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

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Contributors:
Marilyn Case, Chris Martin

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By the S.M. Stoller Corporation,
Environmental Surveillance, Education and Research Program
Douglas K. Halford, Program Manager
1780 First Street, Idaho Falls, Idaho 83401
www.stoller-eser.com

EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the second quarter of 2003 could be directly linked with INEEL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States or were consistent with levels measured historically at the INEEL. All detected radionuclide concentrations were well below guidelines set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public. (See Table E-1.)

This report for the second quarter, 2003, contains results from the Environmental Surveillance, Education and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Engineering and Environmental Laboratory's (INEEL) offsite environment, April 1 through May 30, 2003. All sample types (media) and the sampling schedule followed during 2003 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including air filters and charcoal cartridges, atmospheric moisture, and 10-micron particulate matter (PM_{10});
- 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.

- o Results greater than 3s are reported as "detected".
- o Results less than 2s are reported as "undetected".
- o 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 2003. Because of this, these data were statistically analyzed using nonparametric methods, including the use of the median to represent central tendency. At no time during the 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). None of these radionuclides were detected in any sample collected and composited during the second quarter.

Twelve atmospheric moisture samples were obtained during the second quarter of 2003; two each from Atomic City and Blackfoot, three from Rexburg, and five from Idaho Falls. None of the exceeded their respective 3s levels.

The ESER Program operates three PM_{10} samplers, one each at Rexburg, Blackfoot, and Atomic City. Sampling of PM_{10} is informational as no analyses are conducted for contaminants. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour concentration was 73.04 $\mu g/m^3$ on June 19, 2003, at Atomic City. This below the EPA Air Quality Standard of 150 $\mu g/m^3$.

Sufficient precipitation occurred to allow collection of three monthly composite samples from Idaho Falls, two monthly composite samples from the Central Facilities Area (CFA) on the INEEL, and eight 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 2003. Samples were analyzed for gross alpha, gross beta, and tritium (^{3}H). None of the samples exceeded its 3s value for gross alpha or tritium. Ten samples exceeded the 3s value for gross beta. The maximum gross beta concentration measured, (9.72 ± 0.17) pCi/L, was from Monteview 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 (^{3}H). None of the samples exceeded its 3s value for tritium. Gross alpha and gross beta activities were detected in three and four samples, respectively. 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.

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 northern 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.

Two large game animals (a mule deer and a pronghorn) were sampled during the second quarter of 2003. They were killed as a result of a vehicular collision. Thyroid, liver, and muscle tissues were sampled. 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 0.28 mR/day to 0.34 mR/day. The overall Boundary average was 0.31 mR/day. The Distant group ranged from 0.25 mR/day to 0.38 mR/day, with an overall average exposure also of 0.31 mR/day. No statistical difference existed between Boundary and Distant locations. All exposure results are consistent with those measured historically.

Quality assurance samples submitted for analysis during the first quarter 2003 demonstrate that the results were reasonably complete, accurate, precise, and free of field contamination, as measured by criteria established in the ESER Quality Assurance Project Plan.

No radionuclide in any of the samples taken during the second quarter of 2003 could be directly linked with INEEL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States 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, 2003 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 2003.

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.
	PM10	Particulate matter	Forty-three total samples were collected from three locations. No regulatory limits were exceeded.
Atmospheric Moisture	Liquid	Tritium	Thirteen atmospheric moisture samples were collected. None 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 not detected in any sample. Gross beta activity was measured in 10 of 14 samples. The maximum was well below the EPA Safe Drinking Water Act limits. Tritium was not detected in any sample. at concentrations many times lower than the EPA screening level.
Surface Water	Liquid	Gross alpha, gross beta, tritium	No tritium was detected in any of the six samples collected. Gross alpha activity was measured in three samples at values greater than 3s. 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	No radionuclides were detected in any of samples collected.
Sheep	Tissue	Iodine-131, gamma emitting radionuclides	Cesium-137 was detected in three samples: two muscle samples and one liver from two sheep collected from the Northern allotment animal.
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides	Two 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 1988). During calendar year 2003, environmental monitoring within the INEEL boundaries was primarily the responsibility of the INEEL Management and Operating (M&O) contractor, while monitoring outside the INEEL boundaries was conducted under the Environmental Surveillance, Education and Research (ESER) Program. The ESER Program is led by the S.M. Stoller Corporation in cooperation with its team members, including: the University of Idaho (UI) and Washington State University (WSU) for research, and MWH Global, Inc., and North Wind Environmental, Inc. for technical support. This report contains monitoring results from the ESER Program for samples collected during the second quarter of 2003 (April 1 – June 30, 2003).

The surveillance portion of the ESER Program is designed to satisfy the following program objectives:

- Verify compliance with applicable environmental laws, regulations, and DOE Orders;
- Characterize and define trends in the physical, chemical, and biological condition of environmental media on and around the INEEL;
- Assess the potential radiation dose to members of the public from INEEL effluents, and;
- Present program results clearly and concisely through the use of reports, presentations, newsletter articles, and press releases.

The goal of the surveillance program is to monitor different media at a number of potential exposure points within the various exposure pathways, including air, water, agricultural products, wildlife, and soil, that could possibly contribute to the radiation dose received by the public.

Environmental samples 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 2003). The EPA established the ERAMS network in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, drinking water, and milk samples. The ESER Program currently operates a high-volume air sampler and 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 2000), 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 (2000).

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.

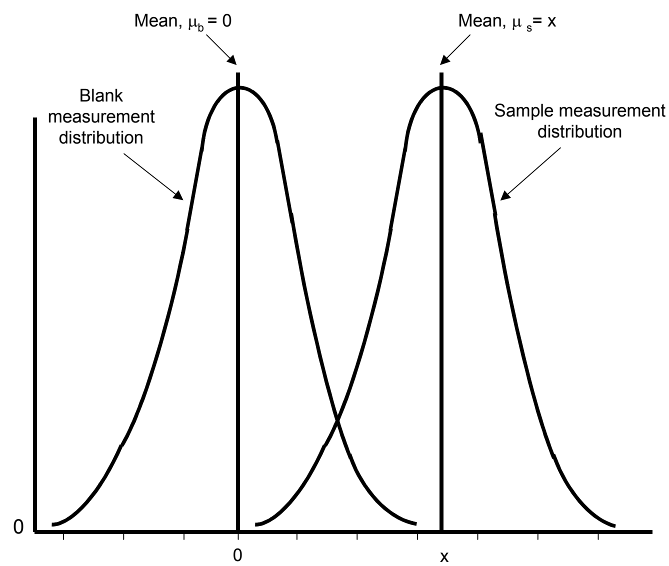

Figure 1. Example overlap of blank and sample measurement distributions.

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 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 2003 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, 2003 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the second quarter of 2003 (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 16,102 ft^3 (456 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.

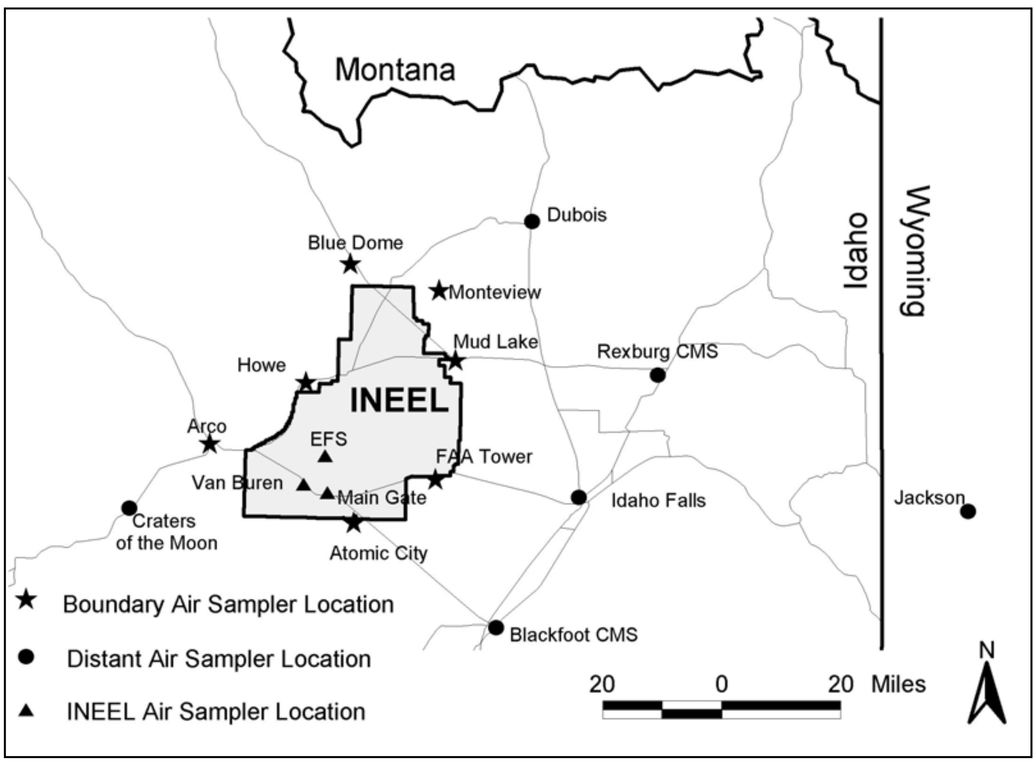

Figure 2. Low-volume air sampler locations.

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 2003 are shown in Figure 3. The data were tested for normality prior to statistical analyses. For the most part the data showed no discernable distribution. Box and whisker plots are commonly used when there is no assumed distribution. Each data group in Figure 3 is presented as a box and whisker plot, with a median, a box enclosing values between the 25th and 75th percentiles, and whiskers representing the non-outlier range. Note that outliers and extreme values are identified separately from the box and whiskers. Outliers and extreme values are atypical, infrequent, data points that are far from the middle of the data distribution. For this report, outliers are defined as values that are greater than 1.5 times the height of the box, above or below the box. Extreme values are greater than 2 times the height of the box, above or below the box. Outliers and extreme values may reflect inherent variability, may be due to errors associated with transcription or measurement, or may be related to other anomalies. A careful review of the data collected during the 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 2003.

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.

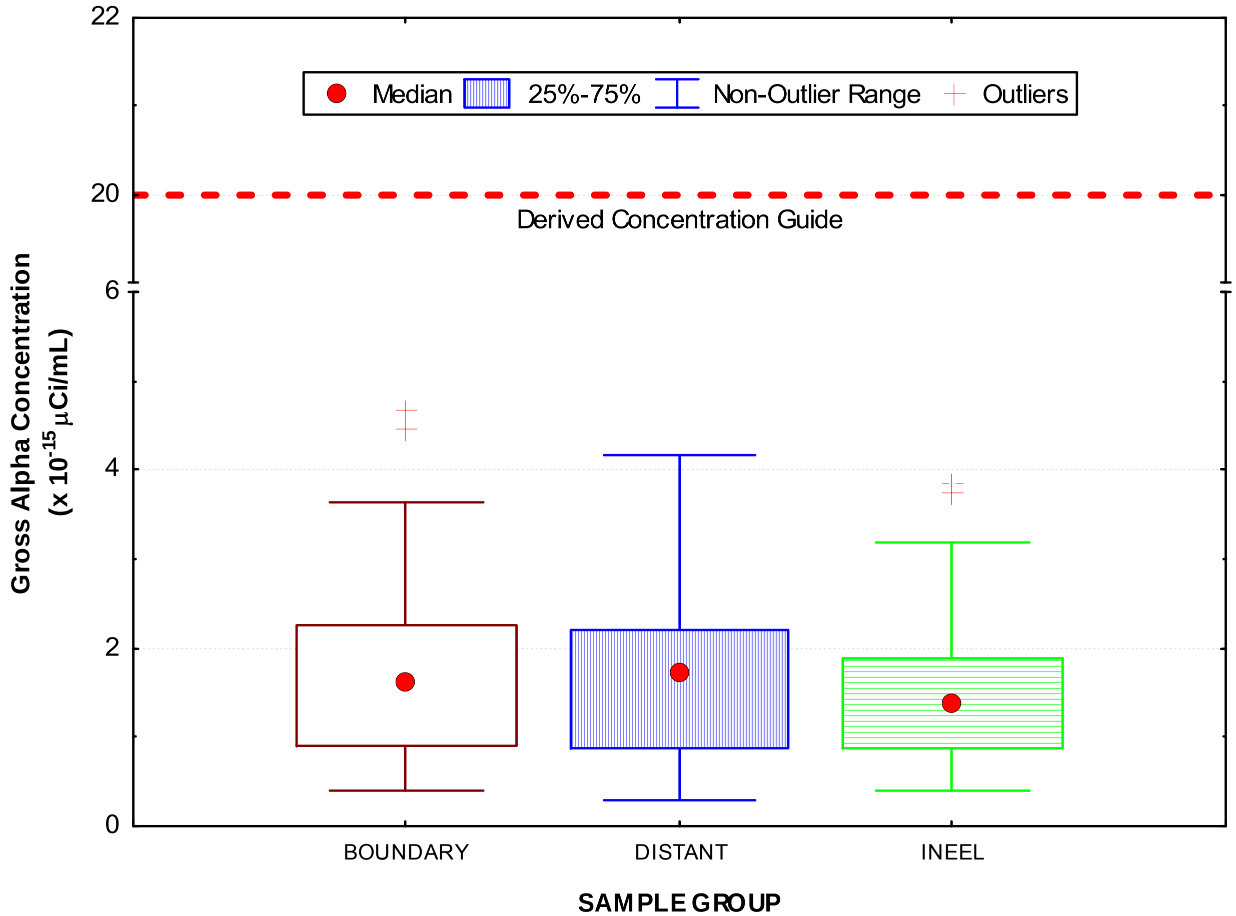

Figure 3. Gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the second quarter of 2003.

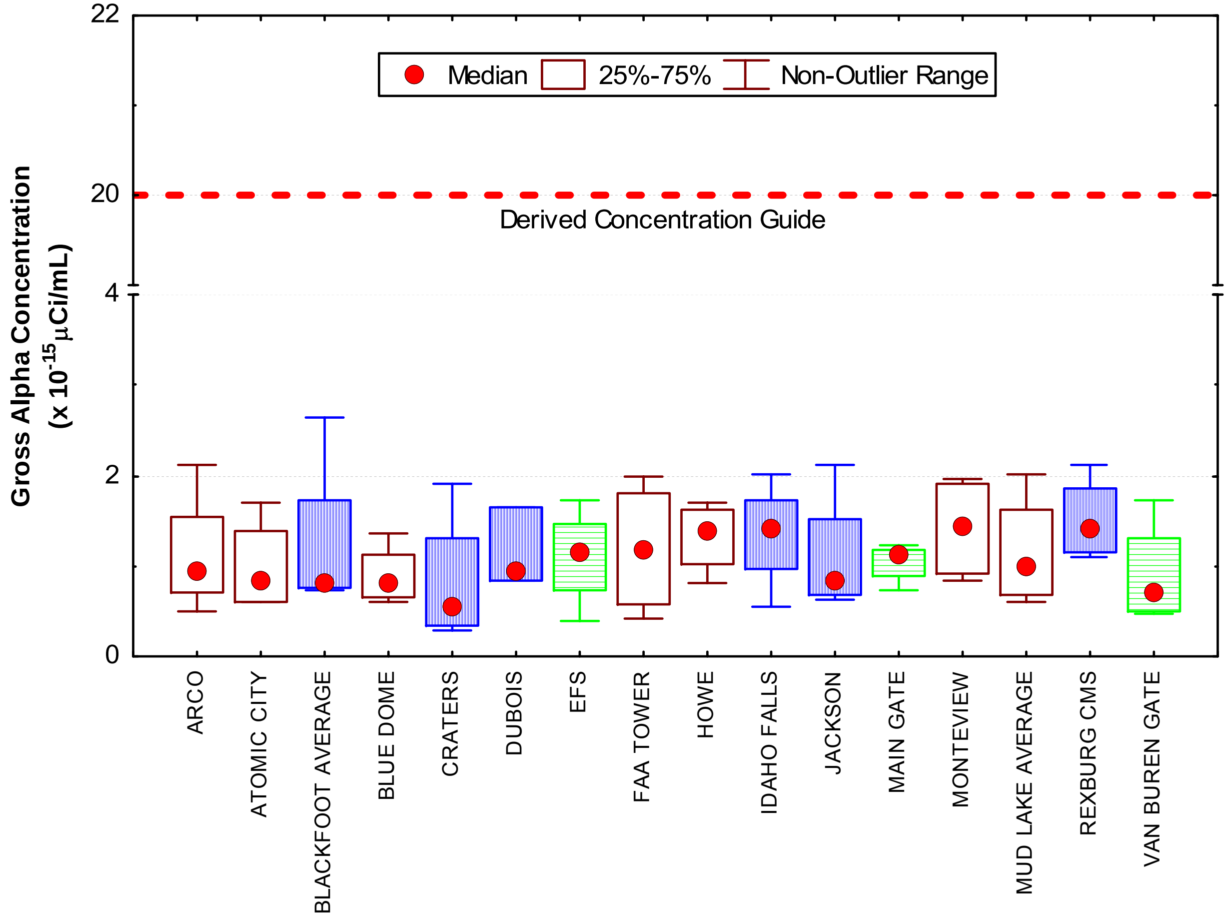

Figure 4. April gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of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

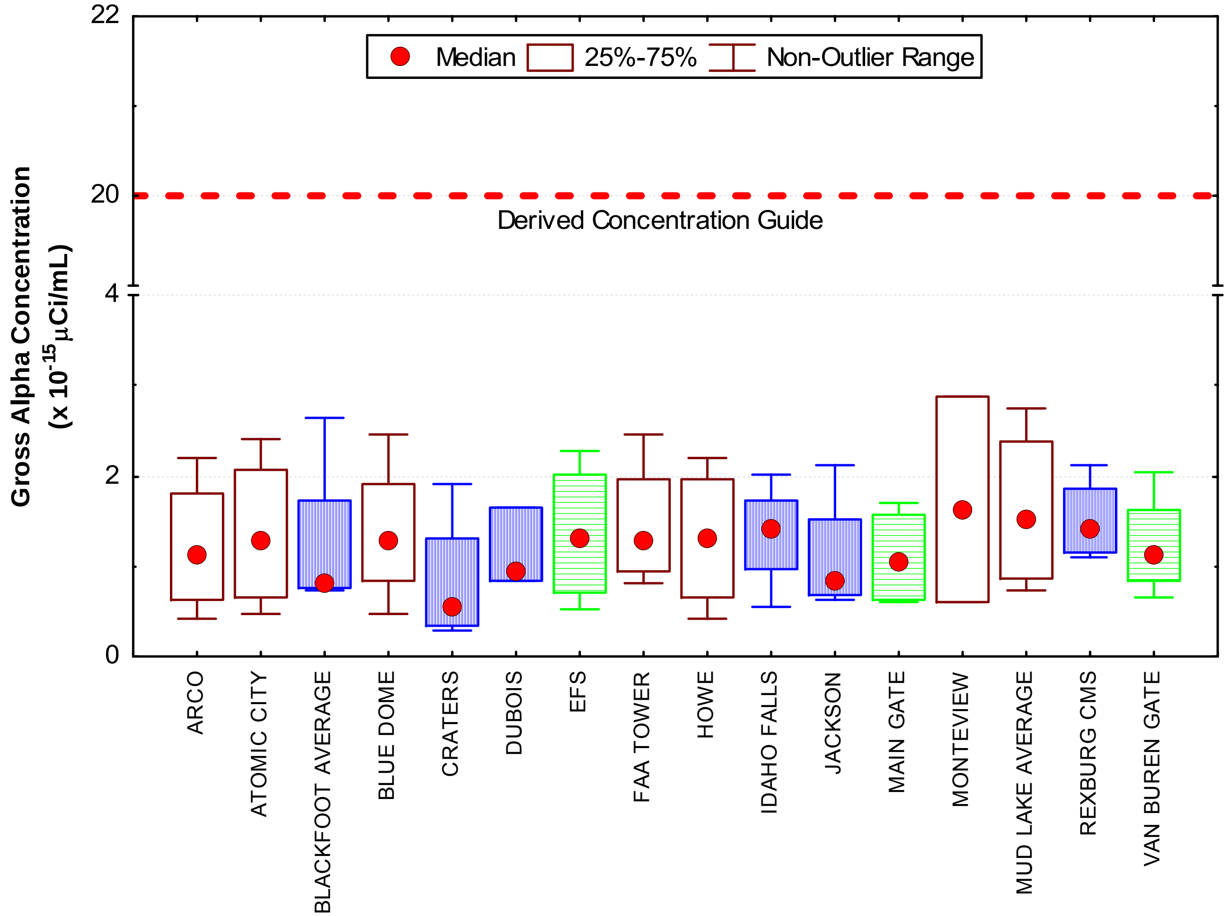

Figure 5. May gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples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

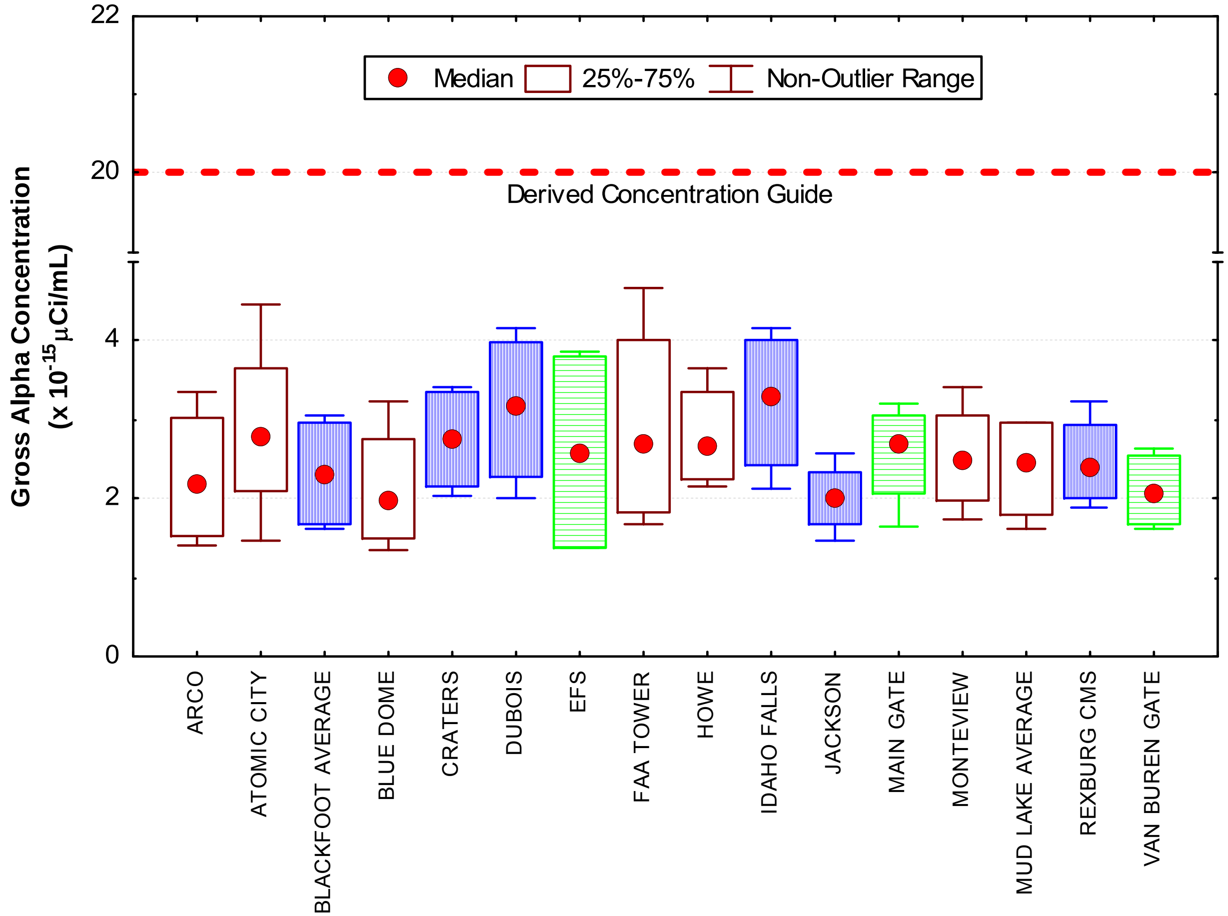

Figure 6. June gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples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

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

As a further 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 2003 are shown in Figure 7. The data were tested and found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. As in the case of alpha activity, the quarterly data for each group appear to be similar and were determined using the Kruskal-Wallace test to be statistically the same (Table D-1).

Monthly median gross beta concentrations in air for each sampling group are shown in Figures 8 – 10. Statistical data are presented in Table D-1. Again as in the case of alpha activity, the monthly data for each group during the second quarter 2003 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, indicate no statistical differences between weekly Boundary and Distant measurements during the second quarter 2003 (Table D-2).

No ^{131}I was detected in any of the charcoal cartridge batches collected during the second quarter of 2003. 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 44 of the 217 measured cartridges.

Weekly filters for the second quarter of 2003 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. None of these radionuclides were detected in any quarterly composited sample. All results for composite filter samples are shown in Table C-3, Appendix C.

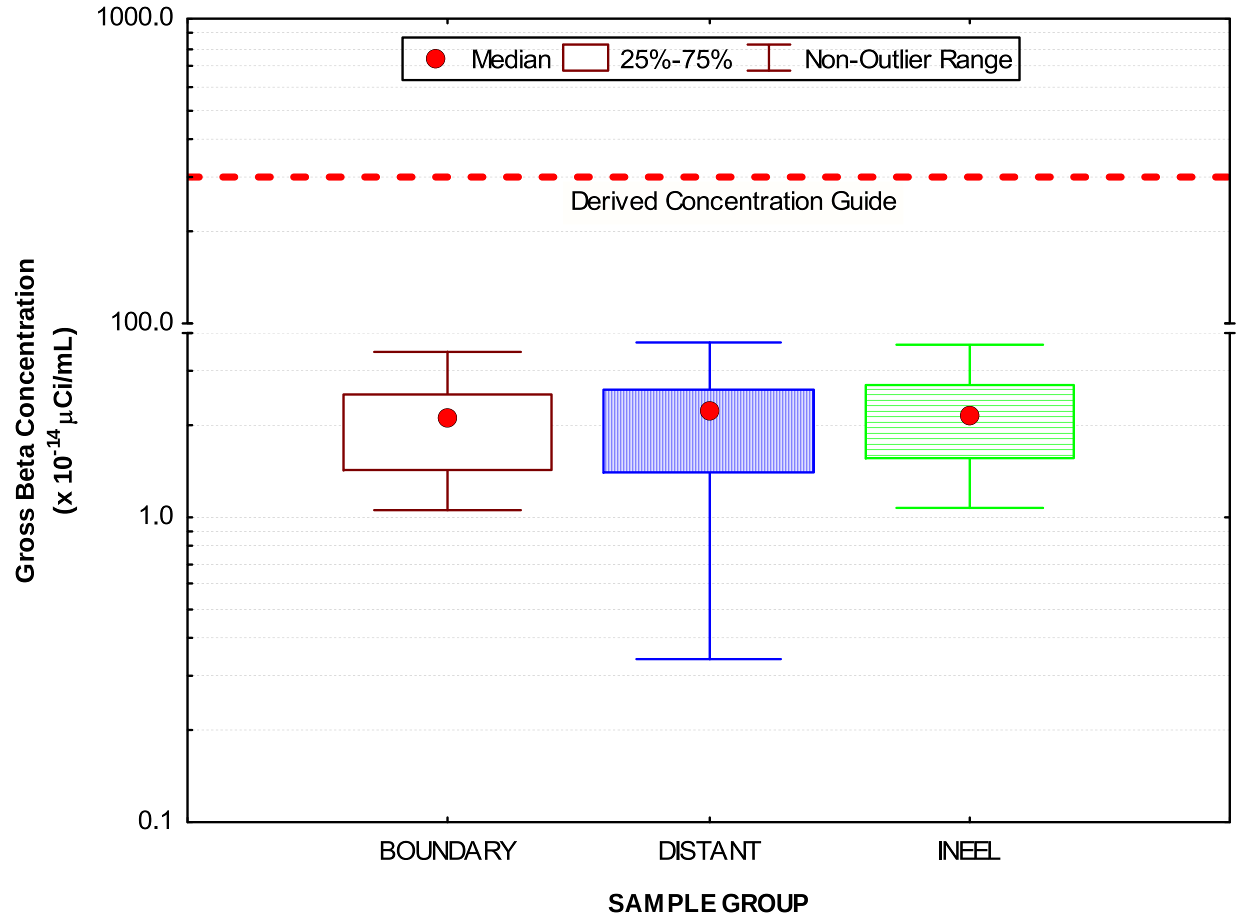

Figure 7. **Gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the second quarter 2003.**

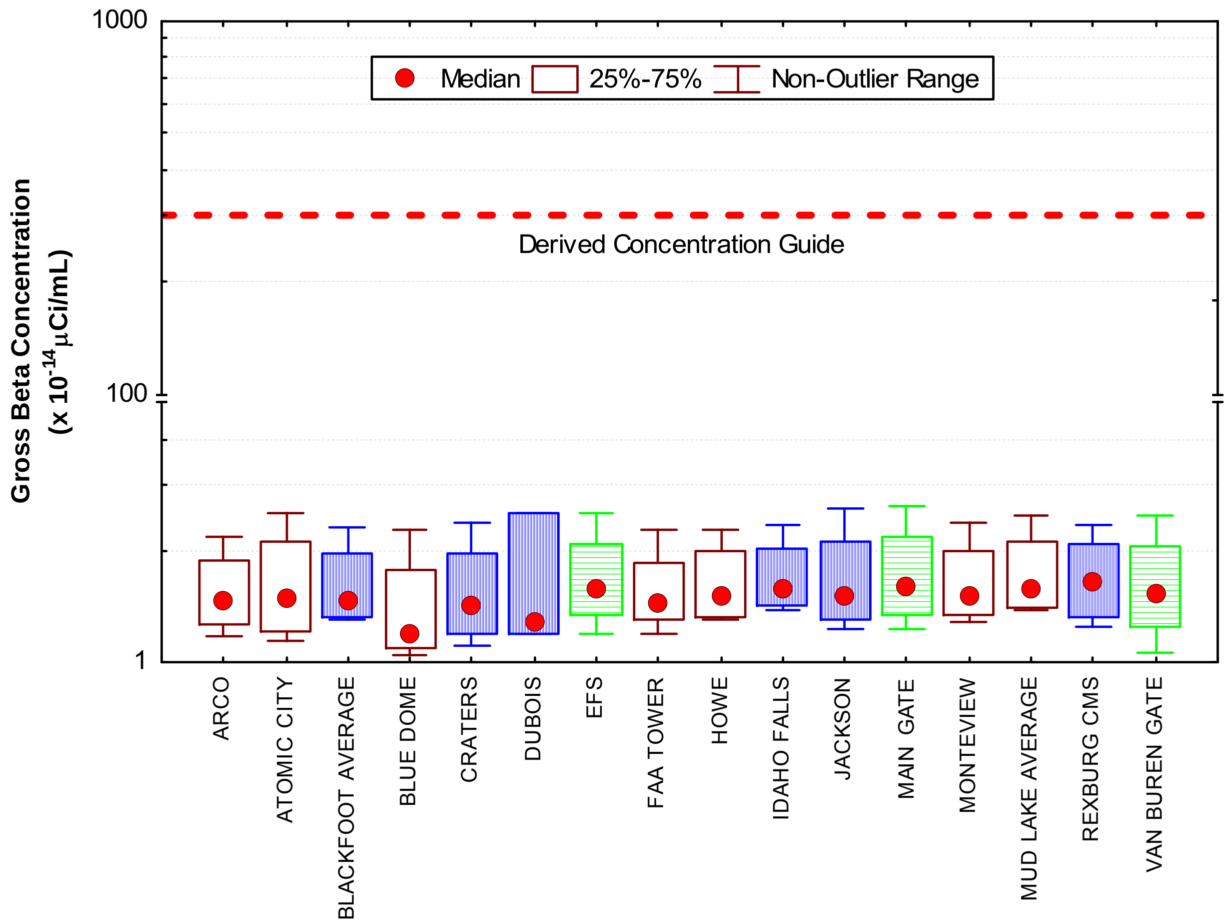

Figure 8. April gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 4 at each location, except for Dubois, where N=3.]

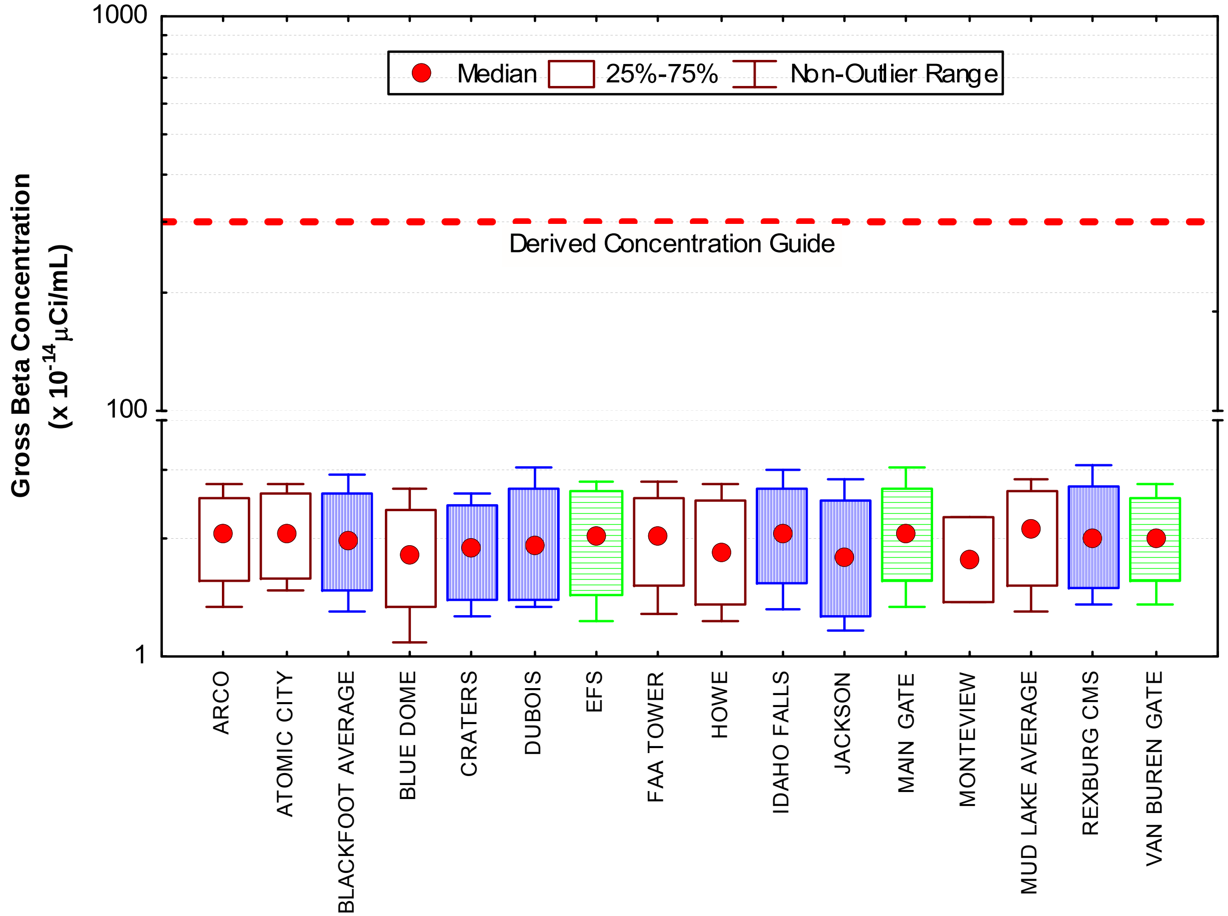

Figure 9. May gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples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

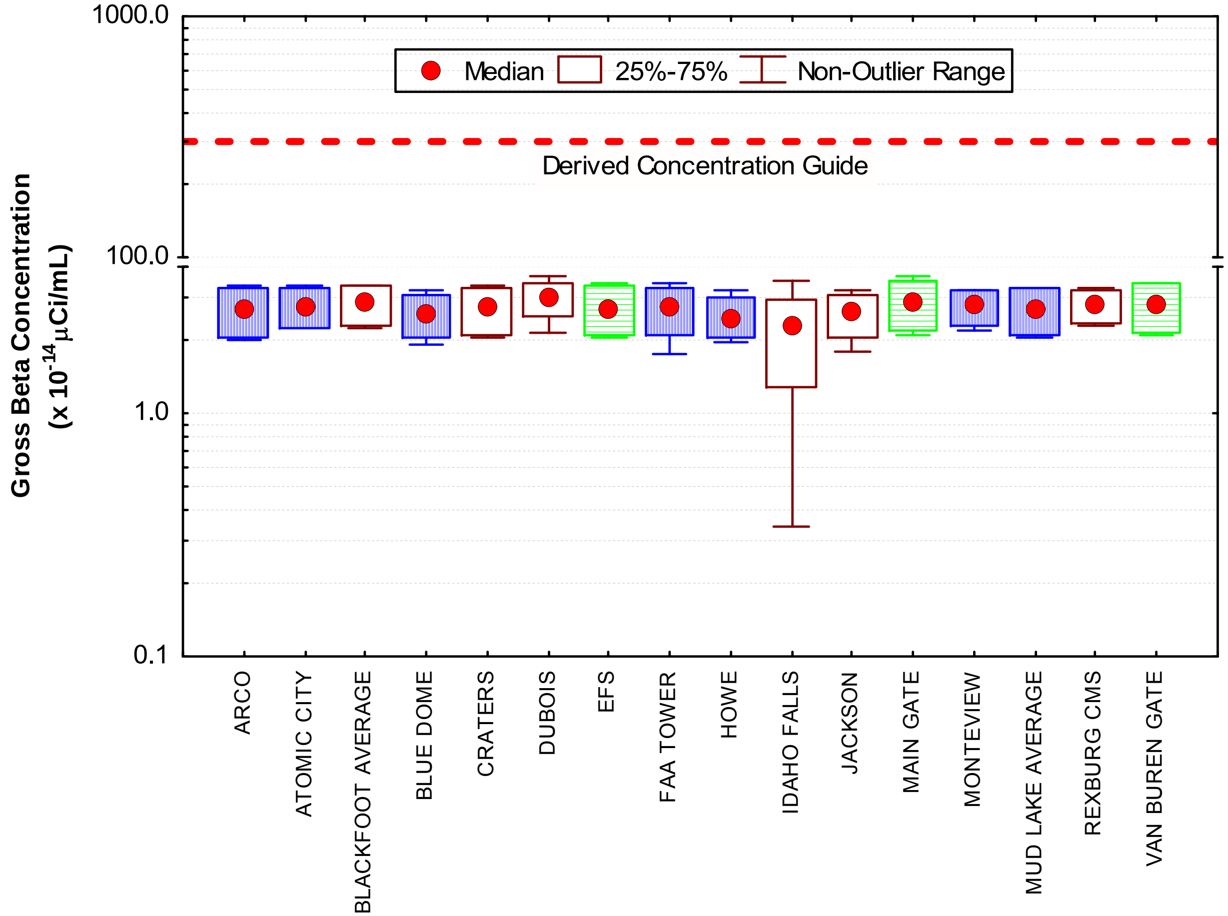

Figure 10. June gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples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

ATMOSPHERIC MOISTURE SAMPLING

Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., silica gel) 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. Twelve atmospheric moisture samples were obtained during the second quarter of 2003 from Atomic City, Blackfoot CMS, Idaho Falls, and Rexburg CMS.

None of the samples exceeded the 3s uncertainty level. All results are shown in Table C-4. All sample results were well below the DOE DCG for tritium in air of 1×10^{-7} µCi/mL (3.7×10^{-3} Bq/mL).

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). Particles of this size can be inhaled deep into the lungs and are considered to be responsible for most of the adverse health effects associated with airborne particulate pollution. The air quality standards for these particulates are an annual average of 50 µg/m^3, with a maximum 24-hour concentration of 150 µg/m^3.

The ESER Program operates three PM_{10} samplers, one each at the Rexburg CMS and Blackfoot CMS, and one in Atomic City. Sampling of PM_{10} is informational only as no chemical analyses are conducted for contaminants. A twenty-four hour sampling period is scheduled to run once every six days. Equipment problems invalidated a two of the samples from the Blackfoot CMS (the sample for the week of May 8 and June 13, 2003). The maximum 24-hour concentration was 73.04 µg/m^3 on June 19, 2003, at Atomic City. 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	0.07	73.04	19.82
Blackfoot, CMS	2.89	42.54	13.33
Rexburg, CMS	4.11	42.89	17.62

a. All concentrations are in (µCi/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 2003 produced sufficient precipitation to yield 13 samples – two from CFA, three from Idaho Falls, and eight from Idaho Falls.

No tritium was measured above the 3s value in any of the samples collected during the second quarter 2003. Data for all second quarter 2003 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).

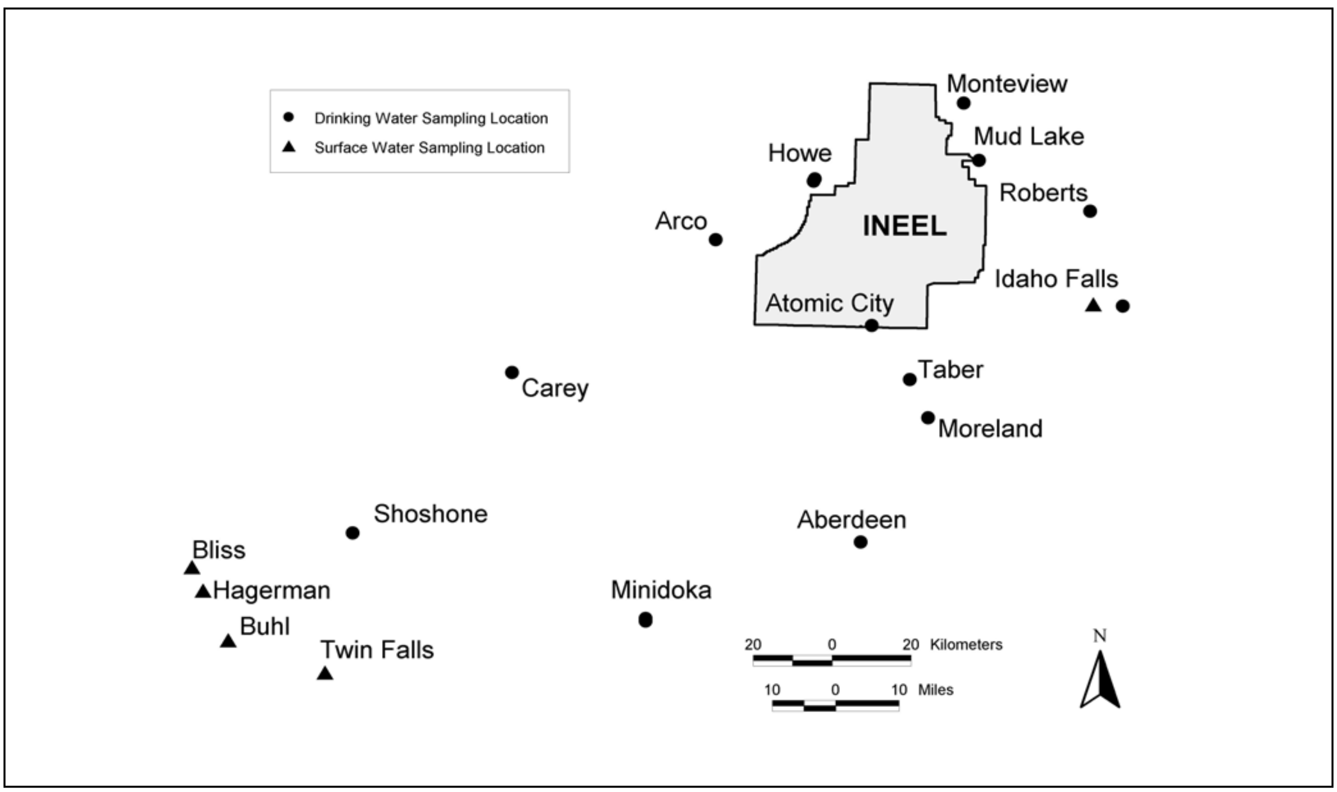

Figure 11. Drinking and Surface Water Sampling locations.

None of the samples exceeded their 3s values for gross alpha or tritium.

Of the fourteen drinking water samples collected, all but four samples (Arco, Carey, Howe, and Mud Lake) 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 1991). 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 gross beta results greater than (>) 3s.

	Sample Results[a]		Limits for Comparison[a]	
Location	**Result ± 1s**	**MDC**	**SDWA[b]**	**DOE DCG[c]**
Aberdeen	5.24 ± .94	2.66	50	100
Atomic City	3.25 ± .82	2.45	50	100
Fort Hall	9.59 ± .03	2.60	50	100
Idaho Falls	3.01 ± .82	2.52	50	100
Minidoka	3.57 ± .84	3.03	50	100
Monteview	9.72 ± .17	2.51	50	100
Moreland	8.36 ± .07	2.82	50	100
Mud Lake (duplicate)	4.87 ± .83	2.35	50	100
Roberts	4.38 ± .87	2.51	50	100
Shoshone	4.09 ± .84	2.45	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 (all results were less than 3s). Three samples were greater than their respective 3s values for gross alpha activity.

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.

Location	Result ± 1s	Limits for Comparison[a]	
		SDWA	DOE DCG
Bliss (Bliss Boat Dock)	5.32 ± 0.95	50	100
Buhl (Clear Spring)	4.47 ± 0.92	50	100
Twin Falls (Alpheus Spring)	8.01 ± 1.00	50	100
Twin Falls (duplicate)	5.38 ± 0.97	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 (USGS, 1991). 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 PRODUCTS AND WILDLIFE SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, 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 2003.

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 2003. All samples were analyzed for gamma emitting radionuclides. Samples are analyzed for ^{90}Sr during the second and fourth quarters.

Iodine-131 (^{131}I) and ^{137}Cs were not detected in any milk sample during the second quarter.

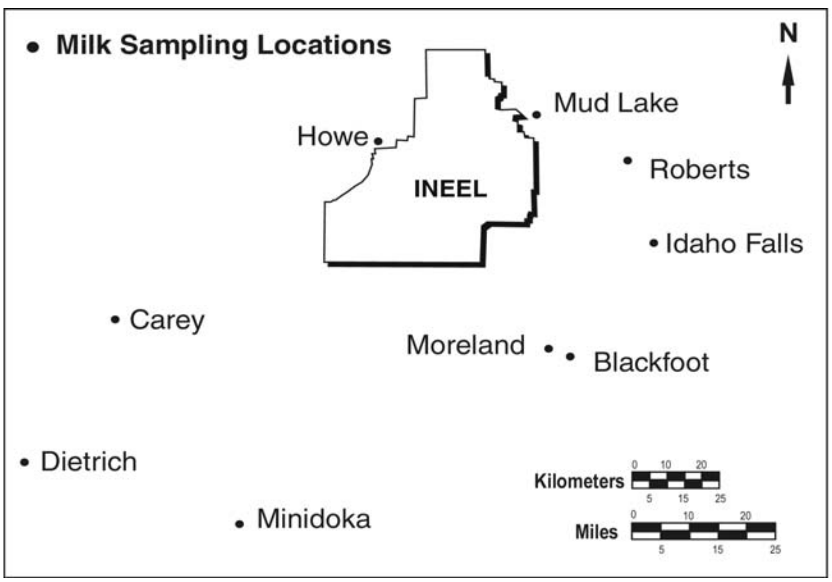

Figure 12. ESER Program milk sampling locations.

Strontium-90 was measured above the 3s uncertainty level in four of six samples analyzed. Like ^{137}Cs, ^{90}Sr is related to uptake through the food chain of historical weapons derived fallout. The maximum level of ^{90}Sr in milk was below the EPA MCL of 8 pCi/L and the DOE DCG of 1000 pCi/L. Data for ^{90}Sr in milk samples are listed in Appendix C, Table C-8

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 2003, 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.

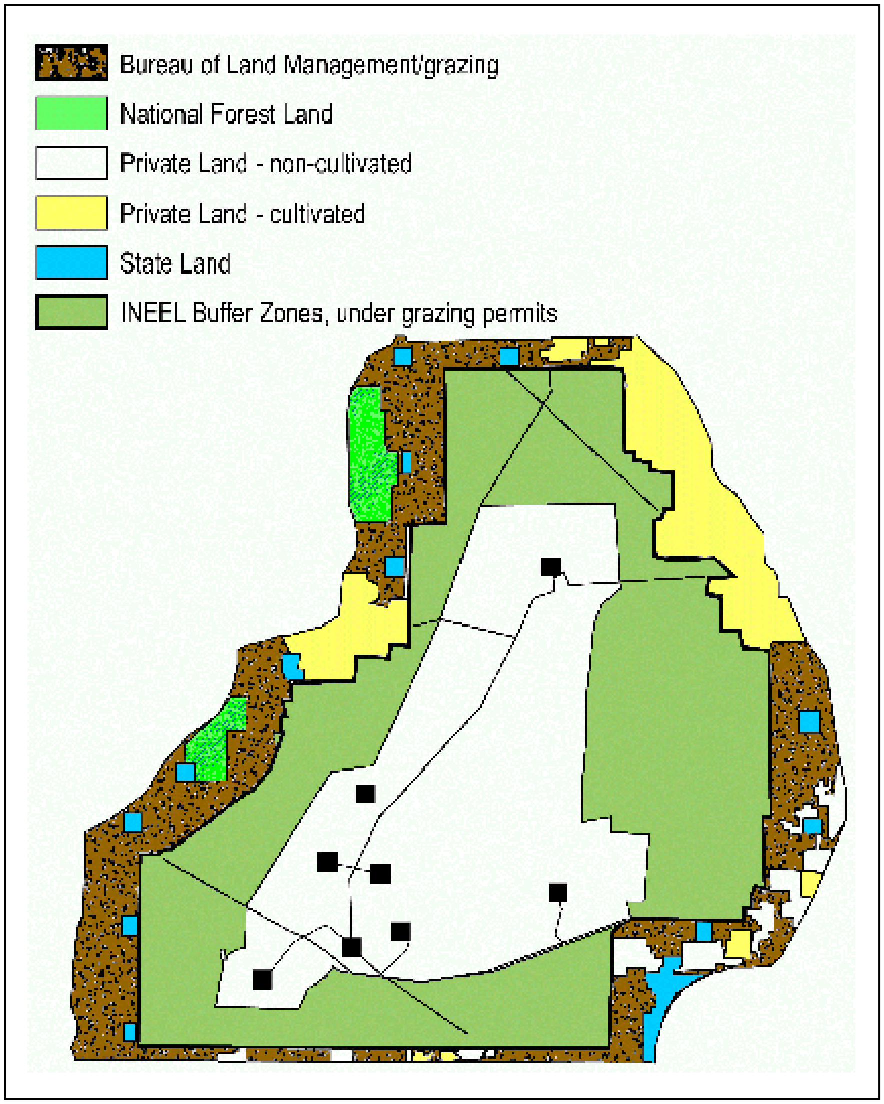

Figure 13. Grazing and land ownership on and around the INEEL.

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 liver and two muscle) from two different sheep. Both animals were collected from the Northern 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

Two large game animals were sampled during the second quarter of 2003. A single Pronghorn and a 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 2001 to May 2003) are discussed below.

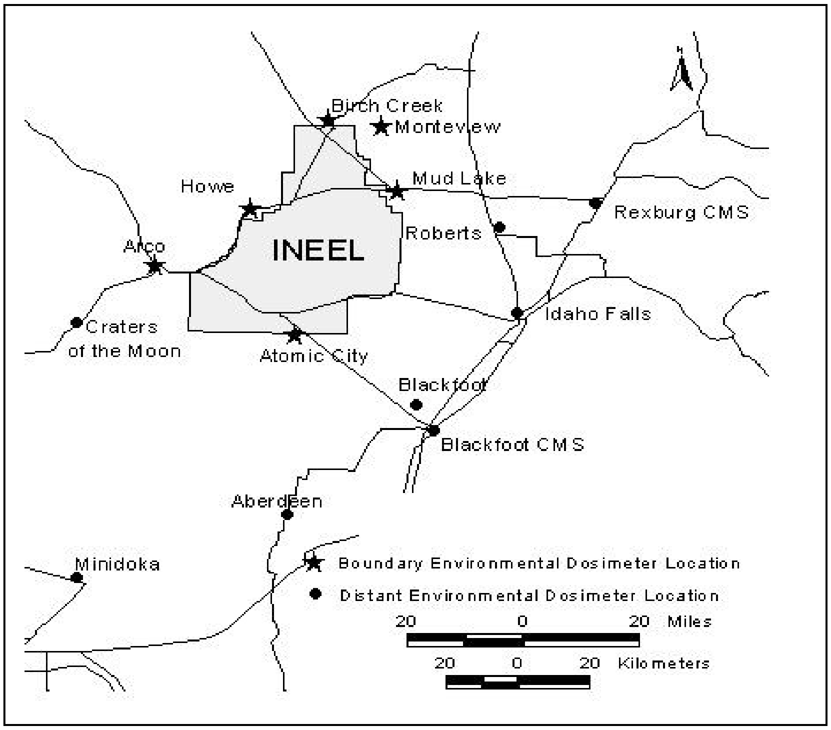

Figure 14. TLD sampling locations.

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 0.28 mR/day at Monteview to a high of 0.34 mR/day at Atomic City. The overall Boundary average was 0.31 mR/day. The Distant group had a high of 0.38 mR/day at the Rexburg CMS and a low of 0.25 mR/day at the Jackson, Wyoming location. The overall average Distant value was also 0.31 mR/day. There was no statistical difference between Boundary and Distant locations. Furthermore, all values are consistent with past readings. Table 4 lists the range and average for both groups over a six-month period. All results are listed in Appendix C, Table C-10.

Table 4. TLD Exposures from November 2001 to May 2003.

	Total Exposure[a]	
Location	Boundary	Distant
Average	55.27	56.64
Maximum	60.80	68.40
Minimum	50.80	44.20

a All values shown are in milliroetgens (mR).

7. QUALITY ASSURANCE

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

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

The following discussion summarizes the results of the quality assurance program for the period from January 1 to March 31, 2003.

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 April 25 and Monteview on May 28). The completeness of air filter data is thus considered to be 99.2 percent.

DATA ACCURACY

During the second quarter of 2003, spikes of the following types were obtained and submitted:

- Two milk sample spikes analyzed for gamma-emitting radionuclides by the EAL. One of these milk samples was obtained in 2002 but was not analyzed in time for the short-lived radionuclides. This sample was then submitted in the second quarter of 2003 to measure the long-lived radionuclides.
- Drinking water spike analyzed for tritium by the EAL.
- Low-volume air filter analyzed for gross alpha and gross beta by the EAL.
- Quarterly composite analyzed for strontium-90 by Severn-Trent.

The Quality Assurance Project Plan specifies a required accuracy of ±20 percent for ^{131}I in milk, gross alpha and gross beta in air, ±10 percent for tritium in water, and 25 percent for ^{90}Sr in air. A comparison is also provided using the 3 sigma standard described in the Data Precision section.

The EAL was within the accuracy criteria for all radionuclides except for cobalt-60 in milk, gross alpha activity in LV air filters, and ^{90}Sr in the water. The gamma-emitting radionuclide, ^{60}Co, is not typically measured in milk and thus does not represent a major concern. Gross alpha activity is difficult to measure accurately since the analyst must calibrate the spectrometer to specific radionuclides, which may or may not represent the major source of alpha activity in the sample. Alpha and beta measurements are at best screening tools which can indicate higher or lower concentrations of radionuclides in air. The ^{90}Sr concentration measured in the spiked water sample was 11.7 percent below the actual concentrations. The activity was within the 3s criterion. Because the measurement was close to the ± 10 percent criterion and within the 3s criterion (see *Data Precision* section), the result was judged to be reasonably accurate. However, we will continue to track the issue.

The EAL also prepares internal laboratory spikes. During the second quarter of 2003, 32 analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. Geometries included low-volume air filter composites and charcoal cartridges. A total of 207 analytical results were generated. All of the results within the ±20 percent range, with the exception of one result for ^{88}Y. However, this result was within the three sigma criterion (see *Data Precision* section). Water samples were spiked with NIST tritium standards. Ten analyses were conducted and all results were well within the ± 20 percent criterion, and in fact were within 4 percent of the known value. In addition, a tritium milk spike analysis was also within 20 percent of the known value.

Severn-Trent analyzes a laboratory control sample (LCS) with each batch of samples submitted by the ESER. During the second quarter these consisted of ^{90}Sr and actinides in air, ^{90}Sr in milk, and ^{90}Sr, actinides, and ^{137}Cs in marmots. The QAPP specifies accuracies of ± 10 percent for radionuclides in air, ± 25 percent for ^{90}Sr in milk, and ± 20 percent for ^{90}Sr, actinides, and ^{137}Cs in marmots. All LCS results were within parameters.

Both EAL and Severn-Trent participate in the DOE Environmental Measurements Laboratory (EML) Quality Assessment Program QAP-58 reported in June 2003. Air filter, water, soil, and vegetation samples were spiked by the EML with specific alpha, beta, and gamma emitters. All of the EAL analytical results were acceptable within EML QAP limits. Some Severn-Trent results were not within the acceptable limits (a value less than the 5th percentile and greater than the 98th percentile.) These included ^{90}Sr in an air filter and ^{239}Pu in vegetation. The ^{90}Sr measurement made by the laboratory was 33.4 percent of the EML value. The ^{239}Pu measurement made by Severn-Trent was 7.2 percent of the spike concentration. Severn-Trent has been made aware of the results and is investigating.

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 3σ, whichever is greater. For environmental samples at levels that are within the normal range found by the ESER, the 3σ criterion is the one that applies in nearly all cases. Mathematically, the 3σ criterion is expressed as:

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

where:

X is the result of the regular sample

Y is the result of the duplicate sample

σ_x is the uncertainty of the regular sample

σ_y is the uncertainty of the duplicate sample

Another measure of duplicate sample results is the relative percent difference. This value is the difference in the two results divided by the mean of the two results.

Field duplicate samples

Duplicate milk samples were collected during the second quarter and were analyzed for gamma-emitting radionuclides. They were found to be within the 3s criterion for ^{131}I and ^{137}Cs.

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the second quarter of 2003 these samplers, designated as QA-1 and QA-2, were in operation at Mountain View and Mud Lake, respectively. Particulate filters were analyzed for gross alpha and gross beta activity. All valid QA-1 samples analyzed by the EAL met the 3s criterion for gross alpha and gross beta during the second quarter.

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

A comparison of duplicate results can also show bias in the sampling system. For example, if one set of results is consistently lower or higher than the other one might suspect that this bias was due to a leak in the system or variations in the calibration of the flow meter. Figures 15 through 18 show the ratio of results (QA duplicate sampler/main sampler) over time. A ratio of one means that the results of both samplers are exactly the same. The figures show that the bias is small (<2) and not consistent, indicating that there is no obvious bias in the duplicate sampling systems. The average bias ratios during the first quarter are 1.0, 1.0, 1.2, and 1.0 for Mountain View gross alpha, Mud Lake gross alpha, Mountain View gross beta, and Mud Lake gross beta, respectively.

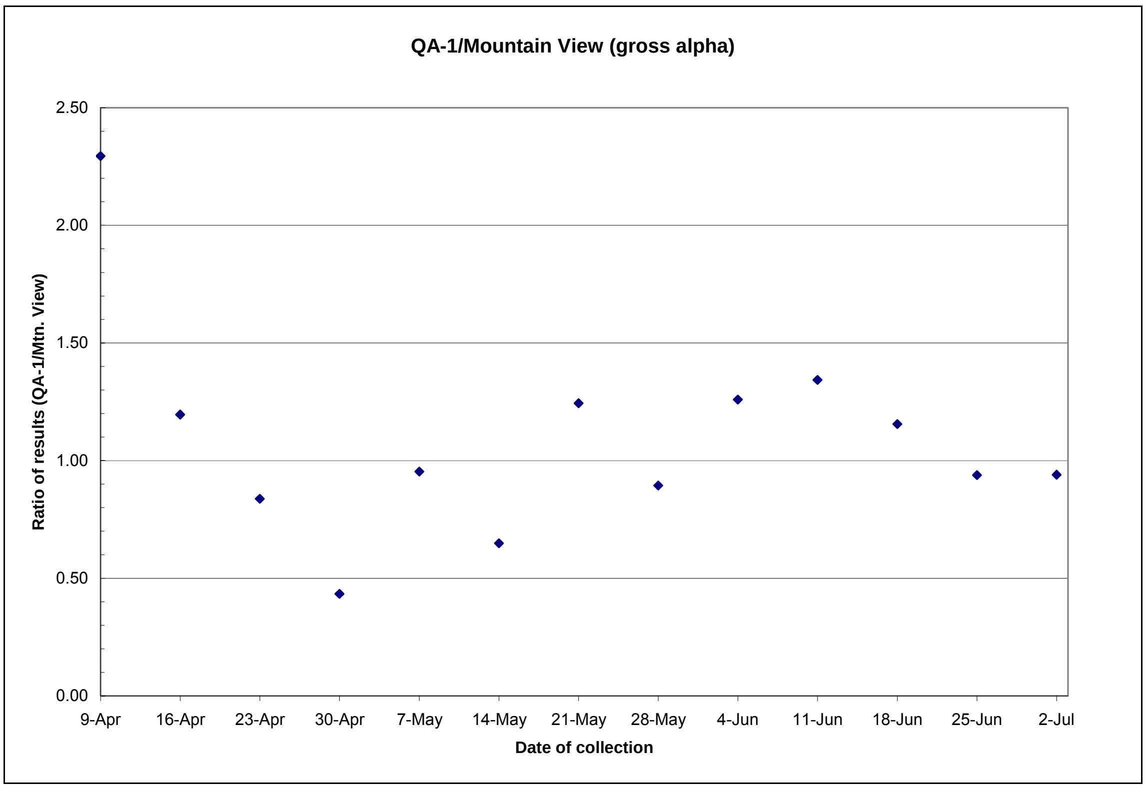

Figure 15. Ratio of QA-1/Mountain View gross alpha activities.

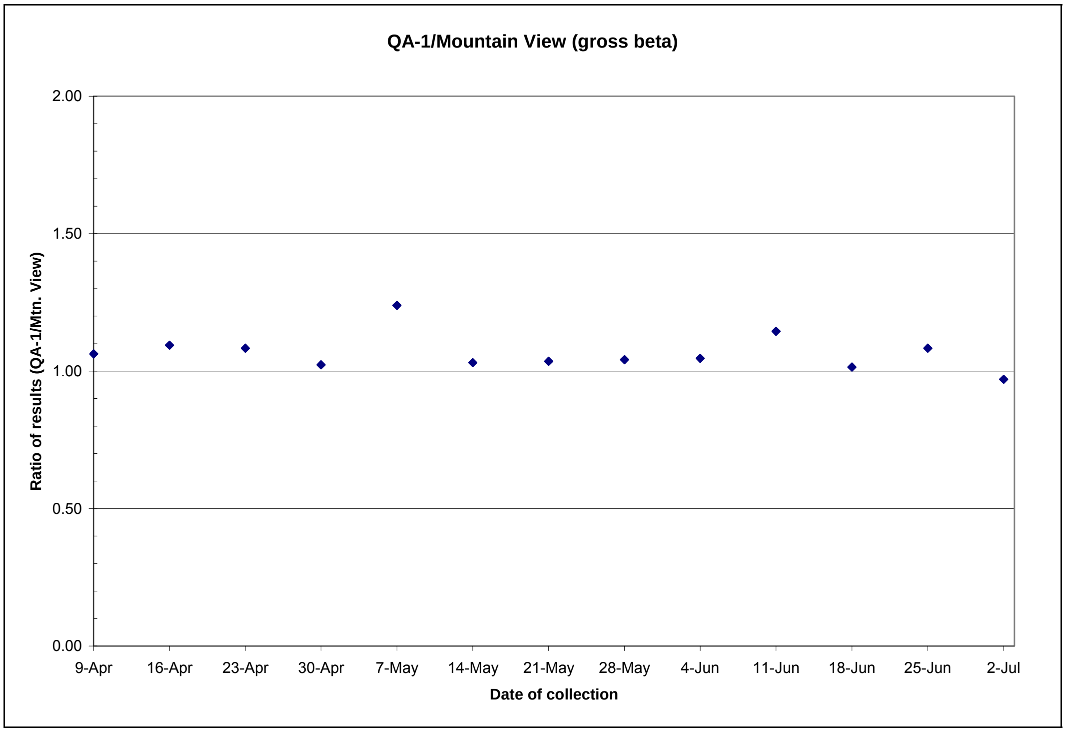

Figure 16. Ratio of QA-1/Mountain View gross beta activities.

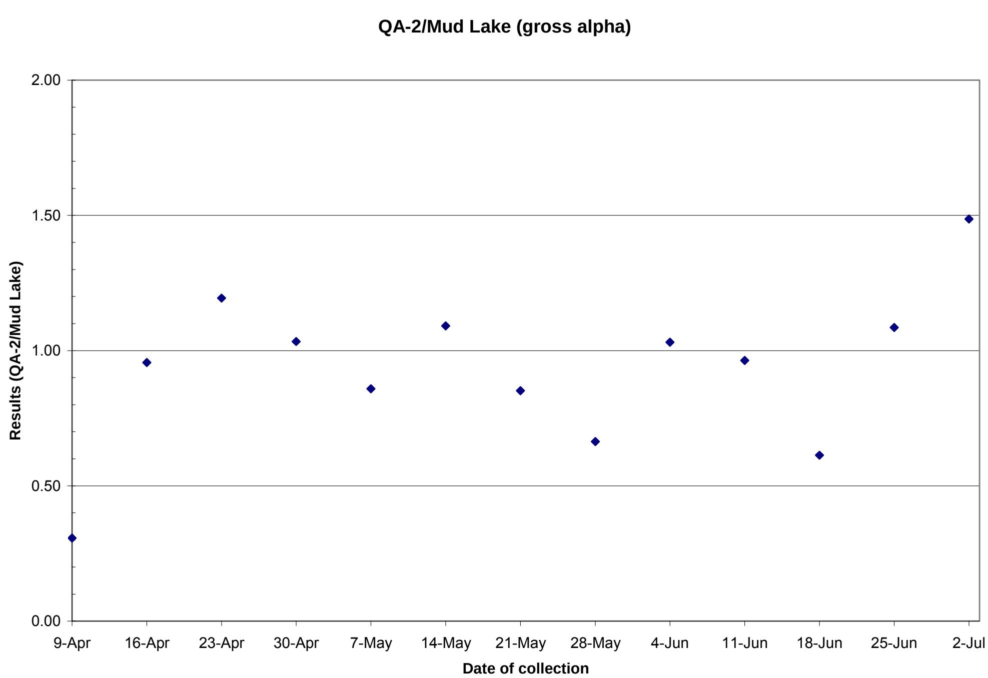

Figure 17. Ratio of QA-2/Mud Lake gross alpha activities.

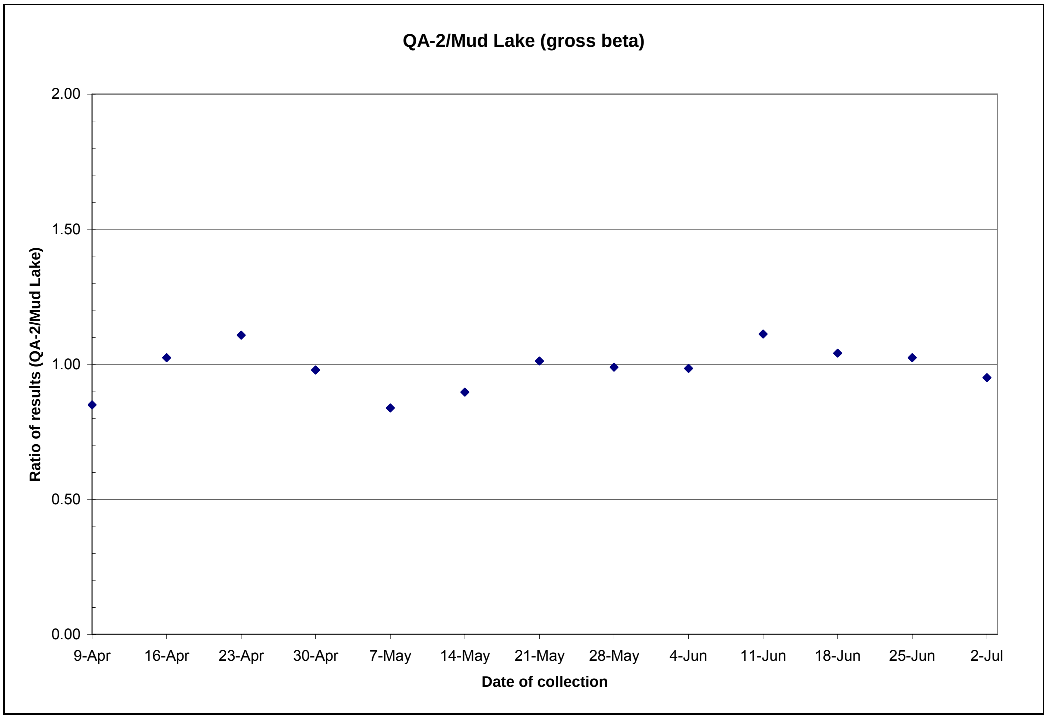

Figure 18. Ratio of QA-2/Mud Lake gross beta activities.

Lab split samples

The EAL splits and analyzes a number of milk, precipitation, and atmospheric moisture samples each quarter. The laboratory tests each result using both the ±20 percent criterion and the 3σ criterion, although it considers the former test meaningless for analyses producing fewer than 15 total counts and questionable even where counts are on the order of 100. The latter criterion is applied in nearly all cases at the levels seen in environmental samples analyzed for the ESER program. Results of the EAL split sample analyses met the criteria for acceptance during the second quarter 2003.

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

Sample recounts

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

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

- 41 low-volume air filters were recounted for alpha activity; one was recounted twice. All were within the 3σ criterion.

- 41 low-volume air filters were recounted for beta activity; one was recounted twice. All were within the 3σ criterion.
- 22 milk samples were recounted for iodine-131. All were within the 3σ criterion.
- 11 groups of charcoal cartridges were recounted for iodine-131. All were within the 3σ criterion.
- 21 tissue samples were recounted for cesium-137. All were within the 3σ criterion.
- Three precipitation samples were recounted for tritium. Two were outside the 3σ criterion, but within the 20 percent criterion.
- One water sample was recounted for tritium. The result was within the 3σ criterion.
- Two milk samples were recounted for tritium. One result was not within the 3σ criterion, but was within 20 percent.
- 13 atmospheric moisture samples were recounted for tritium. All were within the 3σ criterion.

BLANKS

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

The QAPP also specifies that one milk sample blank will be submitted per year (although this is now being done monthly).

The QAPP does not specify requirements for blank performance, but ideally the result should be within ±3σ of zero on most analyses. The 2003 blanks submitted for analyses were, for the most part, within this range. One exception of concern is the result of $(1.71 \pm 0.33) \times 10^{-10}$ pCi/mL for ^{90}Sr in the quarterly air composite analyzed by Severn-Trent. However, the reagent blank analyzed by the laboratory at the same time was also between 4-5 standard deviations. In addition, the reagent blank for marmots was between five and six standard deviations for ^{90}Sr. All results were corrected for the activity observed in the reagent blank. The case narrative for wheat samples in the third quarter said that the laboratory had a high strontium-90 sample come through the lab so they cleaned everything and re-did the wheat sample. So the lab may have been contaminated during the second quarter as well. We will continue to follow this issue.

The EAL also analyzes reagent blanks to help determine if the analysis will yield a zero result when no activity is present. Two such blanks were analyzed for tritium in the second quarter. The results were less than the calculated MDCs and less than three standard deviations. Reagent blanks for gross alpha and gross beta were less than one standard deviation of zero.

ADDITIONAL QA NOTES

There were no significant QA problems noted for the second quarter. A new HPGe detector was installed during the quarter. No samples were analyzed on this system as control chart data was being collected

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APPENDIX A

SUMMARY OF SAMPLING MEDIA & 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, Reno Ranch	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS Distant	Boundary	INEEL
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Reno Ranch	None
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Mud Lake	None
WHEAT				
Gamma Spec, ^{90}Sr	annually	Am. Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Tabor, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	None
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INEEL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois,	None	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
FISH				
Gamma Spec	annually or as available	None	None	Big Lost River

APPENDIX B

SUMMARY OF MDC'S, DCG'S, AND SDWA LIMITS

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

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)	x 10^{-15} 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	x 10^{-7} µCi/mL$_{water}$	1×10^{-7} µCi/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 percent level of confidence and precision of plus or minus 100 percent under a specified set of typical laboratory measurement conditions.

b DCGs, set by the DOE, represent reference values for radiation exposure. They are based on a radiation dose of 100 mrem/yr for exposure through a particular exposure mode such as direct exposure, inhalation, or ingestion of water.

c The DCG for gross alpha is equivalent to the DCGs for $^{239,240}Pu$ and ^{241}Am.

d The DCG for gross beta is equivalent to the DCGs for ^{228}Ra

e The approximate MDC is based on an average filtered air volume (pressure corrected) of 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 & Gross Beta Concentrations in Air

Sample Group & Location	Sampling Date	GROSS ALPHA Result ± Uncertainty (1s) 10^{-15} μCi/mL			GROSS ALPHA Result ± Uncertainty (1s) X 10^{-10} Bq/mL			GROSS BETA Result ± Uncertainty (1s) 10^{-14} μCi/mL			GROSS BETA Result ± Uncertainty (1s) X 10^{-10} Bq/ml		
BOUNDARY													
ARCO													
	4/2/2003	0.77	±	0.30	0.03	±	0.01	1.61	±	0.09	0.60	±	0.04
	4/9/2003	0.50	±	0.27	0.02	±	0.01	1.17	±	0.07	0.43	±	0.03
	4/16/2003	2.13	±	0.35	0.08	±	0.01	2.17	±	0.10	0.80	±	0.04
	4/23/2003	0.94	±	0.40	0.03	±	0.01	1.57	±	0.10	0.58	±	0.04
	4/30/2003	0.93	±	0.30	0.03	±	0.01	1.35	±	0.08	0.50	±	0.03
	5/7/2003	0.42	±	0.23	0.02	±	0.01	1.33	±	0.07	0.49	±	0.03
	5/14/2003	0.82	±	0.27	0.03	±	0.01	1.80	±	0.08	0.67	±	0.03
	5/21/2003	1.42	±	0.28	0.05	±	0.01	2.29	±	0.08	0.85	±	0.03
	5/28/2003	2.19	±	0.39	0.08	±	0.01	2.77	±	0.11	1.02	±	0.04
	6/4/2003	3.34	±	0.46	0.12	±	0.02	3.21	±	0.11	1.19	±	0.04
	6/11/2003	1.66	±	0.45	0.06	±	0.02	2.10	±	0.11	0.78	±	0.04
	6/18/2003	2.72	±	0.40	0.10	±	0.01	3.32	±	0.11	1.23	±	0.04
	6/25/2003	1.40	±	0.34	0.05	±	0.01	2.02	±	0.09	0.75	±	0.03
ATOMIC CITY													
	4/2/2003	0.59	±	0.29	0.02	±	0.01	1.56	±	0.09	0.58	±	0.04
	4/9/2003	0.62	±	0.26	0.02	±	0.01	1.15	±	0.07	0.43	±	0.02
	4/16/2003	1.70	±	0.33	0.06	±	0.01	2.51	±	0.10	0.93	±	0.04
	4/23/2003	1.07	±	0.38	0.04	±	0.01	1.71	±	0.09	0.63	±	0.03
	4/30/2003	0.59	±	0.32	0.02	±	0.01	1.27	±	0.09	0.47	±	0.03
	5/7/2003	0.47	±	0.22	0.02	±	0.01	1.48	±	0.07	0.55	±	0.03
	5/14/2003	0.82	±	0.29	0.03	±	0.01	1.67	±	0.08	0.62	±	0.03
	5/21/2003	1.74	±	0.32	0.06	±	0.01	2.45	±	0.09	0.91	±	0.03
	5/28/2003	2.40	±	0.38	0.09	±	0.01	2.75	±	0.10	1.02	±	0.04
	6/4/2003	4.45	±	0.65	0.16	±	0.02	3.28	±	0.14	1.21	±	0.05
	6/11/2003	1.45	±	0.42	0.05	±	0.02	2.25	±	0.10	0.83	±	0.04
	6/18/2003	2.82	±	0.41	0.10	±	0.02	3.34	±	0.11	1.24	±	0.04
	6/25/2003	2.71		0.41	0.10	±	0.02	2.24		0.09	0.83	±	0.04

BLUE DOME												
4/2/2003	0.79	±	0.25	0.03	±	0.01	1.32	±	0.08	0.49	±	0.03
4/9/2003	0.70	±	0.27	0.03	±	0.01	1.13	±	0.07	0.42	±	0.03
4/16/2003	1.36	±	0.34	0.05	±	0.01	2.29	±	0.11	0.85	±	0.04
4/23/2003	0.91	±	0.37	0.03	±	0.01	1.26	±	0.09	0.47	±	0.03
4/30/2003	0.60	±	0.25	0.02	±	0.01	1.04	±	0.06	0.38	±	0.02
5/7/2003	0.47	±	0.20	0.02	±	0.01	1.09	±	0.06	0.40	±	0.02
5/14/2003	1.19	±	0.28	0.04	±	0.01	1.60	±	0.07	0.59	±	0.03
5/21/2003	1.37	±	0.29	0.05	±	0.01	2.02	±	0.08	0.75	±	0.03
5/28/2003	2.45	±	0.36	0.09	±	0.01	2.69	±	0.10	1.00	±	0.04
6/4/2003	3.22	±	0.46	0.12	±	0.02	3.21	±	0.12	1.19	±	0.04
6/11/2003	1.67	±	0.46	0.06	±	0.02	2.14	±	0.11	0.79	±	0.04
6/18/2003	2.26	±	0.37	0.08	±	0.01	2.94	±	0.10	1.09	±	0.04
6/25/2003	1.33	±	0.29	0.05	±	0.01	1.94	±	0.08	0.72	±	0.03
FAA TOWER												
4/2/2003	0.84	±	0.30	0.03	±	0.01	1.37	±	0.09	0.51	±	0.03
4/9/2003	0.75	±	0.33	0.03	±	0.01	1.19	±	0.08	0.44	±	0.03
4/16/2003	2.00	±	0.37	0.07	±	0.01	2.27	±	0.11	0.84	±	0.04
4/23/2003	1.59	±	0.49	0.06	±	0.02	1.46	±	0.10	0.54	±	0.04
4/30/2003	0.41	±	0.30	0.02	±	0.01	1.41	±	0.09	0.52	±	0.03
5/7/2003	1.05	±	0.32	0.04	±	0.01	1.28	±	0.08	0.47	±	0.03
5/14/2003	0.82	±	0.33	0.03	±	0.01	1.75	±	0.09	0.65	±	0.03
5/21/2003	1.49	±	0.33	0.06	±	0.01	2.29	±	0.09	0.85	±	0.03
5/28/2003	2.46	±	0.42	0.09	±	0.02	2.78	±	0.11	1.03	±	0.04
6/4/2003	4.67	±	0.50	0.17	±	0.02	3.44	±	0.11	1.27	±	0.04
6/11/2003	1.66	±	0.68	0.06	±	0.03	1.75	±	0.14	0.65	±	0.05
6/18/2003	3.36	±	0.48	0.12	±	0.02	3.14	±	0.12	1.16	±	0.04
6/25/2003	1.99	±	0.39	0.07	±	0.01	2.41	±	0.10	0.89	±	0.04

HOWE													
	4/2/2003	0.84	±	0.27	0.03	±	0.01	1.46	±	0.08	0.54	±	0.03
	4/9/2003	1.54	±	0.32	0.06	±	0.01	1.34	±	0.07	0.50	±	0.03
	4/16/2003	1.71	±	0.33	0.06	±	0.01	2.28	±	0.10	0.84	±	0.04
	4/23/2003	1.26	±	0.42	0.05	±	0.02	1.69	±	0.10	0.63	±	0.04
	4/30/2003	0.80	±	0.28	0.03	±	0.01	1.31	±	0.07	0.48	±	0.03
	5/7/2003	0.41	±	0.21	0.02	±	0.01	1.24	±	0.06	0.46	±	0.02
	5/14/2003	0.89	±	0.29	0.03	±	0.01	1.46	±	0.08	0.54	±	0.03
	5/21/2003	1.73	±	0.33	0.06	±	0.01	2.22	±	0.09	0.82	±	0.03
	5/28/2003	2.20	±	0.35	0.08	±	0.01	2.77	±	0.10	1.02	±	0.04
	6/4/2003	3.02	±	0.39	0.11	±	0.01	2.79	±	0.10	1.03	±	0.04
	6/11/2003	2.32	±	0.44	0.09	±	0.02	2.17	±	0.10	0.80	±	0.04
	6/18/2003	3.65	±	0.44	0.14	±	0.02	3.21	±	0.11	1.19	±	0.04
	6/25/2003	2.15	±	0.36	0.08	±	0.01	1.95	±	0.09	0.72	±	0.03
MONTEVIEW													
	4/2/2003	0.59	±	0.23	0.02	±	0.01	1.64	±	0.08	0.61	±	0.03
	4/9/2003	1.85	±	0.36	0.07	±	0.01	1.28	±	0.08	0.47	±	0.03
	4/16/2003	1.97	±	0.34	0.07	±	0.01	2.37	±	0.10	0.88	±	0.04
	4/23/2003	1.02	±	0.40	0.04	±	0.01	1.65	±	0.10	0.61	±	0.04
	4/30/2003	0.83	±	0.30	0.03	±	0.01	1.39	±	0.08	0.51	±	0.03
	5/7/2003	0.60	±	0.23	0.02	±	0.01	1.37	±	0.07	0.51	±	0.03
	5/14/2003	1.61	±	0.36	0.06	±	0.01	1.76	±	0.09	0.65	±	0.03
	5/21/2003	2.89	±	0.37	0.11	±	0.01	2.26	±	0.09	0.84	±	0.03
	5/28/2003	Invalid sample (insufficient volume)											
	6/4/2003	2.72	±	0.41	0.10	±	0.02	3.18	±	0.11	1.18	±	0.04
	6/11/2003	2.23	±	0.52	0.08	±	0.02	2.39	±	0.12	0.88	±	0.04
	6/18/2003	3.40	±	0.44	0.13	±	0.02	3.19	±	0.11	1.18	±	0.04
	6/25/2003	1.73	±	0.33	0.06	±	0.01	2.18	±	0.09	0.81	±	0.03
MUD LAKE													
	4/2/2003	0.80	±	0.30	0.03	±	0.01	1.53	±	0.09	0.57	±	0.03
	4/9/2003	1.92	±	0.38	0.07	±	0.01	1.53	±	0.09	0.57	±	0.03
	4/16/2003	2.05	±	0.37	0.08	±	0.01	2.44	±	0.11	0.90	±	0.04
	4/23/2003	0.67	±	0.40	0.02	±	0.01	1.67	±	0.10	0.62	±	0.04
	4/30/2003	0.59	±	0.28	0.02	±	0.01	1.40	±	0.08	0.52	±	0.03
	5/7/2003	0.78	±	0.25	0.03	±	0.01	1.42	±	0.07	0.53	±	0.03
	5/14/2003	0.98	±	0.32	0.04	±	0.01	1.84	±	0.09	0.68	±	0.03
	5/21/2003	2.16	±	0.34	0.08	±	0.01	2.45	±	0.09	0.91	±	0.03
	5/28/2003	3.30	±	0.47	0.12	±	0.02	2.85	±	0.11	1.05	±	0.04
	6/4/2003	2.62	±	0.39	0.10	±	0.01	3.26	±	0.10	1.21	±	0.04
	6/11/2003	1.64	±	0.42	0.06	±	0.02	2.05	±	0.10	0.76	±	0.04
	6/18/2003	3.67	±	0.45	0.14	±	0.02	3.17	±	0.11	1.17	±	0.04
	6/25/2003	1.87	±	0.37	0.07	±	0.01	2.04	±	0.09	0.75	±	0.03

(MUD LAKE) Q/A-2

4/2/2003	1.26	±	0.30	0.05	±	0.01	1.40	±	0.08	0.52	±	0.03
4/9/2003	0.59	±	0.30	0.02	±	0.01	1.30	±	0.08	0.48	±	0.03
4/16/2003	1.96	±	0.33	0.07	±	0.01	2.50	±	0.10	0.93	±	0.04
4/23/2003	0.80	±	0.41	0.03	±	0.02	1.85	±	0.11	0.68	±	0.04
4/30/2003	0.61	±	0.25	0.02	±	0.01	1.37	±	0.07	0.51	±	0.03
5/7/2003	0.67	±	0.25	0.02	±	0.01	1.19	±	0.07	0.44	±	0.03
5/14/2003	1.07	±	0.29	0.04	±	0.01	1.65	±	0.08	0.61	±	0.03
5/21/2003	1.84	±	0.34	0.07	±	0.01	2.48	±	0.09	0.92	±	0.03
5/28/2003	2.19	±	0.35	0.08	±	0.01	2.82	±	0.10	1.04	±	0.04
6/4/2003	3.25	±	0.53	0.12	±	0.02	3.37	±	0.13	1.25	±	0.05
6/11/2003	1.58	±	0.36	0.06	±	0.01	2.28	±	0.09	0.84	±	0.03
6/18/2003	2.25	±	0.36	0.08	±	0.01	3.30	±	0.10	1.22	±	0.04
6/25/2003	2.03	±	0.34	0.08	±	0.01	2.09	±	0.09	0.77	±	0.03

DISTANT

BLACKFOOT, CMS

4/2/2004	0.75	±	0.23	0.03	±	0.01	0.89	±	0.06	0.33	±	0.02
4/9/2003	0.51	±	0.28	0.02	±	0.01	1.27	±	0.08	0.47	±	0.03
4/16/2003	2.40	±	0.35	0.09	±	0.01	2.22	±	0.09	0.82	±	0.03
4/23/2003	0.80	±	0.37	0.03	±	0.01	1.55	±	0.09	0.57	±	0.03
4/30/2003	1.06	±	0.29	0.04	±	0.01	1.32	±	0.07	0.49	±	0.03
5/7/2003	0.86	±	0.26	0.03	±	0.01	1.17	±	0.07	0.43	±	0.02
5/14/2003	0.91	±	0.28	0.03	±	0.01	1.62	±	0.08	0.60	±	0.03
5/21/2003	1.80	±	0.34	0.07	±	0.01	2.26	±	0.09	0.84	±	0.03
5/28/2003	1.98	±	0.34	0.07	±	0.01	2.86	±	0.10	1.06	±	0.04
6/4/2003	2.99	±	0.48	0.11	±	0.02	3.58	±	0.13	1.32	±	0.05
6/11/2003	1.37	±	0.34	0.05	±	0.01	2.21	±	0.09	0.82	±	0.03
6/18/2003	2.64	±	0.40	0.10	±	0.01	3.31	±	0.11	1.22	±	0.04
6/25/2003	1.79	±	0.33	0.07	±	0.01	2.15	±	0.09	0.80	±	0.03

BLACKFOOT NOAA Q/A-1

4/2/2003	1.45	±	0.40	0.05	±	0.01	1.82	±	0.11	0.67	±	0.04
4/9/2003	1.17	±	0.43	0.04	±	0.02	1.35	±	0.10	0.50	±	0.04
4/16/2003	2.87	±	0.42	0.11	±	0.02	2.43	±	0.11	0.90	±	0.04
4/23/2003	0.67	±	0.49	0.02	±	0.02	1.68	±	0.12	0.62	±	0.05
4/30/2003	0.46	±	0.30	0.02	±	0.01	1.35	±	0.09	0.50	±	0.03
5/7/2003	0.82	±	0.28	0.03	±	0.01	1.45	±	0.08	0.54	±	0.03
5/14/2003	0.59	±	0.28	0.02	±	0.01	1.67	±	0.08	0.62	±	0.03
5/21/2003	2.24	±	0.41	0.08	±	0.02	2.34	±	0.10	0.87	±	0.04
5/28/2003	1.77	±	0.35	0.07	±	0.01	2.98	±	0.11	1.10	±	0.04
6/4/2003	3.11	±	0.41	0.12	±	0.02	3.09	±	0.10	1.14	±	0.04
6/11/2003	1.84	±	0.50	0.07	±	0.02	2.53	±	0.12	0.94	±	0.04
6/18/2003	3.05	±	0.50	0.11	±	0.02	3.36	±	0.13	1.24	±	0.05
6/25/2003	1.68	±	0.40	0.06	±	0.01	2.33	±	0.11	0.86	±	0.04

CRATERS OF THE MOON													
4/2/2003	0.63	±	0.27	0.02	±	0.01	1.45	±	0.09	0.54	±	0.03
4/9/2003	0.30	±	0.35	0.01	±	0.01	1.11	±	0.09	0.41	±	0.03
4/16/2003	1.92	±	0.37	0.07	±	0.01	2.38	±	0.11	0.88	±	0.04
4/23/2003	0.70	±	0.55	0.03	±	0.02	1.57	±	0.13	0.58	±	0.05
4/30/2003	0.40	±	0.34	0.01	±	0.01	1.29	±	0.09	0.48	±	0.03
5/7/2003	0.92	±	0.32	0.03	±	0.01	1.27	±	0.08	0.47	±	0.03
5/14/2003	0.52	±	0.31	0.02	±	0.01	1.53	±	0.09	0.57	±	0.03
5/21/2003	0.87	±	0.37	0.03	±	0.01	2.27	±	0.12	0.84	±	0.04
5/28/2003	1.74	±	0.40	0.06	±	0.01	2.61	±	0.11	0.97	±	0.04
6/4/2003	3.42	±	0.44	0.13	±	0.02	3.32	±	0.11	1.23	±	0.04
6/11/2003	2.26	±	0.49	0.08	±	0.02	2.03	±	0.11	0.75	±	0.04
6/18/2003	3.25	±	0.52	0.12	±	0.02	3.28	±	0.13	1.21	±	0.05
6/25/2003	2.02	±	0.42	0.07	±	0.02	2.16	±	0.10	0.80	±	0.04
DUBOIS													
4/2/2003	1.18	±	0.33	0.04	±	0.01	1.55	±	0.092	0.57	±	0.03
4/9/2003	0.84	±	0.31	0.03	±	0.01	1.29	±	0.08	0.48	±	0.03
4/16/2003	1.64	±	0.41	0.06	±	0.02	2.51	±	0.13	0.93	±	0.05
4/23/2003	Invalid sample (insufficient volume)											
4/30/2003	0.94	±	0.37	0.03	±	0.01	1.20	±	0.09	0.44	±	0.03
5/7/2003	0.92	±	0.27	0.03	±	0.01	1.33	±	0.07	0.49	±	0.03
5/14/2003	1.19	±	0.34	0.04	±	0.01	1.47	±	0.08	0.54	±	0.03
5/21/2003	2.02	±	0.38	0.07	±	0.01	2.36	±	0.10	0.87	±	0.04
5/28/2003	2.20	±	0.45	0.08	±	0.02	3.03	±	0.13	1.12	±	0.05
6/4/2003	4.16	±	0.51	0.15	±	0.02	3.69	±	0.12	1.37	±	0.05
6/11/2003	2.00	±	0.55	0.07	±	0.02	2.16	±	0.12	0.80	±	0.05
6/18/2003	3.78	±	0.47	0.14	±	0.02	3.13	±	0.11	1.16	±	0.04
6/25/2003	2.57	±	0.58	0.10	±	0.02	2.81	±	0.15	1.04	±	0.05
IDAHO FALLS													
4/2/2003	1.02	±	0.31	0.04	±	0.01	1.30	±	0.09	0.48	±	0.03
4/9/2003	1.42	±	0.37	0.05	±	0.01	1.45	±	0.09	0.54	±	0.03
4/16/2003	2.01	±	0.39	0.07	±	0.01	2.33	±	0.11	0.86	±	0.04
4/23/2003	1.40	±	0.48	0.05	±	0.02	1.70	±	0.11	0.63	±	0.04
4/30/2003	0.55	±	0.38	0.02	±	0.01	1.39	±	0.10	0.51	±	0.04
5/7/2003	0.47	±	0.26	0.02	±	0.01	1.32	±	0.08	0.49	±	0.03
5/14/2003	1.62	±	0.36	0.06	±	0.01	1.77	±	0.09	0.65	±	0.03
5/21/2003	2.21	±	0.39	0.08	±	0.01	2.34	±	0.10	0.87	±	0.04
5/28/2003	2.99	±	0.43	0.11	±	0.02	3.00	±	0.11	1.11	±	0.04
6/4/2003	4.16	±	0.51	0.15	±	0.02	0.34	±	0.04	0.13	±	0.02
6/11/2003	2.11	±	0.44	0.08	±	0.02	2.41	±	0.10	0.89	±	0.04
6/18/2003	2.73	±	0.44	0.10	±	0.02	3.48	±	0.12	1.29	±	0.04
6/25/2003	3.86	±	0.54	0.14	±	0.02	2.22	±	0.11	0.82	±	0.04

REXBURG, CMS													
	4/2/2003	1.67	±	0.36	0.06	±	0.01	1.69	±	0.09	0.63	±	0.03
	4/9/2003	1.62	±	0.38	0.06	±	0.01	1.25	±	0.08	0.46	±	0.03
	4/16/2003	2.12	±	0.39	0.08	±	0.01	2.33	±	0.11	0.86	±	0.04
	4/23/2003	1.22	±	0.47	0.05	±	0.02	1.87	±	0.11	0.69	±	0.04
	4/30/2003	1.09	±	0.34	0.04	±	0.01	1.41	±	0.09	0.52	±	0.03
	5/7/2003	0.71	±	0.25	0.03	±	0.01	1.35	±	0.07	0.50	±	0.03
	5/14/2003	1.07	±	0.30	0.04	±	0.01	1.66	±	0.08	0.61	±	0.03
	5/21/2003	2.12	±	0.44	0.08	±	0.02	2.36	±	0.11	0.87	±	0.04
	5/28/2003	2.31	±	0.40	0.09	±	0.01	3.07	±	0.11	1.14	±	0.04
	6/4/2003	3.23	±	0.46	0.12	±	0.02	3.25	±	0.12	1.20	±	0.04
	6/11/2003	2.12	±	0.51	0.08	±	0.02	2.37	±	0.12	0.88	±	0.04
	6/18/2003	2.63	±	0.40	0.10	±	0.01	3.21	±	0.11	1.19	±	0.04
	6/25/2003	1.88	±	0.34	0.07	±	0.01	2.28	±	0.09	0.84	±	0.03
INEEL													
EFS													
	4/2/2003	0.75	±	0.26	0.03	±	0.01	1.42	±	0.08	0.53	±	0.03
	4/9/2003	1.21	±	0.37	0.04	±	0.01	1.19	±	0.08	0.44	±	0.03
	4/16/2003	1.73	±	0.36	0.06	±	0.01	2.51	±	0.11	0.93	±	0.04
	4/23/2003	1.08	±	0.47	0.04	±	0.02	1.67	±	0.11	0.62	±	0.04
	4/30/2003	0.39	±	0.30	0.01	±	0.01	1.49	±	0.09	0.55	±	0.03
	5/7/2003	0.54	±	0.24	0.02	±	0.01	1.23	±	0.07	0.46	±	0.03
	5/14/2003	0.87	±	0.29	0.03	±	0.01	1.62	±	0.08	0.60	±	0.03
	5/21/2003	1.74	±	0.35	0.06	±	0.01	2.45	±	0.10	0.91	±	0.04
	5/28/2003	2.27	±	0.38	0.08	±	0.01	2.80	±	0.10	1.04	±	0.04
	6/4/2003	3.85	±	0.49	0.14	±	0.02	3.24	±	0.11	1.20	±	0.04
	6/11/2003	1.37	±	0.42	0.05	±	0.02	2.14	±	0.10	0.79	±	0.04
	6/18/2003	3.73	±	0.50	0.14	±	0.02	3.41	±	0.12	1.26	±	0.04
	6/25/2003	1.38		0.32	0.05	±	0.01	2.06		0.09	0.76	±	0.03
MAIN GATE													
	4/2/2003	0.66	±	0.27	0.02	±	0.01	1.36	±	0.08	0.50	±	0.03
	4/9/2003	0.73	±	0.27	0.03	±	0.01	1.23	±	0.07	0.46	±	0.03
	4/16/2003	1.22	±	0.33	0.05	±	0.01	2.64	±	0.11	0.98	±	0.04
	4/23/2003	1.08	±	0.41	0.04	±	0.02	1.73	±	0.10	0.64	±	0.04
	4/30/2003	1.15	±	0.30	0.04	±	0.01	1.47	±	0.08	0.54	±	0.03
	5/7/2003	0.63	±	0.24	0.02	±	0.01	1.34	±	0.07	0.50	±	0.03
	5/14/2003	0.61	±	0.28	0.02	±	0.01	1.80	±	0.08	0.67	±	0.03
	5/21/2003	1.47	±	0.32	0.05	±	0.01	2.31	±	0.09	0.85	±	0.03
	5/28/2003	1.69	±	0.34	0.06	±	0.01	3.04	±	0.11	1.12	±	0.04
	6/4/2003	2.92	±	0.46	0.11	±	0.02	3.44	±	0.12	1.27	±	0.04
	6/11/2003	1.65	±	0.42	0.06	±	0.02	2.12	±	0.10	0.78	±	0.04
	6/18/2003	3.19	±	0.46	0.12	±	0.02	3.64	±	0.12	1.35	±	0.04
	6/25/2003	2.47	±	0.45	0.09	±	0.02	2.24	±	0.11	0.83	±	0.04

VAN BUREN

4/2/2003	1.00	±	0.29	0.04	±	0.01	1.58	±	0.09	0.58	±	0.03
4/9/2003	0.47	±	0.29	0.02	±	0.01	1.06	±	0.07	0.39	±	0.03
4/16/2003	1.73	±	0.37	0.06	±	0.01	2.50	±	0.11	0.93	±	0.04
4/23/2003	0.52	±	0.37	0.02	±	0.01	1.61	±	0.10	0.60	±	0.04
4/30/2003	0.87	±	0.34	0.03	±	0.01	1.44	±	0.09	0.53	±	0.03
5/7/2003	1.03	±	0.28	0.04	±	0.01	1.36	±	0.07	0.50	±	0.03
5/14/2003	0.66	±	0.27	0.02	±	0.01	1.75	±	0.08	0.65	±	0.03
5/21/2003	1.21	±	0.31	0.04	±	0.01	2.27	±	0.09	0.84	±	0.03
5/28/2003	2.03	±	0.38	0.08	±	0.01	2.77	±	0.11	1.02	±	0.04
6/4/2003	2.63	±	0.43	0.10	±	0.02	3.44	±	0.12	1.27	±	0.04
6/11/2003	1.61	±	0.42	0.06	±	0.02	2.19	±	0.10	0.81	±	0.04
6/18/2003	2.44	±	0.44	0.09	±	0.02	3.38	±	0.12	1.25	±	0.04
6/25/2003	1.71	±	0.34	0.06	±	0.01	2.12	±	0.09	0.78	±	0.03

OUT OF STATE

JACKSON, WYOMING

4/2/2003	1.36	±	0.30	0.05	±	0.01	1.45	±	0.08	0.54	±	0.03
4/9/2003	0.73	±	0.28	0.03	±	0.01	1.22	±	0.07	0.45	±	0.03
4/16/2003	2.13	±	0.34	0.08	±	0.01	2.59	±	0.10	0.96	±	0.04
4/23/2003	0.63	±	0.35	0.02	±	0.01	1.40	±	0.09	0.52	±	0.03
4/30/2003	0.93	±	0.29	0.03	±	0.01	1.63	±	0.08	0.60	±	0.03
5/7/2003	0.62	±	0.25	0.02	±	0.01	1.16	±	0.07	0.43	±	0.03
5/14/2003	0.75	±	0.27	0.03	±	0.01	1.37	±	0.07	0.51	±	0.03
5/21/2003	1.73	±	0.33	0.06	±	0.01	2.21	±	0.09	0.82	±	0.03
5/28/2003	1.65	±	0.31	0.06	±	0.01	2.82	±	0.10	1.04	±	0.04
6/4/2003	2.56	±	0.40	0.09	±	0.01	3.22	±	0.11	1.19	±	0.04
6/11/2003	1.47	±	0.35	0.05	±	0.01	1.79	±	0.08	0.66	±	0.03
6/18/2003	2.13	±	0.36	0.08	±	0.01	2.93	±	0.10	1.08	±	0.04
6/25/2003	1.89	±	0.34	0.07	±	0.01	2.28	±	0.09	0.84	±	0.03

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

Sample Group & Location	Sampling Date	Result ± Uncertainty (1s) x 10^{-6} μCi			Result ± Uncertainty (1s) X 10^{-2} Bq		
BOUNDARY							
ARCO							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92
ATOMIC CITY							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92

BLACKFOOT NOAA Q/A-1 2004							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92
BLUE DOME							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
FAA TOWER							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26

HOWE							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
MONTEVIEW							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
MUD LAKE							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26

(MUD LAKE) Q/A-2 2004							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
DISTANT							
BLACKFOOT, CMS							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92
CRATERS OF THE MOON							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92

DUBOIS							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
IDAHO FALLS							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
REXBURG, CMS							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26

INEEL							
EFS							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
MAIN GATE							
	4/2/2003	2.43	±	1.48	8.99	±	5.48
	4/9/2003	0.00	±	0.745	0.00	±	2.76
	4/16/2003	1.38	±	1.24	5.11	±	4.59
	4/23/2003	0.26	±	1.15	0.96	±	4.26
	4/30/2003	0.05	±	0.83	0.19	±	3.07
	5/7/2003	-0.17	±	1.78	-0.63	±	6.59
	5/14/2003	0.25	±	0.9	0.93	±	3.33
	5/21/2003	0.14	±	0.815	0.52	±	3.02
	5/28/2003	-0.81	±	0.81	-3.00	±	3.00
	6/4/2003	-0.89	±	0.955	-3.29	±	3.53
	6/11/2003	0.95	±	1.11	3.52	±	4.11
	6/18/2003	-2.21	±	1.19	-8.18	±	4.40
	6/25/2003	-1.15	±	1.15	-4.26	±	4.26
VAN BUREN							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92

OUT OF STATE							
JACKSON, WYOMING							
	4/2/2003	0.84	±	1.05	3.11	±	3.89
	4/9/2003	0.85	±	1.2	3.15	±	4.44
	4/16/2003	1.43	±	0.855	5.29	±	3.16
	4/23/2003	-1.98	±	0.825	-7.33	±	3.05
	4/30/2003	-0.87	±	0.81	-3.22	±	3.00
	5/7/2003	-0.99	±	1.21	-3.66	±	4.48
	5/14/2003	-0.90	±	1.37	-3.33	±	5.07
	5/21/2003	-1.76	±	1.28	-6.51	±	4.74
	5/28/2003	-0.84	±	1.3	-3.11	±	4.81
	6/4/2003	-2.38	±	1.59	-8.81	±	5.88
	6/11/2003	-0.29	±	0.79	-1.07	±	2.92
	6/18/2003	0.05	±	0.82	0.19	±	3.03
	6/25/2003	0.62	±	0.79	2.29	±	2.92

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

Group and Location	Date	Analyte	Result ± Uncertainty (1s) (x 10^{-18} μCi/mL)			Result ± Uncertainty (1s) (x 10^{-13} Bq/mL)		
BOUNDARY								
ARCO								
	6/30/2003	AMERICIUM-241	2.71	±	1.05	1.00	±	0.39
	6/30/2003	CESIUM-137	3.82	±	96.00	1.41	±	35.52
	6/30/2003	PLUTONIUM-238	-0.51	±	0.50	-0.19	±	0.19
	6/30/2003	PLUTONIUM-239/40	1.02	±	0.75	0.38	±	0.28
ATOMIC CITY								
	6/30/2003	AMERICIUM-241	1.26	±	0.80	0.47	±	0.30
	6/30/2003	CESIUM-137	-11.20	±	219.50	-4.14	±	81.22
	6/30/2003	PLUTONIUM-238	0.48	±	0.49	0.18	±	0.18
	6/30/2003	PLUTONIUM-239/40	0.48	±	1.10	0.18	±	0.41
BLACKFOOT NOAA Q/A-1								
	6/30/2003	AMERICIUM-241	4.33	±	1.65	1.60	±	0.61
	6/30/2003	CESIUM-137	-146.00	±	149.50	-54.02	±	55.32
	6/30/2003	PLUTONIUM-238	0.00	±	1.00	0.00	±	0.37
	6/30/2003	PLUTONIUM-239/40	0.00	±	1.15	0.00	±	0.43
BLUE DOME								
	6/30/2003	AMERICIUM-241	1.46	±	0.85	0.54	±	0.31
	6/30/2003	CESIUM-137	-101.00	±	201.50	-37.37	±	74.56
	6/30/2003	PLUTONIUM-238	1.54	±	0.90	0.57	±	0.33
	6/30/2003	PLUTONIUM-239/40	0.00	±	0.65	0.00	±	0.24
FAA TOWER								
	6/30/2003	CESIUM-137	55.50	±	133.00	20.54	±	49.21
	6/30/2003	STRONTIUM-90	-11.50	±	31.00	-4.26	±	11.47

HOWE								
	6/30/2003	CESIUM-137	358.00	±	246.00	132.46	±	91.02
	6/30/2003	STRONTIUM-90	-0.94	±	22.00	-0.35	±	8.14
MONTEVIEW								
	6/30/2003	CESIUM-137	44.20	±	232.00	16.35	±	85.84
	6/30/2003	STRONTIUM-90	-18.90	±	24.50	-6.99	±	9.07
MUD LAKE								
	6/30/2003	AMERICIUM-241	1.05	±	2.10	0.39	±	0.78
	6/30/2003	CESIUM-137	-139.00	±	206.00	-51.43	±	76.22
	6/30/2003	PLUTONIUM-238	0.40	±	1.40	0.15	±	0.52
	6/30/2003	PLUTONIUM-239/40	1.60	±	1.60	0.59	±	0.59
(MUD LAKE) Q/A-2								
	6/30/2003	AMERICIUM-241	0.74	±	0.90	0.27	±	0.33
	6/30/2003	CESIUM-137	58.70	±	92.50	21.72	±	34.23
	6/30/2003	PLUTONIUM-238	0.00	±	0.65	0.00	±	0.24
	6/30/2003	PLUTONIUM-239/40	0.52	±	0.50	0.19	±	0.19
DISTANT								
BLACKFOOT, CMS								
	6/30/2003	AMERICIUM-241	1.22	±	0.60	0.45	±	0.22
	6/30/2003	CESIUM-137	-125.00	±	116.00	-46.25	±	42.92
	6/30/2003	PLUTONIUM-238	-0.47	±	0.48	-0.17	±	0.18
	6/30/2003	PLUTONIUM-239/40	1.42	±	1.25	0.53	±	0.46
CRATERS OF THE MOON								
	6/30/2003	CESIUM-137	-223.00	±	341.50	-82.51	±	126.36
	6/30/2003	STRONTIUM-90	-7.91	±	31.00	-2.93	±	11.47
DUBOIS								
	6/30/2003	AMERICIUM-241	1.36	±	0.48	0.50	±	0.18
	6/30/2003	CESIUM-137	-40.30	±	142.00	-14.91	±	52.54
	6/30/2003	PLUTONIUM-238	-0.84	±	0.43	-0.31	±	0.16
	6/30/2003	PLUTONIUM-239/40	3.35	±	1.70	1.24	±	0.63
IDAHO FALLS								
	6/30/2003	CESIUM-137	106.00	±	130.00	39.22	±	48.10
	6/30/2003	STRONTIUM-90	9.78	±	28.00	3.62	±	10.36

REXBURG, CMS								
	6/30/2003	CESIUM-137	-48.20	±	136.00	-17.83	±	50.32
	6/30/2003	STRONTIUM-90	31.10	±	26.00	11.51	±	9.62
INEEL								
EFS								
	6/30/2003	CESIUM-137	-253.00	±	130.50	-93.61	±	48.29
	6/30/2003	STRONTIUM-90	21.40	±	27.00	7.92	±	9.99
MAIN GATE								
	6/30/2003	AMERICIUM-241	0.00	±	0.75	0.00	±	0.28
	6/30/2003	CESIUM-137	297.00	±	268.50	109.89	±	99.35
	6/30/2003	PLUTONIUM-238	0.00	±	0.40	0.00	±	0.15
	6/30/2003	PLUTONIUM-239/40	1.97	±	0.80	0.73	±	0.30
VAN BUREN								
	6/30/2003	CESIUM-137	-54.40	±	274.50	-20.13	±	101.57
	6/30/2003	STRONTIUM-90	4.17	±	25.50	1.54	±	9.44
OUT OF STATE								
JACKSON, WYOMING								
	6/30/2003	AMERICIUM-241	1.29	±	0.80	0.48	±	0.30
	6/30/2003	CESIUM-137	-18.70	±	94.00	-6.92	±	34.78
	6/30/2003	PLUTONIUM-238	0.40	±	0.70	0.15	±	0.26
	6/30/2003	PLUTONIUM-239/40	1.58	±	0.80	0.58	±	0.30

TABLE C-4: Tritium Concentrations in Atmospheric Moisture [(a)]

Location	*Start Date*	*Collect Date*	*Result ± Uncertainty (1s) (x 10^{-13} $\mu Ci/mL_{air}$)*			*Result ± Uncertainty (1s) (x 10^{-9} Bq/mL_{air})*			*Media Type Collection Medium*
ATOMIC CITY									
	3/5/2003	4/23/2003	1.32	±	0.48	4.89	±	1.76	SILICA GEL
	4/23/2003	5/28/2003	0.62	±	1.62	2.28	±	6.01	SILICA GEL
BLACKFOOT, CMS[a]	3/26/2003	4/30/2003	1.31	±	1.82	4.85	±	6.73	SILICA GEL
	4/30/2003	5/21/2003	-0.45	±	0.66	-1.66	±	2.43	SILICA GEL
IDAHO FALLS									
	3/11/2003	4/15/2003	0.44	±	0.82	1.64	±	3.05	SILICA GEL
	4/15/2003	5/20/2003	1.61	±	2.19	5.96	±	8.12	SILICA GEL
	5/20/2003	6/5/2003	3.96	±	2.14	14.64	±	7.91	MOLECULAR SIEVE
	5/22/2003	6/4/2003	2.07	±	4.27	7.67	±	15.79	SILICA GEL
	5/21/2003	6/5/2003	-1.53	±	2.98	-5.66	±	11.04	SILICA GEL
REXBURG, CMS[a]									
	3/17/2003	4/24/2003	0.83	±	0.69	3.05	±	2.56	SILICA GEL
	4/24/2003	5/29/2003	-0.19	±	1.64	-0.72	±	6.08	SILICA GEL
	5/29/2003	6/17/2003	-2.86	±	3.10	-10.59	±	11.47	SILICA GEL

a. CMS = Community Monitoring Station

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

Location	*Sampling Date*	*Concentration ($\mu g/m^3$)*
ATOMIC CITY		
	4/2/2003	0.07
	4/8/2003	5.87
	4/14/2003	0.15
	4/20/2003	8.63
	4/26/2003	2.25
	5/2/2003	3.23
	5/8/2003	31.67
	5/14/2003	11.10
	5/20/2003	8.26
	5/26/2003	21.85
	6/1/2003	35.87
	6/7/2003	46.95
	6/13/2003	37.29
	6/19/2003	73.04
	6/25/2003	11.02
BLACKFOOT, CMS		
	4/2/2003	2.89
	4/8/2003	9.70
	4/14/2003	9.87
	4/20/2003	9.08
	4/26/2003	4.43
	5/2/2003	10.16
	5/8/2003	Invalid sample
	5/14/2003	15.72
	5/20/2003	16.13
	5/26/2003	18.35
	6/1/2003	15.63
	6/7/2003	7.09
	6/13/2003	Invalid sample
	6/19/2003	42.52
	6/25/2003	11.77

Location	***Sampling Date***	***Concentration ($\mu g/m^3$)***
REXBURG, CMS		
	4/2/2003	4.94
	4/8/2003	22.63
	4/14/2003	17.40
	4/20/2003	9.35
	4/26/2003	4.11
	5/2/2003	14.90
	5/8/2003	22.16
	5/14/2003	20.42
	5/20/2003	17.76
	5/26/2003	22.54
	6/1/2003	12.81
	6/7/2003	13.69
	6/13/2003	29.26
	6/19/2003	42.89
	6/25/2003	9.38

TABLE C-6: Weekly & Monthly Tritium Concentrations in Precipitation

Location	Start Date	End Date	Result ± Uncertainty (1s) pCi /L			Result ± Uncertainty (1s) Bq /L		
CFA								
	3/3/2003	4/2/2003	-102.00	±	58.00	-3.77	±	2.15
	4/2/2003	5/1/2003	29.60	±	22.55	1.10	±	0.83
EFS								
	3/26/2003	4/2/2003	-9.14	±	58.50	-0.34	±	2.16
	4/2/2003	4/9/2003	3.19	±	60.00	0.12	±	2.22
	4/9/2003	4/16/2003	44.90	±	57.50	1.66	±	2.13
	4/16/2003	4/23/2003	-25.30	±	59.50	-0.94	±	2.20
	4/23/2003	4/30/2003	19.30	±	22.35	0.71	±	0.83
	4/30/2003	5/7/2003	50.00	±	57.50	1.85	±	2.13
	5/7/2003	5/14/2003	29.70	±	58.00	1.10	±	2.15
	6/18/2003	6/25/2003	28.40	±	57.10	1.05	±	2.11
IDAHO FALLS								
	3/3/2003	4/4/2003	-114.00	±	58.00	-4.22	±	2.15

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

Sample Type and Location	*Sampling Date*	*Quality Control Type*	*Analyte*	*Result ± Uncertainty(2s) pCi/L*			*Result ± Uncertainty(2s) Bq/L*		
DRINKING WATER									
ABERDEEN									
	5/12/2003	N/A	GROSS ALPHA	1.02	±	0.56	0.04	±	0.02
	5/12/2003	N/A	GROSS BETA	5.24	±	0.94	0.19	±	
	5/12/2003	N/A	TRITIUM	-52.70	±	59.50	-1.95	±	2.20
ARCO									
	5/12/2003	N/A	GROSS ALPHA	0.47	±	0.40	0.02	±	0.01
	5/12/2003	N/A	GROSS BETA	1.99	±	0.78	0.07	±	0.03
	5/12/2003	N/A	TRITIUM	50.50	±	23.00	1.87	±	0.85
ATOMIC CITY									
	5/14/2003	N/A	GROSS ALPHA	0.37	±	0.39	0.01	±	0.01
	5/14/2003	N/A	GROSS BETA	3.25	±	0.82	0.12	±	0.03
	5/14/2003	N/A	TRITIUM	-66.90	±	59.40	-2.48	±	2.20
CAREY									
	5/12/2003	N/A	GROSS ALPHA	1.07	±	0.45	0.04	±	0.02
	5/12/2003	N/A	GROSS BETA	2.24	±	0.79	0.08	±	0.03
	5/12/2003	N/A	TRITIUM	-11.50	±	23.10	-0.43	±	0.85
FORT HALL									
	5/12/2003	N/A	GROSS ALPHA	0.18	±	0.47	0.01	±	0.02
	5/12/2003	N/A	GROSS BETA	9.59	±	1.03	0.35	±	0.04
	5/12/2003	N/A	TRITIUM	-5.48	±	58.80	-0.20	±	2.18
HOWE									
	5/12/2003	N/A	GROSS ALPHA	-0.06	±	0.37	0.00	±	0.01
	5/12/2003	N/A	GROSS BETA	2.05	±	0.79	0.08	±	0.03
	5/12/2003	N/A	TRITIUM	-34.90	±	59.60	-1.29	±	2.21

IDAHO FALLS										
	5/12/2003	N/A	GROSS ALPHA	-0.17	±	0.37	-0.01	±	0.01
	5/12/2003	N/A	GROSS BETA	3.01	±	0.82	0.11	±	0.03
	5/12/2003	N/A	TRITIUM	68.80	±	23.40	2.55	±	0.87
MINIDOKA									
	5/13/2003	N/A	GROSS ALPHA	-0.18	±	0.37	-0.01	±	0.01
	5/13/2003	N/A	GROSS BETA	3.57	±	0.84	0.13	±	0.03
	5/13/2003	N/A	TRITIUM	-72.00	±	58.50	-2.66	±	2.16
MONTEVIEW									
	5/12/2003	N/A	GROSS ALPHA	0.70	±	0.60	0.03	±	0.02
	5/12/2003	N/A	GROSS BETA	9.72	±	1.17	0.36	±	0.04
	5/12/2003	N/A	TRITIUM	18.30	±	23.80	0.68	±	0.88
MORELAND									
	5/12/2003	N/A	GROSS ALPHA	0.93	±	0.61	0.03	±	0.02
	5/12/2003	N/A	GROSS BETA	8.36	±	1.07	0.31	±	0.04
	5/12/2003	N/A	TRITIUM	-24.00	±	22.80	-0.89	±	0.84
MUDLAKE									
	5/14/2003	N/A	GROSS ALPHA	-0.02	±	0.23	0.00	±	0.01
	5/14/2003	DUPLICATE	GROSS ALPHA	-0.11	±	0.28	0.00	±	0.01
	5/14/2003	N/A	GROSS BETA	1.00	±	0.69	0.04		0.03
	5/14/2003	DUPLICATE	GROSS BETA	4.87	±	0.83	0.18		0.03
	5/14/2003	N/A	TRITIUM	-30.50	±	56.90	-1.13		2.11
	5/14/2003	DUPLICATE	TRITIUM	-24.90	±	58.80	-0.92		2.18
ROBERTS									
	5/12/2003	N/A	GROSS ALPHA	0.21	±	0.42	0.01	±	0.02
	5/12/2003	N/A	GROSS BETA	4.38	±	0.87	0.16	±	0.03
	5/12/2003	N/A	TRITIUM	-7.52	±	21.60	-0.28	±	0.80
SHOSHONE									
	5/13/2003	N/A	GROSS ALPHA	0.04	±	0.36	0.00	±	0.01
	5/13/2003	N/A	GROSS BETA	4.09	±	0.84	0.15	±	0.03
	5/13/2003	N/A	TRITIUM	44.10	±	22.90	1.63	±	0.85

SURFACE WATER

BLISS									
	5/13/2003	N/A	GROSS ALPHA	0.89	±	0.47	0.03	±	0.02
	5/13/2003	N/A	GROSS BETA	5.32	±	0.95	0.20	±	0.04
	5/13/2003	N/A	TRITIUM	0.50	±	21.50	0.02	±	0.80
BUHL									
	5/13/2003	N/A	GROSS ALPHA	0.00	±	0.38	0.00	±	0.01
	5/13/2003	N/A	GROSS BETA	4.47	±	0.92	0.17	±	0.03
	5/13/2003	N/A	TRITIUM	-16.60	±	22.20	-0.61	±	0.82
HAGERMAN									
	5/13/2003	N/A	GROSS ALPHA	1.53	±	0.47	0.06	±	0.02
	5/13/2003	N/A	GROSS BETA	2.18	±	0.84	0.08	±	0.03
	5/13/2003	N/A	TRITIUM	-27.80	±	21.90	-1.03	±	0.81
IDAHO FALLS									
	5/15/2003	N/A	GROSS ALPHA	-0.23	±	0.28	-0.01	±	0.01
	5/15/2003	N/A	GROSS BETA	2.29	±	0.82	0.08	±	0.03
	5/15/2003	N/A	TRITIUM	-1.96	±	22.60	-0.07	±	0.84
TWIN FALLS									
	5/13/2003	N/A	GROSS ALPHA	0.52	±	0.51	0.02	±	0.02
	5/13/2003	DUPLICATE	GROSS ALPHA	0.62	±	0.48	0.02	±	0.02
	5/13/2003	N/A	GROSS BETA	8.01	±	1.00	0.30	±	0.04
	5/13/2003	DUPLICATE	GROSS BETA	5.38	±	0.97	0.20	±	0.04
	5/13/2003	N/A	TRITIUM	-24.9	±	58.8	-0.9213	±	2.1756
	5/13/2003	DUPLICATE	TRITIUM	36.5	±	22.4	1.3505	±	0.8288

TABLE C-8: Bi-annual Strontium-90 Concentrations in Milk

Location	*Sampling Date*	*Result ± Uncertainty (1s) pCi/L*			*Result ± Uncertainty (1s) Bq/L*		
BLACKFOOT							
	5/6/2003	1.19	±	0.32	0.04	±	0.01
IDAHO FALLS							
	5/6/2003	1.13	±	0.45	0.04	±	0.02
RUPERT							
	5/6/2003	0.94	±	0.26	0.03	±	0.01
TERRETON							
	5/6/2003	1.37	±	0.29	0.05	±	0.01

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

Location & Media	Sample	Sampling Date	Analyte	Result ± Uncertainty (1s) pCi /kg			Result ± Uncertainty (1s) Bq /kg		
DUBOIS									
LIVER *									
	SAMPLE #1	5/16/2003	CESIUM-137	2.80	±	2.15	0.10	±	0.08
	SAMPLE #1	5/16/2003	IODINE-131	-2.80	±	4.35	-0.10	±	0.16
MUSCLE									
	SAMPLE #1	5/16/2003	CESIUM-137	2.90	±	1.35	0.11	±	0.05
	SAMPLE #1	5/16/2003	IODINE-131	0.90	±	2.10	0.03	±	0.08
	SAMPLE #2	5/16/2003	CESIUM-137	0.10	±	2.65	0.00	±	0.10
	SAMPLE #2	5/16/2003	IODINE-131	6.20	±	3.15	0.23	±	0.12
THYROID									
	SAMPLE #1	5/16/2003	CESIUM-137	-64.70		60.50	-2.39		2.24
	SAMPLE #1	5/16/2003	IODINE-131	52.00	±	44.55	1.92	±	1.65
	SAMPLE #2	5/16/2003	CESIUM-137	-49.90	±	40.60	-1.85	±	1.50
	SAMPLE #2	5/16/2003	IODINE-131	-16.10	±	55.00	-0.60	±	2.04
INEEL NORTH									
LIVER									
	SAMPLE #1	5/8/2003	CESIUM-137	4.90	±	1.50	0.18	±	0.06
	SAMPLE #1	5/8/2003	IODINE-131	8.90	±	4.65	0.33	±	0.17
	SAMPLE #2	5/8/2003	CESIUM-137	4.20	±	1.50	0.16	±	0.06
	SAMPLE #2	5/8/2003	IODINE-131	11.30	±	5.60	0.42	±	0.21
MUSCLE									
	SAMPLE #1	5/8/2003	CESIUM-137	12.10	±	1.55	0.45	±	0.06
	SAMPLE #1	5/8/2003	IODINE-131	-7.00	±	7.15	-0.26	±	0.26
	SAMPLE #2	5/8/2003	CESIUM-137	8.30	±	2.55	0.31	±	0.09
	SAMPLE #2	5/8/2003	IODINE-131	-2.90	±	6.05	-0.11	±	0.22
THYROID									
	SAMPLE #1	5/8/2003	CESIUM-137	-26.50	±	41.75	-0.98	±	1.54
	SAMPLE #1	5/8/2003	IODINE-131	25.80	±	64.00	0.95	±	2.37
	SAMPLE #2	5/8/2003	CESIUM-137	-157.00	±	82.00	-5.81	±	3.03
	SAMPLE #2	5/8/2003	IODINE-131	187.00	±	105.00	6.92	±	3.89

Location & Media	Sample	Sampling Date	Analyte	Result	±	Uncertainty (1s) pCi /kg	Result	±	Uncertainty (1s) Bq /kg
INEEL SOUTH									
LIVER									
	SAMPLE #1	5/8/2003	CESIUM-137	5.80	±	2.65	0.21	±	0.10
	SAMPLE #1	5/8/2003	IODINE-131	1.30	±	4.40	0.05	±	0.16
	SAMPLE #2	5/8/2003	CESIUM-137	8.50	±	7.05	0.31	±	0.26
	SAMPLE #2	5/8/2003	IODINE-131	7.20	±	9.40	0.27	±	0.35
MUSCLE									
	SAMPLE #1	5/8/2003	CESIUM-137	3.50	±	1.60	0.13	±	0.06
	SAMPLE #1	5/8/2003	IODINE-131	4.00	±	2.50	0.15	±	0.09
	SAMPLE #2	5/8/2003	CESIUM-137	9.70	±	6.00	0.36	±	0.22
	SAMPLE #2	5/8/2003	IODINE-131	-1.60	±	7.00	-0.06	±	0.26
THYROID									
	SAMPLE #1	5/8/2003	CESIUM-137	-94.70	±	81.50	-3.50	±	3.02
	SAMPLE #1	5/8/2003	IODINE-131	70.20	±	134.00	2.60	±	4.96
	SAMPLE #2	5/8/2003	CESIUM-137	-180.00	±	120.50	-6.66	±	4.46
	SAMPLE #2	5/8/2003	IODINE-131	-659.00	±	212.00	-24.38	±	7.84

*** No Liver Collected for Sample #2 Dubois 5/16/2003**

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

Species	*Tissue*	*Analyte*	*Sampling Date*	*Results ± Uncertainty (1s) (pCi/kg wet weight)*			*Results ± Uncertainty (1s) Bq/kg wet weight)*		
MULE DEER									
	LIVER	CESIUM-137	6/18/2003	-0.21	±	3.80	-0.01	±	0.14
		IODINE-131	6/18/2003	2.80	±	178.50	0.10	±	6.60
	MUSCLE	CESIUM-137	6/18/2003	3.43	±	1.48	0.13	±	0.05
		IODINE-131	6/18/2003	0.66	±	2.19	0.02	±	0.08
	THYROID	CESIUM-137	6/18/2003	198.00	±	163.50	7.33	±	6.05
		IODINE-131	6/18/2003	-91.90	±	159.50	-3.40	±	5.90
PRONGHORN	LIVER	CESIUM-137	6/18/2003	4.79	±	1.65	0.18	±	0.06
		IODINE-131	6/18/2003	0.24	±	2.29	0.01	±	0.08
	MUSCLE	CESIUM-137	6/18/2003	1.59	±	1.35	0.06	±	0.05
		IODINE-131	6/18/2003	-0.29	±	1.80	-0.01	±	0.07
	THYROID	CESIUM-137	6/18/2003	-116.00	±	86.50	-4.29	±	3.20
		IODINE-131	6/18/2003	-89.80	±	77.50	-3.32	±	2.87

TABLE-C-11: Environmental Radiation Results

Location	Sample Group	Start Date	End Date	Radiation Measurement ± 1s Uncertainty mR			mR/day
Arco	BOUNDARY	11/01/2002	04/30/2003	55.20	±	5.40	0.31
Atomic City	BOUNDARY	11/01/2002	04/30/2003	60.80	±	5.95	0.34
Blue Dome	BOUNDARY	11/01/2002	04/30/2003	52.70	±	5.15	0.29
Howe	BOUNDARY	11/01/2002	04/30/2003	54.60	±	5.35	0.30
Monteview	BOUNDARY	11/01/2002	04/30/2003	50.80	±	4.95	0.28
Mud Lake	BOUNDARY	11/01/2002	04/30/2003	58.60	±	5.75	0.33
Reno Ranch	BOUNDARY	11/01/2002	04/30/2003	54.20	±	5.30	0.30
						Boundary Average	**0.31**
Aberdeen	DISTANT	11/01/2002	04/30/2003	60.50	±	5.95	0.34
Blackfoot	DISTANT	11/01/2002	04/30/2003	60.40	±	5.90	0.34
Blackfoot CMS	DISTANT	11/01/2002	04/30/2003	51.90	±	5.10	0.29
Craters of Moon	DISTANT	11/01/2002	04/30/2003	55.90	±	5.50	0.31
Dubois	DISTANT	11/01/2002	04/30/2003	49.30	±	4.85	0.27
Idaho Falls	DISTANT	11/01/2002	04/30/2003	60.20	±	5.90	0.33
Minidoka	DISTANT	11/01/2002	04/30/2003	53.00	±	5.20	0.29
Rexburg CMS	DISTANT	11/01/2002	04/30/2003	68.40	±	6.70	0.38
Roberts	DISTANT	11/01/2002	04/30/2003	62.60	±	6.15	0.35
						Distant Average	**0.32**
Jackson	OUT OF STATE	11/01/2002	04/30/2003	44.20	±	4.35	0.25

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	H	p[b]
Gross Alpha		
Quarter	1.44	0.49
April	9.33	0.86
May	4.64	0.99
June	9.91	0.83
Gross Beta		
Quarter	0.45	0.80
April	5.01	0.99
May	2.32	1.00
June	4.68	0.99

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.

Parameter	Mann-Whitney U test[a]		
Week	U	Z	p[b]
Gross Alpha			
April 9th	20.0	-0.14	0.89
April 16th	12.5	-1.21	0.23
April 23rd	12.0	0.89	0.37
April 30th	17.0	-0.57	0.57
May 7th	11.0	-1.43	0.15
May 14th	17.5	0.50	0.62
May 21st	14.5	-0.93	0.35
May 28th	9.5	1.36	0.17
June 4th	20.0	-0.14	0.89
June 11th	19.0	-0.29	0.78
June 18th	17.0	0.57	0.57
June 25th	15.0	-0.86	0.39
Gross Beta			
April 9th	17.0	-0.57	0.57
April 16th	11.5	-1.36	0.18
April 23rd	16.5	-0.16	0.87
April 30th	17.0	-0.57	0.57
May 7th	20.5	0.07	0.94
May 14th	12.0	1.29	0.20
May 21st	18.0	-0.43	0.67
May 28th	7.0	-1.76	0.08
June 4th	15.0	-0.86	0.39
June 11th	18.0	-0.43	0.67
June 18th	19.5	-0.21	0.83
June 25th	8.5	-1.79	0.07

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.