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Idaho National Engineering and Environmental Laboratory Offsite Environmental Surveillance Program Report: Second Quarter 2004

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EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the second quarter of 2004 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 second quarter, 2004, 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, April 1 through May 30, 2004. All sample types (media) and the sampling schedule followed during 2004 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});
- Water sampling, including precipitation, surface water, and drinking water;
- Agricultural product sampling, including milk, sheep, and large game;
- Measurement of external exposure, using environmental dosimetry.

Results are presented in this report with an analytical uncertainty term, s, where "s" is an estimate of the population standard deviation (σ), assuming a normal (Guassian) distribution. The following guidelines, based on Currie (1984), are used to interpret the analytical results.

- Results greater than 3s are reported as "detected".
- Results less than 2s are reported as "undetected".
- Results between 2-3s are reported as "questionable" (i.e., the radionuclide might have been detected but such detection may not be considered reliable.)

Gross alpha and gross beta measurements are used as general indicators of the presence of radionuclides. Gross alpha and gross beta results were found to have no discernable statistical distribution during the second quarter of 2004. Because of this, these data were statistically analyzed using nonparametric methods, including the use of the median to represent central tendency. At no time during the second quarter were weekly, monthly, or quarterly gross alpha or gross beta concentrations in air collected at Boundary locations statistically greater than corresponding data for Distant locations, as one would expect if the INEEL were a significant source of radionuclide contamination.

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

Selected quarterly composite filter samples were analyzed for gamma emitting radionuclides, strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}Pu$), and americium-241 (^{241}Am). Americium-241 and $^{239/240}Pu$ were detected in three samples collected and composited during the second quarter. Concentrations of both were below the DOE derived concentration guidelines (DCGs).

Sixteen atmospheric moisture samples were obtained during the second quarter of 2004 and analyzed for tritium. One each from Blackfoot and Rexburg, and two from Idaho Falls exceeded their respective 3s levels. The maximum value was below the DOE DCG for tritium in air.

The ESER Program operates three PM_{10} samplers for particulate sampling, one each at Rexburg, Blackfoot, and Atomic City. Sampling of PM_{10} is informational as no analyses are conducted for contaminants. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour particulate concentration was 45.98 $\mu g/m^3$ on May 8, 2004, at the Rexburg CMS. This below the EPA Air Quality Standard of 150 $\mu g/m^3$.

Sufficient precipitation occurred to allow collection of three samples; one from Idaho Falls and two weekly samples from the Experimental Field Station (EFS) on the INEEL. Tritium was not detected above the 3s level in any of the samples.

Thirteen drinking water samples and one duplicate were collected from selected taps throughout southeast Idaho during the second quarter 2004. Samples were analyzed for gross alpha, gross beta, and tritium (^3H). One of the samples exceeded its 3s value for gross alpha and two others exceeded for tritium. The maximum value of both was below the EPA limits established under the Safe Drinking Water Act and DOE DCGs. Ten samples exceeded the 3s value for gross beta. The maximum gross beta concentration measured, (3.22 ± 0.89) pCi/L, was from Minidoka and was below the EPA Safe Water Drinking Water Act (SDWA) screening limit of 50 pCi/L and the DOE DCG of 100 pCi/L. Levels of gross beta activity observed are not unusual given the basaltic terrain.

Six surface water samples (including one duplicate) were collected from locations throughout southeast Idaho. Samples were analyzed for gross alpha, gross beta, and tritium (^3H). None of the samples exceeded their 3s value for tritium or gross alpha. Gross beta activities were detected in four samples. Results were less that SDWA screening limits and DOE DCGs and were typical of historical and regional measurements.

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL. All samples were analyzed for gamma-emitting radionuclides. Iodine-131 and ^{137}Cs concentrations were not detected in any milk sample. One of five samples had ^{90}Sr concentrations above the 3s value. Tritium was not detected in any of the five samples analyzed.

Individual sheep from three separate flocks were sampled including a control flock in Dubois from the Experimental Sheep Station, a flock from a southern INEEL allotment, and a flock from a northern INEEL allotment. Two sheep were taken from each flock. Thyroid, muscle, and liver tissue were collected and analyzed for gamma emitting radionuclides. No ^{131}I was found in any of the samples. Analysis for ^{137}Cs showed results greater than 3s in three samples from two different animals on the southern allotment: one liver and two muscle samples. All concentrations of ^{137}Cs were similar to those found in both onsite and offsite sheep samples during recent years.

Three large game animals (two mule deer and a pronghorn) were sampled during the second quarter of 2004. There were killed as a result of a vehicular collision. Thyroid, liver, and muscle tissues were sampled when available. Only the naturally occurring radionuclide potassium-40 was measured at concentrations greater than the associated 3s uncertainty values. No human-made radionuclides were detected.

Environmental dosimeter locations are also divided into Boundary and Distant groupings. Boundary exposure rates ranged from a low of 0.29 mR/day to 0.37 mR/day. The overall Boundary average was 0.34 mR/day. The Distant group ranged from 0.27 mR/day to 0.38 mR/day, with an overall average exposure also of 0.33 mR/day. No statistical difference existed between Boundary and Distant locations. All exposure results are consistent with those measured historically.

Quality assurance checks and samples submitted for analysis during the second quarter 2004 met most QA requirements. QA issues arose with method uncertainty and recount accuracy for ^{131}I measurements in charcoal cartridges and milk, ^{241}Am and ^{90}Sr in quarterly composites, and gross alpha and tritium in drinking and surface water as measured by criteria established in the ESER Quality Assurance Project Plan. These issues are being resolved with the laboratory to avoid future problems.

No radionuclide in any of the samples taken during the second quarter of 2004 could be directly linked with INEEL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States and consistent with levels measured in the past in this area. Radionuclide concentrations in all of the samples collected and analyzed during the second quarter, 2004 were below guidelines set by both the DOE and the U.S. Environmental Protection Agency (EPA) for protection of the public.

Table E-1 Summary of results for the second quarter of 2004.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	There were no statistical differences noted for weekly, monthly or quarterly gross alpha or gross beta concentrations measured at INEEL, Boundary, and Distant locations. No result exceeded the DCG for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, select actinides, ^{90}Sr	Gamma-emitting radionuclides, ^{241}Am, $^{239/240}Pu$, and ^{90}Sr were not detected in any composite sample.
	Charcoal Cartridge	Iodine-131	No detections of ^{131}I were made during the second quarter.
	PM_{10}	Particulate matter	Forty-three total samples were collected from three locations. No regulatory limits were exceeded.
Atmospheric Moisture	Liquid	Tritium	Sixteen atmospheric moisture samples were collected. Four of the results were greater than the 3s uncertainty.
Precipitation	Liquid	Tritium	No measurable concentrations of tritium were recorded during the second quarter.
Drinking Water	Liquid	Gross alpha, gross beta, tritium	Gross alpha activity was detected in one sample from Idaho Falls. Gross beta activity was measured in 10 of 14 samples. The maximum was well below the EPA Safe Drinking Water Act limits. Tritium was detected in two samples at concentrations many times lower than the EPA regulatory level.
Surface Water	Liquid	Gross alpha, gross beta, tritium	No tritium or gross alpha activity was detected in any of the six samples collected. Gross beta activity was measured above the 3s values in four samples. All concentrations were below EPA and DOE limits, and ere within historical measurements.
Milk	Liquid	Iodine-131, gamma emitting radionuclides, ^{90}Sr, and tritium	Strontium-90 was detected in one of samples collected from Idaho Falls.
Sheep	Tissue	Iodine-131, gamma emitting radionuclides	Cesium-137 was detected in three samples: two muscle samples and one liver. Samples came from two sheep collected from the Southern grazing allotment.
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides	Three game animals were collected during this quarter. No man-made radionuclides were detected.
Environmental Radiation	TLD	Ambient ionizing radiation	Values were consistent with expected exposures given the altitude and location of the TLD's. There were no statistical differences between Boundary and Distant location results.

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LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
ANL-W	Argonne National Laboratory-West
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
INTEC	Idaho Nuclear Technology and Engineering Center
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
SI	Systeme International d'Unites
TLDs	thermoluminescent dosimeters
TRA	Test Reactor Area
UI	University of Idaho
WSU	Washington State University

LIST OF UNITS

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

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National 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 Clean Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities on and off of DOE facilities (DOE 2003). During calendar year 2004, 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 second quarter of 2004 (April 1 – June 30, 2004).

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 routinely 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 13 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.

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 2004). 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 precipitation sampling equipment 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 these 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 detected 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 (USGS 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 USGS (2003).

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

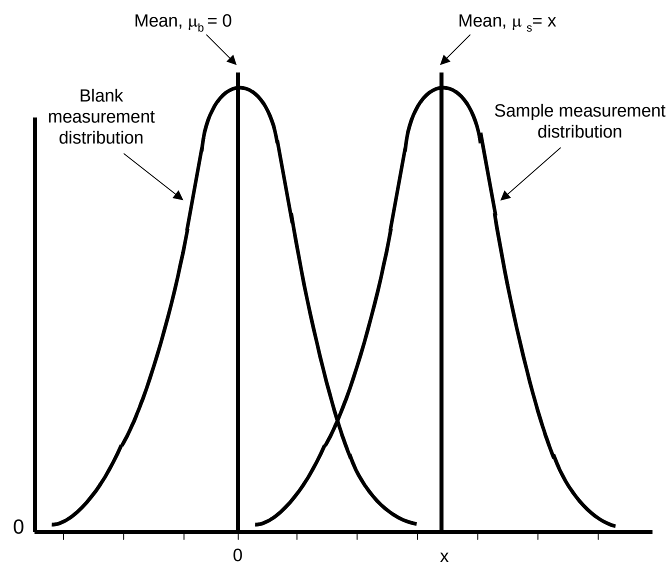

Figure 1. Example overlap of blank and sample measurement distributions.

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. 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 nuclear reactor at the NRTS became the second to produce useful amounts of electricity. Over time the site has evolved into an assembly of 52 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 2004 that Argonne National Laboratory and the INEEL are to 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 at 16 locations using low-volume air samplers for the duration of the quarter. 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 second quarter, 2004 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the second quarter of 2004 (Figure 2). Three of these samplers are located on the INEEL, eight samplers (including one replicate samplers at Mud Lake) are situated off the INEEL near the boundary, and seven samplers (including one replicate at Blackfoot) have been placed at locations distant to the INEEL. Each replicate sampler is relocated every year to a new location. Samplers are divided into INEEL, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INEEL. An average of 15,624 ft^3 (442 m^3) of air was sampled at each location, each week, at an average flow rate of 1.6 ft^3/min (0.045 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.

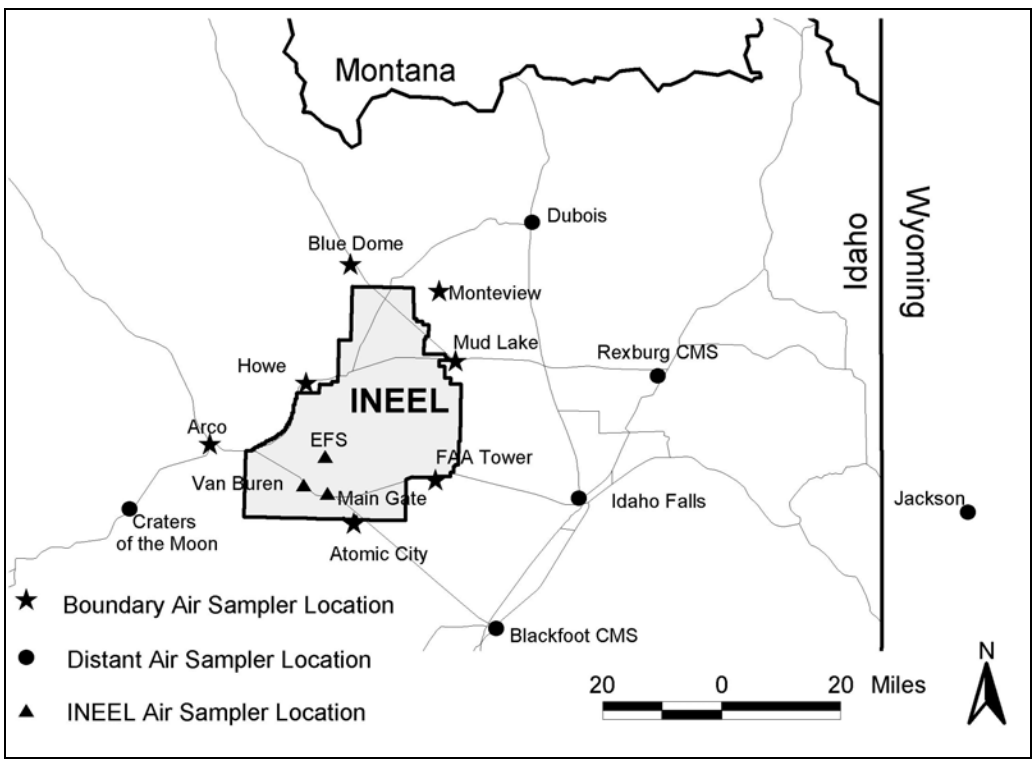

Figure 2. Low-volume air sampler locations.

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

Gross alpha results are reported in Table C-1. Median gross alpha concentrations in air for INEEL, Boundary, and Distant locations for the second quarter of 2004 are shown in Figure 3. The data were tested for normality prior to statistical analyses. The data showed no consistent discernable distribution. Box and whisker plots are commonly used when there is no assumed distribution. Each data group in Figure 3 is presented as a box and whisker plot, with a median (small red square), a box enclosing values between the 25th and 75th percentiles, and whiskers representing the non-outlier range. Note that outliers and extreme values are identified separately from the box and whiskers. Outliers (open red circles) and extreme values (open red triangles) are atypical, infrequent, data points that are far from the middle of the data distribution. For this report, outliers are defined as values that are greater than 1.5 times the height of the box, above or below the box. Extreme values are greater than 2 times the height of the box, above or below the box. Outliers and extreme values may reflect inherent variability, may be due to errors associated with transcription or measurement, or may be related to other anomalies. A careful review of the data collected during the second quarter indicates that the outlier values were not due to mistakes in collection, analysis, or reporting procedures, but rather reflect natural variability in the measurements. The outlier 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 second quarter. If the INEEL were a significant source of offsite contamination, concentrations of contaminants could be statistically greater at Boundary locations than at Distant locations. Because there is no discernable distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INEEL, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outlier and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. There were no statistical differences in gross alpha concentrations between location groups during the second quarter 2004.

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.

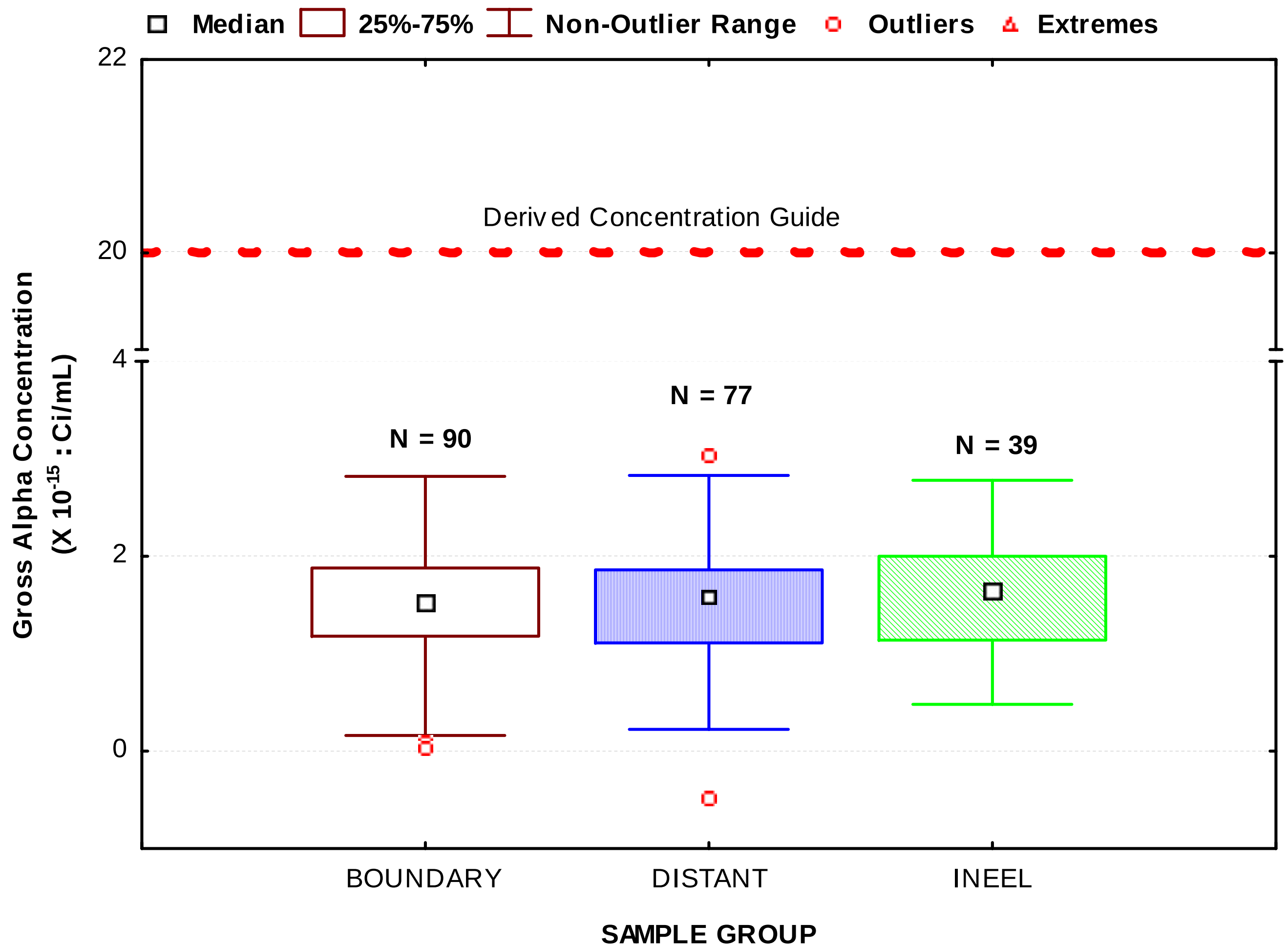

Figure 3. **Gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the second quarter of 2004.**

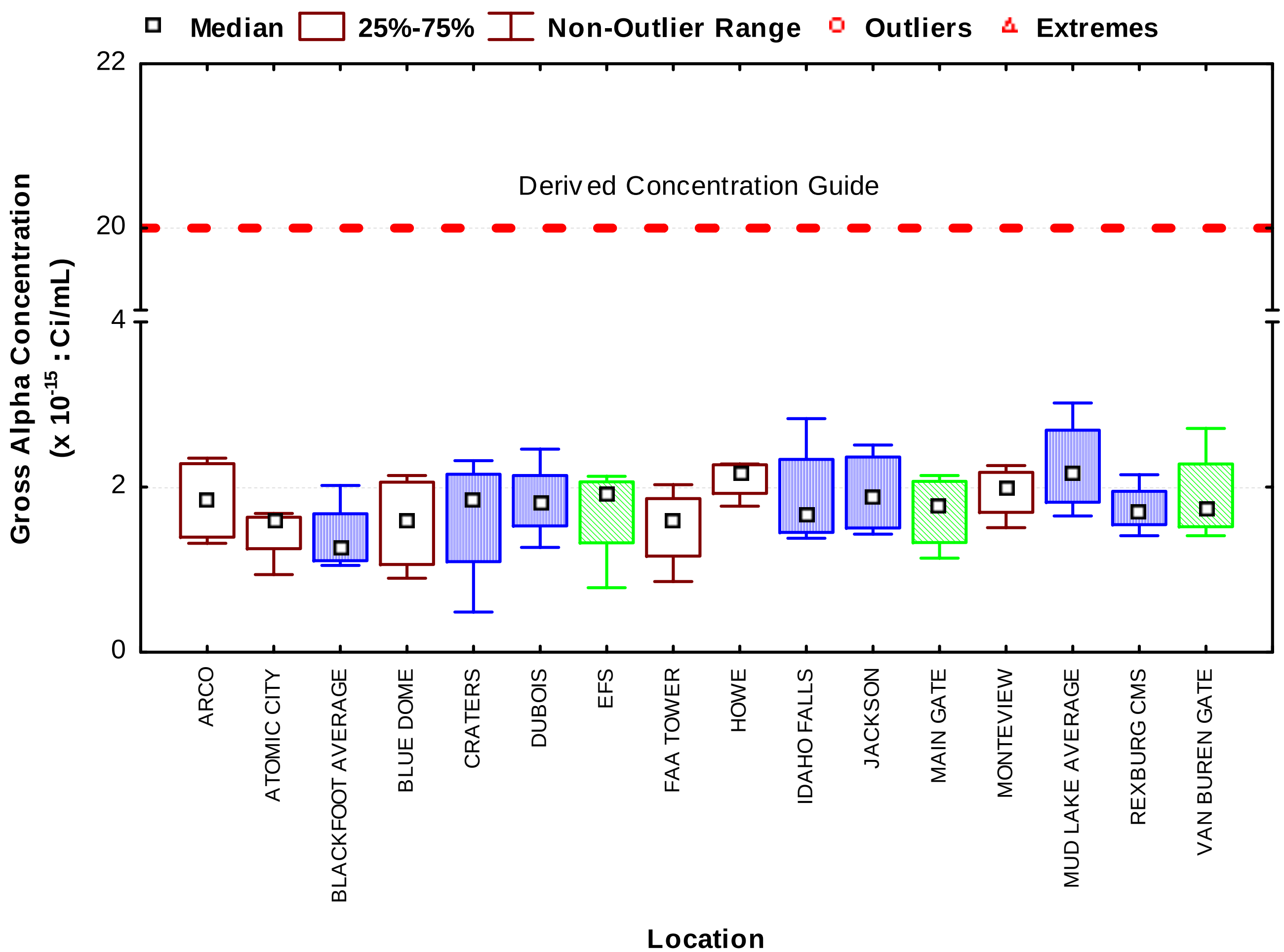

Figure 4. **April gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number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

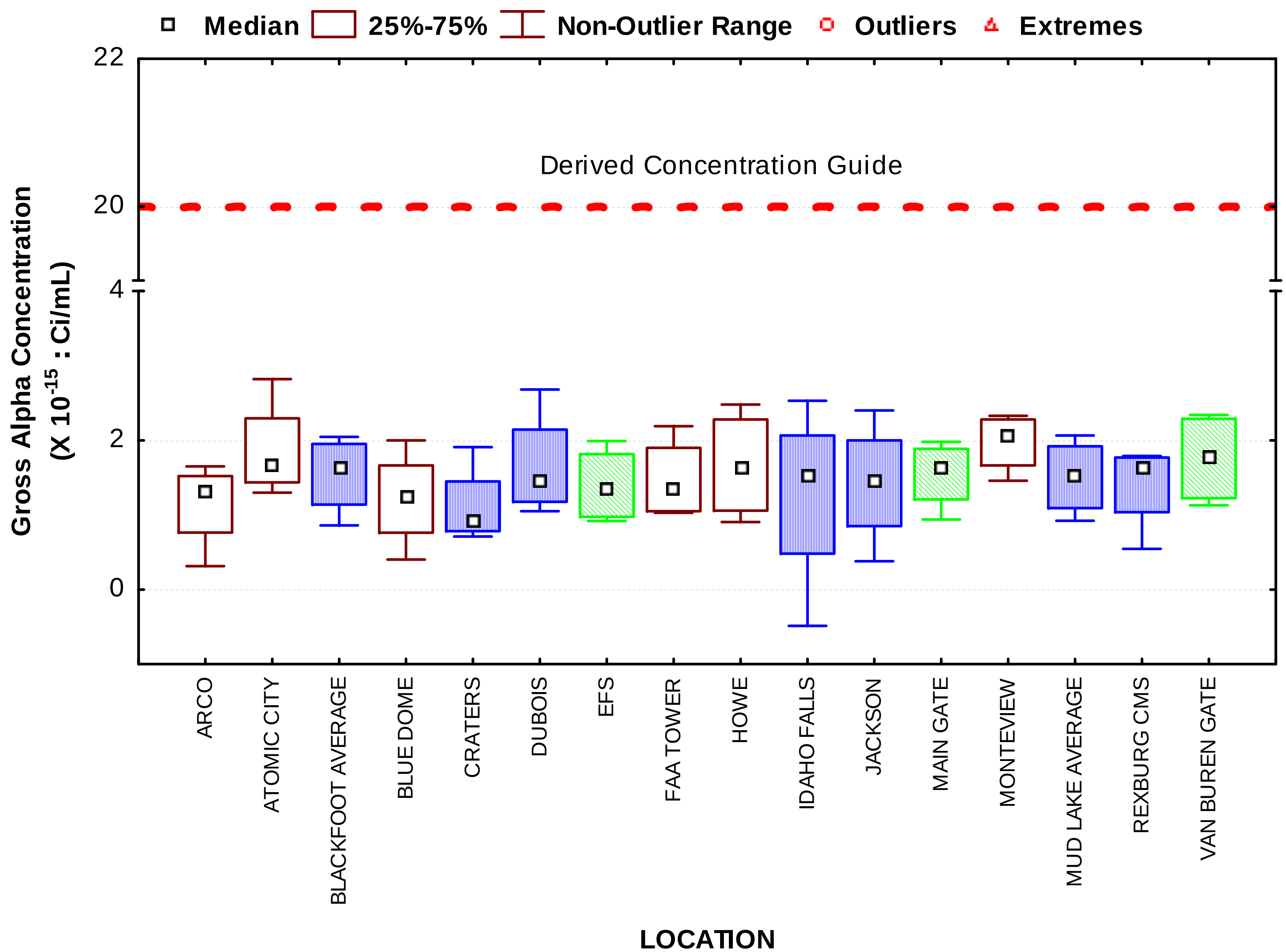

Figure 5. **May gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of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

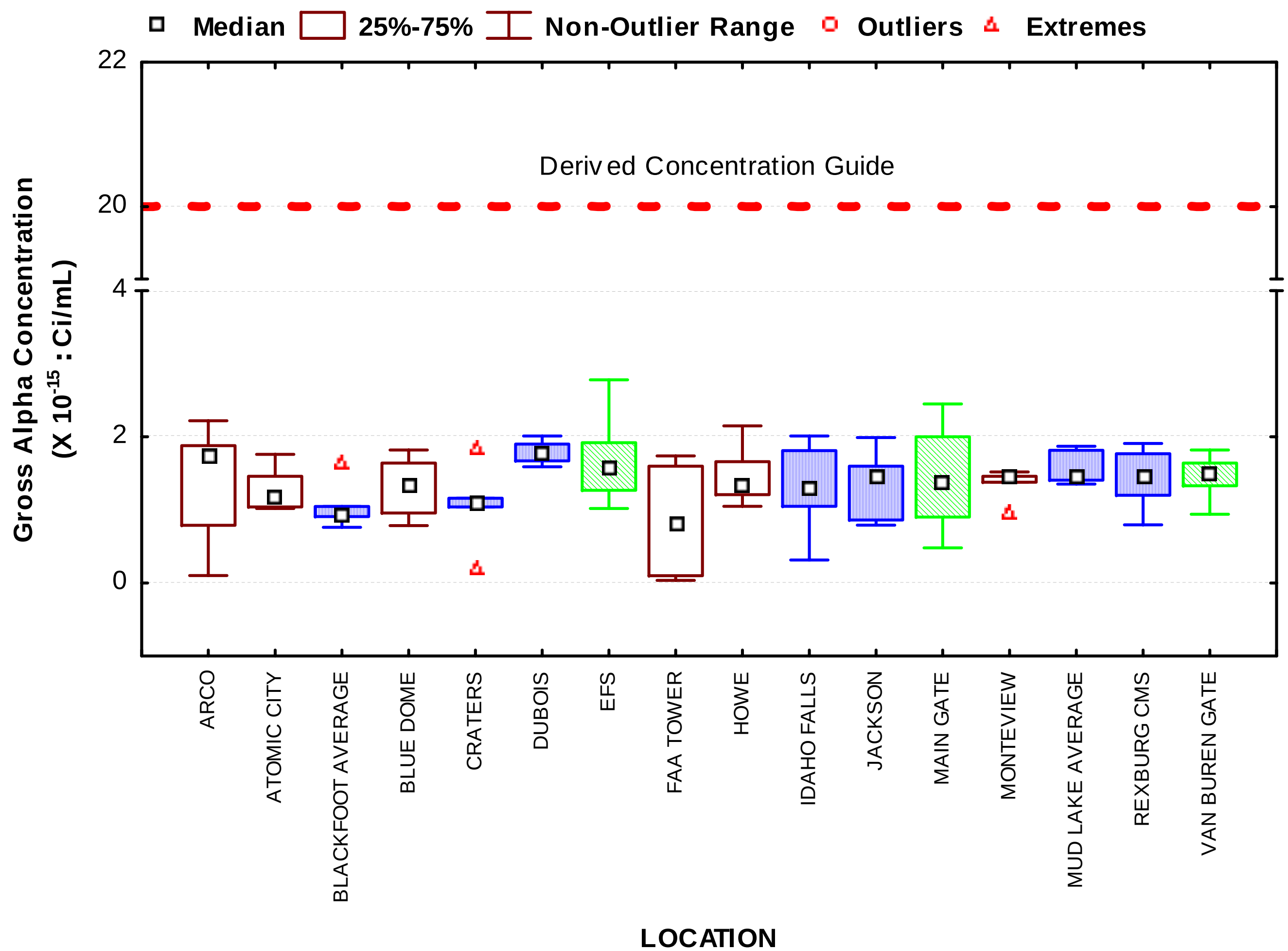

Figure 6. **June gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 at each location, except Dubois and FAA Tower where N = 4.]

There were no statistical differences in gross alpha results between groups for any month during the second quarter (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. 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 not statistically greater than those measured at Distant locations in any of the thirteen weeks of data evaluated (Table D-2). More detail on the statistical tests used can be found in Determining Statistical Differences under Helpful Information.

Gross beta results are presented in Table C-1. Gross beta concentrations in air for INEEL, Boundary, and Distant locations for the second quarter of 2004 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. Again as in the case of alpha activity, the monthly data for each group during the second quarter 2004 appear to be similar and were determined using the Kruskal-Wallace test to be statistically the same (Table D-1). Comparison of weekly Boundary and Distant data sets, using the Mann Whitney U test, also showed no statistical difference between Boundary and Distant measurements.

No ^{131}I was detected in any of the charcoal cartridge batches collected during the second quarter of 2004. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C Gamma spectrographic analysis is also done with the ^{131}I analysis. Cesium-137 was detected in 43 of the 235 measured cartridges.

Weekly filters for the second quarter of 2004 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs. Composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. Only ^{241}Am (two samples) and $^{239/240}$Pu (one sample) were detected in any quarterly composited sample. Americium-241 was detected in the composite samples from FAA Tower and the Rexburg CMS. Plutonium-239/240 was also detected in the Rexburg CMS sample. It is not uncommon to detect these compounds, especially at the CMS stations as agricultural activities in the area resuspend particles associated with historic above ground weapons testing. The maximum concentration of ^{241}Am was from FAA Tower of $(5.63 \pm 1.70) \times 10^{-18}$ µCi/mL ($[2.08 \pm 0.63] \times 10^{-13}$ Bq/mL) is below the DOE DCG for ^{241}Am of 2×10^{-14} µCi/mL (7.4×10^{-10} Bq/mL). The $^{239/240}$Pu concentration of $(2.12 \pm 0.38) \times 10^{-17}$ µCi/mL ($[7.84 \pm 1.41] \times 10^{-13}$ Bq/mL) was also below the DCG value of 2×10^{-14} µCi/mL (7.4×10^{-10} Bq/mL). All results for composite filter samples are shown in Table C-3, Appendix C.

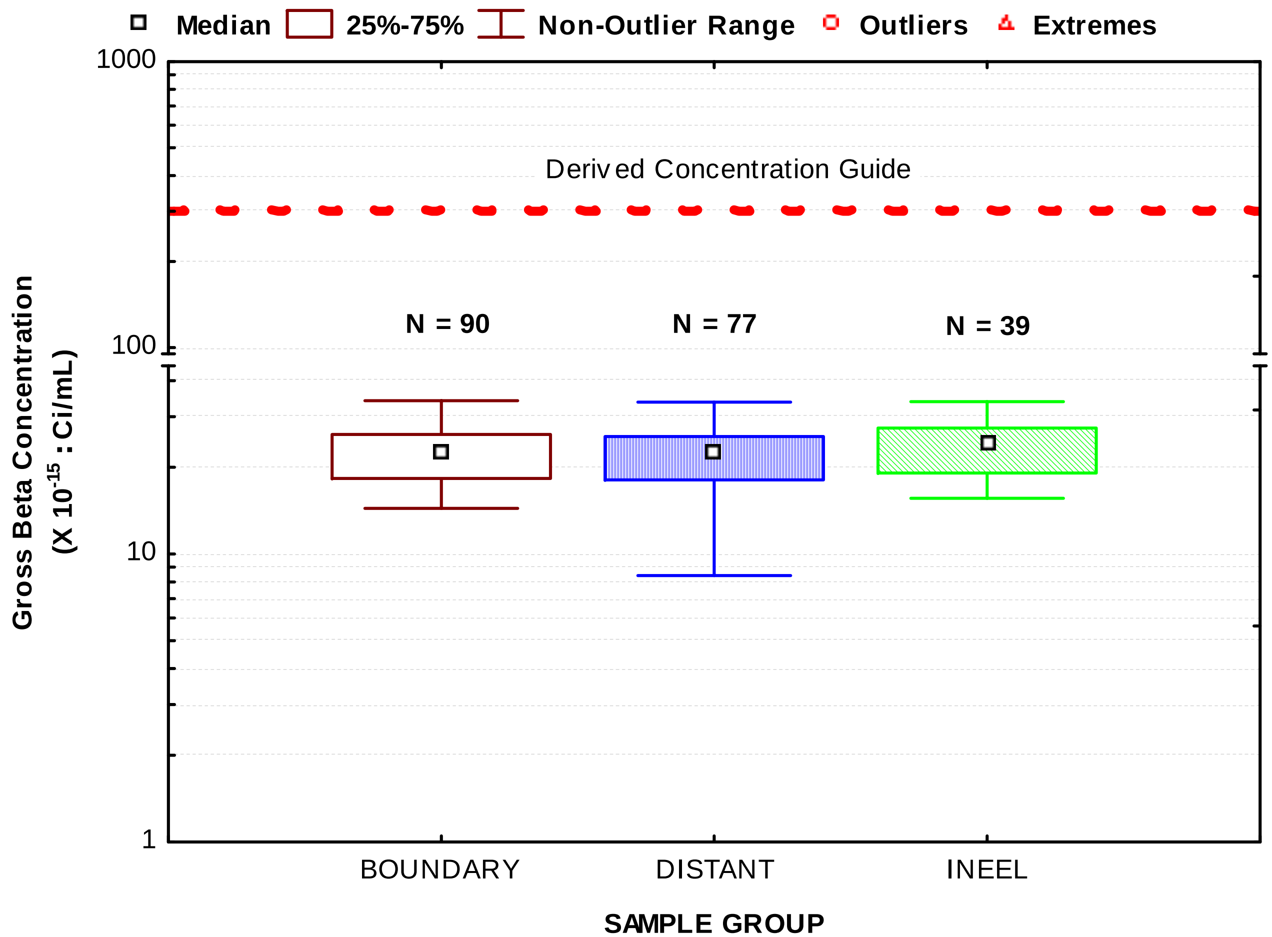

Figure 7. **Gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the second quarter 2004.**

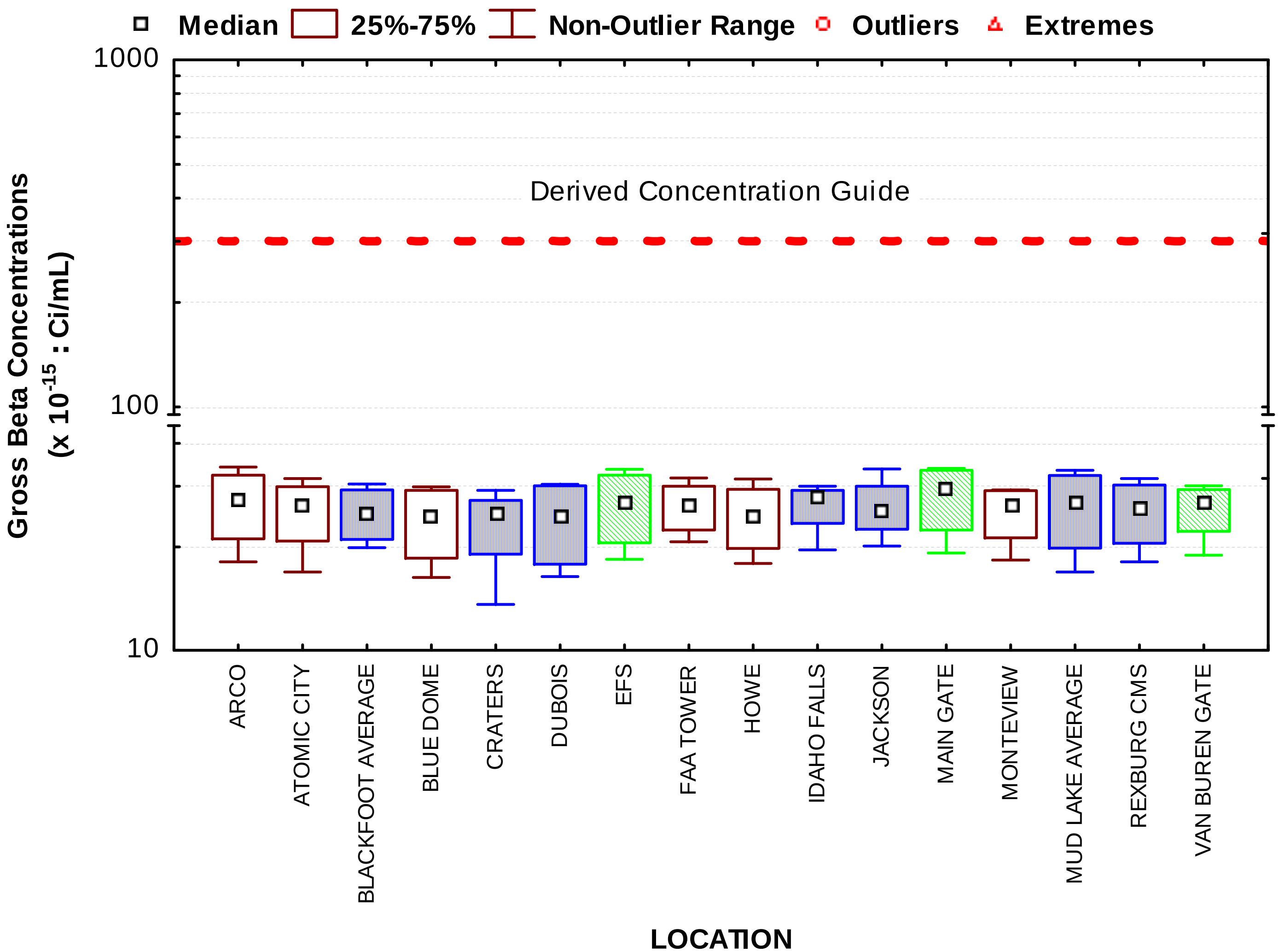

Figure 8. **April gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 4 at each location.]

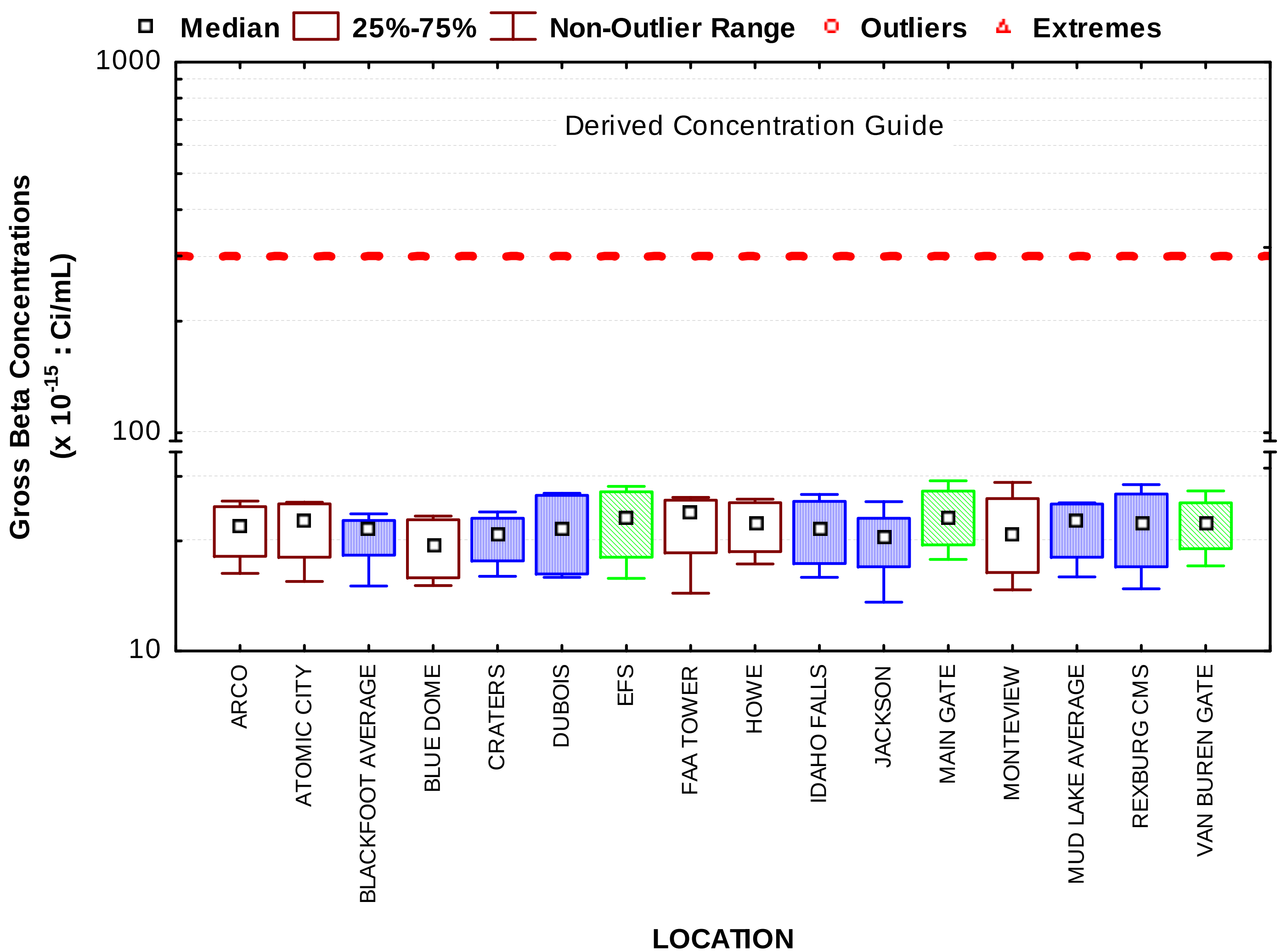

Figure 9. **May gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of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

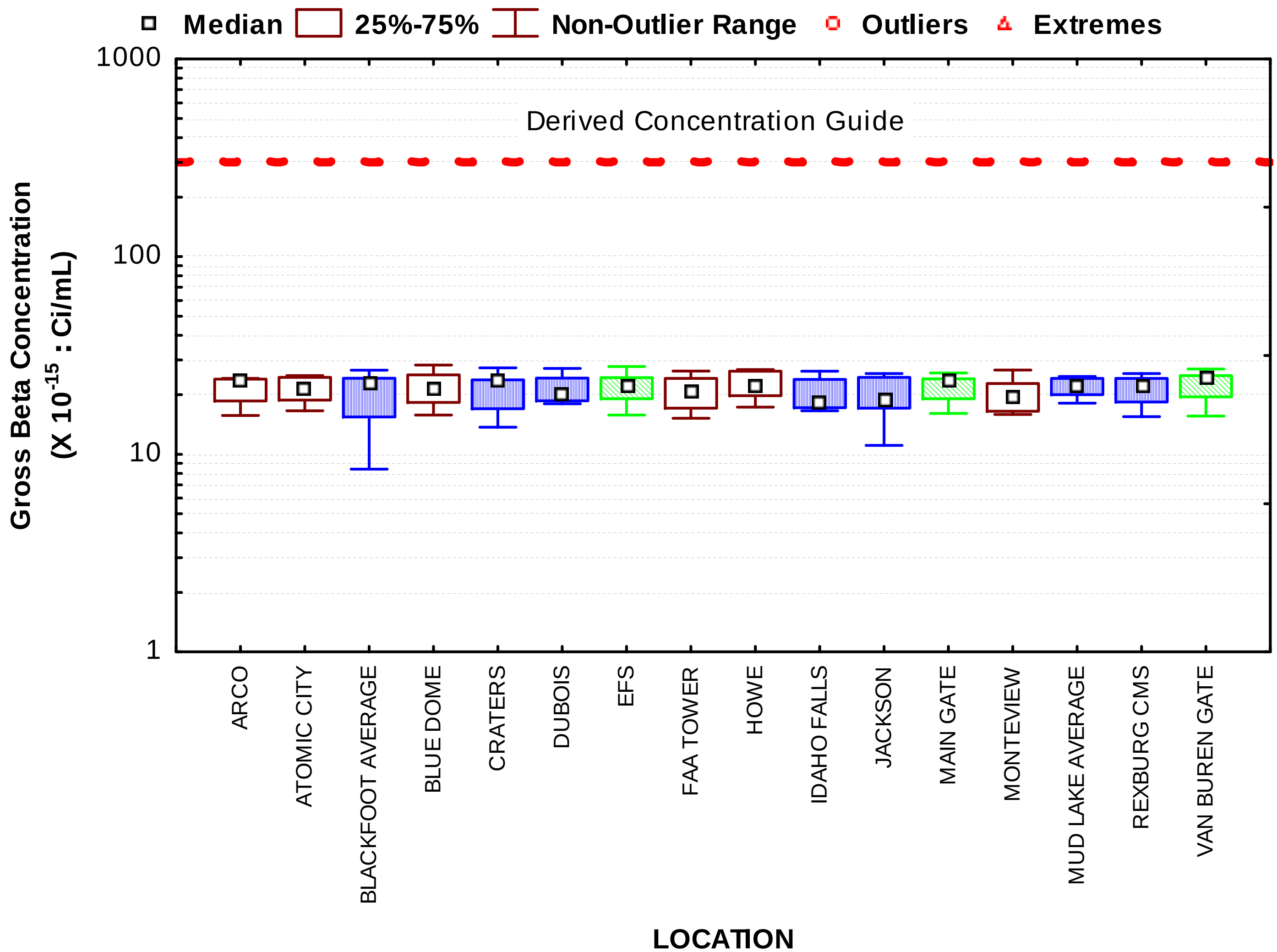

Figure 10. June gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 at each location, except Dubois and FAA Tower where N = 4.]

ATMOSPHERIC MOISTURE SAMPLING

Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., silica gel or molecular sieve material) to absorb water vapor. The water is then extracted from the absorbent material by heat distillation. The resulting water samples are then analyzed for tritium using liquid scintillation. Sixteen atmospheric moisture samples were obtained during the second quarter of 2004 from Atomic City, Blackfoot CMS, Idaho Falls, and Rexburg CMS.

Four samples exceeded the 3s uncertainty level for tritium (one silica gel and three molecular sieve). Samples from the Blackfoot CMS, Idaho Falls and the Rexburg CMS were all collected around mid May. Another sample from Idaho Falls was collected at the beginning of April. The maximum concentration of $(6.7 \pm 1.8) \times 10^{-13}$ $\mu Ci/mL_{air}$ ($[2.48 \pm 0.67] \times 10^{-9}$ Bq/mL) from Idaho Falls in May is well below the DOE DCG for tritium in air of 1×10^{-7} µCi/mL (3.7×10^{-3} Bq/mL). All three results from May were within the same range. All results are shown in Table C-4.

PM_{10} AIR SAMPLING

The EPA began using a standard for concentrations of airborne particulate matter (PM) less than 10 micrometers in diameter (PM_{10}) in 1987 (40 CFR 50.6 [CFR 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 $\mu g/m^3$, with a maximum 24-hour concentration of 150 $\mu g/m^3$.

The ESER Program operates three PM_{10} particulate samplers, one each at the Rexburg CMS and Blackfoot CMS, and one in Atomic City. Sampling of PM_{10} is informational only as no chemical analyses are conducted for contaminants. A twenty-four hour sampling period is scheduled to run once every six days. The maximum 24-hour particulate concentration was 45.98 $\mu g/m^3$ on May 8, 2004, at the Rexburg CMS. The average, maximum, and minimum results of the 24-hour samples are shown are shown in Table 1. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

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

	Concentration[a]		
Location	**Minimum**	**Maximum**	**Average**
Atomic City	0.00	26.54	13.05
Blackfoot, CMS	1.47	39.32	17.58
Rexburg, CMS	6.69	45.98	

a. All concentrations are in ($\mu Ci/m^3$).

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. The results of the second quarter sampling are reported here.

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 20 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the second quarter of 2004 produced sufficient precipitation to yield only three samples – one from Idaho Falls, and two from the EFS.

No tritium was measured above the 3s value in any of the samples collected during the second quarter 2004. Data for all second quarter 2004 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

DRINKING WATER

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

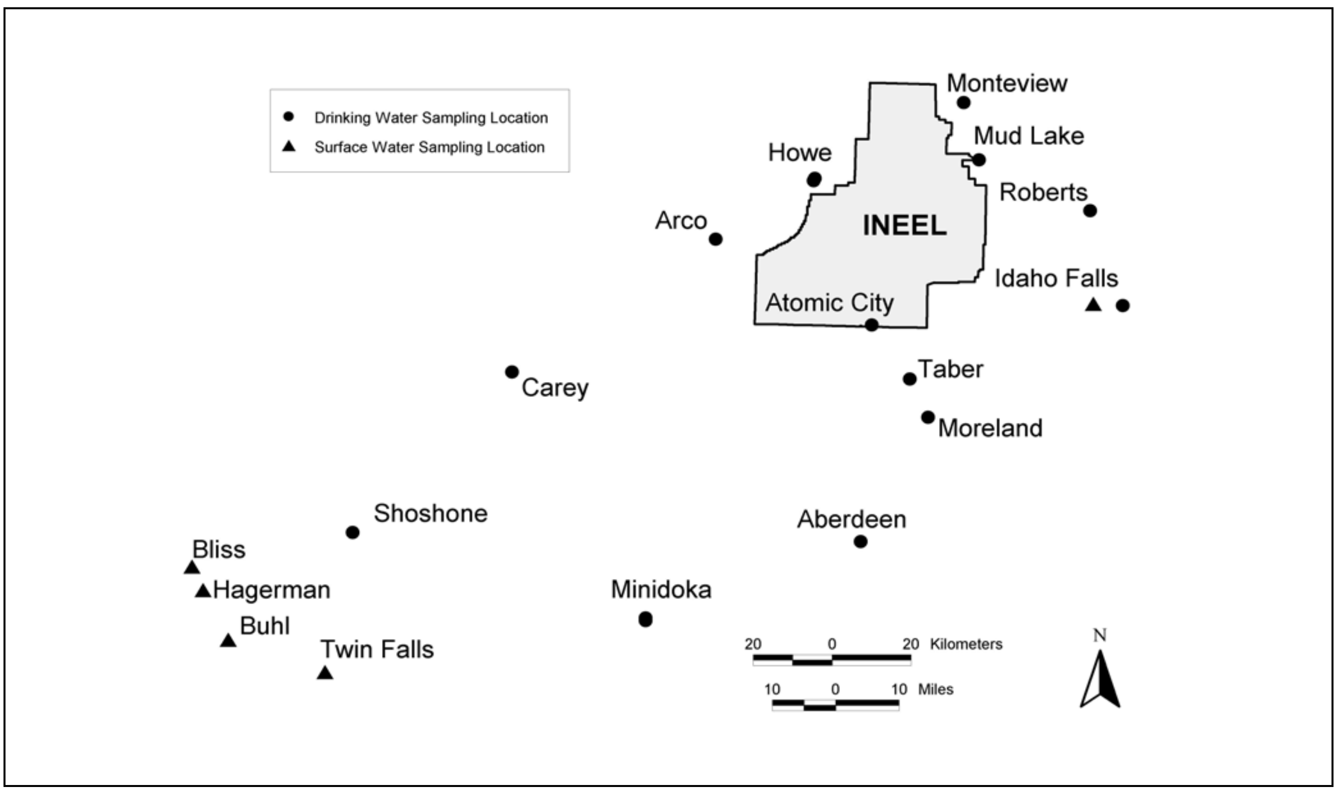

Figure 11. Drinking and Surface Water Sampling locations.

One of the samples exceeded the 3s value for gross alpha, and two others for tritium. It is not unusual to detect these constituents in water of the Snake River Plain. They tend to be related to natural production from the basalts that make up the aquifer. The sample from Idaho Falls had a gross alpha concentration of 4.58 ± 1.46 pCi/L which is below the EPA and DOE limits for tritium in drinking water of 15 pCi/L (0.56 Bq/L) and 30 pCi/L (1.11 Bq/L), respectively. Tritium concentrations ranged from 0.78 ± 0.25 pCi/L (0.03 ± 0.01 Bq/L) at Tabor to 0.97 ± 0.30 pCi/L (0.04 ± 0.01 Bq/L) at Howe. Both values are well below the EPA limit of 20,000 pCi/L (740 Bq/L) and the DOE DCG of 2.0 x 10^6 pCi/L (74,074 Bq/L).

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

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

	Sample Results[a]	Limits for Comparison[a]	
Location	**Result ± 1s**	**SDWA[b]**	**DOE DCG[c]**
Gross Alpha			
Idaho Falls	4.58 ± 1.46	8	30
Tritium			
Howe	0.97 ± 0.30	20,000	2 x 10^6
Tabor	0.78 ± 0.25	20,000	2 x 10^6
Gross Beta			
Aberdeen	5.80 ± 0.99	50	100
Arco	2.36 ± 0.85	50	100
Atomic City	3.00 ± 0.85	50	100
Fort Hall	7.85 ± 1.06	50	100
Idaho Falls	4.92 ± 0.95	50	100
Minidoka	3.22 ± 0.89	50	100
Monteview	5.17 ± 0.93	50	100
Mud Lake	3.69 ± 0.93	50	100
Mud Lake (duplicate)	3.77 ± 0.86	50	100
Shoshone	3.47 ± 0.88	50	100
Tabor	3.99 ± 0.97	50	100

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

SURFACE WATER

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

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

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

		Limits for Comparison[a]	
Location	**Result ± 1s**	**SDWA**	**DOE DCG**
Bliss	4.65 ± 0.93	50	100
Buhl	4.89 ± 0.94	50	100
Hagerman	4.25 ± 0.89	50	100
Twin Falls	6.94 ± 1.04	50	100

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

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

5. AGRICULTURAL PRODUCT AND WILDLIFE SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, 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, and large game sampled during the second quarter of 2004.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL (Figure 12) during the second quarter of 2004. All samples were analyzed for gamma emitting radionuclides. Samples are analyzed for ^{90}Sr and tritium during the second and fourth quarters.

Iodine-131 (^{131}I) and ^{137}Cs were not detected in any milk sample during the second quarter. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-8.

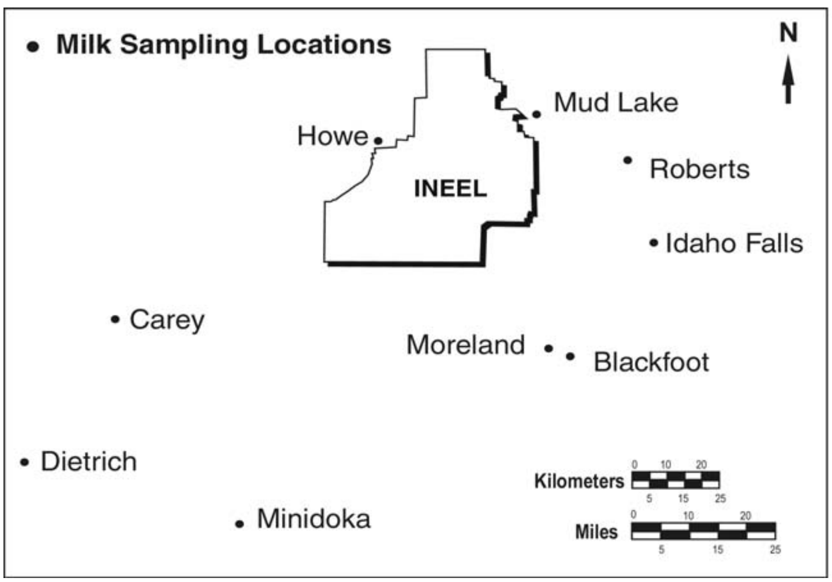

Figure 12. ESER Program milk sampling locations.

Strontium-90 was measured above the 3s uncertainty level in one of five samples analyzed. Strontium-90 is related to uptake through the food chain of historical weapons derived fallout. The maximum level of ^{90}Sr in milk measured in the Idaho Falls sample collected on May 4, was below the EPA MCL of 8 pCi/L (0.30 Bq/L) and the DOE DCG of 1000 pCi/L. Data for ^{90}Sr in milk samples are listed in Appendix C, Table C-8.

Tritium was not detected in any milk sample analyzed.

SHEEP SAMPLING

Certain areas of the INEEL are open to grazing under lease agreements managed by the Bureau of Land Management (Figure 13). Every year ESER Program personnel collect samples of sheep that have grazed on these leased areas, either just before or shortly after the sheep leave the INEEL. This occurs during the second quarter of the year. For the calendar year 2004, sheep were collected from the selected INEEL allotments before they were moved off site. Three flocks were sampled, including a control flock in Dubois from the Experimental Sheep Station, a flock from a southern INEEL allotment, and a flock from a northern INEEL allotment. Two sheep were taken from each flock for tissue analysis. Thyroid, muscle, and liver tissue were collected and analyzed for gamma emitting radionuclides.

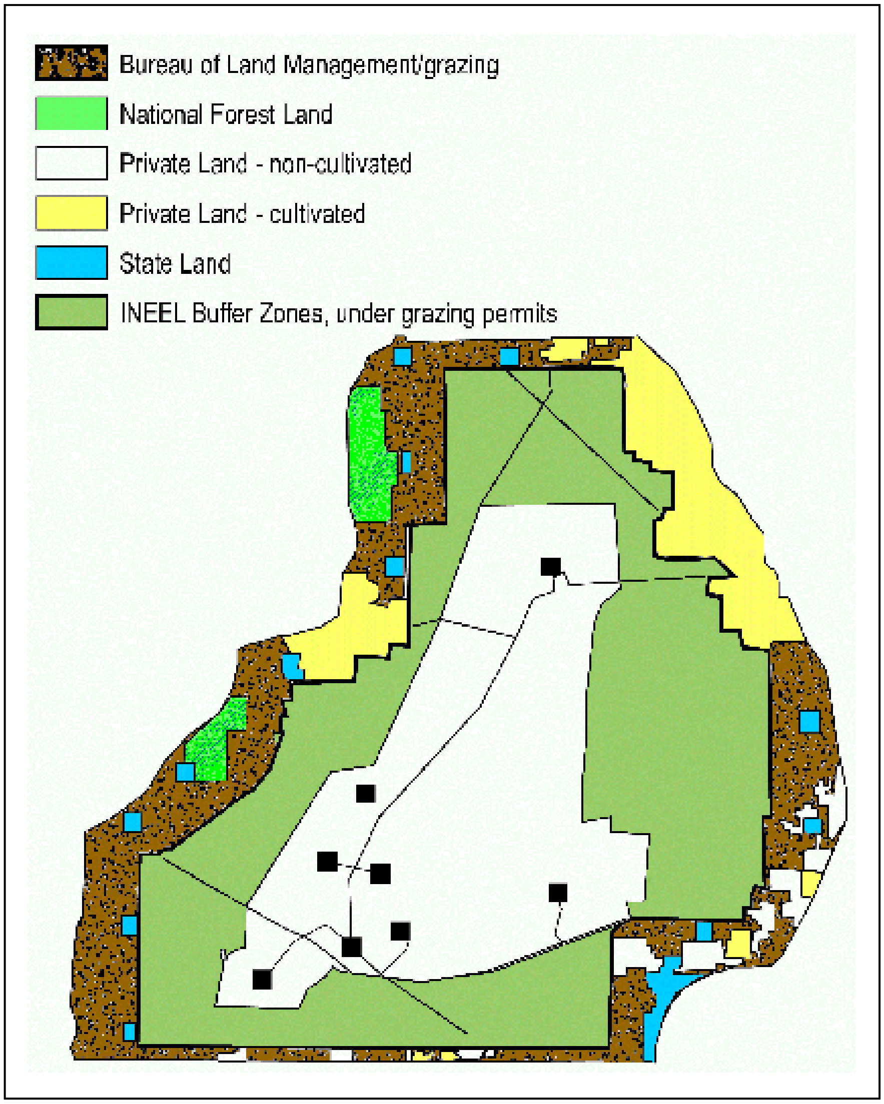

Figure 13. Grazing and land ownership on and around the INEEL.

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

Analysis for ^{137}Cs showed results greater than the 3s analytical uncertainty in three samples (one muscle and two liver) from two different sheep. Both animals were collected from the Southern allotment. All concentrations of ^{137}Cs were similar to those found in both onsite and offsite sheep samples during recent years. Data for all sheep samples are listed in Appendix C, Table C-9.

LARGE GAME ANIMAL SAMPLING

Three large game animals were sampled during the second quarter of 2004. A single pronghorn and two mule deer were both victims of vehicular collisions. No ^{131}I was detected in any of the sampled tissues. Cesium-137 was not measured in any sample collected. Data for all game animal samples are listed in Appendix C, Table C-10.

6. ENVIRONMENTAL RADIATION

An array of thermoluminescent dosimeters (TLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation (Figure 14). TLDs are changed out in May and again in November after six months in the field. The results of the spring sampling of TLDs exposed from November 2003 to May 2004) are discussed below.

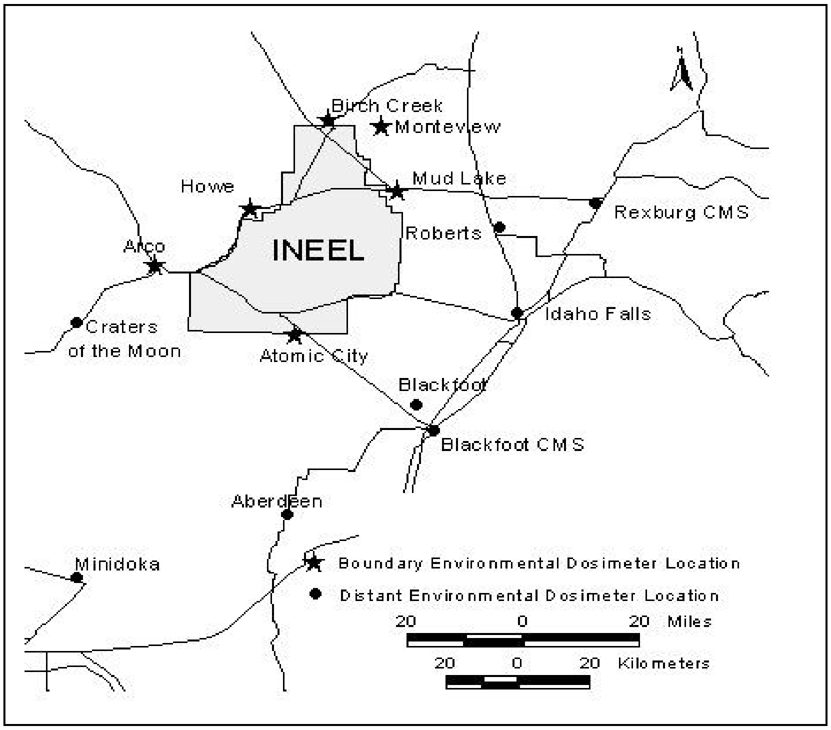

Figure 14. TLD sampling locations.

Similar to the low-volume air results the environmental dosimeter locations are also divided into Boundary and Distant groupings. Boundary average exposure rates ranged from a low of 0.29 mR/day at Blue Dome to a high of 0.37 mR/day at Atomic City. The overall Boundary average was 0.34 mR/day. The Distant group had a high of 0.38 mR/day at the Rexburg CMS and a low of 0.27 mR/day at the Jackson, Wyoming location. The overall average Distant value was 0.33 mR/day. There was no statistical difference between Boundary and Distant locations. Furthermore, all values are consistent with past readings. Table 4 lists the range and average for both groups over a six-month period. All results are listed in Appendix C, Table C-11.

Table 4. TLD Exposures from December 2003 to May 2004.

	Total Exposure[a]	
Location	**Boundary**	**Distant**
Average	61.1	59.6
Maximum	67.8	68.0
Minimum	52.5	49.3

a All values shown are in milliRoentgens (mR).

7. QUALITY ASSURANCE

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

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

The following discussion briefly summarizes the results of the quality assurance program for the period from April 1 to June 30, 2004.

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 average 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 5.

DATA COMPLETENESS

The Quality Assurance Project Plan (QAPP) specifies a 98 percent completeness goal for all regularly scheduled sample types (Stoller 2004). Data completeness for sample collection and delivery was 100 percent during the second quarter for all sample types with one exception: a number of precipitation samples were not collected due to lack of precipitation.

Two air samples were determined to invalid due to insufficient volume collected because of equipment failure (Dubois on June 30 and FAA Tower on June 23). The completeness of air filter data is thus considered to be 99.2%.

DATA PRECISION

Data 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.

SUMMARY

In summary the quality assurance and data quality objectives for analyses were met in the fourth quarter of 2004 with the following exceptions:

- The FAA Tower air samples for the week ending June 23 and the June 30 air samples from Dubois were invalid due to insufficient volume collected;
- ^{131}I in charcoal cartridges;

- ^{241}Am and ^{90}Sr in quarterly composites;
- Gross alpha and tritium in drinking and surface water;
- ^{90}Sr in milk.

Table 5. Analytical results determined to be unacceptable.

Media	Radionuclide	Number Unacceptable[a]
Air	Gross alpha	41 / 384[b]
filters and cartridges	Gross beta	2 / 381
	Cesium-137	18 / 662
	Iodine-131	517 / 662
	Americium-141	9 / 20
	Plutonium-238	0 / 20
	Plutonium-239/40	0 / 20
	Strontium-90	3 / 9
moisture in air	Tritium	0 / 21
Precipitation	Tritium	0 / 10
Drinking Water	Gross alpha	18 / 21
	Gross beta	0 / 21
	Tritium	17 / 17
Surface Water	Gross alpha	8 / 9
	Gross beta	0 / 6
	Tritium	9 / 9
Milk	Cesium-137	0 / 41
	Iodine-131	0 / 39
	Strontium-90	4 / 5
	Tritium	0 / 7
Sheep	Cesium-137	3 / 24[c]
	Iodine-131	9 / 51[c]
Game Animals	Cesium-137	1 / 3[c]
	Iodine-131	7 / 27[c]

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.

c. Unacceptable results are all associated with thyroids. Results are affected by small sample size.

8. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INEEL
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
^{90}Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	4 to 13 weeks	Blackfoot, Idaho Falls, Rexburg	Atomic City	None
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	CFA
Tritium	weekly	None	None	EFS
PM-10				
Particulate Mass	every 6th day	Rexburg, Blackfoot	Atomic City	None
WATER SAMPLING				
SURFACE WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Twin Falls, Buhl, Hagerman, Idaho Falls, Bliss	None	None
DRINKING WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Aberdeen, Carey, 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, Howe, Monteview, Mud Lake, Birch Creek	None
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INEEL
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	N. INEEL (Circular Butte), S. INEEL (Tractor Flats)
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Heise, Fort Hall, Mud Lake and Market Lake	None	Waste disposal ponds
Marmots				
Gamma Spec	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 Second quarter 2004

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	8.27×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.65×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	8.42×10^{-18} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	2.65×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}Pu$	2.43×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	2.39×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	8.25×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	9.72×10^{-16} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	7.98×10^{-15} $\mu Ci/mL_{wat}$	1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	1.08×10^{-7} µCi/mL	2×10^{-3} µCi/mL
Drinking Water	Gross Alpha	1.29 pCi/L	30 pCi/L
	Gross Beta	2.54 pCi/L	100 pCi/L
	^{3}H	102.54 pCi/L	2×10^{6} pCi/L
Surface Water	Gross Alpha	1.29 pCi/L	30 pCi/L
	Gross Beta	2.73 pCi/L	100 pCi/L
	^{3}H	95.85 pCi/L	2×10^{6} pCi/L
Milk	^{131}I	0.68 pCi/L	--
	^{137}Cs	3.30 pCi/L	--
	^{90}Sr	0.96 pCi/L	--
Potatoes	^{137}Cs	2.08 pCi/kg	--
	^{90}Sr	288.0 pCi/kg	--
Game Animal Tissue[g]	^{137}Cs	39.65 pCi/kg	--
	^{131}I	39.65 pCi/kg	--

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Sheep	^{137}Cs	23.72 µCi/kg	--
	^{131}I	23.62 µCi/kg	--
Waterfowl	^{141}Cm	48.6 pCi/kg	--
	^{137}Cs	25.1 pCi/kg	--
	^{60}Co	3.00 pCi/kg	--
	^{95}Nb	38.6 pCi/kg	--
	$^{239/240}Pu$	5.07 pCi/kg	--
	^{90}Sr	14.2 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 The approximate MDC assumes a sample size of 500 g.

APPENDIX C

SAMPLE ANALYSIS RESULTS

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 2s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
BOUNDARY							
ARCO	04/07/2004	2.35 ± 0.43	8.70 ± 1.58	Y	34.10 ± 1.18	12.62 ± 0.44	Y
	04/14/2004	2.22 ± 0.47	8.21 ± 1.74	Y	30.50 ± 1.25	11.29 ± 0.46	Y
	04/21/2004	1.32 ± 0.32	4.88 ± 1.17	Y	18.10 ± 0.83	6.70 ± 0.31	Y
	04/28/2004	1.47 ± 0.36	5.44 ± 1.34	Y	24.10 ± 1.06	8.92 ± 0.39	Y
	05/05/2004	1.65 ± 0.35	6.11 ± 1.28	Y	23.90 ± 0.96	8.84 ± 0.36	Y
	05/12/2004	1.21 ± 0.39	4.48 ± 1.46	Y	25.70 ± 1.14	9.51 ± 0.42	Y
	05/19/2004	1.39 ± 0.30	5.14 ± 1.12	Y	20.00 ± 0.86	7.40 ± 0.32	Y
	05/26/2004	0.32 ± 0.30	1.17 ± 1.11		16.30 ± 0.94	6.03 ± 0.35	Y
	06/02/2004	0.10 ± 0.40	0.37 ± 1.48		15.70 ± 1.00	5.81 ± 0.37	Y
	06/09/2004	0.79 ± 0.53	2.92 ± 1.97		24.20 ± 1.26	8.95 ± 0.47	Y
	06/16/2004	1.72 ± 0.34	6.36 ± 1.27	Y	18.60 ± 0.89	6.88 ± 0.33	Y
	06/23/2004	1.88 ± 0.55	6.96 ± 2.05	Y	24.00 ± 1.25	8.88 ± 0.46	Y
	06/30/2004	2.22 ± 0.52	8.21 ± 1.94	Y	23.80 ± 1.17	8.81 ± 0.43	Y
ATOMIC CITY	04/07/2004	1.59 ± 0.38	5.88 ± 1.40	Y	28.25 ± 1.09	10.45 ± 0.40	Y
	04/14/2004	1.68 ± 0.43	6.22 ± 1.60	Y	31.60 ± 1.26	11.69 ± 0.47	Y
	04/21/2004	0.94 ± 0.28	3.48 ± 1.04	Y	16.90 ± 0.78	6.25 ± 0.29	Y
	04/28/2004	1.57 ± 0.34	5.81 ± 1.27	Y	24.70 ± 1.00	9.14 ± 0.37	Y
	05/05/2004	1.30 ± 0.34	4.81 ± 1.25	Y	25.50 ± 1.02	9.44 ± 0.38	Y
	05/12/2004	2.82 ± 0.49	10.43 ± 1.79	Y	25.00 ± 1.12	9.25 ± 0.41	Y
	05/19/2004	1.77 ± 0.32	6.55 ± 1.17	Y	20.60 ± 0.85	7.62 ± 0.31	Y
	05/26/2004	1.57 ± 0.43	5.81 ± 1.59	Y	15.50 ± 1.01	5.74 ± 0.37	Y
	06/02/2004	1.18 ± 0.54	4.37 ± 2.00		16.60 ± 1.15	6.14 ± 0.43	Y
	06/09/2004	1.46 ± 0.70	5.40 ± 2.59		25.00 ± 1.51	9.25 ± 0.56	Y
	06/16/2004	1.76 ± 0.37	6.51 ± 1.38	Y	18.80 ± 0.97	6.96 ± 0.36	Y
	06/23/2004	1.04 ± 0.57	3.85 ± 2.10		21.30 ± 1.33	7.88 ± 0.49	Y
	06/30/2004	1.02 ± 0.48	3.77 ± 1.78		24.50 ± 1.24	9.07 ± 0.46	Y
BLUE DOME	04/07/2004	2.14 ± 0.35	7.92 ± 1.31	Y	29.90 ± 0.97	11.06 ± 0.36	Y
	04/14/2004	1.98 ± 0.36	7.33 ± 1.33	Y	28.50 ± 0.99	10.55 ± 0.37	Y
	04/21/2004	0.90 ± 0.26	3.31 ± 0.97	Y	16.30 ± 0.74	6.03 ± 0.27	Y
	04/28/2004	1.23 ± 0.28	4.55 ± 1.04	Y	20.80 ± 0.83	7.70 ± 0.31	Y
	05/05/2004	2.00 ± 0.33	7.40 ± 1.23	Y	22.30 ± 0.86	8.25 ± 0.32	Y
	05/12/2004	1.33 ± 0.38	4.92 ± 1.41	Y	23.40 ± 1.05	8.66 ± 0.39	Y
	05/19/2004	1.12 ± 0.26	4.14 ± 0.95	Y	16.60 ± 0.74	6.14 ± 0.27	Y
	05/26/2004	0.40 ± 0.22	1.49 ± 0.82		15.10 ± 0.71	5.59 ± 0.26	Y
	06/02/2004	0.96 ± 0.39	3.54 ± 1.44		15.80 ± 0.88	5.85 ± 0.33	Y
	06/09/2004	1.64 ± 0.62	6.07 ± 2.29		28.30 ± 1.40	10.47 ± 0.52	Y
	06/16/2004	1.82 ± 0.32	6.73 ± 1.20	Y	18.30 ± 0.83	6.77 ± 0.31	Y
	06/23/2004	1.33 ± 0.43	4.92 ± 1.58	Y	21.60 ± 1.03	7.99 ± 0.38	Y
	06/30/2004	0.79 ± 0.57	2.90 ± 2.11		25.20 ± 1.47	9.32 ± 0.54	Y
FAA TOWER	04/07/2004	1.47 ± 0.40	5.44 ± 1.47	Y	28.30 ± 1.15	10.47 ± 0.43	Y
	04/14/2004	1.69 ± 0.42	6.25 ± 1.55	Y	31.70 ± 1.22	11.73 ± 0.45	Y
	04/21/2004	0.86 ± 0.34	3.17 ± 1.27		20.70 ± 1.00	7.66 ± 0.37	Y
	04/28/2004	2.03 ± 0.36	7.51 ± 1.31	Y	24.10 ± 0.95	8.92 ± 0.35	Y
	05/05/2004	1.61 ± 0.40	5.96 ± 1.49	Y	25.40 ± 1.14	9.40 ± 0.42	Y
	05/12/2004	2.19 ± 0.45	8.10 ± 1.65	Y	26.30 ± 1.13	9.73 ± 0.42	Y
	05/19/2004	1.07 ± 0.31	3.96 ± 1.15	Y	22.70 ± 0.99	8.40 ± 0.37	Y
	05/26/2004	1.03 ± 0.37	3.81 ± 1.37		14.40 ± 0.94	5.33 ± 0.35	Y
	06/02/2004	0.04 ± 0.49	0.13 ± 1.80		15.20 ± 1.15	5.62 ± 0.43	Y
	06/09/2004	0.16 ± 0.55	0.60 ± 2.03		22.00 ± 1.32	8.14 ± 0.49	Y
	06/16/2004	1.46 ± 0.33	5.40 ± 1.23	Y	19.00 ± 0.91	7.03 ± 0.34	Y
	06/23/2004	40.50 ± 11.60	149.85 ± 42.92	Y	190.00 ± 20.20	70.30 ± 7.47	Y
	06/30/2004	1.74 ± 0.55	6.44 ± 2.04	Y	26.40 ± 1.33	9.77 ± 0.49	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL			GROSS ALPHA Result ± 2s Uncertainty x 10^{-11} Bq/mL			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s
HOWE	04/07/2004	2.28	±	0.39	8.44	±	1.44	Y	27.30	±	1.01	10.10	±	0.37	Y
	04/14/2004	2.08	±	0.41	7.70	±	1.51	Y	31.50	±	1.13	11.66	±	0.42	Y
	04/21/2004	1.77	±	0.36	6.55	±	1.34	Y	17.90	±	0.87	6.62	±	0.32	Y
	04/28/2004	2.26	±	0.39	8.36	±	1.42	Y	21.70	±	0.96	8.03	±	0.35	Y
	05/05/2004	2.08	±	0.37	7.70	±	1.38	Y	24.90	±	0.98	9.21	±	0.36	Y
	05/12/2004	2.48	±	0.44	9.18	±	1.64	Y	26.00	±	1.08	9.62	±	0.40	Y
	05/19/2004	1.21	±	0.29	4.48	±	1.06	Y	20.10	±	0.85	7.44	±	0.32	Y
	05/26/2004	0.91	±	0.30	3.35	±	1.09	Y	17.30	±	0.84	6.40	±	0.31	Y
	06/02/2004	1.21	±	0.41	4.48	±	1.52		17.30	±	0.92	6.40	±	0.34	Y
	06/09/2004	1.66	±	0.68	6.14	±	2.52		26.80	±	1.48	9.92	±	0.55	Y
	06/16/2004	2.15	±	0.35	7.96	±	1.29	Y	19.80	±	0.86	7.33	±	0.32	Y
	06/23/2004	1.34	±	0.57	4.96	±	2.10		22.30	±	1.31	8.25	±	0.48	Y
	06/30/2004	1.05	±	0.60	3.89	±	2.23		26.30	±	1.52	9.73	±	0.56	Y
MONTEVIEW	04/07/2004	2.26	±	0.36	8.36	±	1.34	Y	29.00	±	0.97	10.73	±	0.36	Y
	04/14/2004	2.10	±	0.38	7.77	±	1.40	Y	29.30	±	1.03	10.84	±	0.38	Y
	04/21/2004	1.51	±	0.32	5.59	±	1.17	Y	18.30	±	0.80	6.77	±	0.30	Y
	04/28/2004	1.88	±	0.38	6.96	±	1.39	Y	24.20	±	1.02	8.95	±	0.38	Y
	05/05/2004	2.23	±	0.36	8.25	±	1.32	Y	23.30	±	0.90	8.62	±	0.33	Y
	05/12/2004	2.33	±	0.66	8.62	±	2.45	Y	28.90	±	1.63	10.69	±	0.60	Y
	05/19/2004	1.87	±	0.32	6.92	±	1.17	Y	18.10	±	0.80	6.70	±	0.29	Y
	05/26/2004	1.46	±	0.31	5.40	±	1.14	Y	14.70	±	0.74	5.44	±	0.27	Y
	06/02/2004	1.38	±	0.45	5.11	±	1.65	Y	15.90	±	0.95	5.88	±	0.35	Y
	06/09/2004	1.46	±	0.49	5.40	±	1.80		26.70	±	1.15	9.88	±	0.43	Y
	06/16/2004	1.52	±	0.31	5.62	±	1.15	Y	19.70	±	0.85	7.29	±	0.32	Y
	06/23/2004	1.44	±	0.43	5.33	±	1.59	Y	16.50	±	0.94	6.11	±	0.35	Y
	06/30/2004	0.96	±	0.39	3.55	±	1.44		22.80	±	1.04	8.44	±	0.38	Y
MUD LAKE	04/07/2004	3.22	±	0.43	11.91	±	1.59	Y	35.00	±	1.09	12.95	±	0.40	Y
	04/14/2004	2.25	±	0.39	8.33	±	1.45	Y	30.70	±	1.06	11.36	±	0.39	Y
	04/21/2004	1.65	±	0.38	6.11	±	1.42	Y	16.00	±	0.90	5.92	±	0.33	Y
	04/28/2004	1.95	±	0.36	7.22	±	1.33	Y	22.70	±	0.95	8.40	±	0.35	Y
	05/05/2004	1.80	±	0.34	6.66	±	1.27	Y	25.20	±	0.95	9.32	±	0.35	Y
	05/12/2004	1.87	±	0.39	6.92	±	1.45	Y	24.80	±	1.02	9.18	±	0.38	Y
	05/19/2004	1.66	±	0.32	6.14	±	1.17	Y	21.90	±	0.88	8.10	±	0.33	Y
	05/26/2004	0.77	±	0.28	2.83	±	1.02		15.60	±	0.78	5.77	±	0.29	Y
	06/02/2004	1.79	±	0.46	6.62	±	1.71	Y	19.50	±	1.00	7.22	±	0.37	Y
	06/09/2004	0.60	±	0.53	2.23	±	1.96		25.00	±	1.29	9.25	±	0.48	Y
	06/16/2004	1.19	±	0.29	4.40	±	1.05	Y	19.70	±	0.84	7.29	±	0.31	Y
	06/23/2004	2.16	±	0.59	7.99	±	2.18	Y	25.00	±	1.31	9.25	±	0.48	Y
	06/30/2004	1.83	±	0.65	6.77	±	2.42		23.40	±	1.47	8.66	±	0.54	Y
MUD LAKE (Q/A-2)	04/07/2004	2.82	±	0.40	10.43	±	1.49	Y	31.80	±	1.03	11.77	±	0.38	Y
	04/14/2004	1.72	±	0.36	6.36	±	1.32	Y	31.50	±	1.05	11.66	±	0.39	Y
	04/21/2004	1.65	±	0.38	6.11	±	1.39	Y	17.80	±	0.91	6.59	±	0.34	Y
	04/28/2004	2.77	±	0.39	10.25	±	1.44	Y	22.80	±	0.92	8.44	±	0.34	Y
	05/05/2004	2.33	±	0.38	8.62	±	1.40	Y	24.90	±	0.96	9.21	±	0.36	Y
	05/12/2004	1.68	±	0.35	6.22	±	1.28	Y	26.00	±	0.95	9.62	±	0.35	Y
	05/19/2004	0.86	±	0.28	3.17	±	1.05	Y	18.40	±	0.89	6.81	±	0.33	Y
	05/26/2004	1.08	±	0.28	4.00	±	1.02	Y	16.30	±	0.74	6.03	±	0.27	Y
	06/02/2004	1.09	±	0.40	4.03	±	1.48		16.80	±	0.90	6.22	±	0.33	Y
	06/09/2004	2.21	±	0.49	8.18	±	1.81	Y	24.50	±	1.05	9.07	±	0.39	Y
	06/16/2004	1.52	±	0.30	5.62	±	1.11	Y	20.40	±	0.84	7.55	±	0.31	Y
	06/23/2004	1.47	±	0.47	5.44	±	1.73	Y	19.50	±	1.06	7.22	±	0.39	Y
	06/30/2004	1.91	±	0.47	7.07	±	1.74	Y	25.00	±	1.11	9.25	±	0.41	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL			Result ± 2s Uncertainty x 10^{-11} Bq/mL			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s
MUD LAKE AVERAGE	04/07/2004	3.02	±	0.20	11.17	±	0.74	Y	33.40	±	1.60	12.36	±	0.59	Y
	04/14/2004	1.99	±	0.27	7.34	±	0.98	Y	31.10	±	0.40	11.51	±	0.15	Y
	04/21/2004	1.65	±	0.00	6.11	±	0.00	Y	16.90	±	0.90	6.25	±	0.33	Y
	04/28/2004	2.36	±	0.41	8.73	±	1.52	Y	22.75	±	0.05	8.42	±	0.02	Y
	05/05/2004	2.07	±	0.27	7.64	±	0.98	Y	25.05	±	0.15	9.27	±	0.06	Y
	05/12/2004	1.78	±	0.10	6.57	±	0.35	Y	25.40	±	0.60	9.40	±	0.22	Y
	05/19/2004	1.26	±	0.40	4.66	±	1.49	Y	20.15	±	1.75	7.46	±	0.65	Y
	05/26/2004	0.92	±	0.16	3.41	±	0.58	Y	15.95	±	0.35	5.90	±	0.13	Y
	06/02/2004	1.44	±	0.35	5.33	±	1.30	Y	18.15	±	1.35	6.72	±	0.50	Y
	06/09/2004	1.41	±	0.80	5.21	±	2.97		24.75	±	0.25	9.16	±	0.09	Y
	06/16/2004	1.36	±	0.17	5.01	±	0.61	Y	20.05	±	0.35	7.42	±	0.13	Y
	06/23/2004	1.82	±	0.35	6.72	±	1.28	Y	22.25	±	2.75	8.23	±	1.02	Y
	06/30/2004	1.87	±	0.04	6.92	±	0.15	Y	24.20	±	0.80	8.95	±	0.30	Y
DISTANT												0.00		0.00	
BLACKFOOT CMS	04/07/2004	1.47	±	0.35	5.44	±	1.28	Y	26.70	±	1.00	9.88	±	0.37	Y
	04/14/2004	1.50	±	0.33	5.55	±	1.22	Y	30.90	±	1.01	11.43	±	0.37	Y
	04/21/2004	1.33	±	0.32	4.92	±	1.17	Y	18.30	±	0.83	6.77	±	0.31	Y
	04/28/2004	1.30	±	0.28	4.81	±	1.05	Y	20.60	±	0.83	7.62	±	0.31	Y
	05/05/2004	1.68	±	0.32	6.22	±	1.18	Y	20.00	±	0.84	7.40	±	0.31	Y
	05/12/2004	1.41	±	0.31	5.22	±	1.14	Y	23.80	±	0.87	8.81	±	0.32	Y
	05/19/2004	1.88	±	0.32	6.96	±	1.17	Y	20.00	±	0.82	7.40	±	0.30	Y
	05/26/2004	0.77	±	0.25	2.86	±	0.92	Y	15.50	±	0.71	5.74	±	0.26	Y
	06/02/2004	0.41	±	0.37	1.53	±	1.37		14.50	±	0.89	5.37	±	0.33	Y
	06/09/2004	1.17	±	0.42	4.33	±	1.56		24.50	±	1.03	9.07	±	0.38	Y
	06/16/2004	1.64	±	0.31	6.07	±	1.14	Y	17.40	±	0.80	6.44	±	0.30	Y
	06/23/2004	1.47	±	0.40	5.44	±	1.48	Y	22.60	±	0.97	8.36	±	0.36	Y
	06/30/2004	1.62	±	0.46	5.99	±	1.69	Y	25.40	±	1.13	9.40	±	0.42	Y
BLACKFOOT CMS (Q/A-1)	04/07/2004	2.57	±	0.48	9.51	±	1.77	Y	29.50	±	1.21	10.92	±	0.45	Y
	04/14/2004	1.17	±	0.39	4.33	±	1.44		30.00	±	1.21	11.10	±	0.45	Y
	04/21/2004	0.78	±	0.37	2.87	±	1.38		21.50	±	1.10	7.96	±	0.41	Y
	04/28/2004	1.03	±	0.36	3.81	±	1.33		23.70	±	1.14	8.77	±	0.42	Y
	05/05/2004	1.16	±	0.35	4.29	±	1.28	Y	23.60	±	1.04	8.73	±	0.38	Y
	05/12/2004	2.68	±	0.45	9.92	±	1.67	Y	23.60	±	1.04	8.73	±	0.38	Y
	05/19/2004	1.84	±	0.40	6.81	±	1.49	Y	23.00	±	1.10	8.51	±	0.41	Y
	05/26/2004	0.95	±	0.36	3.50	±	1.33		14.60	±	0.93	5.40	±	0.35	Y
	06/02/2004	1.11	±	0.48	4.11	±	1.76		16.40	±	1.03	6.07	±	0.38	Y
	06/09/2004	0.67	±	0.60	2.48	±	2.23		24.00	±	1.40	8.88	±	0.52	Y
	06/16/2004	0.18	±	0.26	0.67	±	0.97		-0.56	±	0.59	-0.21	±	0.22	
	06/23/2004	0.63	±	0.47	2.31	±	1.72		23.90	±	1.23	8.84	±	0.46	Y
	06/30/2004	1.66	±	0.53	6.14	±	1.97	Y	27.80	±	1.32	10.29	±	0.49	Y
BLACKFOOT AVERAGE	04/07/2004	2.02	±	0.55	7.47	±	2.04	Y	28.10	±	1.40	10.40	±	0.52	Y
	04/14/2004	1.34	±	0.17	4.94	±	0.61	Y	30.45	±	0.45	11.27	±	0.17	Y
	04/21/2004	1.05	±	0.28	3.89	±	1.03	Y	19.90	±	1.60	7.36	±	0.59	Y
	04/28/2004	1.17	±	0.14	4.31	±	0.50	Y	22.15	±	1.55	8.20	±	0.57	Y
	05/05/2004	1.42	±	0.26	5.25	±	0.96	Y	21.80	±	1.80	8.07	±	0.67	Y
	05/12/2004	2.05	±	0.64	7.57	±	2.35	Y	23.70	±	0.10	8.77	±	0.04	Y
	05/19/2004	1.86	±	0.02	6.88	±	0.07	Y	21.50	±	1.50	7.96	±	0.56	Y
	05/26/2004	0.86	±	0.09	3.18	±	0.32	Y	15.05	±	0.45	5.57	±	0.17	Y
	06/02/2004	0.76	±	0.35	2.82	±	1.29		15.45	±	0.95	5.72	±	0.35	Y
	06/09/2004	0.92	±	0.25	3.40	±	0.93	Y	24.25	±	0.25	8.97	±	0.09	Y
	06/16/2004	0.91	±	0.73	3.37	±	2.70		8.42	±	8.98	3.12	±	3.32	
	06/23/2004	1.05	±	0.42	3.88	±	1.56		23.25	±	0.65	8.60	±	0.24	Y
	06/30/2004	1.64	±	0.02	6.07	±	0.07	Y	26.60	±	1.20	9.84	±	0.44	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 2s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
CRATERS	04/07/2004	1.71 ± 0.40	6.33 ± 1.49	Y	25.40 ± 1.09	9.40 ± 0.40	Y
	04/14/2004	1.99 ± 0.43	7.36 ± 1.58	Y	29.20 ± 1.16	10.80 ± 0.43	Y
	04/21/2004	0.49 ± 0.33	1.80 ± 1.20		13.60 ± 0.91	5.03 ± 0.34	Y
	04/28/2004	2.32 ± 0.40	8.58 ± 1.47	Y	24.50 ± 1.02	9.07 ± 0.38	Y
	05/05/2004	0.86 ± 0.34	3.17 ± 1.25		22.10 ± 1.06	8.18 ± 0.39	Y
	05/12/2004	1.91 ± 0.40	7.07 ± 1.47	Y	24.00 ± 1.02	8.88 ± 0.38	Y
	05/19/2004	0.99 ± 0.31	3.67 ± 1.13	Y	19.30 ± 0.94	7.14 ± 0.35	Y
	05/26/2004	0.71 ± 0.29	2.63 ± 1.07		16.00 ± 0.83	5.92 ± 0.31	Y
	06/02/2004	0.22 ± 0.46	0.83 ± 1.71		13.70 ± 1.06	5.07 ± 0.39	Y
	06/09/2004	1.11 ± 0.53	4.11 ± 1.96		23.60 ± 1.21	8.73 ± 0.45	Y
	06/16/2004	1.84 ± 0.39	6.81 ± 1.42	Y	17.00 ± 0.95	6.29 ± 0.35	Y
	06/23/2004	1.04 ± 0.47	3.85 ± 1.73		23.80 ± 1.18	8.81 ± 0.44	Y
	06/30/2004	1.16 ± 0.55	4.29 ± 2.02		27.40 ± 1.41	10.14 ± 0.52	Y
DUBOIS	04/07/2004	1.82 ± 0.34	6.73 ± 1.26	Y	29.80 ± 0.98	11.03 ± 0.36	Y
	04/14/2004	2.46 ± 0.42	9.10 ± 1.54	Y	30.40 ± 1.09	11.25 ± 0.40	Y
	04/21/2004	1.27 ± 0.32	4.70 ± 1.18	Y	16.40 ± 0.81	6.07 ± 0.30	Y
	04/28/2004	1.79 ± 0.39	6.62 ± 1.46	Y	19.20 ± 1.01	7.10 ± 0.37	Y
	05/05/2004	2.68 ± 0.38	9.92 ± 1.41	Y	26.30 ± 0.95	9.73 ± 0.35	Y
	05/12/2004	1.61 ± 0.45	5.96 ± 1.65	Y	27.00 ± 1.22	9.99 ± 0.45	Y
	05/19/2004	1.05 ± 0.27	3.89 ± 0.98	Y	16.60 ± 0.77	6.14 ± 0.29	Y
	05/26/2004	1.30 ± 0.34	4.81 ± 1.27	Y	15.90 ± 0.86	5.88 ± 0.32	Y
	06/02/2004	2.01 ± 0.49	7.44 ± 1.82	Y	18.00 ± 1.00	6.66 ± 0.37	Y
	06/09/2004	1.59 ± 0.68	5.88 ± 2.52		27.20 ± 1.50	10.06 ± 0.56	Y
	06/16/2004	1.79 ± 0.35	6.62 ± 1.28	Y	19.30 ± 0.90	7.14 ± 0.33	Y
	06/23/2004	1.75 ± 0.56	6.48 ± 2.05	Y	21.40 ± 1.22	7.92 ± 0.45	Y
	06/30/2004	-1.93 ± 3.27	-7.14 ± 12.10		29.30 ± 7.01	10.84 ± 2.59	Y
IDAHO FALLS	04/07/2004	2.83 ± 0.45	10.47 ± 1.65	Y	30.00 ± 1.11	11.10 ± 0.41	Y
	04/14/2004	1.38 ± 0.36	5.11 ± 1.34	Y	28.40 ± 1.08	10.51 ± 0.40	Y
	04/21/2004	1.52 ± 0.35	5.62 ± 1.30	Y	19.60 ± 0.91	7.25 ± 0.34	Y
	04/28/2004	1.84 ± 0.37	6.81 ± 1.35	Y	27.20 ± 1.05	10.06 ± 0.39	Y
	05/05/2004	2.53 ± 0.41	9.36 ± 1.51	Y	24.50 ± 1.00	9.07 ± 0.37	Y
	05/12/2004	-0.49 ± 0.28	-1.80 ± 1.04		26.80 ± 1.22	9.92 ± 0.45	Y
	05/19/2004	1.60 ± 0.32	5.92 ± 1.20	Y	18.80 ± 0.86	6.96 ± 0.32	Y
	05/26/2004	1.45 ± 0.33	5.37 ± 1.21	Y	15.90 ± 0.81	5.88 ± 0.30	Y
	06/02/2004	0.31 ± 0.42	1.16 ± 1.54		16.60 ± 1.02	6.14 ± 0.38	Y
	06/09/2004	1.05 ± 0.60	3.89 ± 2.22		23.90 ± 1.35	8.84 ± 0.50	Y
	06/16/2004	2.01 ± 0.37	7.44 ± 1.38	Y	17.20 ± 0.90	6.36 ± 0.33	Y
	06/23/2004	1.30 ± 0.43	4.81 ± 1.58	Y	18.00 ± 0.98	6.66 ± 0.36	Y
	06/30/2004	1.81 ± 0.51	6.70 ± 1.87	Y	26.30 ± 1.22	9.73 ± 0.45	Y
JACKSON	04/07/2004	2.51 ± 0.42	9.29 ± 1.55	Y	33.70 ± 1.13	12.47 ± 0.42	Y
	04/14/2004	2.22 ± 0.41	8.21 ± 1.53	Y	26.30 ± 1.06	9.73 ± 0.39	Y
	04/21/2004	1.43 ± 0.35	5.29 ± 1.29	Y	20.10 ± 0.92	7.44 ± 0.34	Y
	04/28/2004	1.58 ± 0.35	5.85 ± 1.29	Y	24.90 ± 1.02	9.21 ± 0.38	Y
	05/05/2004	1.32 ± 0.34	4.88 ± 1.27	Y	20.50 ± 0.96	7.59 ± 0.36	Y
	05/12/2004	2.40 ± 0.43	8.88 ± 1.57	Y	25.60 ± 1.04	9.47 ± 0.38	Y
	05/19/2004	1.60 ± 0.35	5.92 ± 1.28	Y	20.40 ± 0.95	7.55 ± 0.35	Y
	05/26/2004	0.38 ± 0.27	1.41 ± 1.01		13.60 ± 0.82	5.03 ± 0.30	Y
	06/02/2004	0.79 ± 0.46	2.93 ± 1.71		11.10 ± 0.95	4.11 ± 0.35	Y
	06/09/2004	0.86 ± 0.52	3.19 ± 1.92		24.50 ± 1.23	9.07 ± 0.46	Y
	06/16/2004	1.60 ± 0.34	5.92 ± 1.27	Y	17.10 ± 0.89	6.33 ± 0.33	Y
	06/23/2004	1.46 ± 0.49	5.40 ± 1.82		18.80 ± 1.09	6.96 ± 0.40	Y
	06/30/2004	1.99 ± 0.53	7.36 ± 1.95	Y	25.60 ± 1.23	9.47 ± 0.46	Y

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

Sampling Group and Location		Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 2s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
	REXBURG CMS	04/07/2004	1.75 ± 0.39	6.48 ± 1.45	Y	28.90 ± 1.11	10.69 ± 0.41	Y
		04/14/2004	1.68 ± 0.36	6.22 ± 1.33	Y	31.60 ± 1.07	11.69 ± 0.40	Y
		04/21/2004	1.41 ± 0.34	5.22 ± 1.25	Y	18.10 ± 0.87	6.70 ± 0.32	Y
		04/28/2004	2.15 ± 0.37	7.96 ± 1.37	Y	22.90 ± 0.95	8.47 ± 0.35	Y
		05/05/2004	1.75 ± 0.38	6.48 ± 1.39	Y	25.20 ± 1.04	9.32 ± 0.38	Y
		05/12/2004	1.53 ± 0.37	5.66 ± 1.38	Y	28.50 ± 1.07	10.55 ± 0.40	Y
		05/19/2004	1.79 ± 0.32	6.62 ± 1.19	Y	19.20 ± 0.84	7.10 ± 0.31	Y
		05/26/2004	0.55 ± 0.26	2.02 ± 0.97		14.80 ± 0.78	5.48 ± 0.29	Y
		06/02/2004	0.80 ± 0.42	2.94 ± 1.55		15.50 ± 0.95	5.74 ± 0.35	Y
		06/09/2004	1.20 ± 0.48	4.44 ± 1.79		25.60 ± 1.15	9.47 ± 0.43	Y
		06/16/2004	1.77 ± 0.36	6.55 ± 1.34	Y	18.40 ± 0.93	6.81 ± 0.34	Y
		06/23/2004	1.47 ± 0.45	5.44 ± 1.68	Y	22.10 ± 1.07	8.18 ± 0.40	Y
		06/30/2004	1.91 ± 0.52	7.07 ± 1.94	Y	24.20 ± 1.21	8.95 ± 0.45	Y
INEEL							0.00 0.00	
	EFS	04/07/2004	2.00 ± 0.39	7.40 ± 1.45	Y	31.00 ± 1.10	11.47 ± 0.41	Y
		04/14/2004	2.13 ± 0.43	7.88 ± 1.57	Y	33.60 ± 1.20	12.43 ± 0.44	Y
		04/21/2004	0.78 ± 0.27	2.89 ± 1.01		18.40 ± 0.81	6.81 ± 0.30	Y
		04/28/2004	1.87 ± 0.38	6.92 ± 1.41	Y	22.70 ± 1.02	8.40 ± 0.38	Y
		05/05/2004	1.99 ± 0.40	7.36 ± 1.49	Y	26.30 ± 1.09	9.73 ± 0.40	Y
		05/12/2004	1.64 ± 0.40	6.07 ± 1.47	Y	28.20 ± 1.12	10.43 ± 0.41	Y
		05/19/2004	1.03 ± 0.29	3.81 ± 1.07	Y	20.30 ± 0.90	7.51 ± 0.33	Y
		05/26/2004	0.92 ± 0.33	3.40 ± 1.22		15.80 ± 0.89	5.85 ± 0.33	Y
		06/02/2004	1.02 ± 0.52	3.77 ± 1.91		15.80 ± 1.11	5.85 ± 0.41	Y
		06/09/2004	2.78 ± 0.65	10.29 ± 2.39	Y	24.40 ± 1.28	9.03 ± 0.47	Y
		06/16/2004	1.57 ± 0.37	5.81 ± 1.36	Y	19.10 ± 0.99	7.07 ± 0.37	Y
		06/23/2004	1.27 ± 0.46	4.70 ± 1.70		22.30 ± 1.11	8.25 ± 0.41	Y
		06/30/2004	1.92 ± 0.55	7.10 ± 2.03	Y	27.80 ± 1.32	10.29 ± 0.49	Y
	MAIN GATE	04/07/2004	2.00 ± 0.46	7.40 ± 1.71	Y	33.00 ± 1.30	12.21 ± 0.48	Y
		04/14/2004	2.14 ± 0.46	7.92 ± 1.71	Y	33.80 ± 1.29	12.51 ± 0.48	Y
		04/21/2004	1.14 ± 0.40	4.22 ± 1.47		19.20 ± 1.06	7.10 ± 0.39	Y
		04/28/2004	1.52 ± 0.43	5.62 ± 1.58	Y	25.60 ± 1.25	9.47 ± 0.46	Y
		05/05/2004	1.98 ± 0.46	7.33 ± 1.71	Y	25.50 ± 1.23	9.44 ± 0.46	Y
		05/12/2004	1.79 ± 0.50	6.62 ± 1.86	Y	29.20 ± 1.36	10.80 ± 0.50	Y
		05/19/2004	1.48 ± 0.37	5.48 ± 1.37	Y	21.20 ± 1.04	7.84 ± 0.38	Y
		05/26/2004	0.94 ± 0.42	3.47 ± 1.54		17.80 ± 1.12	6.59 ± 0.41	Y
		06/02/2004	0.48 ± 0.50	1.78 ± 1.86		16.10 ± 1.15	5.96 ± 0.43	Y
		06/09/2004	2.45 ± 0.78	9.07 ± 2.88	Y	24.10 ± 1.53	8.92 ± 0.57	Y
		06/16/2004	1.37 ± 0.42	5.07 ± 1.55	Y	19.10 ± 1.16	7.07 ± 0.43	Y
		06/23/2004	0.90 ± 0.61	3.34 ± 2.27		24.00 ± 1.49	8.88 ± 0.55	Y
		06/30/2004	2.00 ± 0.58	7.40 ± 2.13	Y	25.80 ± 1.33	9.55 ± 0.49	Y
	VAN BUREN GATE	04/07/2004	1.63 ± 0.37	6.03 ± 1.36	Y	30.10 ± 1.08	11.14 ± 0.40	Y
		04/14/2004	1.85 ± 0.42	6.85 ± 1.57	Y	28.60 ± 1.16	10.58 ± 0.43	Y
		04/21/2004	1.41 ± 0.36	5.22 ± 1.31	Y	18.90 ± 0.92	6.99 ± 0.34	Y
		04/28/2004	2.71 ± 0.44	10.03 ± 1.62	Y	25.50 ± 1.08	9.44 ± 0.40	Y
		05/05/2004	2.34 ± 0.42	8.66 ± 1.54	Y	23.40 ± 1.03	8.66 ± 0.38	Y
		05/12/2004	2.24 ± 0.42	8.29 ± 1.54	Y	27.40 ± 1.07	10.14 ± 0.40	Y
		05/19/2004	1.32 ± 0.30	4.88 ± 1.11	Y	21.00 ± 0.89	7.77 ± 0.33	Y
		05/26/2004	1.13 ± 0.30	4.18 ± 1.11	Y	17.10 ± 0.81	6.33 ± 0.30	Y
		06/02/2004	0.94 ± 0.46	3.48 ± 1.70		15.60 ± 1.01	5.77 ± 0.37	Y
		06/09/2004	1.82 ± 0.55	6.73 ± 2.02	Y	25.00 ± 1.20	9.25 ± 0.44	Y
		06/16/2004	1.64 ± 0.37	6.07 ± 1.37	Y	19.50 ± 0.98	7.22 ± 0.36	Y
		06/23/2004	1.50 ± 0.52	5.55 ± 1.92		24.10 ± 1.23	8.92 ± 0.46	Y
		06/30/2004	1.33 ± 0.46	4.92 ± 1.72		27.00 ± 1.21	9.99 ± 0.45	Y

Red text denotes invalid sample.

a 06/23/2003 FAA Tower invalid due to equipment failure.
b 06/30/2003 Dubois invalid due to tripped breaker.

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
BOUNDARY									
	ARCO	04/07/2004	-5.02	±	2.55	-18.58	±	9.42	
		04/14/2004	1.53	±	2.74	5.67	±	10.15	
		04/21/2004	0.31	±	1.80	1.15	±	6.65	
		04/28/2004	-1.51	±	2.53	-5.60	±	9.35	
		05/05/2004	0.23	±	2.15	0.87	±	7.96	
		05/12/2004	-0.45	±	2.70	-1.67	±	10.00	
		05/19/2004	-3.60	±	1.87	-13.30	±	6.90	
		05/26/2004	3.05	±	1.77	11.30	±	6.57	
		06/02/2004	2.08	±	2.04	7.69	±	7.53	
		06/09/2004	-1.28	±	2.24	-4.72	±	8.27	
		06/16/2004	0.65	±	1.38	2.42	±	5.12	
		06/23/2004	2.40	±	2.35	8.90	±	8.70	
		06/30/2004	-0.67	±	2.08	-2.47	±	7.68	
	ATOMIC CITY	04/07/2004	-5.00	±	2.53	-18.50	±	9.37	
		04/14/2004	1.50	±	2.69	5.55	±	9.94	
		04/21/2004	0.30	±	1.73	1.10	±	6.40	
		04/28/2004	-1.34	±	2.24	-4.96	±	8.29	
		05/05/2004	0.25	±	2.28	0.92	±	8.45	
		05/12/2004	-0.44	±	2.65	-1.64	±	9.81	
		05/19/2004	-3.44	±	1.79	-12.74	±	6.61	
		05/26/2004	3.47	±	2.02	12.84	±	7.47	
		06/02/2004	2.47	±	2.42	9.13	±	8.94	
		06/09/2004	-1.62	±	2.84	-6.00	±	10.51	
		06/16/2004	0.74	±	1.55	2.72	±	5.75	
		06/23/2004	2.80	±	2.73	10.35	±	10.12	
		06/30/2004	-0.72	±	2.24	-2.67	±	8.30	
	BLUE DOME	04/07/2004	1.64	±	1.50	6.06	±	5.57	
		04/14/2004	-1.31	±	1.31	-4.86	±	4.83	
		04/21/2004	-0.02	±	1.12	-0.09	±	4.15	
		04/28/2004	-0.27	±	1.31	-0.98	±	4.83	
		05/05/2004	0.60	±	1.30	2.22	±	4.80	
		05/12/2004	-0.86	±	1.77	-3.18	±	6.56	
		05/19/2004	-1.18	±	1.15	-4.37	±	4.26	
		05/26/2004	-1.16	±	1.61	-4.31	±	5.96	
		06/02/2004	-0.48	±	1.25	-1.79	±	4.62	
		06/09/2004	2.37	±	1.76	8.76	±	6.52	
		06/16/2004	0.40	±	1.73	1.49	±	6.40	
		06/23/2004	-0.57	±	1.25	-2.12	±	4.63	
		06/30/2004	-3.23	±	1.96	-11.95	±	7.25	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
	FAA TOWER	04/07/2004	2.27	±	2.08	8.38	±	7.70	
		04/14/2004	-1.75	±	1.74	-6.47	±	6.43	
		04/21/2004	-0.03	±	1.59	-0.13	±	5.90	
		04/28/2004	-0.30	±	1.47	-1.10	±	5.43	
		05/05/2004	0.88	±	1.91	3.26	±	7.05	
		05/12/2004	-0.89	±	1.84	-3.31	±	6.81	
		05/19/2004	-1.57	±	1.53	-5.80	±	5.66	
		05/26/2004	-1.84	±	2.55	-6.82	±	9.44	
		06/02/2004	-0.72	±	1.87	-2.68	±	6.91	
		06/09/2004	2.46	±	1.83	9.10	±	6.78	
		06/16/2004	0.46	±	1.99	1.72	±	7.36	
		06/23/2004	-15.63	±	34.11	-57.82	±	126.22	
		06/30/2004	-2.70	±	1.64	-10.01	±	6.07	
	HOWE	04/07/2004	1.87	±	1.71	6.91	±	6.34	
		04/14/2004	-1.54	±	1.53	-5.70	±	5.67	
		04/21/2004	-0.03	±	1.38	-0.11	±	5.09	
		04/28/2004	-0.32	±	1.59	-1.20	±	5.89	
		05/05/2004	0.70	±	1.51	2.58	±	5.58	
		05/12/2004	-0.84	±	1.73	-3.10	±	6.38	
		05/19/2004	-1.33	±	1.30	-4.93	±	4.81	
		05/26/2004	-1.40	±	1.93	-5.17	±	7.15	
		06/02/2004	-0.50	±	1.28	-1.84	±	4.75	
		06/09/2004	2.65	±	1.97	9.81	±	7.30	
		06/16/2004	0.41	±	1.77	1.53	±	6.54	
		06/23/2004	-0.82	±	1.79	-3.03	±	6.62	
		06/30/2004	-3.33	±	2.02	-12.32	±	7.47	
	MONTEVIEW	04/07/2004	1.66	±	1.52	6.14	±	5.64	
		04/14/2004	-1.38	±	1.38	-5.12	±	5.09	
		04/21/2004	-0.03	±	1.20	-0.10	±	4.44	
		04/28/2004	-0.34	±	1.67	-1.25	±	6.16	
		05/05/2004	0.63	±	1.37	2.35	±	5.07	
		05/12/2004	-1.52	±	3.14	-5.63	±	11.61	
		05/19/2004	-1.27	±	1.24	-4.69	±	4.58	
		05/26/2004	-1.26	±	1.74	-4.66	±	6.45	
		06/02/2004	-0.54	±	1.38	-1.98	±	5.11	
		06/09/2004	1.81	±	1.35	6.69	±	4.98	
		06/16/2004	0.41	±	1.76	1.51	±	6.50	
		06/23/2004	-0.57	±	1.25	-2.12	±	4.63	
		06/30/2004	-2.01	±	1.22	-7.42	±	4.50	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
	MUD LAKE	04/07/2004	1.79	±	1.64	6.62	±	6.08	
		04/14/2004	-1.41	±	1.40	-5.22	±	5.19	
		04/21/2004	-0.03	±	1.54	-0.12	±	5.71	
		04/28/2004	-0.31	±	1.54	-1.16	±	5.70	
		05/05/2004	0.65	±	1.41	2.42	±	5.23	
		05/12/2004	-0.79	±	1.62	-2.91	±	6.01	
		05/19/2004	-1.33	±	1.30	-4.93	±	4.81	
		05/26/2004	-1.34	±	1.86	-4.97	±	6.88	
		06/02/2004	-0.52	±	1.35	-1.94	±	5.00	
		06/09/2004	2.23	±	1.66	8.26	±	6.15	
		06/16/2004	0.40	±	1.72	1.49	±	6.38	
		06/23/2004	-0.77	±	1.67	-2.84	±	6.19	
		06/30/2004	-3.33	±	2.02	-12.32	±	7.48	
	MUD LAKE (Q/A-2)	04/07/2004	1.75	±	1.60	6.46	±	5.93	
		04/14/2004	-1.37	±	1.36	-5.05	±	5.02	
		04/21/2004	-0.03	±	1.49	-0.12	±	5.51	
		04/28/2004	-0.29	±	1.44	-1.08	±	5.31	
		05/05/2004	0.67	±	1.46	2.49	±	5.38	
		05/12/2004	-0.68	±	1.40	-2.52	±	5.19	
		05/19/2004	-1.51	±	1.47	-5.59	±	5.46	
		05/26/2004	-1.20	±	1.66	-4.44	±	6.15	
		06/02/2004	-0.49	±	1.26	-1.81	±	4.66	
		06/09/2004	1.64	±	1.22	6.08	±	4.53	
		06/16/2004	0.39	±	1.66	1.43	±	6.13	
		06/23/2004	-0.64	±	1.39	-2.35	±	5.13	
		06/30/2004	-2.13	±	1.29	-7.89	±	4.79	
	MUD LAKE AVERAGE	04/07/2004	1.77	±	2.30	6.54	±	8.49	
		04/14/2004	-1.39	±	1.95	-5.13	±	7.22	
		04/21/2004	-0.03	±	2.14	-0.12	±	7.94	
		04/28/2004	-0.30	±	2.10	-1.12	±	7.78	
		05/05/2004	0.66	±	2.03	2.46	±	7.50	
		05/12/2004	-0.73	±	2.13	-2.70	±	7.88	
		05/19/2004	-1.42	±	1.95	-5.24	±	7.23	
		05/26/2004	-1.27	±	2.48	-4.69	±	9.18	
		06/02/2004	-0.51	±	1.84	-1.87	±	6.82	
		06/09/2004	1.89	±	1.99	7.00	±	7.37	
		06/16/2004	0.39	±	2.39	1.46	±	8.84	
		06/23/2004	-0.69	±	2.15	-2.57	±	7.94	
		06/30/2004	-2.60	±	2.23	-9.62	±	8.25	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
DISTANT									
	BLACKFOOT CMS	04/07/2004	-4.55	±	2.31	-16.83	±	8.53	
		04/14/2004	1.06	±	1.90	3.94	±	7.05	
		04/21/2004	0.31	±	1.81	1.15	±	6.69	
		04/28/2004	-1.11	±	1.86	-4.11	±	6.86	
		05/05/2004	0.21	±	1.92	0.78	±	7.11	
		05/12/2004	-0.30	±	1.81	-1.12	±	6.69	
		05/19/2004	-3.31	±	1.72	-12.25	±	6.36	
		05/26/2004	2.04	±	1.18	7.54	±	4.38	
		06/02/2004	1.81	±	1.78	6.71	±	6.58	
		06/09/2004	-0.92	±	1.61	-3.40	±	5.96	
		06/16/2004	0.57	±	1.21	2.11	±	4.47	
		06/23/2004	1.68	±	1.64	6.21	±	6.06	
		06/30/2004	-0.61	±	1.90	-2.26	±	7.04	
	BLACKFOOT CMS (Q/A-1)	04/07/2004	-5.80	±	2.94	-21.48	±	10.88	
		04/14/2004	1.46	±	2.61	5.40	±	9.66	
		04/21/2004	0.45	±	2.59	1.65	±	9.59	
		04/28/2004	-1.71	±	2.86	-6.33	±	10.57	
		05/05/2004	0.27	±	2.48	1.00	±	9.16	
		05/12/2004	-0.41	±	2.43	-1.50	±	9.01	
		05/19/2004	-4.91	±	2.54	-18.15	±	9.42	
		05/26/2004	3.18	±	1.85	11.77	±	6.84	
		06/02/2004	2.14	±	2.09	7.91	±	7.75	
		06/09/2004	-1.49	±	2.60	-5.50	±	9.64	
		06/16/2004	0.85	±	1.79	3.13	±	6.62	
		06/23/2004	2.36	±	2.30	8.72	±	8.53	
		06/30/2004	-0.74	±	2.29	-2.72	±	8.48	
	BLACKFOOT CMS AVERAGE	04/07/2004	-5.10	±	3.66	-18.87	±	13.53	
		04/14/2004	1.23	±	3.12	4.55	±	11.53	
		04/21/2004	0.37	±	3.01	1.36	±	11.14	
		04/28/2004	-1.35	±	3.18	-4.99	±	11.77	
		05/05/2004	0.24	±	3.06	0.87	±	11.33	
		05/12/2004	-0.35	±	2.93	-1.28	±	10.86	
		05/19/2004	-3.95	±	2.90	-14.63	±	10.73	
		05/26/2004	2.48	±	2.04	9.19	±	7.55	
		06/02/2004	1.96	±	2.72	7.26	±	10.06	
		06/09/2004	-1.14	±	2.81	-4.20	±	10.41	
		06/16/2004	0.68	±	2.04	2.52	±	7.54	
		06/23/2004	1.96	±	2.71	7.25	±	10.02	
		06/30/2004	-0.67	±	2.94	-2.47	±	10.88	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
	CRATERS	04/07/2004	-5.36	±	2.72	-19.83	±	10.05	
		04/14/2004	1.39	±	2.48	5.12	±	9.18	
		04/21/2004	0.42	±	2.43	1.55	±	9.00	
		04/28/2004	-1.39	±	2.32	-5.14	±	8.57	
		05/05/2004	0.29	±	2.65	1.07	±	9.81	
		05/12/2004	-0.39	±	2.34	-1.45	±	8.67	
		05/19/2004	-4.22	±	2.19	-15.61	±	8.10	
		05/26/2004	2.56	±	1.49	9.47	±	5.51	
		06/02/2004	2.38	±	2.34	8.82	±	8.64	
		06/09/2004	-1.22	±	2.13	-4.50	±	7.89	
		06/16/2004	0.76	±	1.60	2.80	±	5.91	
		06/23/2004	2.20	±	2.15	8.15	±	7.96	
		06/30/2004	-0.82	±	2.55	-3.04	±	9.45	
	DUBOIS	04/07/2004	1.67	±	1.53	6.16	±	5.66	
		04/14/2004	-1.48	±	1.47	-5.46	±	5.43	
		04/21/2004	-0.03	±	1.30	-0.10	±	4.82	
		04/28/2004	-0.38	±	1.87	-1.41	±	6.92	
		05/05/2004	0.63	±	1.36	2.33	±	5.04	
		05/12/2004	-1.00	±	2.06	-3.70	±	7.64	
		05/19/2004	-1.28	±	1.25	-4.73	±	4.61	
		05/26/2004	-1.53	±	2.12	-5.67	±	7.85	
		06/02/2004	-0.55	±	1.42	-2.04	±	5.25	
		06/09/2004	2.67	±	1.98	9.86	±	7.34	
		06/16/2004	0.45	±	1.93	1.67	±	7.16	
		06/23/2004	-0.75	±	1.64	-2.78	±	6.08	
		06/30/2004	-22.50	±	13.65	-83.23	±	50.50	
	IDAHO FALLS	04/07/2004	2.06	±	1.89	7.63	±	7.01	
		04/14/2004	-1.53	±	1.52	-5.66	±	5.63	
		04/21/2004	-0.03	±	1.40	-0.11	±	5.17	
		04/28/2004	-0.32	±	1.60	-1.20	±	5.91	
		05/05/2004	0.73	±	1.57	2.68	±	5.80	
		05/12/2004	-1.01	±	2.09	-3.75	±	7.74	
		05/19/2004	-1.41	±	1.38	-5.22	±	5.09	
		05/26/2004	-1.38	±	1.92	-5.12	±	7.09	
		06/02/2004	-0.59	±	1.52	-2.18	±	5.61	
		06/09/2004	2.44	±	1.82	9.03	±	6.72	
		06/16/2004	0.48	±	2.04	1.76	±	7.55	
		06/23/2004	-0.58	±	1.28	-2.16	±	4.72	
		06/30/2004	-2.40	±	1.45	-8.87	±	5.38	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
	JACKSON	04/07/2004	-4.76	±	2.41	-17.63	±	8.93	
		04/14/2004	1.28	±	2.29	4.74	±	8.48	
		04/21/2004	0.34	±	2.00	1.27	±	7.38	
		04/28/2004	-1.38	±	2.31	-5.11	±	8.53	
		05/05/2004	0.26	±	2.37	0.96	±	8.78	
		05/12/2004	-0.39	±	2.33	-1.44	±	8.63	
		05/19/2004	-4.17	±	2.16	-15.44	±	8.01	
		05/26/2004	2.70	±	1.57	10.00	±	5.81	
		06/02/2004	2.19	±	2.14	8.09	±	7.92	
		06/09/2004	-1.22	±	2.14	-4.53	±	7.93	
		06/16/2004	0.68	±	1.44	2.53	±	5.34	
		06/23/2004	2.21	±	2.16	8.19	±	8.00	
		06/30/2004	-0.69	±	2.16	-2.56	±	7.97	
	REXBURG CMS	04/07/2004	2.10	±	1.93	7.77	±	7.13	
		04/14/2004	-1.40	±	1.39	-5.17	±	5.14	
		04/21/2004	-0.03	±	1.36	-0.11	±	5.05	
		04/28/2004	-0.31	±	1.53	-1.15	±	5.65	
		05/05/2004	0.77	±	1.66	2.85	±	6.16	
		05/12/2004	-0.78	±	1.61	-2.89	±	5.97	
		05/19/2004	-1.32	±	1.29	-4.90	±	4.78	
		05/26/2004	-1.36	±	1.88	-5.03	±	6.97	
		06/02/2004	-0.54	±	1.40	-2.01	±	5.19	
		06/09/2004	1.86	±	1.38	6.88	±	5.12	
		06/16/2004	0.49	±	2.08	1.80	±	7.70	
		06/23/2004	-0.61	±	1.32	-2.24	±	4.90	
		06/30/2004	-2.48	±	1.50	-9.18	±	5.57	
INEEL									
	EFS	04/07/2004	-4.80	±	2.43	-17.74	±	8.99	
		04/14/2004	1.33	±	2.38	4.92	±	8.81	
		04/21/2004	0.30	±	1.75	1.11	±	6.46	
		04/28/2004	-1.47	±	2.46	-5.44	±	9.08	
		05/05/2004	0.27	±	2.50	1.01	±	9.25	
		05/05/2004	0.27	±	2.50	1.01	±	9.25	
		05/12/2004	-0.41	±	2.47	-1.52	±	9.13	
		05/19/2004	-3.81	±	1.98	-14.11	±	7.32	
		05/26/2004	2.86	±	1.67	10.60	±	6.16	
		06/02/2004	2.39	±	2.34	8.86	±	8.67	
		06/09/2004	-1.29	±	2.27	-4.79	±	8.39	
		06/16/2004	0.75	±	1.59	2.79	±	5.90	
		06/23/2004	2.08	±	2.03	7.70	±	7.52	

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

Location	Sampling Group	Sampling Date	Result ± 1s Uncertainty x 10^{-15} µCI/mL			Result ± 1s Uncertainty x 10^{-12} Bq/mL			Result > 3s
		06/30/2004	-0.74	±	2.29	-2.73	±	8.48	
	MAIN GATE	04/07/2004	-6.07	±	3.08	-22.46	±	11.38	
		04/14/2004	1.50	±	2.69	5.57	±	9.97	
		04/21/2004	0.45	±	2.59	1.65	±	9.59	
		04/28/2004	-1.89	±	3.16	-7.01	±	11.70	
		05/05/2004	0.34	±	3.09	1.24	±	11.42	
		05/12/2004	-0.56	±	3.33	-2.06	±	12.33	
		05/19/2004	-4.73	±	2.45	-17.50	±	9.08	
		05/26/2004	3.81	±	2.21	14.09	±	8.19	
		06/02/2004	2.51	±	2.46	9.29	±	9.10	
		06/09/2004	-1.68	±	2.95	-6.23	±	10.92	
		06/16/2004	0.96	±	2.03	3.56	±	7.53	
		06/23/2004	3.10	±	3.03	11.49	±	11.23	
		06/30/2004	-0.78	±	2.43	-2.89	±	8.98	
	VAN BUREN	04/07/2004	-4.73	±	2.40	-17.50	±	8.87	
		04/14/2004	1.41	±	2.53	5.23	±	9.37	
		04/21/2004	0.36	±	2.07	1.32	±	7.66	
		04/28/2004	-1.49	±	2.49	-5.53	±	9.23	
		05/05/2004	0.26	±	2.42	0.98	±	8.97	
		05/12/2004	-0.39	±	2.33	-1.44	±	8.63	
		05/19/2004	-3.65	±	1.89	-13.51	±	7.01	
		05/26/2004	2.33	±	1.35	8.60	±	5.00	
		06/02/2004	2.12	±	2.08	7.84	±	7.68	
		06/09/2004	-1.16	±	2.03	-4.28	±	7.50	
		06/16/2004	0.74	±	1.57	2.75	±	5.82	
		06/23/2004	2.34	±	2.29	8.66	±	8.46	
		06/30/2004	-0.65	±	2.03	-2.41	±	7.51	

Red text denotes invalid sample.

a 06/23/2003 FAA Tower invalid due to equipment failure.
b 06/30/2003 Dubois invalid due to tripped breaker.

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} µCI/mL			Result ± 1s Uncertainty x 10^{-14} Bq/mL			Result > 3s
BOUNDARY									
ARCO									
	06/30/2004	CESIUM-137	-82.70	±	119.00	-305.99	±	440.30	
ATOMIC CITY									
	06/30/2004	CESIUM-137	273.00	±	97.70	1010.10	±	361.49	
BLUE DOME									
	06/30/2004	CESIUM-137	155.00	±	199.00	573.50	±	736.30	
FAA TOWER									
	06/30/2004	AMERICIUM-241	5.63	±	1.70	20.83	±	6.29	y
	06/30/2004	CESIUM-137	-54.50	±	147.00	-201.65	±	543.90	
	06/30/2004	PLUTONIUM-238	0.37	±	0.64	1.38	±	2.37	
	06/30/2004	PLUTONIUM-239/240	1.18	±	1.30	4.37	±	4.81	
	06/30/2004	STRONTIUM-90	22.80	±	17.00	84.36	±	62.90	
HOWE									
	06/30/2004	AMERICIUM-241	0.92	±	0.53	3.39	±	1.96	
	06/30/2004	CESIUM-137	-18.30	±	91.10	-67.71	±	337.07	
	06/30/2004	PLUTONIUM-238	0.53	±	0.53	1.97	±	1.96	
	06/30/2004	PLUTONIUM-239/240	-1.31	±	1.60	-4.85	±	5.92	
	06/30/2004	STRONTIUM-90	20.40	±	10.00	75.48	±	37.00	
MONTEVIEW									
	06/30/2004	AMERICIUM-241	1.08	±	0.55	4.00	±	2.04	
	06/30/2004	CESIUM-137	-173.00	±	208.00	-640.10	±	769.60	
	06/30/2004	PLUTONIUM-238	0.00	±	0.44	0.00	±	1.63	
	06/30/2004	PLUTONIUM-239/240	1.22	±	1.30	4.51	±	4.81	
	06/30/2004	STRONTIUM-90	24.30	±	12.00	89.91	±	44.40	
MUD LAKE									
	06/30/2004	CESIUM-137	91.70	±	85.70	339.29	±	317.09	
MUD LAKE (Q/A-2)									
	06/30/2004	CESIUM-137	-25.80	±	81.70	-95.46	±	302.29	

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} µCI/mL			Result ± 1s Uncertainty x 10^{-14} Bq/mL			Result > 3s
BOUNDARY									
DISTANT									
BLACKFOOT									
	06/30/2004	CESIUM-137	76.90	±	96.70	284.53	±	357.79	
BLACKFOOT CMS (Q/A-1)									
	06/30/2004	CESIUM-137	-47.30	±	132.00	-175.01	±	488.40	
CRATERS									
	06/30/2004	AMERICIUM-241	0.31	±	0.31	1.13	±	1.15	
	06/30/2004	CESIUM-137	-61.20	±	250.00	-226.44	±	925.00	
	06/30/2004	PLUTONIUM-238	1.29	±	0.75	4.77	±	2.78	
	06/30/2004	PLUTONIUM-239/240	1.01	±	1.20	3.74	±	4.44	
	06/30/2004	STRONTIUM-90	36.60	±	13.00	135.42	±	48.10	
DUBOIS									
	06/30/2004	CESIUM-137	63.80	±	124.00	236.06	±	458.80	
IDAHO FALLS									
	06/30/2004	AMERICIUM-241	3.66	±	1.30	13.54	±	4.81	
	06/30/2004	CESIUM-137	77.60	±	115.00	287.12	±	425.50	
	06/30/2004	PLUTONIUM-238	-0.36	±	0.79	-1.31	±	2.92	
	06/30/2004	PLUTONIUM-239/240	0.46	±	1.10	1.68	±	4.07	
	06/30/2004	STRONTIUM-90	29.20	±	13.00	108.04	±	48.10	
JACKSON									
	06/30/2004	CESIUM-137	231.00	±	98.30	854.70	±	363.71	
REXBURG CMS									
	06/30/2004	AMERICIUM-241	4.87	±	1.30	18.02	±	4.81	y
	06/30/2004	CESIUM-137	18.20	±	119.00	67.34	±	440.30	
	06/30/2004	PLUTONIUM-238	1.02	±	0.73	3.77	±	2.70	
	06/30/2004	PLUTONIUM-239/240	21.20	±	3.80	78.44	±	14.06	y
	06/30/2004	STRONTIUM-90	28.90	±	13.00	106.93	±	48.10	
INEEL									
EFS									
	06/30/2004	AMERICIUM-241	0.35	±	0.35	1.28	±	1.30	
	06/30/2004	CESIUM-137	101.00	±	236.00	373.70	±	873.20	
	06/30/2004	PLUTONIUM-238	0.72	±	0.51	2.66	±	1.89	
	06/30/2004	PLUTONIUM-239/240	0.46	±	1.00	1.69	±	3.70	
	06/30/2004	STRONTIUM-90	17.40	±	17.00	64.38	±	62.90	

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										
	03/17/2004	04/14/2004	1.83	±	1.00	6.77	±	3.70	Silica Gel	
	03/17/2004	04/21/2004	1.69	±	0.90	6.24	±	3.31	Molecular Sieve	
	04/14/2004	05/12/2004	2.72	±	0.92	10.06	±	3.42	Silica Gel	
	04/21/2004	05/19/2004	0.85	±	1.02	3.14	±	3.76	Molecular Sieve	
BLACKFOOT										
	03/25/2004	04/21/2004	2.98	±	1.36	11.04	±	5.03	Silica Gel	
	03/17/2004	04/21/2004	1.34	±	0.92	4.95	±	3.42	Molecular Sieve	
	04/21/2004	05/12/2004	3.38	±	1.61	12.50	±	5.95	Silica Gel	
	04/21/2004	05/19/2004	6.32	±	1.46	23.39	±	5.41	Molecular Sieve	Y
IDAHO FALLS										
	03/11/2004	04/09/2004	4.71	±	1.06	17.44	±	3.92	Silica Gel	Y
	03/08/2004	04/26/2004	0.94	±	0.64	3.47	±	2.37	Molecular Sieve	
	04/09/2004	05/10/2004	2.00	±	0.91	7.39	±	3.36	Silica Gel	
	04/26/2004	05/17/2004	6.70	±	1.60	24.77	±	5.93	Molecular Sieve	Y
REXBURG										
	12/09/2003	04/09/2004	1.35	±	0.50	4.99	±	1.83	Molecular Sieve	
	03/22/2004	04/27/2004	0.82	±	1.06	3.03	±	3.94	Silica Gel	
	04/09/2004	05/10/2004	5.82	±	1.24	21.55	±	4.61	Molecular Sieve	Y
	04/27/2004	05/21/2004	3.29	±	1.47	12.16	±	5.42	Silica Gel	

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

Location	Sampling Date	Concentration ($\mu g/m_3$)
ATOMIC CITY		
	04/02/2004	17.81
	04/08/2004	3.27
	04/14/2004	19.98
	04/20/2004	2.26
	04/26/2004	19.20
	05/02/2004	20.03
	05/08/2004	26.54
	05/14/2004	6.88
	05/20/2004	15.36
	05/26/2004	10.32
	06/01/2004	9.64
	06/07/2004	11.25
	06/13/2004	14.02
	06/19/2004	0.00
	06/25/2004	6.11
BLACKFOOT CMS		
	04/02/2004	39.32
	04/08/2004	8.95
	04/14/2004	33.51
	04/20/2004	1.47
	04/26/2004	19.51
	05/02/2004	16.63
	05/08/2004	35.58
	05/14/2004	7.42
	05/20/2004	14.29
	05/26/2004	5.34
	06/01/2004	35.98
	06/07/2004	14.16
	06/13/2004	8.48
	06/19/2004	6.78
	06/25/2004	16.31
REXBURG CMS		
	04/02/2004	15.45
	04/08/2004	7.03
	04/14/2004	39.01
	04/20/2004	6.88
	04/26/2004	32.01
	05/02/2004	18.49
	05/08/2004	45.98
	05/14/2004	8.24
	05/20/2004	13.74
	05/26/2004	6.69
	06/01/2004	22.18
	06/07/2004	13.36
	06/13/2004	9.74
	06/19/2004	17.66
	06/25/2004	19.52

TABEL C-6: Tritium Concentrations in Precipitation.

			Concentration						
			Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			
Location	Start Date	End Date							Result > 3s
EFS									
	4/7/2004	4/14/2004	30.60	±	61.20	1.13	±	2.27	
	4/14/2004	4/21/2004	31.00	±	61.90	1.15	±	2.29	
IDAHO FALLS									
	02/29/2004	4/1/2004	29.6	±	59.20	1.10	±	2.19	

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

Sampling Type and Location	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
DRINKING WATER									
ABERDEEN									
	GROSS ALPHA	05/13/2004	1.13	±	1.41	0.04	±	0.05	
	GROSS BETA	05/13/2004	5.80	±	0.99	0.21	±	0.04	Y
	TRITIUM	05/13/2004	30.80	±	24.10	1.14	±	0.89	
ARCO									
	GROSS ALPHA	05/12/2004	0.83	±	1.01	0.03	±	0.04	
	GROSS BETA	05/12/2004	2.36	±	0.85	0.09	±	0.03	Y
	TRITIUM	05/12/2004	40.80	±	24.10	1.51	±	0.89	
ATOMIC CITY									
	GROSS ALPHA	05/12/2004	-0.15	±	0.81	-0.01	±	0.03	
	GROSS BETA	05/12/2004	3.00	±	0.85	0.11	±	0.03	Y
	TRITIUM	05/12/2004	15.20	±	23.20	0.56	±	0.86	
CAREY									
	GROSS ALPHA	05/12/2004	-0.84	±	0.82	-0.03	±	0.03	
	GROSS BETA	05/12/2004	1.29	±	0.81	0.05	±	0.03	
	TRITIUM	05/12/2004	80.90	±	29.70	3.00	±	1.10	
FORT HALL									
	GROSS ALPHA	05/13/2004	-1.30	±	1.36	-0.05	±	0.05	
	GROSS BETA	05/13/2004	7.85	±	1.06	0.29	±	0.04	Y
	TRITIUM	05/13/2004	35.00	±	24.10	1.30	±	0.89	
HOWE									
	GROSS ALPHA	05/12/2004	0.61	±	0.82	0.02	±	0.03	
	GROSS BETA	05/12/2004	1.17	±	0.79	0.04	±	0.03	
	TRITIUM	05/12/2004	97.40	±	29.80	3.61	±	1.10	Y
IDAHO FALLS									
	GROSS ALPHA	05/13/2004	4.58	±	1.46	0.17	±	0.05	Y
	GROSS BETA	05/13/2004	4.92	±	0.95	0.18	±	0.04	Y
	TRITIUM	05/13/2004	71.10	±	29.80	2.63	±	1.10	
MINIDOKA									
	GROSS ALPHA	05/11/2004	0.87	±	1.12	0.03	±	0.04	
	GROSS BETA	05/11/2004	3.22	±	0.89	0.12	±	0.03	Y
	TRITIUM	05/11/2004	52.80	±	29.60	1.96	±	1.10	
MONTEVIEW									
	GROSS ALPHA	05/12/2004	-1.54	±	0.90	-0.06	±	0.03	
	GROSS BETA	05/12/2004	5.17	±	0.93	0.19	±	0.03	Y
	TRITIUM	05/12/2004	21.90	±	23.40	0.81	±	0.87	
MUD LAKE									
	GROSS ALPHA	05/12/2004	-1.77	±	0.90	-0.07	±	0.03	
	GROSS BETA	05/12/2004	3.69	±	0.93	0.14	±	0.03	Y
	TRITIUM	05/12/2004	8.17	±	23.10	0.30	±	0.86	
MUD LAKE									
DUPLICATE	GROSS ALPHA	05/11/2004	-0.39	±	0.57	-0.01	±	0.02	
	GROSS BETA	05/11/2004	3.77	±	0.86	0.14	±	0.03	Y
	TRITIUM	05/11/2004	8.54	±	23.40	0.32	±	0.87	
ROBERTS									
	GROSS ALPHA	05/12/2004	-1.47	±	1.08	-0.05	±	0.04	
	GROSS BETA	05/12/2004	2.27	±	0.89	0.08	±	0.03	
	TRITIUM	05/12/2004	53.00	±	24.10	1.96	±	0.89	
SHOSHONE									
	GROSS ALPHA	05/11/2004	-0.36	±	0.91	-0.01	±	0.03	
	GROSS BETA	05/11/2004	3.47	±	0.88	0.13	±	0.03	Y
	TRITIUM	05/11/2004	40.20	±	24.10	1.49	±	0.89	
TABOR									
	GROSS ALPHA	05/12/2004	-1.14	±	1.35	-0.04	±	0.05	
	GROSS BETA	05/12/2004	3.99	±	0.97	0.15	±	0.04	Y
	TRITIUM	05/12/2004	78.00	±	25.10	2.89	±	0.93	Y

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

and Location	Analyte	Sampling Date	(pCi/L)			(Bq/L)			Result > 3s
DRINKING WATER									
SURFACE WATER									
BLISS									
	GROSS ALPHA	05/11/2004	0.59	±	1.09	0.02	±	0.04	
	GROSS BETA	05/11/2004	4.65	±	0.93	0.17	±	0.03	Y
	TRITIUM	05/11/2004	20.80	±	23.70	0.77	±	0.88	
BUHL									
	GROSS ALPHA	05/11/2004	1.71	±	1.23	0.06	±	0.05	
	GROSS BETA	05/11/2004	4.89	±	0.94	0.18	±	0.03	Y
	TRITIUM	05/11/2004	5.50	±	23.00	0.20	±	0.85	
HAGERMAN									
	GROSS ALPHA	05/11/2004	0.07	±	0.89	0.00	±	0.03	
	GROSS BETA	05/11/2004	4.25	±	0.89	0.16	±	0.03	Y
	TRITIUM	05/11/2004	27.90	±	23.40	1.03	±	0.87	
IDAHO FALLS									
	GROSS ALPHA	05/13/2004	-0.70	±	0.77	-0.03	±	0.03	
	GROSS BETA	05/13/2004	2.40	±	0.83	0.09	±	0.03	
	TRITIUM	05/13/2004	40.30	±	23.70	1.49	±	0.88	
TWIN FALLS									
	GROSS ALPHA	05/11/2004	-0.44	±	1.40	-0.02	±	0.05	
	GROSS BETA	05/11/2004	6.94	±	1.04	0.26	±	0.04	Y
	TRITIUM	05/11/2004	45.70	±	24.00	1.69	±	0.89	

TABLE C-8: Cesium-137, Iodine-131 and Strontium-90 Concentrations in Milk.

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi/L)	Iodine-131 Result ± 1s Uncertainty (Bq/L)	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Tritium/Strontium-90[a] Result ± 1s Uncertainty (pCi/L)	Tritium/Strontium-90[a] Result ± 1s Uncertainty (Bq/L)
BLACKFOOT							
	04/06/2004	-0.81 ± 1.64	-0.03 ± 0.06	-1.50 ± 1.42	-0.06 ± 0.05		
	05/04/2004	-2.76 ± 2.18	-0.10 ± 0.08	4.15 ± 2.95	0.15 ± 0.11	0.43 ± 0.16	0.02 ± 0.01
	06/01/2004	-5.26 ± 3.36	-0.19 ± 0.12	3.55 ± 3.36	0.13 ± 0.12		
CAREY							
	04/06/2004	-0.60 ± 1.49	-0.02 ± 0.06	0.74 ± 1.41	0.03 ± 0.05		
	05/04/2004	-3.63 ± 1.95	-0.13 ± 0.07	2.00 ± 1.31	0.07 ± 0.05	0.39 ± 0.22	0.01 ± 0.01
	06/01/2004	-3.03 ± 2.08	-0.11 ± 0.08	-0.85 ± 1.45	-0.03 ± 0.05		
DIETRICH							
	04/06/2004	-0.43 ± 1.42	-0.02 ± 0.05	0.77 ± 1.36	0.03 ± 0.05		
Duplicate	04/06/2004	2.79 ± 1.31	0.10 ± 0.05	1.26 ± 0.86	0.05 ± 0.03		
	05/04/2004	0.78 ± 1.83	0.03 ± 0.07	0.48 ± 1.41	0.02 ± 0.05	23.50 ± 47.00	0.87 ± 1.74
	06/01/2004	0.45 ± 1.17	0.02 ± 0.04	-0.47 ± 0.90	-0.02 ± 0.03		
HOWE							
	04/06/2004	-0.83 ± 2.09	-0.03 ± 0.08	-3.29 ± 3.02	-0.12 ± 0.11		
	05/04/2004	1.59 ± 2.40	0.06 ± 0.09	2.47 ± 2.90	0.09 ± 0.11	24.60 ± 49.20	0.91 ± 1.82
	06/01/2004	-0.11 ± 3.57	0.00 ± 0.13	2.23 ± 3.53	0.08 ± 0.13		
	06/01/2004	0.66 ± 2.14	0.02 ± 0.08	2.58 ± 1.33	0.10 ± 0.05		
IDAHO FALLS							
	04/06/2004	0.54 ± 1.07	0.02 ± 0.04	0.21 ± 0.82	0.01 ± 0.03		
	04/14/2004	-0.47 ± 1.01	-0.02 ± 0.04	-0.60 ± 0.83	-0.02 ± 0.03		
	04/21/2004	-2.34 ± 0.95	-0.09 ± 0.04	-0.21 ± 0.85	-0.01 ± 0.03		
	04/28/2004	-0.49 ± 1.01	-0.02 ± 0.04	0.93 ± 0.84	0.03 ± 0.03		
	05/04/2004	-0.98 ± 1.51	-0.04 ± 0.06	1.65 ± 1.36	0.06 ± 0.05	0.60 ± 0.18	0.02 ± 0.01
	05/12/2004	0.32 ± 1.02	0.01 ± 0.04	-0.33 ± 0.84	-0.01 ± 0.03		
	05/19/2004	-0.02 ± 2.05	0.00 ± 0.08	1.23 ± 2.98	0.05 ± 0.11		
	05/26/2004	0.96 ± 2.47	0.04 ± 0.09	1.36 ± 3.28	0.05 ± 0.12		
	06/01/2004	-2.16 ± 3.17	-0.08 ± 0.12	2.70 ± 3.46	0.10 ± 0.13		
	06/09/2004	0.14 ± 1.06	0.01 ± 0.04	-0.38 ± 0.92	-0.01 ± 0.03		
	06/16/2004	-1.75 ± 1.07	-0.06 ± 0.04	0.40 ± 0.93	0.01 ± 0.03		
	06/24/2004	-0.03 ± 1.07	0.00 ± 0.04	-0.36 ± 0.92	-0.01 ± 0.03		

TABLE C-8: Cesium-137, Iodine-131 and Strontium-90 Concentrations in Milk.

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi/L)	Iodine-131 Result ± 1s Uncertainty (Bq/L)	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Tritium/Strontium-90[a] Result ± 1s Uncertainty (pCi/L)	Tritium/Strontium-90[a] Result ± 1s Uncertainty (Bq/L)
MORELAND							
	04/06/2004	0.52 ± 1.86	0.02 ± 0.07	-2.42 ± 3.05	-0.09 ± 0.11		
	04/06/2004	-1.10 ± 0.97	-0.04 ± 0.04	-0.57 ± 0.82	-0.02 ± 0.03		
	05/04/2004	0.33 ± 0.99	0.01 ± 0.04	-1.08 ± 0.94	-0.04 ± 0.03	24.30 ± 48.70	0.90 ± 1.80
	06/01/2004	0.32 ± 1.09	0.01 ± 0.04	0.60 ± 0.78	0.02 ± 0.03		
ROBERTS							
	04/06/2004	0.33 ± 0.92	0.01 ± 0.03	1.88 ± 0.94	0.07 ± 0.03		
	05/04/2004	-0.49 ± 1.01	-0.02 ± 0.04	-0.72 ± 0.86	-0.03 ± 0.03	26.90 ± 53.80	1.00 ± 1.99
	06/01/2004	-0.35 ± 1.18	-0.01 ± 0.04	-0.31 ± 0.77	-0.01 ± 0.03		
RUPERT							
	04/06/2004	-0.61 ± 0.80	-0.02 ± 0.03	-0.44 ± 0.93	-0.02 ± 0.03		
	05/04/2004	-1.65 ± 1.21	-0.06 ± 0.04	-0.24 ± 0.85	-0.01 ± 0.03	0.47 ± 0.16	0.02 ± 0.01
	06/01/2004	0.11 ± 1.33	0.00 ± 0.05	0.14 ± 0.91	0.01 ± 0.03		
TERRETON							
	04/06/2004	0.52 ± 1.02	0.02 ± 0.04	-0.84 ± 0.84	-0.03 ± 0.03		
	05/04/2004	-0.83 ± 1.76	-0.03 ± 0.07	-0.09 ± 1.36	0.00 ± 0.05	0.45 ± 0.19	0.02 ± 0.01
	06/01/2004	1.03 ± 1.46	0.04 ± 0.05	-0.44 ± 0.94	-0.02 ± 0.03		

a. Highlighted cells contain tritium results. Remaining cells contain strontium-90 results.

TABLE C-9: Cesium-137 and Iodine-131 Concentrations in Sheep.

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
INEEL NORTH										
Animal #1	LIVER	CESIUM-137	05/20/2004	0.85	±	1.11	3.14	±	4.12	
		IODINE-131	05/20/2004	-0.44	±	1.39	-1.61	±	5.15	
	MUSCLE	CESIUM-137	05/20/2004	1.05	±	1.35	3.90	±	4.99	
		IODINE-131	05/20/2004	0.03	±	1.44	0.13	±	5.33	
	THYROID	CESIUM-137	05/20/2004	-194.00	±	185.00	-718.52	±	685.19	
		IODINE-131	05/20/2004	220.00	±	164.00	814.81	±	607.41	
Animal # 2	LIVER	CESIUM-137	05/20/2004	0.84	±	1.19	3.11	±	4.43	
		IODINE-131	05/20/2004	-1.49	±	1.12	-5.52	±	4.15	
	MUSCLE	CESIUM-137	05/20/2004	3.04	±	1.10	11.25	±	4.09	
		IODINE-131	05/20/2004	0.55	±	1.40	2.02	±	5.19	
	THYROID	CESIUM-137	05/20/2004	115.00	±	148.00	425.93	±	548.15	
		IODINE-131	05/20/2004	12.10	±	125.00	44.81	±	462.96	
INEEL SOUTH										
Animal # 1	LIVER	CESIUM-137	04/30/2004	4.33	±	1.30	16.03	±	4.82	Y
		IODINE-131	04/30/2004	-6.55	±	4.58	-24.26	±	16.96	
	MUSCLE	CESIUM-137	04/30/2004	-1.00	±	5.17	-3.70	±	19.14	
		IODINE-131	04/30/2004	13.60	±	10.30	50.37	±	38.15	
	THYROID	CESIUM-137	04/30/2004	91.10	±	95.10	337.41	±	352.22	
		IODINE-131	04/30/2004	64.20	±	71.60	237.78	±	265.19	
Animal # 2	LIVER	CESIUM-137	04/30/2004	4.76	±	1.24	17.65	±	4.58	Y
		IODINE-131	04/30/2004	5.12	±	3.49	18.96	±	12.93	
	MUSCLE	CESIUM-137	04/30/2004	3.99	±	1.31	14.78	±	4.85	Y
		IODINE-131	04/30/2004	0.83	±	5.55	3.07	±	20.56	
	THYROID	CESIUM-137	04/30/2004	7.46	±	27.00	27.63	±	100.00	
		IODINE-131	04/30/2004	22.90	±	30.90	84.81	±	114.44	

TABLE C-9: Cesium-137 and Iodine-131 Concentrations in Sheep.

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
DUBOIS										
Animal # 1	LIVER	CESIUM-137	04/30/2004	1.22	±	1.28	4.53	±	4.73	
		IODINE-131	04/30/2004	-2.39	±	6.04	-8.85	±	22.37	
	MUSCLE	CESIUM-137	04/30/2004	0.72	±	1.31	2.65	±	4.86	
		IODINE-131	04/30/2004	-13.80	±	8.13	-51.11	±	30.11	
	THYROID	CESIUM-137	04/30/2004	-52.00	±	45.70	-192.59	±	169.26	
		IODINE-131	04/30/2004	-1.07	±	41.80	-3.96	±	154.81	
Animal # 2	LIVER	CESIUM-137	04/30/2004	-6.80	±	4.43	-25.19	±	16.40	
		IODINE-131	04/30/2004	9.41	±	12.20	34.85	±	45.19	
	MUSCLE	CESIUM-137	04/30/2004	3.98	±	1.33	14.75	±	4.94	
		IODINE-131	04/30/2004	5.64	±	7.42	20.89	±	27.48	
	THYROID	CESIUM-137	04/30/2004	-103	±	137.00	-381.48	±	507.41	
		IODINE-131	04/30/2004	-82.1	±	72.20	-304.07	±	267.41	

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 ($\times 10^{-2}$ Bq/kg wet weight)			Result > 3s
PRONGHORN										
	LIVER	IODINE-131	04/07/2004	-4.63	±	2.33	-17.13	±	8.62	
	MUSCLE	IODINE-131	04/07/2004	-5.62	±	3.90	-20.79	±	14.43	
	THYROID	CESIUM-137	04/07/2004	-12.70	±	163.00	-46.99	±	603.10	
	THYROID	IODINE-131	04/07/2004	99.10	±	187.00	366.67	±	691.90	
MULE DEER[a]										
	LIVER	CESIUM-137	04/20/2004	-6.89	±	5.90	-25.49	±	21.83	
	LIVER	IODINE-131	04/20/2004	-3.59		3.71	-13.28	±	13.73	
	MUSCLE	CESIUM-137	04/20/2004	1.66	±	1.48	6.14	±	5.48	
	MUSCLE	IODINE-131	04/20/2004	0.23	±	1.33	0.85	±	4.92	
	THYROID	IODINE-131	04/20/2004	-31.30	±	105.00	-115.81	±	388.50	
Fetus	MUSCLE	IODINE-131	04/20/2004	-18.10	±	15.00	-66.97	±	55.50	
MULE DEER										
	LIVER	IODINE-131	05/06/2004	-18.20	±	17.90	-67.34	±	66.23	
	MUSCLE	IODINE-131	05/06/2004	-4.43	±	4.18	-16.39	±	15.47	
	THYROID	IODINE-131	05/06/2004	10.30	±	90.40	38.11	±	334.48	

a. Deer was fitted with a radio collar around 1995. This would make her age would have been around 10 years old. She was pregnant. Tissue from the fetus was analyzed and had no detectable radionuclides.

TABLE C-11: Environmental Radiation Results

Location	Begin	End	Ambient			Exposure
Location	Start Date	End Date	Radiation Measurement ± 1s Uncertainty mR			Exposure mR/day
BOUNDARY						
ARCO	11/04/2003	05/04/2004	62.40	±	12.20	0.34
ATOMIC CITY	11/04/2003	05/04/2004	67.80	±	13.30	0.37
BIRCH CREEK	11/04/2003	05/03/2004	58.50	±	11.50	0.32
BLUE DOME	11/04/2003	05/03/2004	52.50	±	10.30	0.29
HOWE	11/04/2003	05/04/2004	61.50	±	12.10	0.34
MONTEVIEW	11/04/2003	05/03/2004	58.40	±	11.50	0.32
MUD LAKE	11/04/2003	05/04/2004	66.40	±	13.00	0.36
					Boundary Average	**0.34**
DISTANT						
ABERDEEN	11/04/2003	05/04/2004	65.40	±	12.80	0.36
BLACKFOOT	11/04/2003	05/04/2004	56.20	±	11.00	0.31
CRATERS	11/04/2003	05/04/2004	58.00	±	11.40	0.32
DUBOIS	11/04/2003	05/03/2004	53.10	±	10.40	0.29
IDAHO FALLS	11/04/2003	05/03/2004	62.60	±	12.30	0.35
MINIDOKA	11/04/2003	05/04/2004	55.70	±	10.90	0.31
REXBURG	11/04/2003	05/03/2004	68.00	±	13.30	0.38
ROBERTS	11/04/2003	05/04/2004	67.70		13.30	0.37
					Distant Average	**0.33**
OUT-OF-STATE						
JACKSON	11/04/2003	05/03/2004	49.30	±	9.70	0.27

APPENDIX D

STATISTICAL ANALYSIS RESULTS

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Table D-1. Results of the Kruskal-Wallace[a] statistical test between INEEL, Boundary, and Distant sample groups by month.

Parameter	p[b]
Gross Alpha	
Quarter	0.71
April	0.67
May	0.44
June	0.73
Gross Beta	
Quarter	0.42
April	1.00
May	1.00
June	1.00

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

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

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

		Mann-Whitney U test[a]
Parameter	**Week**	**p[b]**
Gross Alpha		
	April 7th	0.48
	April 14th	0.67
	April 21st	0.67
	April 28th	0.48
	May 5th	1.00
	May 12th	0.32
	May 19th	1.00
	May 26th	0.67
	June 2nd	0.87
	June 9th	0.48
	June 16th	0.87
	June 23rd	0.87
	June 30th	0.11
Gross Beta		
	April 7th	0.78
	April 14th	0.25
	April 21st	1.00
	April 28th	0.78
	May 5th	0.57
	May 12th	1.00
	May 19th	0.83
	May 26th	0.89
	June 2nd	0.72
	June 9th	0.48
	June 16th	0.15
	June 23rd	0.94
	June 30th	0.30

a. See the Determining Statistical Differences of the Helpful Information section for details on the Mann-Whitney U test and a description of each test statistic.

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