±	0.61	13.62	±	2.24	Y	44.00	±	1.57	162.80	±	5.81	Y
	07/30/2003	2.49	±	0.48	9.21	±	1.79	Y	36.00	±	1.32	133.20	±	4.88	Y
	08/06/2003	1.88	±	0.50	6.96	±	1.85	Y	30.00	±	1.31	111.00	±	4.85	Y
	08/13/2003	1.61	±	0.43	5.96	±	1.59	Y	32.70	±	1.30	120.99	±	4.81	Y
	08/20/2003	4.73	±	0.60	17.50	±	2.23	Y	38.40	±	1.35	142.08	±	5.00	Y
	08/27/2003	2.31	±	0.41	8.55	±	1.50	Y	27.40	±	1.05	101.38	±	3.89	Y
	09/03/2003	3.12	±	0.51	11.54	±	1.88	Y	39.00	±	1.27	144.30	±	4.70	Y
	09/10/2003	3.23	±	0.50	11.95	±	1.86	Y	38.90	±	1.32	143.93	±	4.88	Y
	09/17/2003	1.63	±	0.34	6.03	±	1.27	Y	18.50	±	0.87	68.45	±	3.22	Y
	09/24/2003	2.64	±	0.50	9.77	±	1.85	Y	34.50		1.28	127.65	±	4.74	Y
INEEL															
EFS	07/02/2003	2.28	±	0.42	8.44	±	1.55	Y	30.50	±	1.06	112.85	±	3.92	Y
	07/09/2003	2.07	±	0.39	7.66	±	1.45	Y	27.90	±	1.08	103.23	±	4.00	Y
	07/16/2003	1.99	±	0.37	7.36	±	1.38	Y	28.60	±	1.03	105.82	±	3.81	Y
	07/23/2003	2.65	±	0.53	9.81	±	1.95	Y	41.40	±	1.48	153.18	±	5.48	Y
	07/30/2003	2.42	±	0.56	8.95	±	2.06	Y	36.50	±	1.52	135.05	±	5.62	Y
	08/06/2003	2.18	±	0.47	8.07	±	1.75	Y	28.40	±	1.19	105.08	±	4.40	Y
	08/13/2003	3.55	±	0.54	13.14	±	2.01	Y	33.40	±	1.31	123.58	±	4.85	Y
	08/20/2003	3.19	±	0.54	11.80	±	2.01	Y	36.70	±	1.36	135.79	±	5.03	Y
	08/27/2003	2.38	±	0.48	8.81	±	1.76	Y	30.60	±	1.25	113.22	±	4.63	Y
	09/03/2003	1.93	±	0.41	7.14	±	1.53	Y	37.60	±	1.17	139.12	±	4.33	Y
	09/10/2003	2.86	±	0.51	10.58	±	1.89	Y	35.10	±	1.33	129.87	±	4.92	Y
	09/17/2003	1.51	±	0.33	5.59	±	1.21	Y	19.00	±	0.86	70.30	±	3.17	Y
	09/24/2003	1.42	±	0.41	5.25	±	1.53	Y	30.00		1.19	111.00	±	4.40	Y
MAIN GATE	07/02/2003	1.93	±	0.40	7.14	±	1.47	Y	26.40	±	1.00	97.68	±	3.69	Y
	07/09/2003	1.76	±	0.38	6.51	±	1.42	Y	29.40	±	1.12	108.78	±	4.14	Y
	07/16/2003	1.65	±	0.36	6.11	±	1.32	Y	28.90	±	1.04	106.93	±	3.85	Y
	07/23/2003	2.61	±	0.55	9.66	±	2.05	Y	42.60	±	1.57	157.62	±	5.81	Y
	07/30/2003	2.44	±	0.52	9.03	±	1.93	Y	33.90	±	1.39	125.43	±	5.14	Y
	08/06/2003	1.66	±	0.50	6.14	±	1.84	Y	28.30	±	1.31	104.71	±	4.85	Y
	08/13/2003	3.20	±	0.51	11.84	±	1.88	Y	35.60	±	1.30	131.72	±	4.81	Y
	08/20/2003	3.40	±	0.52	12.58	±	1.91	Y	35.00	±	1.25	129.50	±	4.63	Y
	08/27/2003	2.15	±	0.39	7.96	±	1.43	Y	29.40	±	1.05	108.78	±	3.89	Y
	09/03/2003	2.32	±	0.43	8.58	±	1.61	Y	38.70	±	1.19	143.19	±	4.40	Y
	09/10/2003	2.59	±	0.44	9.58	±	1.64	Y	35.00	±	1.20	129.50	±	4.44	Y
	09/17/2003	1.20	±	0.33	4.44	±	1.22	Y	23.00	±	0.98	85.10	±	3.61	Y
	09/24/2003	1.31	±	0.37	4.85	±	1.37	Y	30.60		1.11	113.22	±	4.11	Y
VAN BUREN GATE	07/02/2003	1.98	±	0.42	7.33	±	1.55	Y	31.30	±	1.11	115.81	±	4.11	Y
	07/09/2003	2.20	±	0.39	8.14	±	1.44	Y	26.20	±	1.02	96.94	±	3.77	Y
	07/16/2003	1.70	±	0.32	6.29	±	1.20	Y	29.40	±	0.96	108.78	±	3.54	Y
	07/23/2003	3.33	±	0.57	12.32	±	2.12	Y	41.50	±	1.50	153.55	±	5.55	Y
	07/30/2003	2.07	±	0.47	7.66	±	1.75	Y	34.20	±	1.33	126.54	±	4.92	Y
	08/06/2003	1.16	±	0.45	4.29	±	1.67		29.50	±	1.29	109.15	±	4.77	Y
	08/13/2003	3.23	±	0.51	11.95	±	1.88	Y	32.40	±	1.25	119.88	±	4.63	Y
	08/20/2003	3.01	±	0.53	11.14	±	1.97	Y	37.80	±	1.37	139.86	±	5.07	Y
	08/27/2003	2.96	±	0.47	10.95	±	1.74	Y	29.40	±	1.14	108.78	±	4.22	Y
	09/03/2003	2.00	±	0.46	7.40	±	1.69	Y	37.80	±	1.27	139.86	±	4.70	Y
	09/10/2003	2.41	±	0.41	8.92	±	1.52	Y	36.90	±	1.17	136.53	±	4.33	Y
	09/17/2003	1.48	±	0.41	5.48	±	1.51	Y	20.60	±	1.09	76.22	±	4.03	Y
	09/24/2003	1.91	±	0.48	7.07	±	1.78	Y	31.00	±	1.29	114.70	±	4.77	Y

Red text denotes invalid sample: a 07/02/2003 FAA Tower invalid due to tripped breaker.
b 07/16/2003 FAA Tower invalid due to equipment failure.
c 08/27/2003 Craters invalid due to equipment failure.
d 07/23/2003 Dubois invalid due to equipment failure.

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

Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s?
BOUNDARY								
ARCO	07/02/2003	-0.91	±	2.90	-0.34	±	1.07	
	07/09/2003	6.15	±	2.12	2.28	±	0.78	
	07/16/2003	5.08	±	2.45	1.88	±	0.91	
	07/23/2003	4.63	±	3.72	1.71	±	1.38	
	07/30/2003	-6.55	±	3.45	-2.42	±	1.28	
	08/06/2003	-1.35	±	2.38	-0.50	±	0.88	
	08/13/2003	-0.79	±	2.70	-0.29	±	1.00	
	08/20/2003	1.96	±	1.95	0.72	±	0.72	
	08/27/2003	2.12	±	2.45	0.79	±	0.91	
	09/03/2003	5.07	±	2.89	1.88	±	1.07	
	09/10/2003	1.22	±	1.50	0.45	±	0.56	
	09/17/2003	2.57	±	1.72	0.95	±	0.63	
	09/24/2003	1.58	±	2.83	0.58	±	1.05	
ATOMIC CITY	07/02/2003	-0.91	±	2.89	-0.34	±	1.07	
	07/09/2003	4.92	±	1.69	1.82	±	0.63	
	07/16/2003	5.31	±	2.56	1.96	±	0.95	
	07/23/2003	4.76	±	3.82	1.76	±	1.41	
	07/30/2003	-5.85	±	3.08	-2.17	±	1.14	
	08/06/2003	-1.46	±	2.57	-0.54	±	0.95	
	08/13/2003	-0.77	±	2.63	-0.29	±	0.97	
	08/20/2003	2.17	±	2.15	0.80	±	0.80	
	08/27/2003	2.02	±	2.33	0.75	±	0.86	
	09/03/2003	5.23	±	2.98	1.93	±	1.10	
	09/10/2003	1.33	±	1.64	0.49	±	0.61	
	09/17/2003	2.86	±	1.91	1.06	±	0.71	
	09/24/2003	1.41	±	2.53	0.52	±	0.94	
BLUE DOME	07/02/2003	1.34	±	1.65	0.50	±	0.61	
	07/09/2003	0.42	±	2.07	0.16	±	0.77	
	07/16/2003	1.77	±	1.44	0.65	±	0.53	
	07/23/2003	-2.61	±	2.35	-0.96	±	0.87	
	07/30/2003	2.05	±	1.99	0.76	±	0.74	
	08/06/2003	-2.27	±	3.20	-0.84	±	1.18	
	08/13/2003	2.04	±	1.65	0.76	±	0.61	
	08/20/2003	3.09	±	2.99	1.14	±	1.11	
	08/27/2003	0.54	±	1.47	0.20	±	0.54	
	09/03/2003	3.33	±	1.79	1.23	±	0.66	
	09/10/2003	0.33	±	2.40	0.12	±	0.89	
	09/17/2003	1.21	±	2.27	0.45	±	0.84	
	09/24/2003	3.26	±	1.76	1.21	±	0.65	

TABLE C-2: Weekly Iodine-131 Activity in Air (cont.)

Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s?
FAA TOWER	07/02/2003	15.28	±	18.74	5.65	±	6.94	
	07/09/2003	0.73	±	3.55	0.27	±	1.31	
	07/16/2003	29.93	±	24.36	11.08	±	9.01	
	07/23/2003	-2.74	±	2.47	-1.01	±	0.91	
	07/30/2003	2.65	±	2.57	0.98	±	0.95	
	08/06/2003	-3.07	±	4.34	-1.14	±	1.61	
	08/13/2003	2.30	±	1.86	0.85	±	0.69	
	08/20/2003	4.24	±	4.11	1.57	±	1.52	
	08/27/2003	0.70	±	1.88	0.26	±	0.70	
	09/03/2003	4.28	±	2.29	1.58	±	0.85	
	09/10/2003	0.40	±	2.90	0.15	±	1.07	
	09/17/2003	1.51	±	2.82	0.56	±	1.05	
	09/24/2003	3.91	±	2.12	1.45	±	0.78	
HOWE	07/02/2003	1.41	±	1.73	0.52	±	0.64	
	07/09/2003	0.53	±	2.58	0.20	±	0.95	
	07/16/2003	1.73	±	1.41	0.64	±	0.52	
	07/23/2003	-2.83	±	2.55	-1.05	±	0.94	
	07/30/2003	1.76	±	1.71	0.65	±	0.63	
	08/06/2003	-2.88	±	4.07	-1.07	±	1.51	
	08/13/2003	1.93	±	1.56	0.71	±	0.58	
	08/20/2003	3.52	±	3.42	1.30	±	1.26	
	08/27/2003	0.64	±	1.73	0.24	±	0.64	
	09/03/2003	3.41	±	1.83	1.26	±	0.68	
	09/10/2003	0.32	±	2.31	0.12	±	0.86	
	09/17/2003	1.26	±	2.36	0.47	±	0.87	
	09/24/2003	3.25	±	1.76	1.20	±	0.65	
MONTEVIEW	07/02/2003	1.46	±	1.79	0.54	±	0.66	
	07/09/2003	0.49	±	2.40	0.18	±	0.89	
	07/16/2003	1.82	±	1.48	0.67	±	0.55	
	07/23/2003	-2.83	±	2.55	-1.05	±	0.94	
	07/30/2003	2.02	±	1.96	0.75	±	0.73	
	08/06/2003	-2.86	±	4.05	-1.06	±	1.50	
	08/13/2003	3.80	±	3.07	1.40	±	1.14	
	08/20/2003	4.03	±	3.90	1.49	±	1.44	
	08/27/2003	0.51	±	1.37	0.19	±	0.51	
	09/03/2003	3.28	±	1.76	1.22	±	0.65	
	09/10/2003	0.28	±	2.02	0.10	±	0.75	
	09/17/2003	1.45	±	2.72	0.54	±	1.01	

TABLE C-2: Weekly Iodine-131 Activity in Air (cont.)

Location	Sampling Date	Result ± 1s Uncertainty (x 10^-15 µCi/mL)			Result ± 1s Uncertainty (x 10^-10 Bq/mL)			Result > 3s?
MUD LAKE	07/02/2003	1.58	±	1.94	0.59	±	0.72	
	07/09/2003	0.51	±	2.48	0.19	±	0.92	
	07/16/2003	1.90	±	1.55	0.70	±	0.57	
	07/23/2003	-2.48	±	2.23	-0.92	±	0.83	
	07/30/2003	2.08	±	2.02	0.77	±	0.75	
	08/06/2003	-3.09	±	4.37	-1.14	±	1.62	
	08/13/2003	2.16	±	1.75	0.80	±	0.65	
	08/20/2003	3.73	±	3.62	1.38	±	1.34	
	08/27/2003	0.58	±	1.55	0.21	±	0.57	
	09/03/2003	3.59	±	1.92	1.33	±	0.71	
	09/10/2003	0.35	±	2.56	0.13	±	0.95	
	09/17/2003	1.43	±	2.67	0.53	±	0.99	
	09/24/2003	3.69	±	1.99	1.37	±	0.74	
MUD LAKE (Q/A-2)	07/02/2003	-0.91	±	2.88	-0.34	±	1.07	
	07/09/2003	4.53	±	1.56	1.68	±	0.58	
	07/16/2003	5.44	±	2.63	2.01	±	0.97	
	07/23/2003	4.70	±	3.78	1.74	±	1.40	
	07/30/2003	-10.04	±	5.29	-3.72	±	1.96	
	08/06/2003	-1.15	±	2.03	-0.43	±	0.75	
	08/13/2003	-0.85	±	2.92	-0.32	±	1.08	
	08/20/2003	2.16	±	2.15	0.80	±	0.79	
	08/27/2003	2.26	±	2.61	0.84	±	0.97	
	09/03/2003	5.35	±	3.06	1.98	±	1.13	
	09/10/2003	1.65	±	2.04	0.61	±	0.75	
	09/17/2003	2.97	±	1.98	1.10	±	0.73	
	09/24/2003	1.67	±	3.00	0.62	±	1.11	
MUD LAKE AVERAGE	07/02/2003	0.34	±	2.41	0.12	±	0.89	
	07/09/2003	2.52	±	2.02	0.93	±	0.75	
	07/16/2003	3.67	±	2.09	1.36	±	0.77	
	07/23/2003	1.11	±	3.00	0.41	±	1.11	
	07/30/2003	-3.98	±	3.65	-1.47	±	1.35	
	08/06/2003	-2.12	±	3.20	-0.78	±	1.18	
	08/13/2003	0.65	±	2.33	0.24	±	0.86	
	08/20/2003	2.95	±	2.88	1.09	±	1.07	
	08/27/2003	1.42	±	2.08	0.52	±	0.77	
	09/03/2003	4.47	±	2.49	1.65	±	0.92	
	09/10/2003	1.00	±	2.30	0.37	±	0.85	
	09/17/2003	2.20	±	2.33	0.81	±	0.86	
	09/24/2003	2.68	±	2.50	0.99	±	0.92	

TABLE C-2: Weekly Iodine-131 Activity in Air (cont.)

Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s?
DISTANT					0.00		0.00	
BLACKFOOT CMS	07/02/2003	-0.98	±	3.10	-0.36	±	1.15	
	07/09/2003	4.86	±	1.67	1.80	±	0.62	
	07/16/2003	5.82	±	2.81	2.15	±	1.04	
	07/23/2003	3.43	±	2.75	1.27	±	1.02	
	07/30/2003	-5.47	±	2.88	-2.02	±	1.07	
	08/06/2003	-1.05	±	1.85	-0.39	±	0.68	
	08/13/2003	-0.84	±	2.89	-0.31	±	1.07	
	08/20/2003	1.80	±	1.79	0.67	±	0.66	
	08/27/2003	2.22	±	2.56	0.82	±	0.95	
	09/03/2003	4.81	±	2.74	1.78	±	1.01	
	09/10/2003	1.37	±	1.70	0.51	±	0.63	
	09/17/2003	2.41	±	1.61	0.89	±	0.59	
	09/24/2003	1.55	±	2.79	0.57	±	1.03	
BLACKFOOT NOAA (Q/A-1)	07/02/2003	-1.22	±	3.89	-0.45	±	1.44	
	07/09/2003	6.39	±	2.20	2.36	±	0.81	
	07/16/2003	6.32	±	3.05	2.34	±	1.13	
	07/23/2003	5.26	±	4.22	1.95	±	1.56	
	07/30/2003	-7.75	±	4.09	-2.87	±	1.51	
	08/06/2003	-1.49	±	2.64	-0.55	±	0.98	
	08/13/2003	-0.96	±	3.29	-0.36	±	1.22	
	08/20/2003	2.74	±	2.72	1.01	±	1.01	
	08/27/2003	2.61	±	3.01	0.97	±	1.12	
	09/03/2003	5.86	±	3.35	2.17	±	1.24	
	09/10/2003	1.57	±	1.94	0.58	±	0.72	
	09/17/2003	3.73	±	2.49	1.38	±	0.92	
	09/24/2003	1.99	±	3.57	0.74	±	1.32	
BLACKFOOT AVERAGE	07/02/2003	-1.10	±	3.50	-0.41	±	1.29	
	07/09/2003	5.62	±	1.94	2.08	±	0.72	
	07/16/2003	6.07	±	2.93	2.25	±	1.09	
	07/23/2003	4.35	±	3.49	1.61	±	1.29	
	07/30/2003	-6.61	±	3.48	-2.45	±	1.29	
	08/06/2003	-1.27	±	2.24	-0.47	±	0.83	
	08/13/2003	-0.90	±	3.09	-0.33	±	1.14	
	08/20/2003	2.27	±	2.26	0.84	±	0.83	
	08/27/2003	2.41	±	2.79	0.89	±	1.03	
	09/03/2003	5.33	±	3.04	1.97	±	1.13	
	09/10/2003	1.47	±	1.82	0.54	±	0.67	
	09/17/2003	3.07	±	2.05	1.14	±	0.76	
	09/24/2003	1.77	±	3.18	0.66	±	1.18	

TABLE C-2: Weekly Iodine-131 Activity in Air (cont.)

Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s?
CRATERS	07/02/2003	-1.43	±	4.53	-0.53	±	1.68	
	07/09/2003	6.00	±	2.07	2.22	±	0.76	
	07/16/2003	6.88	±	3.32	2.55	±	1.23	
	07/23/2003	5.27	±	4.23	1.95	±	1.57	
	07/30/2003	-9.21	±	4.85	-3.41	±	1.80	
	08/06/2003	-1.67	±	2.94	-0.62	±	1.09	
	08/13/2003	-1.13	±	3.85	-0.42	±	1.43	
	08/20/2003	2.25	±	2.23	0.83	±	0.83	
	08/27/2003	-22.79	±	-26.33	-8.43	±	-9.74	
	09/03/2003	6.03	±	3.44	2.23	±	1.27	
	09/10/2003	1.57	±	1.95	0.58	±	0.72	
	09/17/2003	2.71	±	1.81	1.00	±	0.67	
	09/24/2003	1.98	±	3.56	0.73	±	1.32	
DUBOIS	07/02/2003	1.58	±	1.94	0.58	±	0.72	
	07/09/2003	0.62	±	3.03	0.23	±	1.12	
	07/16/2003	1.95	±	1.58	0.72	±	0.59	
	07/23/2003	-9.27	±	8.35	-3.43	±	3.09	
	07/30/2003	2.96	±	2.87	1.10	±	1.06	
	08/06/2003	-3.43	±	4.85	-1.27	±	1.79	
	08/13/2003	1.95	±	1.58	0.72	±	0.58	
	08/20/2003	4.69	±	4.54	1.73	±	1.68	
	08/27/2003	0.65	±	1.75	0.24	±	0.65	
	09/03/2003	3.98	±	2.13	1.47	±	0.79	
	09/10/2003	0.38	±	2.74	0.14	±	1.01	
	09/17/2003	1.41	±	2.64	0.52	±	0.98	
	09/24/2003	3.18	±	1.72	1.18	±	0.64	
CRATERS	07/02/2003	2.19	±	2.69	0.81	±	0.99	
	07/09/2003	0.60	±	2.95	0.22	±	1.09	
	07/16/2003	2.22	±	1.81	0.82	±	0.67	
	07/23/2003	-2.55	±	2.30	-0.94	±	0.85	
	07/30/2003	2.31	±	2.24	0.86	±	0.83	
	08/06/2003	-2.71	±	3.83	-1.00	±	1.42	
	08/13/2003	2.24	±	1.81	0.83	±	0.67	
	08/20/2003	3.76	±	3.65	1.39	±	1.35	
	08/27/2003	0.68	±	1.84	0.25	±	0.68	
	09/03/2003	3.45	±	1.85	1.28	±	0.68	
	09/10/2003	0.33	±	2.40	0.12	±	0.89	
	09/17/2003	1.41	±	2.63	0.52	±	0.97	
	09/24/2003	3.55	±	1.92	1.31	±	0.71	

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

Location	Sampling Date	Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-10}$ Bq/mL)			Result > 3s?
JACKSON	07/02/2003	-0.88	±	2.81	-0.33	±	1.04	
	07/09/2003	4.54	±	1.56	1.68	±	0.58	
	07/16/2003	5.36	±	2.59	1.98	±	0.96	
	07/23/2003	3.18	±	2.55	1.18	±	0.94	
	07/30/2003	-4.77	±	2.51	-1.76	±	0.93	
	08/06/2003	-1.11	±	1.96	-0.41	±	0.72	
	08/13/2003	-0.78	±	2.68	-0.29	±	0.99	
	08/20/2003	1.83	±	1.83	0.68	±	0.68	
	08/27/2003	2.37	±	2.74	0.88	±	1.01	
	09/03/2003	7.23	±	4.12	2.67	±	1.53	
	09/10/2003	1.41	±	1.75	0.52	±	0.65	
	09/17/2003	2.53	±	1.69	0.93	±	0.62	
	09/24/2003	1.55	±	2.79	0.57	±	1.03	
REXBURG CMS	07/02/2003	1.69	±	2.08	0.63	±	0.77	
	07/09/2003	0.48	±	2.34	0.18	±	0.87	
	07/16/2003	1.96	±	1.59	0.72	±	0.59	
	07/23/2003	-2.59	±	2.34	-0.96	±	0.86	
	07/30/2003	2.29	±	2.22	0.85	±	0.82	
	08/06/2003	-2.80	±	3.95	-1.04	±	1.46	
	08/13/2003	2.64	±	2.13	0.98	±	0.79	
	08/20/2003	3.60	±	3.49	1.33	±	1.29	
	08/27/2003	0.59	±	1.58	0.22	±	0.58	
	09/03/2003	3.88	±	2.08	1.44	±	0.77	
	09/10/2003	0.39	±	2.85	0.14	±	1.05	
	09/17/2003	1.30	±	2.43	0.48	±	0.90	
	09/24/2003	4.32	±	2.34	1.60	±	0.86	
INEEL					0.00		0.00	
EFS	07/02/2003	1.61	±	1.97	0.59	±	0.73	
	07/09/2003	0.56	±	2.71	0.21	±	1.00	
	07/16/2003	2.08	±	1.69	0.77	±	0.63	
	07/23/2003	-2.46	±	2.22	-0.91	±	0.82	
	07/30/2003	2.86	±	2.78	1.06	±	1.03	
	08/06/2003	-2.48	±	3.50	-0.92	±	1.29	
	08/13/2003	2.65	±	2.14	0.98	±	0.79	
	08/20/2003	3.74	±	3.63	1.38	±	1.34	
	08/27/2003	0.74	±	1.99	0.27	±	0.73	
	09/03/2003	3.47	±	1.86	1.29	±	0.69	
	09/10/2003	0.43	±	3.11	0.16	±	1.15	
	09/17/2003	1.25	±	2.33	0.46	±	0.86	
	09/24/2003	4.16	±	2.25	1.54	±	0.83	

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

Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s?
MAIN GATE	07/02/2003	1.60	±	1.96	0.59	±	0.73	
	07/09/2003	0.58	±	2.81	0.21	±	1.04	
	07/16/2003	2.09	±	1.70	0.78	±	0.63	
	07/23/2003	-2.66	±	2.39	-0.98	±	0.89	
	07/30/2003	2.59	±	2.52	0.96	±	0.93	
	08/06/2003	-2.89	±	4.09	-1.07	±	1.51	
	08/13/2003	2.49	±	2.01	0.92	±	0.75	
	08/20/2003	3.36	±	3.26	1.24	±	1.21	
	08/27/2003	0.56	±	1.52	0.21	±	0.56	
	09/03/2003	3.47	±	1.86	1.29	±	0.69	
	09/10/2003	0.36	±	2.61	0.13	±	0.97	
	09/17/2003	1.37	±	2.56	0.51	±	0.95	
	09/24/2003	3.68	±	1.99	1.36	±	0.74	
VAN BUREN GATE	07/02/2003	-1.02	±	3.25	-0.38	±	1.20	
	07/09/2003	5.11	±	1.76	1.89	±	0.65	
	07/16/2003	4.97	±	2.40	1.84	±	0.89	
	07/23/2003	4.89	±	3.93	1.81	±	1.45	
	07/30/2003	-7.20	±	3.79	-2.66	±	1.40	
	08/06/2003	-1.45	±	2.57	-0.54	±	0.95	
VAN BUREN GATE	08/13/2003	-0.97	±	3.32	-0.36	±	1.23	
	08/20/2003	2.30	±	2.29	0.85	±	0.85	
	08/27/2003	2.56	±	2.96	0.95	±	1.09	
	09/03/2003	6.15	±	3.51	2.27	±	1.30	
	09/10/2003	1.39	±	1.72	0.51	±	0.64	
	09/17/2003	3.39	±	2.26	1.25	±	0.84	
	09/24/2003	2.17	±	3.90	0.80	±	1.44	

Red text denotes invalid sample: a 07/02/2003 FAA Tower invalid due to tripped breaker.
b 07/16/2003 FAA Tower invalid due to equipment failure.
c 08/27/2003 Craters invalid due to equipment failure.
d 07/23/2003 Dubois invalid due to equipment failure.

TABLE C-3: Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/40, Strontium-90 Concentrations in Composited Air Filters

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty x 10^{-18} µCimL			Result ± 1s Uncertainty x 10^{-14} Bq/mL			Result > 3s
BOUNDARY									
ARCO									
	09/30/2003	CESIUM-137	190.00	±	278.00	703.00	±	1028.60	
	09/30/2003	STRONTIUM-90	8.86	±	19.00	32.78	±	70.30	
ATOMIC CITY									
	09/30/2003	CESIUM-137	88.60	±	334.00	327.82	±	1235.80	
	09/30/2003	STRONTIUM-90	22.60	±	16.00	83.62	±	59.20	
BLUE DOME									
	09/30/2003	CESIUM-137	43.00	±	115.00	159.10	±	425.50	
	09/30/2003	STRONTIUM-90	43.90	±	16.00	162.43	±	59.20	
FAA TOWER									
	09/30/2003	AMERICIUM-241	4.41	±	1.80	16.32	±	6.66	
	09/30/2003	CESIUM-137	162.00	±	195.00	599.40	±	721.50	
	09/30/2003	PLUTONIUM-238	-1.60	±	1.10	-5.92	±	4.07	
	09/30/2003	PLUTONIUM-239/40	2.39	±	1.80	8.84	±	6.66	
HOWE									
	09/30/2003	AMERICIUM-241	5.94	±	2.00	21.98	±	7.40	
	09/30/2003	CESIUM-137	216.00	±	124.00	799.20	±	458.80	
	09/30/2003	PLUTONIUM-238	9.05	±	2.80	33.49	±	10.36	Y
	09/30/2003	PLUTONIUM-239/40[a]	1280.00	±	100.00	4736.00	±	370.00	Y
MONTEVIEW									
	09/30/2003	AMERICIUM-241	7.74	±	2.20	28.64	±	8.14	Y
	09/30/2003	CESIUM-137	101.00	±	127.00	373.70	±	469.90	
	09/30/2003	PLUTONIUM-238	0.59	±	0.59	2.19	±	2.18	
	09/30/2003	PLUTONIUM-239/40	-0.59	±	0.59	-2.19	±	2.18	
MUD LAKE									
	09/30/2003	CESIUM-137	-0.55	±	297.00	-2.05	±	1098.90	
	09/30/2003	STRONTIUM-90	39.10	±	18.00	144.67	±	66.60	
MUD LAKE (Q/A-2)									
	09/30/2003	CESIUM-137	-184.00	±	354.00	-680.80	±	1309.80	
	09/30/2003	STRONTIUM-90	60.20	±	18.00	222.74	±	66.60	Y

TABLE C-3: Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/40, Strontium-90 Concentrations in Composited Air Filters (cont.)

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty x 10^{-18} µCi/mL			Result ± 1s Uncertainty x 10^{-14} Bq/mL			Result > 3s
BOUNDARY									
DISTANT									
BLACKFOOT CMS									
	09/30/2003	CESIUM-137	-127.00	±	139.00	-469.90	±	514.30	
	09/30/2003	STRONTIUM-90	34.40	±	16.00	127.28	±	59.20	
BLACKFOOT CMS (Q/A-1)									
	09/30/2003	CESIUM-137	8.22	±	140.00	30.41	±	518.00	
	09/30/2003	STRONTIUM-90	16.40	±	19.00	60.68	±	70.30	
CRATERS									
	09/30/2003	AMERICIUM-241	6.48	±	1.90	23.98	±	7.03	Y
	09/30/2003	CESIUM-137	-143.00	±	149.00	-529.10	±	551.30	
	09/30/2003	PLUTONIUM-238	2.19	±	1.30	8.10	±	4.81	
	09/30/2003	PLUTONIUM-239/240	3.64	±	1.60	13.47	±	5.92	
DUBOIS									
	09/30/2003	CESIUM-137	338.00	±	170.00	1250.60	±	629.00	
	09/30/2003	STRONTIUM-90	62.30	±	20.00	230.51	±	74.00	Y
IDAHO FALLS									
	09/30/2003	AMERICIUM-241	8.56	±	2.70	31.67	±	9.99	Y
	09/30/2003	CESIUM-137	-106.00	±	372.00	-392.20	±	1376.40	
	09/30/2003	PLUTONIUM-238	-0.61	±	1.40	-2.26	±	5.18	
	09/30/2003	PLUTONIUM-239/40	4.88	±	1.80	18.06	±	6.66	
JACKSON									
	09/30/2003	CESIUM-137	442.00	±	259.00	1635.40	±	958.30	
	09/30/2003	STRONTIUM-90	30.40	±	15.00	112.48	±	55.50	
REXBURG CMS									
	09/30/2003	AMERICIUM-241	9.21	±	2.50	34.08	±	9.25	Y
	09/30/2003	CESIUM-137	-38.60	±	372.00	-142.82	±	1376.40	
	09/30/2003	PLUTONIUM-238	0.00	±	1.30	0.00	±	4.81	
	09/30/2003	PLUTONIUM-239/40	2.69	±	2.00	9.95	±	7.40	
INEEL									
EFS									
	09/30/2003	AMERICIUM-241	-2.34	±	2.30	-8.66	±	8.51	
	09/30/2003	CESIUM-137	-6.71	±	159.00	-24.83	±	588.30	
	09/30/2003	PLUTONIUM-238	0.80	±	0.80	2.96	±	2.96	
	09/30/2003	PLUTONIUM-239/40	0.00	±	0.98	0.00	±	3.63	

TABLE C-3: Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/40, Strontium-90 Concentrations in Composited Air Filters (cont.)

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty x 10^{-18} µCi/mL			Result ± 1s Uncertainty x 10^{-14} Bq/mL			Result > 3s
BOUNDARY									
MAIN GATE									
	09/30/2003	CESIUM-137	314.00	±	304.00	1161.80	±	1124.80	
	09/30/2003	STRONTIUM-90	7.44	±	17.00	27.53	±	62.90	
VAN BUREN GATE									
	09/30/2003	AMERICIUM-241	0.50	±	0.86	1.84	±	3.18	
	09/30/2003	CESIUM-137	-90.60	±	378.00	-335.22	±	1398.60	
	09/30/2003	PLUTONIUM-238	-1.16	±	1.40	-4.29	±	5.18	
	09/30/2003	PLUTONIUM-239/40	1.74	±	1.00	6.44	±	3.70	

a This result is unusually high, probably due to cross contamination with a spiked sample. See Section 3 for details.

TABLE C-4: Tritium Concentrations in Atmospheric Moisture.

Location	Start Date	Collect Date	Result ± 1s Uncertainty x 10^{-13} µCi/mL			Result ± 1s Uncertainty x 10^{-9} Bq/mL			Collection Medium	Result > 3s
ATOMIC CITY	07/17/2003	07/25/2003	2.07	±	3.00	7.67	±	11.10	SILICA GEL	
	07/02/2003	07/30/2003	1.93	±	0.54	7.13	±	2.01	SILICA GEL	Y
	07/25/2003	07/31/2003	-3.50	±	2.69	-12.95	±	9.94	SILICA GEL	
	07/30/2003	08/11/2003	9.35	±	2.75	34.58	±	10.17	SILICA GEL	Y
	07/31/2003	08/11/2003	5.62	±	2.11	20.78	±	7.82	SILICA GEL	
	08/11/2003	08/20/2003	49.06	±	5.09	181.50	±	18.84	SILICA GEL	Y
	08/11/2003	08/27/2003	13.45	±	4.27	49.77	±	15.80	MOLECULAR SIEVE	Y
	08/20/2003	08/27/2003	17.44	±	6.63	64.53	±	24.55	SILICA GEL	
	08/11/2003	08/27/2003	2.26	±	1.26	8.35	±	4.66	SILICA GEL	
	08/27/2003	09/10/2003	3.97	±	1.59	14.70	±	5.90	SILICA GEL	
	07/17/2003	09/10/2003	1.28	±	1.21	4.74	±	4.48	MOLECULAR SIEVE	
	08/27/2003	09/10/2003	3.80	±	2.11	14.07	±	7.80	SILICA GEL	
	08/27/2003	09/26/2003	0.62	±	0.98	2.28	±	3.63	MOLECULAR SIEVE	
	09/10/2003	09/26/2003	4.32	±	2.96	15.98	±	10.96	SILICA GEL	
	09/10/2003	10/01/2003	2.85	±	1.73	10.54	±	6.39	SILICA GEL	
	09/26/2003	10/08/2003	6.83	±	2.11	25.27	±	7.82	SILICA GEL	Y
	09/10/2003	10/15/2003	1.01	±	0.86	3.74	±	3.18	MOLECULAR SIEVE	
	08/11/2003	09/04/2003	4.39	±	1.13	16.24	±	4.20	SILICA GEL	Y
	08/27/2003	09/18/2003	0.17	±	0.42	0.63	±	1.56	SILICA GEL	
	08/27/2003	09/18/2003	-0.36	±	0.42	-1.32	±	1.55	MOLECULAR SIEVE	
	09/04/2003	09/23/2003	5.15	±	3.15	19.07	±	11.65	SILICA GEL	
	09/04/2003	10/02/2003	-1.07	±	1.10	-3.96	±	4.06	MOLECULAR SIEVE	
	09/18/2003	10/09/2003	4.22	±	2.55	15.63	±	9.45	SILICA GEL	
	09/23/2003	10/14/2003	3.44	±	1.13	12.73	±	4.17	SILICA GEL	Y
IDAHO FALLS	07/02/2003	07/17/2003	-0.97	±	1.20	-3.59	±	4.45	SILICA GEL	
	07/10/2003	07/25/2003	7.40	±	1.69	27.39	±	6.24	SILICA GEL	Y
	07/10/2003	07/28/2003	2.76	±	1.06	10.19	±	3.92	SILICA GEL	
	07/10/2003	08/11/2003	9.40	±	2.15	34.78	±	7.97	MOLECULAR SIEVE	Y
	07/25/2003	08/11/2003	8.95	±	2.83	33.10	±	10.46	SILICA GEL	Y
	07/28/2003	08/11/2003	5.29	±	1.59	19.56	±	5.89	SILICA GEL	Y
	07/17/2003	08/11/2003	1.73	±	2.68	6.39	±	9.90	MOLECULAR SIEVE	
	08/11/2003	08/27/2003	3.33	±	1.71	12.32	±	6.33	SILICA GEL	
	08/11/2003	09/04/2003	1.89	±	1.21	7.00	±	4.46	MOLECULAR SIEVE	

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

Location	Sampling Date	Concentration (mg/m^3)	Comments
ATOMIC CITY			
	07/01/2003	27.67	
	07/07/2003	18.26	
	07/13/2003	33.14	
	07/19/2003	59.69	
	07/25/2003	22.98	
	07/31/2003	43.93	
	08/06/2003	19.60	Wheat Harvest
	08/12/2003	26.19	Wheat harvest
	08/18/2003	51.43	Wheat harvest
	08/24/2003	5.26	
	08/30/2003	14.50	
	09/05/2003	14.09	
	09/11/2003	2.10	
	09/17/2003	4.92	
	09/23/2003	17.85	
BLACKFOOT			
	09/29/2003	24.37	
	07/01/2003	29.31	
	07/07/2003	23.39	
	07/13/2003	25.99	
	07/19/2003	36.84	
	07/25/2003	19.56	
	07/31/2003	43.06	
	08/06/2003	19.83	Wheat harvest
	08/12/2003	36.06	Wheat harvest
	08/18/2003	37.69	Wheat harvest
	08/24/2003	23.39	
	08/30/2003	8.57	
	09/05/2003	17.72	
	09/11/2003	8.14	
	09/17/2003	8.21	

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

Location	Sampling Date	Concentration (mg/m^3)	Comments
REXBURG			
	09/23/2003	25.43	
	09/29/2003	31.18	
	07/01/2003	34.22	
	07/07/2003	21.18	
	07/13/2003	13.12	Breaker tripped at 13.24 hours rendering the sample invalid.
	07/19/2003	26.47	
	07/25/2003	19.76	
	07/31/2003	54.83	
	08/06/2003	28.83	Wheat harvest
	08/12/2003	53.37	Wheat harvest
	08/18/2003	60.24	
	08/24/2003	10.43	
	08/30/2003	7.90	
	09/05/2003	33.03	
	09/11/2003	7.96	
	09/17/2003	8.48	
	09/23/2003	31.93	
	09/29/2003	34.41	

TABLE C-6: Tritium Concentrations in Precipitation.

Location	Start Date	End Date	Concentration Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
CFA PRECIP									
	08/07/2003	09/02/2003	64.20	±	25.40	2.38	±	0.94	
EFS PRECIP									
	08/20/2003	08/27/2003	194.00	±	57.70	7.18	±	2.14	Y
	09/03/2003	09/10/2003	190.00	±	64.10	7.03	±	2.37	
IDAHO FALLS									
	07/31/2003	09/04/2003	89.1	±	25.00	3.30	±	0.93	Y

TABLE C-7: Cesium-137 and Iodine-131 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)		
BLACKFOOT														
	07/01/2003	3.73	±	1.57	0.138	±	0.058		-1.72	±	1.39	-0.064	±	0.051
	08/05/2003	-0.99	±	1.45	-0.037	±	0.054		-1.09	±	1.44	-0.040	±	0.053
	09/02/2003	-2.60	±	1.54	-0.096	±	0.057		-0.20	±	1.42	-0.008	±	0.053
CAREY														
	07/01/2003	1.99	±	1.48	0.074	±	0.055		2.76	±	1.35	0.102	±	0.050
	08/05/2003	-1.41	±	2.20	-0.052	±	0.081		-2.33	±	2.39	-0.086	±	0.089
	09/02/2003	0.38	±	1.89	0.014	±	0.070		0.10	±	2.61	0.004	±	0.097
DIETRICH														
	07/01/2003	-1.93	±	1.99	-0.071	±	0.074		-0.87	±	2.24	-0.032	±	0.083
	08/05/2003	0.95	±	1.66	0.035	±	0.061		0.83	±	1.36	0.031	±	0.050
	09/02/2003	0.49	±	2.06	0.018	±	0.076		-2.94	±	2.65	-0.109	±	0.098
HOWE														
	07/02/2003	-0.61	±	1.94	-0.023	±	0.072		0.85	±	2.23	0.031	±	0.083
DUPLICATE	07/02/2003	-0.77	±	2.20	-0.029	±	0.081		2.03	±	2.20	0.075	±	0.081
	08/05/2003	0.54	±	2.69	0.020	±	0.100		4.06	±	3.50	0.150	±	0.130
	09/02/2003	0.24	±	2.45	0.009	±	0.091		0.59	±	2.62	0.022	±	0.097
IDAHO FALLS														
	07/01/2003	-3.79	±	2.59	-0.140	±	0.096		-0.84	±	2.25	-0.031	±	0.083
	07/09/2003	1.90	±	1.84	0.070	±	0.068		0.33	±	2.37	0.012	±	0.088
	07/16/2003	-0.18	±	1.92	-0.007	±	0.071		0.51	±	2.35	0.019	±	0.087
	07/23/2003	-0.89	±	1.94	-0.033	±	0.072		-1.73	±	2.40	-0.064	±	0.089
	07/30/2003	3.56	±	1.99	0.132	±	0.074		-2.38	±	2.39	-0.088	±	0.089
	08/05/2003	1.78	±	2.47	0.066	±	0.091		-1.07	±	3.37	-0.040	±	0.125
	08/13/2003	0.54	±	0.91	0.020	±	0.034		0.77	±	0.76	0.029	±	0.028
	08/20/2003	-0.23	±	2.54	-0.009	±	0.094		0.23	±	3.49	0.008	±	0.129
	08/27/2003	3.87	±	1.79	0.143	±	0.066		1.05	±	2.55	0.039	±	0.094
	09/02/2003	0.51	±	1.72	0.019	±	0.064		-2.72	±	1.46	-0.101	±	0.054
	09/10/2003	-0.98	±	2.52	-0.036	±	0.093		0.62	±	3.48	0.023	±	0.129
	09/17/2003	0.37	±	1.71	0.014	±	0.063		2.31	±	2.41	0.086	±	0.089
	09/24/2003	-2.89	±	1.83	-0.107	±	0.068		-1.41	±	2.45	-0.052	±	0.091

TABLE C-7: Cesium-137 and Iodine-131 Concentrations in Milk (cont.).

		Iodine-131							Cesium-137					
Location	**Sampling Date**	**Result ± 1s Uncertainty (pCi/L)**			**Result ± 1s Uncertainty (Bq/L)**			**Result > 3s**	**Result ± 1s Uncertainty (pCi/L)**			**Result ± 1s Uncertainty (Bq/L)**		
MORELAND														
	07/01/2003	-0.74	±	0.89	-0.027	±	0.033		-0.29	±	0.76	-0.011	±	0.028
	08/05/2003	-1.59	±	1.87	-0.059	±	0.069		-0.20	±	2.40	-0.007	±	0.089
	09/02/2003	4.39	±	3.02	0.163	±	0.112		0.43	±	3.48	0.016	±	0.129
ROBERTS														
	07/01/2003	0.74	±	1.69	0.027	±	0.063		-0.68	±	2.26	-0.025	±	0.084
	08/05/2003	-0.35	±	0.89	-0.013	±	0.033		0.98	±	0.77	0.036	±	0.028
	09/02/2003	0.31	±	0.86	0.011	±	0.032		-0.72	±	0.79	-0.027	±	0.029
RUPERT														
	07/01/2003	-1.58	±	2.45	-0.059	±	0.091		-5.23	±	3.54	-0.194	±	0.131
	08/05/2003	1.04	±	1.45	0.039	±	0.054		1.68	±	1.31	0.062	±	0.049
	09/02/2003	0.04	±	0.96	0.001	±	0.036		0.66	±	0.81	0.024	±	0.030
TERRETON														
	07/01/2003	0.17	±	1.81	0.006	±	0.067		-1.24	±	2.23	-0.046	±	0.083
DUPLICATE	07/01/2003	-0.89	±	1.01	-0.033	±	0.037		1.35	±	0.76	0.050	±	0.028
	08/05/2003	-0.33	±	2.06	-0.012	±	0.076		0.29	±	2.36	0.011	±	0.087
	09/02/2003	-1.04	±	1.00	-0.039	±	0.037		1.37	±	0.77	0.051	±	0.028

TABLE C-8: Cesium-137 and Strontium-90 Concentrations in Lettuce.

		Cesium-137						
		Result ± 1s Uncertainty			Result ± 1s Uncertainty			
Location	**Sampling Date**	**pCi/g**			**(x 10^{-2} Bq/g)**			**Result > 3s**
ARCO	08/01/2003	0.12	±	2.05	0.44	±	7.59	
ARCO	08/29/2003	0.21	±	0.19	0.78	±	0.69	
ATOMIC CITY	08/01/2003	0.84	±	0.77	3.12	±	2.85	
EFS	08/04/2003	0.62	±	0.36	2.28	±	1.34	
MONTEVIEW	08/01/2003	0.29	±	0.32	1.06	±	1.17	
HOWE	08/01/2003	0.43	±	0.56	1.59	±	2.08	
CAREY	08/05/2003	0.70	±	0.41	2.59	±	1.52	
IDAHO FALLS	08/09/2003	1.06	±	0.31	3.92	±	1.16	Y
BLACKFOOT	08/01/2003	0.76	±	0.37	2.81	±	1.36	

		Strontium-90						
		Result ± 1s Uncertainty			Result ± 1s Uncertainty			
		pCi/g			**(x 10^{-2} Bq/g)**			**Result > 3s**
ARCO	08/01/2003	0.32	±	0.12	1.20	±	0.44	
ARCO	08/29/2003	0.13	±	0.16	0.47	±	0.59	
ATOMIC CITY	08/01/2003	0.28	±	0.13	1.04	±	0.48	
EFS	08/04/2003	0.44	±	0.13	1.64	±	0.48	Y
MONTEVIEW	08/01/2003	0.21	±	0.14	0.79	±	0.52	
HOWE	08/01/2003	0.03	±	0.08	0.09	±	0.30	
CAREY	08/05/2003	0.22	±	0.18	0.81	±	0.67	
IDAHO FALLS	08/09/2003	0.25	±	0.17	0.94	±	0.63	
BLACKFOOT	08/01/2003	0.23	±	0.08	0.84	±	0.31	

TABLE C-9: Cesium-137 and Strontium-90 Concentrations in Wheat.

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty ($x 10^{-2}$ Bq/kg)		
Menan	08/14/2003	-0.49	±	2.10	-1.81	±	7.77
Carey	08/27/2003	-0.48	±	1.99	-1.76	±	7.36
Arco	08/20/2003	-2.08	±	3.74	-7.70	±	13.84
Minidoka	08/15/2003	2.33	±	1.80	8.62	±	6.66
Terreton	08/14/2003	1.91	±	1.72	7.07	±	6.36
Rupert	08/15/2003	1.10	±	1.90	4.07	±	7.03
Mud Lake	08/14/2003	1.29	±	4.66	4.77	±	17.24
Idaho Falls	08/11/2003	-0.78	±	4.99	-2.87	±	18.46
Aberdeen	08/14/2003	-0.63	±	2.26	-2.33	±	8.36
Rupert	08/15/2003	-1.39	±	4.16	-5.14	±	15.39
Rockford	08/11/2003	2.48	±	5.74	9.18	±	21.24
Howe	08/28/2003	1.36	±	4.37	5.03	±	16.17
Mud Lake	09/04/2003	3.50	±	5.83	12.95	±	21.57

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty (Bq/kg)		
Menan	08/14/2003	53.80	±	55.00	1.99	±	2.04
Menan (duplicate)	08/14/2003	15.50	±	51.00	0.57	±	1.89
Carey	08/27/2003	-52.70	±	47.00	-1.95	±	1.74
Arco	08/20/2003	2.04	±	6.20	0.08	±	0.23
Minidoka	08/15/2003	-60.70	±	48.00	-2.25	±	1.78
Terreton	08/14/2003	4.87	±	43.00	0.18	±	1.59
Rupert	08/15/2003	47.70	±	52.00	1.76	±	1.92
Mud Lake	08/14/2003	8.49	±	56.00	0.31	±	2.07
Idaho Falls	08/11/2003	121.00	±	64.00	4.48	±	2.37
Aberdeen	08/14/2003	83.90	±	62.00	3.10	±	2.29
Rupert	08/15/2003	-26.40	±	52.00	-0.98	±	1.92
Rockford	08/11/2003	195.00	±	68.00	7.22	±	2.52
Howe	08/28/2003	-18.50	±	49.00	-0.68	±	1.81

TABEL C-10: Cesium-137 and Iodine-131 Concentrations in Game Animals.

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^5 Bq/kg wet weight)			Result > 3s
PRONGHORN										
	MUSCLE	CESIUM-137	07/08/2003	3.05	±	1.39	0.11	±	0.05	
		IODINE-131	07/08/2003	0.39	±	1.88	0.01	±	0.07	
	THYROID	CESIUM-137	07/08/2003	-415.00	±	517.00	-15.37	±	19.15	
		IODINE-131	07/08/2003	-675.00	±	357.00	-25.00	±	13.22	
PRONGHORN										
	LIVER	CESIUM-137	08/20/2003	-0.04	±	4.19	0.00	±	0.16	
		IODINE-131	08/20/2003	-0.90	±	2.95	-0.03	±	0.11	
	MUSCLE	CESIUM-137	08/20/2003	2.08	±	2.58	0.08	±	0.10	
		IODINE-131	08/20/2003	0.11	±	1.89	0.00	±	0.07	
	THYROID	CESIUM-137	08/20/2003	-123.00	±	77.00	-4.56	±	2.85	
		IODINE-131	08/20/2003	-0.70	±	79.10	-0.03	±	2.93	
PRONGHORN										
	MUSCLE	CESIUM-137	08/20/2003	1.98	±	3.68	0.07	±	0.14	
		IODINE-131	08/20/2003	-0.69	±	2.43	-0.03	±	0.09	
	THYROID	CESIUM-137	08/20/2003	101.00	±	169.00	3.74	±	6.26	
		IODINE-131	08/20/2003	43.80	±	154.00	1.62	±	5.70	
PRONGHORN										
	MUSCLE	CESIUM-137	09/09/2003	4.23	±	1.84	0.16	±	0.07	
		IODINE-131	09/09/2003	3.39	±	5.01	0.13	±	0.19	
PRONGHORN										
	LIVER	CESIUM-137	09/15/2003	9.58	±	4.46	0.35	±	0.17	
		IODINE-131	09/15/2003	1.36	±	3.06	0.05	±	0.11	
	MUSCLE	CESIUM-137	09/15/2003	1.32	±	2.75	0.05	±	0.10	
		IODINE-131	09/15/2003	-6.65	±	3.13	-0.25	±	0.12	
	THYROID	CESIUM-137	09/15/2003	-0.25	±	151.00	-0.01	±	5.59	
		IODINE-131	09/15/2003	320.00	±	150.00	11.85	±	5.56	
PRONGHORN										
	LIVER	CESIUM-137	09/25/2003	8.08	±	1.44	0.30	±	0.05	Y
		IODINE-131	09/25/2003	-0.93	±	1.32	-0.03	±	0.05	
	MUSCLE	CESIUM-137	09/25/2003	5.59	±	1.37	0.21	±	0.05	Y
		IODINE-131	09/25/2003	2.62	±	1.30	0.10	±	0.05	
	THYROID	CESIUM-137	09/25/2003	78.30	±	306.00	2.90	±	11.33	
		IODINE-131	09/25/2003	145.00	±	178.00	5.37	±	6.59	

TABLE C-11: Radionuclides in Edible Portion of Marmots.

Location	Sampling Date	Analyte	Result ± Uncertainty (1s) (x 10^{-3}) pCi/g			Result ± Uncertainty (1s) (x 10^{-3}) Bq/g			Result > 3s
PIT 9									
	05/12/2003	AMERICIUM-241	1.27	±	0.58	4.70	±	2.15	
	05/12/2003	ANTIMONY-124	3.38	±	5.30	12.52	±	19.63	
	05/12/2003	CERIUM-141	-5.36	±	19.00	-19.85	±	70.37	
	05/12/2003	CERIUM-144	5.49	±	9.10	20.33	±	33.70	
	05/12/2003	CESIUM-134	4.22	±	1.80	15.63	±	6.67	
	05/12/2003	CESIUM-137	-0.11	±	1.60	-0.39	±	5.93	
	05/12/2003	CHROMIUM-51	-29.10	±	190.00	-107.78	±	703.70	
	05/12/2003	COBALT-58	-5.83	±	4.50	-21.59	±	16.67	
	05/12/2003	COBALT-60	1.88	±	1.70	6.96	±	6.30	
	05/12/2003	EUROPIUM-152	0.66	±	3.90	2.45	±	14.44	
	05/12/2003	HAFNIUM-181	-8.46	±	9.30	-31.33	±	34.44	
	05/12/2003	MANGANESE-54	1.38	±	2.00	5.11	±	7.41	
	05/12/2003	NIOBIUM-95	6.47	±	14.00	23.96	±	51.85	
	05/12/2003	PLUTONIUM-238	-0.10	±	0.10	-0.37	±	0.37	
	05/12/2003	PLUTONIUM-239/40	0.80	±	0.41	2.97	±	1.52	
	05/12/2003	RUTHENIUM-103	-10.00	±	10.00	-37.04	±	37.04	
	05/12/2003	SILVER-110m	3.38	±	2.80	12.52	±	10.37	
	05/12/2003	STRONTIUM-90	29.60	±	5.70	109.63	±	21.11	Y
	05/12/2003	ZINC-65	-8.02	±	5.00	-29.70	±	18.52	
	05/12/2003	ZIRCONIUM-95	-3.70	±	8.80	-13.70	±	32.59	
PIT 9									
	05/13/2003	AMERICIUM-241	0.29	±	0.29	1.06	±	1.07	
	05/13/2003	ANTIMONY-124	6.08	±	5.30	22.52	±	19.63	
	05/13/2003	CERIUM-141	-2.87	±	21.00	-10.63	±	77.78	
	05/13/2003	CERIUM-144	-14.60	±	10.00	-54.07	±	37.04	
	05/13/2003	CESIUM-134	2.29	±	2.00	8.48	±	7.41	
	05/13/2003	CESIUM-137	405.00	±	24.00	1500.00	±	88.89	Y
	05/13/2003	CHROMIUM-51	-6.75	±	210.00	-25.00	±	777.78	
	05/13/2003	COBALT-58	1.94	±	4.70	7.19	±	17.41	
	05/13/2003	COBALT-60	-1.60	±	1.80	-5.93	±	6.67	
	05/13/2003	EUROPIUM-152	-4.19	±	4.40	-15.52	±	16.30	
	05/13/2003	HAFNIUM-181	3.66	±	11.00	13.56	±	40.74	
	05/13/2003	MANGANESE-54	1.74	±	2.10	6.44	±	7.78	
	05/13/2003	NIOBIUM-95	7.59	±	16.00	28.11	±	59.26	
	05/13/2003	PLUTONIUM-238	0.00	±	0.44	0.00	±	1.63	
	05/13/2003	PLUTONIUM-239/40	0.00	±	0.44	0.00	±	1.63	
	05/13/2003	RUTHENIUM-103	-7.36	±	12.00	-27.26	±	44.44	
	05/13/2003	SILVER-110m	-4.41	±	3.10	-16.33	±	11.48	
	05/13/2003	STRONTIUM-90	70.70	±	9.50	261.85	±	35.19	Y
	05/13/2003	ZINC-65	-18.10	±	5.90	-67.04	±	21.85	
	05/13/2003	ZIRCONIUM-95	8.25	±	9.10	30.56	±	33.70	

TABLE C-11: Radionuclides in Edible Portion of Marmots (cont.).

Location	Sampling Date	Analyte	Result ± Uncertainty (1s) (x 10^{-3}) pCi/g			Result ± Uncertainty (1s) (x 10^{-5}) Bq/g			Result > 3s
PIT 9									
	05/13/2003	AMERICIUM-241	0.42	±	0.42	1.54	±	1.56	
	05/13/2003	ANTIMONY-124	1.79	±	4.10	6.63	±	15.19	
	05/13/2003	CERIUM-141	-12.20	±	15.00	-45.19	±	55.56	
	05/13/2003	CERIUM-144	-2.00	±	7.40	-7.41	±	27.41	
	05/13/2003	CESIUM-134	-0.20	±	1.40	-0.72	±	5.19	
	05/13/2003	CESIUM-137	366.00	±	27.00	1355.56	±	100.00	Y
	05/13/2003	CHROMIUM-51	-2.17	±	170.00	-8.04	±	629.63	
	05/13/2003	COBALT-58	-0.01	±	3.50	-0.04	±	12.96	
	05/13/2003	COBALT-60	-1.54	±	1.30	-5.70	±	4.81	
	05/13/2003	EUROPIUM-152	-1.33	±	3.70	-4.93	±	13.70	
	05/13/2003	HAFNIUM-181	3.47	±	9.00	12.85	±	33.33	
	05/13/2003	MANGANESE-54	0.52	±	1.50	1.94	±	5.56	
	05/13/2003	NIOBIUM-95	10.60	±	11.00	39.26	±	40.74	
	05/13/2003	PLUTONIUM-238	0.00	±	0.32	0.00	±	1.19	
	05/13/2003	PLUTONIUM-239/40	0.26	±	0.26	0.95	±	0.96	
	05/13/2003	RUTHENIUM-103	-5.21	±	9.90	-19.30	±	36.67	
	05/13/2003	SILVER-110m	-4.06	±	2.40	-15.04	±	8.89	
	05/13/2003	STRONTIUM-90	35.50	±	6.30	131.48	±	23.33	Y
	05/13/2003	ZINC-65	-8.37	±	3.80	-31.00	±	14.07	
	05/13/2003	ZIRCONIUM-95	-1.46	±	6.20	-5.41	±	22.96	
TIE CANYON									
	06/12/2003	AMERICIUM-241	0.30	±	0.30	1.12	±	1.11	
	06/12/2003	ANTIMONY-124	-10.10	±	10.00	-37.41	±	37.04	
	06/12/2003	CERIUM-141	0.21	±	25.00	0.79	±	92.59	
	06/12/2003	CERIUM-144	-9.24	±	20.00	-34.22	±	74.07	
	06/12/2003	CESIUM-134	1.76	±	4.50	6.52	±	16.67	
	06/12/2003	CESIUM-137	7.97	±	4.00	29.52	±	14.81	
	06/12/2003	CHROMIUM-51	-418.00	±	250.00	-1548.15	±	925.93	
	06/12/2003	COBALT-58	0.24	±	8.50	0.88	±	31.48	
	06/12/2003	COBALT-60	7.63	±	4.00	28.26	±	14.81	
	06/12/2003	EUROPIUM-152	-23.10	±	10.00	-85.56	±	37.04	
	06/12/2003	HAFNIUM-181	-0.03	±	16.00	-0.10	±	59.26	
	06/12/2003	MANGANESE-54	0.54	±	4.70	2.01	±	17.41	
	06/12/2003	NIOBIUM-95	23.20	±	21.00	85.93	±	77.78	
	06/12/2003	PLUTONIUM-238	-0.10	±	0.10	-0.38	±	0.37	
	06/12/2003	PLUTONIUM-239/40	0.20	±	0.20	0.76	±	0.74	
	06/12/2003	RUTHENIUM-103	6.79	±	16.00	25.15	±	59.26	
	06/12/2003	SILVER-110m	-0.27	±	6.90	-1.00	±	25.56	
	06/12/2003	STRONTIUM-90	30.00	±	5.90	111.11	±	21.85	Y
	06/12/2003	ZINC-65	-9.27	±	12.00	-34.33	±	44.44	
	06/12/2003	ZIRCONIUM-95	5.62	±	17.00	20.81	±	62.96	

TABLE C-11: Radionuclides in Edible Portion of Marmots (cont.).

Location	Sampling Date	Analyte	Result ± Uncertainty (1s) (x 10^{-3}) pCi/g			Result ± Uncertainty (1s) (x 10^{-5}) Bq/g			Result > 3s
POCATELLO ZOO				±		0.00	±	0.00	
	07/02/2003	AMERICIUM-241	-0.15	±	0.41	-0.57	±	1.52	
	07/02/2003	ANTIMONY-124	-3.72	±	2.80	-13.78	±	10.37	
	07/02/2003	CERIUM-141	0.62	±	6.10	2.30	±	22.59	
	07/02/2003	CERIUM-144	-3.95	±	7.00	-14.63	±	25.93	
	07/02/2003	CESIUM-134	0.82	±	1.70	3.04	±	6.30	
	07/02/2003	CESIUM-137	0.30	±	1.50	1.12	±	5.56	
	07/02/2003	CHROMIUM-51	24.30	±	52.00	90.00	±	192.59	
	07/02/2003	COBALT-58	-1.12	±	2.50	-4.15	±	9.26	
	07/02/2003	COBALT-60	-0.67	±	1.50	-2.46	±	5.56	
	07/02/2003	EUROPIUM-152	-1.92	±	3.50	-7.11	±	12.96	
	07/02/2003	HAFNIUM-181	1.65	±	3.80	6.11	±	14.07	
	07/02/2003	MANGANESE-54	-3.61	±	1.60	-13.37	±	5.93	
	07/02/2003	NIOBIUM-95	-6.33	±	5.00	-23.44	±	18.52	
	07/02/2003	PLUTONIUM-238	-0.13	±	0.11	-0.47	±	0.41	
	07/02/2003	PLUTONIUM-239/40	0.00	±	0.41	0.00	±	1.52	
	07/02/2003	RUTHENIUM-103	-4.11	±	4.00	-15.22	±	14.81	
	07/02/2003	SILVER-110m	-2.00	±	2.30	-7.41	±	8.52	
	07/02/2003	STRONTIUM-90	31.70	±	5.80	117.41	±	21.48	Y
	07/02/2003	ZINC-65	-5.72	±	4.20	-21.19	±	15.56	
	07/02/2003	ZIRCONIUM-95	5.59	±	4.90	20.70	±	18.15	
POCATELLO ZOO									
	07/02/2003	AMERICIUM-241	-0.15	±	0.15	-0.57	±	0.56	
	07/02/2003	ANTIMONY-124	-3.72	±	3.00	-13.78	±	11.11	
	07/02/2003	CERIUM-141	0.62	±	7.20	2.30	±	26.67	
	07/02/2003	CERIUM-144	-3.95	±	7.60	-14.63	±	28.15	
	07/02/2003	CESIUM-134	0.82	±	1.70	3.04	±	6.30	
	07/02/2003	CESIUM-137	0.30	±	1.40	1.12	±	5.19	
	07/02/2003	CHROMIUM-51	24.30	±	56.00	90.00	±	207.41	
	07/02/2003	COBALT-58	-1.12	±	2.80	-4.15	±	10.37	
	07/02/2003	COBALT-60	-0.67	±	1.60	-2.46	±	5.93	
	07/02/2003	EUROPIUM-152	-1.92	±	3.70	-7.11	±	13.70	
	07/02/2003	HAFNIUM-181	1.65	±	4.20	6.11	±	15.56	
	07/02/2003	MANGANESE-54	-3.61	±	1.60	-13.37	±	5.93	
	07/02/2003	NIOBIUM-95	-6.33	±	5.60	-23.44	±	20.74	
	07/02/2003	PLUTONIUM-238	-0.13	±	0.13	-0.47	±	0.48	
	07/02/2003	PLUTONIUM-239/40	0.00	±	0.31	0.00	±	1.15	
	07/02/2003	RUTHENIUM-103	-4.11	±	4.20	-15.22	±	15.56	
	07/02/2003	SILVER-110m	-2.00	±	2.40	-7.41	±	8.89	
	07/02/2003	STRONTIUM-90	31.70	±	6.10	117.41	±	22.59	Y
	07/02/2003	ZINC-65	-5.72	±	4.30	-21.19	±	15.93	
	07/02/2003	ZIRCONIUM-95	5.59	±	5.20	20.70	±	19.26	

APPENDIX D

STATISTICAL ANALYSIS RESULT

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Table D-1. Kruskal-Wallace[a] statistical results between INEEL, Boundary, and Distant location groups by quarter and by month.

Parameter	p[b]
Gross Alpha	
Quarter	0.72
July	0.90
August	0.59
September	0.76
Gross Beta	
Quarter	0.89
July	0.36
August	0.81
September	0.98

a. See the Determining Statistical Differences of the Helpful Information section for details on the Kruskal-Wallace test.

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

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

Mann-Whitney U Test[a]		
Parameter	**Week**	**p[b]**
Gross Alpha		
	July 2nd	0.52
	July 9th	0.67
	July 16th	0.26
	July 23rd	0.37
	July 30th	0.20
	August 6th	0.67
	August 13th	1.00
	August 20th	0.67
	August 27th	0.06
	September 3rd	0.67
	September 10th	0.05
	September 17th	0.87
	September 24th	0.25
Gross Beta		
	July 2nd	0.87
	July 9th	0.43
	July 16th	0.01
	July 23rd	0.12
	July 30th	0.09
	August 6th	0.87
	August 13th	0.83
	August 20th	0.94
	August 27th	0.42
	September 3rd	0.94
	September 10th	0.25
	September 17th	0.01
	September 24th	0.87

See the Determining Statistical Differences of the Helpful Information section for details on the Mann Whitney U test.

a. A ‘p’ value greater than 0.05 signifies no statistical difference between data groups. Red text indicates dates with statistically significant differences.