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Idaho National Laboratory Offsite Environmental Surveillance Program Report: First Quarter 2005

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EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the first quarter of 2005 could be directly linked with INL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States or were consistent with levels measured historically at the INL. 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 first quarter, 2005, 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 (INL) offsite environment, January 1 through March 31, 2005. All sample types (media) and the sampling schedule followed during 2005 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including air filters and charcoal cartridges, atmospheric moisture, and 10-micron particulate matter (PM_{10}) (Section 3);
- Water sampling, specifically collection of precipitation (Section 4);
- Agricultural product sampling, including milk and large game animals (Section 5); and
- Quality assurance program information (Section 6).

Gross alpha and gross beta measurements are used as general indicators of the presence of alpha-emitting and beta-emitting radionuclides in air. Gross alpha and gross beta results were found to have no discernable statistical distribution during the first quarter of 2005. 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 first quarter were gross alpha or gross beta concentrations from Boundary locations statistically higher than corresponding data sets for Distant locations, as one would expect if the INL were a significant source of radionuclide contamination. There were no statistical differences between gross alpha or gross beta results when grouped by location on a quarterly basis. Statistical analysis by month also showed no statistical difference between locations for gross alpha or gross beta, except for gross alpha during January. There was no indication of an INL release during January and the difference was attributed to natural variation in the data.

Weekly comparisons of gross alpha and gross beta concentrations at Distant and Boundary locations showed no statistical differences during the first quarter of 2005.

During the first quarter, analysis of two ten-cartridge batches for iodine-131 (^{131}I) yielded no detections of iodine-131 (^{131}I) above the 3s level.

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. All values were within the range of those measured in the past and were far less than their respective DOE Derived Concentration Guide (DCG) values.

Eighteen atmospheric moisture samples were obtained during the first quarter of 2005 and analyzed for tritium. Five samples each were collected from Atomic City, Blackfoot and Idaho Falls and three were collected from Rexburg. A total of four samples (two from Atomic City and one each from Blackfoot and Rexburg) exceeded their respective 3s values. All sample results were well below the DOE DCG for tritium in air of 1×10^{-7} μCi/mL (3.7×10^{-3} Bq/mL).

The 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.

Sufficient precipitation occurred to allow collection of five samples—one from the Central Facilities Area and two each from the EFS and Idaho Falls. Tritium was detected above the 3s values in none of the samples.

Milk samples were collected weekly in Idaho Falls and monthly at nine other locations around the INL. All samples were analyzed for gamma emitting radionuclides. Iodine-131 and ^{137}Cs were not detected in any of these samples.

One large game animal, a pronghorn antelope, was sampled during the first quarter of 2005. Every effort was made to collect thyroid, liver, and muscle tissue from the animal. However, the liver could not be sampled due to its condition at the time of collection. Cesium-137 and iodine-131 were not measured above the 3s value in any tissue.

Table E-1 Summary of results for the first quarter of 2005.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Independent statistical comparisons of gross alpha and gross beta data indicate no differences between INL, Boundary, and Distant locations when data were compared on quarterly bases. Monthly comparisons yielded no statistical differences except for gross alpha during January. IINL releases were not indicated by this difference, which was attributed to natural variation in data. No statistical differences in gross alpha and gross beta concentrations measured on a weekly basis. All gross alpha and gross beta results were within historical levels and were far less than applicable DOE DCGs.
		Gamma emitting radionuclides (including ^{137}Cs), select actinides (^{238}Pu, ^{239,240}Pu, & ^{241}Am) and ^{90}Sr	None of the radionuclides of interest were detected. All concentrations were well below DOE DCGs and within historical measurements.
	Charcoal Cartridge	Iodine-131	No ^{131}I was measured above the 3s value in any of the charcoal cartridge batches during the quarter.
	PM_{10}	Particulate matter	No regulatory limits were exceeded for atmospheric particulates.
Atmospheric Moisture	Liquid	Tritium	Four of 18 atmospheric moisture samples had tritium measured in them above their respective 3s values. No sample result exceeded the DCG for tritium in air.
Precipitation	Liquid	Tritium	None of five samples collected had detectable concentrations of tritium. All samples were well below regulatory limits for tritium in drinking water. All results were within EPA ERAMS measurements within Region 10.
Milk	Liquid	Iodine-131, gamma emitting radionuclides (including ^{137}Cs)	Radionuclides of interest were not detected in any of the weekly or monthly milk samples.. All results were within historical measurements and within results reported by the EPA ERAMS program for Region 10.
Large Game Animals	Solid	Gamma emitting radionuclides (including ^{137}Cs)	One pronghorn antelope was killed on an INL road.. No radionuclides were detected above their 3s values.

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LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
CFA	Central Facilities Area
CMS	community monitoring station
DCG	Derived Concentration Guide
DOE	Department of Energy
DOE – ID	Department of Energy Idaho Operations Office
EAL	Environmental Assessment Laboratory
EFS	Experimental Field Station
EPA	Environmental Protection Agency
ERAMS	Environmental Radiation Ambient Monitoring System
ESER	Environmental Surveillance, Education and Research
INEL	Idaho National Engineering Laboratory
INL	Idaho National Engineering and Environmental Laboratory
ISU	Idaho State University
MDC	minimum detectable concentration
M&O	Management and Operating
NRTS	National Reactor Testing Station
PM	particulate matter
PM_{10}	particulate matter less than 10 micrometers in diameter
TLDs	thermoluminescent dosimeters
UI	University of Idaho
WSU	Washington State University

LIST OF UNITS

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

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Laboratory (INL) are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act, and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2004). During calendar year 2005, environmental monitoring within the INL boundaries was primarily the responsibility of the INL Management and Operating (M&O) contractor, while monitoring outside the INL 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 first quarter of 2005 (January 1 – March 31, 2005).

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

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

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

Environmental samples collected include:

- air at 16 locations on and around the INL;
- moisture in air at four locations around the INL;
- surface water at five locations on the Snake River;
- drinking water at 13 locations around the INL;
- agricultural products, including milk at 10 dairies around the INL, potatoes from at least five local producers, wheat from approximately 10 local producers, lettuce from approximately nine home-owned gardens around the INL and two maintained by ESER at Atomic City and the EFS, and four sheep from two operators which graze their sheep on the INL;
- soil from 12 locations around the INL 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 INL.

Table A-1 in Appendix A lists samples, sampling locations and collection frequency for the ESER Program.

The ESER Program used two laboratories to perform analyses on routine environmental samples collected during the quarter reported here. The Idaho State University (ISU) Environmental Assessment Laboratory (EAL) performed routine gross alpha, gross beta, tritium, and gamma spectrometry analyses. Analyses requiring radiochemistry, including strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}Pu$), and americium-241 (^{241}Am) were performed by Severn-Trent, Inc of Richland, WA.

In the event of non-routine occurrences, such as suspected releases of radioactive material, the ESER Program may increase the frequency of sampling and/or the number of sampling locations based on the nature of the release and wind distribution patterns. Any data found to be outside historical norms in the ESER Program is thoroughly investigated to determine if an INL origin is likely. Investigation may include re-sampling and/or re-analysis of prior samples.

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident, the EPA may request additional sampling be performed through the Environmental Radiation Ambient Monitoring System (ERAMS) network (EPA 2003). The EPA established the ERAMS network in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, drinking water, and milk samples. The ESER Program currently operates a high-volume air sampler and collects precipitation and drinking water in Idaho Falls for this national program and routinely sends samples to EPA's Eastern Environmental Radiation Facility for analyses. The ERAMS data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA ERAMS website (http://www.epa.gov/enviro/html/erams/).

Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data and for preparing quarterly reports on results from the environmental surveillance program. The quarterly reports are then consolidated into the INL Annual Site Environmental Report for each calendar year. Annual reports also include data collected by other INL contractors.

The results reported in the quarterly and annual reports are assessed in terms of data quality and statistical significance with respect to laboratory analytical uncertainties, sample locations, reported INL releases, meteorological data, and worldwide events that might conceivably have an effect on the INL environment. First, field collection and laboratory information are reviewed to determine identifiable errors that would invalidate or limit use of the data. Examples of such limitations include insufficient sample volume, torn filters, evidence of laboratory cross-contamination or quality control issues. Data that pass initial screening are further evaluated using statistical methods. Statistical tools are necessary for data evaluation particularly since environmental measurements typically involve the determination of minute concentrations, which are difficult to detect and even more difficult to distinguish from other measurements.

Results are presented in this report with an analytical uncertainty term, s, where "s" is the estimated sample standard deviation (σ), assuming a Guassian or normal distribution. All results are reported in this document, even those that do not necessarily represent detections. The term "detected", as used for the discussion of results in this report, does not imply any degree of risk to the public or environment, but rather indicates that the radionuclide was measured at a concentration sufficient for the analytical instrument to record a value that is statistically different from background. The ESER has adopted guidelines developed by the United States Geological Survey (Bartholmay, et al. 2003), based on an extension of a method proposed by Currie (1984), to interpret analytical results and make decisions concerning detection. Most of the following discussion is taken from Bartholomay et al (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.

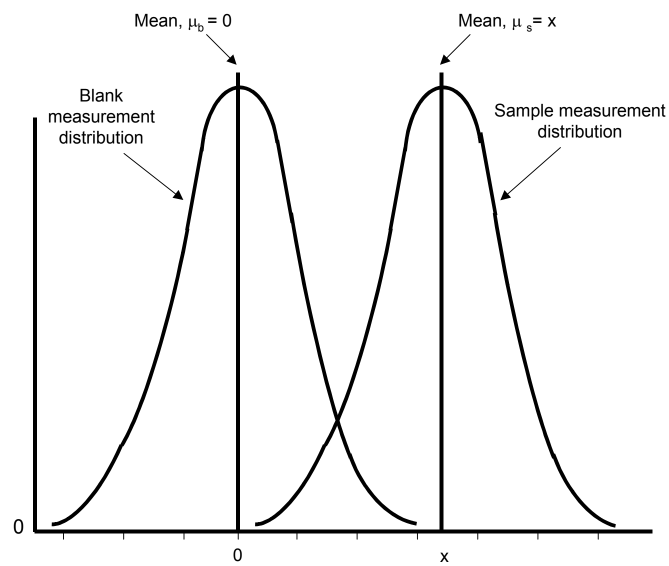

Figure 1. Example overlap of blank and sample measurement distributions.

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 estimate to 2s.

Once the critical level has been defined, the minimum detectable concentration may be determined. Concentrations that equal 3s represent a measurement at the detection level or minimum detectable concentration. For true concentrations of 3s or greater, there is a 95-percent probability that the radionuclide was detected in the target sample. In a large number of samples, the conclusion—not detected—will be made in 5 percent of the samples with true concentrations at the minimum detectable concentration of 3s. These measurements are known as false negatives. The ESER reports measured radionuclide concentrations greater than or equal to their respective 3s uncertainties as being "detected with confidence."

Concentrations between 2s and 3s are reported as “questionably detected”. That is, the radionuclide may be present in the sample, however, the detection may not be reliable. Measurements made between 2s and 3s are examined further to determine if they are a part of a pattern (temporal or spatial) that might warrant further investigation or recounting. For example, if a particular radionuclide is typically detected at > 3s at a specific location, a sample result between 2s and 3s might be considered detected.

If a result is less than or equal to 2s there is little confidence that the radionuclide is present in the sample. Analytical results in this report are presented as the result value ± one standard deviation (1s) for reporting consistency with the annual report. To obtain the 2s or 3s values simply multiply the uncertainty term by 2 or 3. 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 INL

The INL 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 INL began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested on the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the war, as the nation worked to develop nuclear power, the Atomic Energy Commission (AEC), predecessor to the DOE, became interested in the Naval Proving Ground and made plans for a facility to build, test, and perfect nuclear power reactors.

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

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

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL 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 first quarter, 2005 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 first quarter of 2005 (Figure 2). Four of these samplers are located on the INL, eight are situated off the INL near the boundary, and six have been placed at locations distant to the INL. Samplers are divided into INL, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL. Each replicate sampler is relocated every year to a new location. One replicate sampler was placed at Howe (Boundary location) and one at the INL Main Gate (onsite location) during 2005. An average of 14,643 ft^3 (415 m^3) of air was sampled at each location, each week, at an average flow rate of 1.45 ft^3/min (0.04 m^3/min). Particulates in air were collected on glass fiber particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

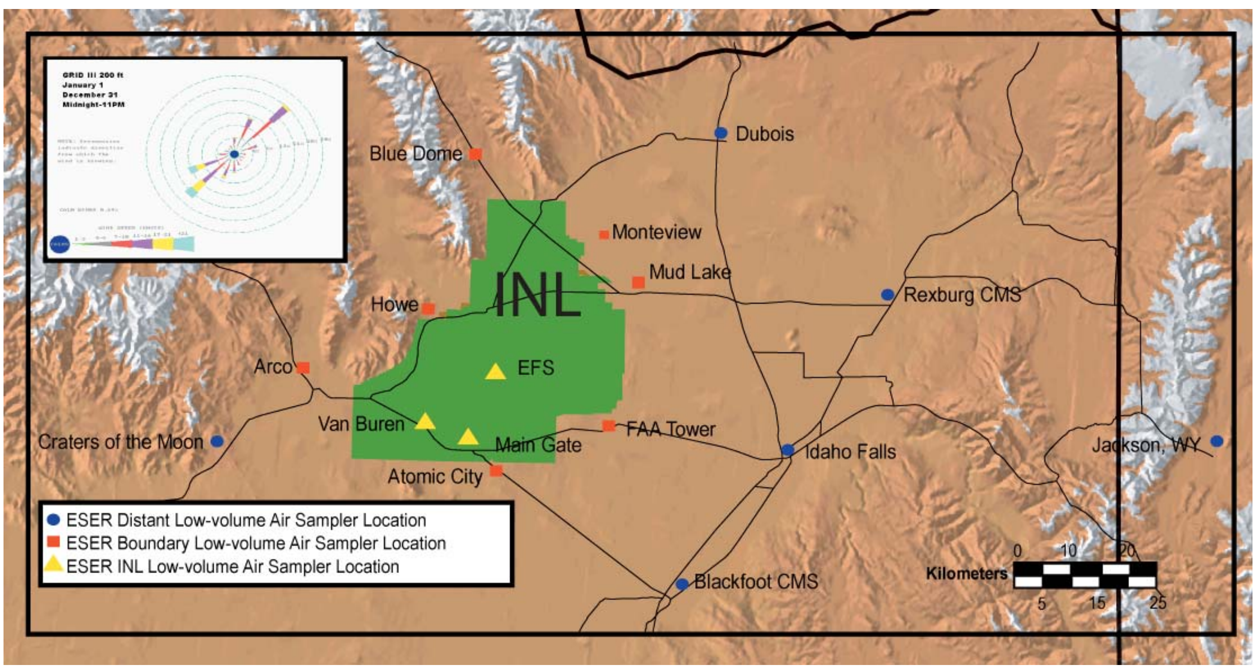

Figure 2. Low-volume air sampler locations.

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

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

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

Gross alpha results are reported in Table C-1. Median gross alpha concentrations in air for INL, Boundary, and Distant locations for the first quarter of 2005 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 first quarter indicates that the outliers and extreme values were not due to mistakes in collection, analysis, or reporting procedures, but rather reflect natural variability in the measurements. The outliers and extreme values lie within the range of measurements made within the past five years. Thus, rather than dismissing the outliers, they were included in the subsequent statistical analyses. Further discussion of box plots may be found in Determining Statistical Differences under Helpful Information.

Figure 3 graphically shows that the gross alpha measurements made at INL, Boundary, and Distant locations are similar for the first quarter. If the INL were a significant source of offsite contamination, concentrations of contaminants should be statistically greater at Boundary locations than at Distant locations. Because there is no discernable distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INL, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outliers and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. There were no statistical differences in gross alpha concentrations between groups for the first quarter.

Comparisons of gross alpha concentrations were made for each month of the quarter (Figures 4– 6). Again the Kruskal-Wallis test of multiple independent groups was used to determine if statistical differences exist between INL, Boundary, and Distant data groups. There were no statistical differences in gross alpha between groups for February or March (Table D-1). However, there was a statistical difference between groups for January. The major difference exists between the INL group results (median = 1.56×10^{-15} μCi/mL) and the Boundary group results (median = 0.89×10^{-15} μCi/mL). It is suspected that the result is a function of statistical variability in the results and small sample size for the INL (three locations) and does not implicate any INL release during January.

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL and would not aid in determining offsite impacts. Gross alpha concentrations measured at Distant locations were not statistically greater than those measured at Boundary locations for any week of the quarter (Table D-2). . Analysis for each week by Boundary location group and Distant location group showed no statistical difference between stations. In other words, no one or group of stations appeared to be significantly higher or lower than the other stations. Thus, it is interpreted that the statistical difference is a result of natural variability More detail on the statistical tests used can be found in Determining Statistical Differences under Helpful Information.

Gross beta results are also presented in Table C-1. Gross beta concentrations in air for INL, Boundary, and Distant locations for the first quarter of 2005 are shown in Figure 7. The data were tested and found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. As in the case of alpha activity, the quarterly data for each group appear to be similar and were determined, using the Kruskal-Wallace test, to be statistically the same (Table D-1).

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

Comparison of weekly Boundary and Distant data sets, using the Mann Whitney U test, indicates no statistical differences between the two location groups during the first quarter (Table D-2).

No ^{131}I was measured above the 3s value in any of the charcoal cartridge batches during the quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

Weekly filters for the first quarter of 2005 were composited by location and analyzed for gamma-emitting radionuclides, including cesium-137 (^{137}Cs). Selected composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. The concentrations measured during this quarter are consistent with those recorded in the past. All results were far less than their respective DCGs. None of the radionuclides were detected above the associated 3s uncertainty values. All results for composite filter samples are shown in Table C-3, Appendix C.

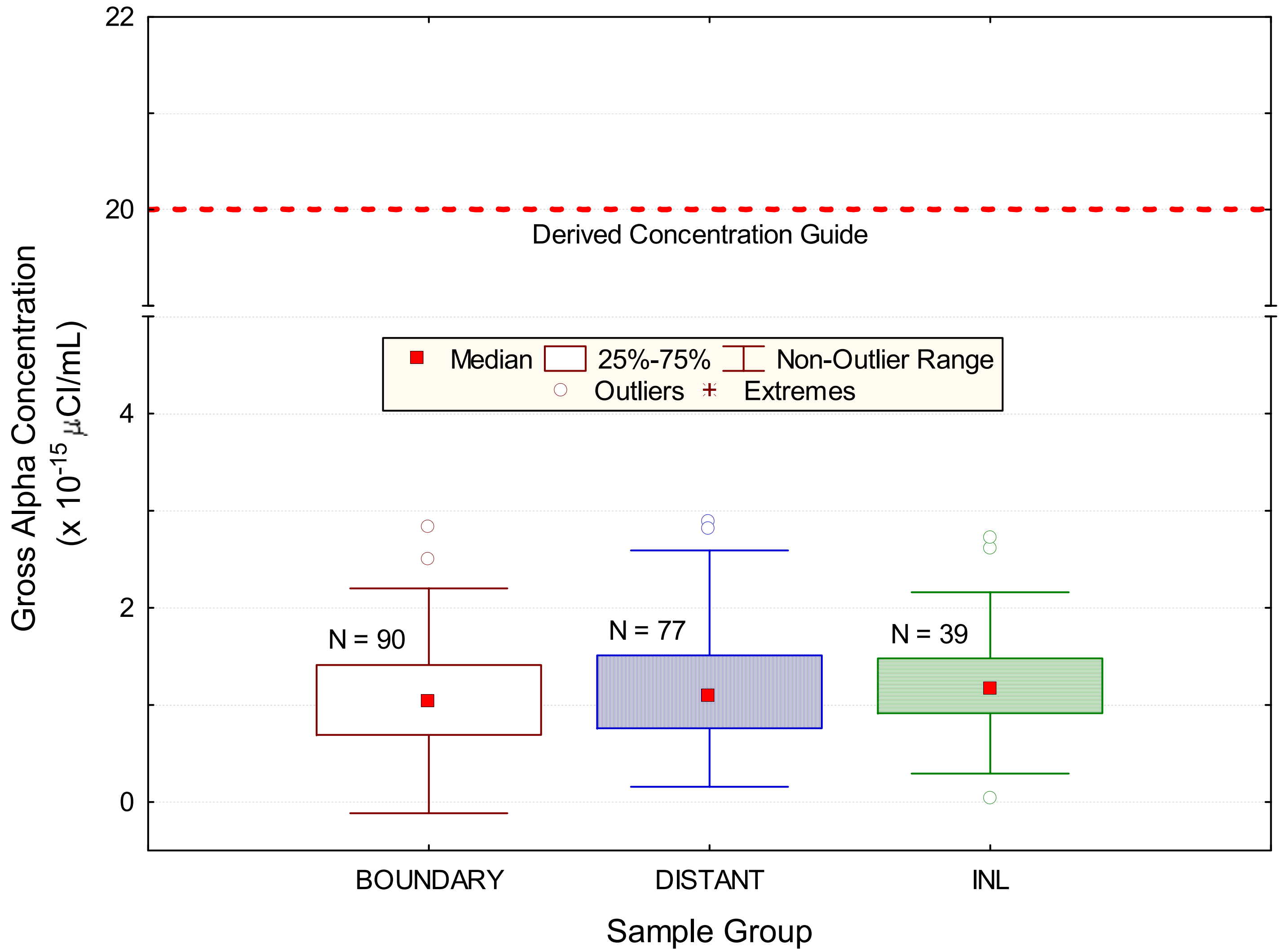

Figure 3. **Gross alpha concentrations in air at ESER Program Boundary, Distant, and INL locations for the first quarter of 2005.**

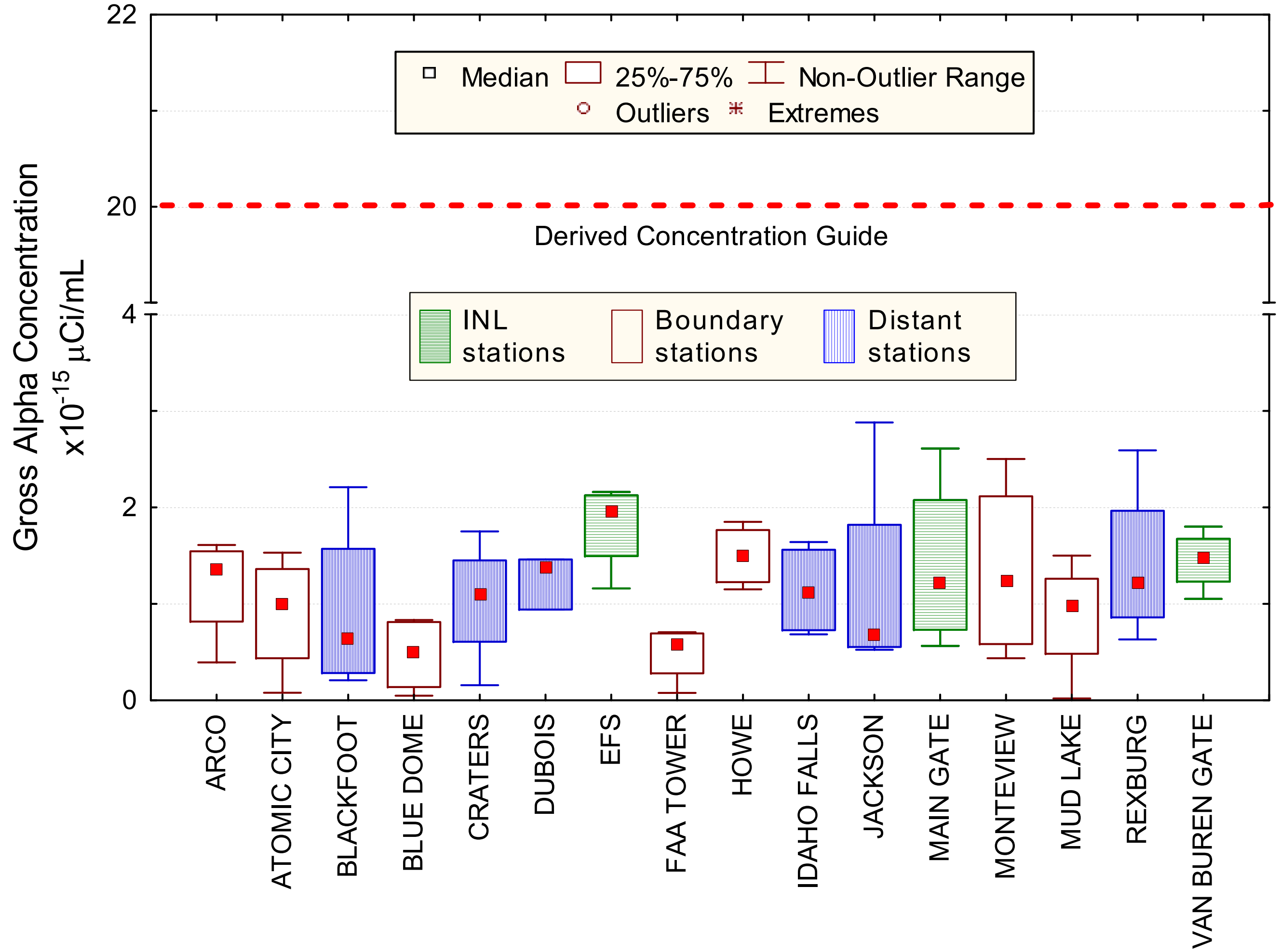

Figure 4. January gross alpha concentrations in air at ESER Program stations. Number of samples (N) = 4 at each station except for Howe and Dubois where N = 3.

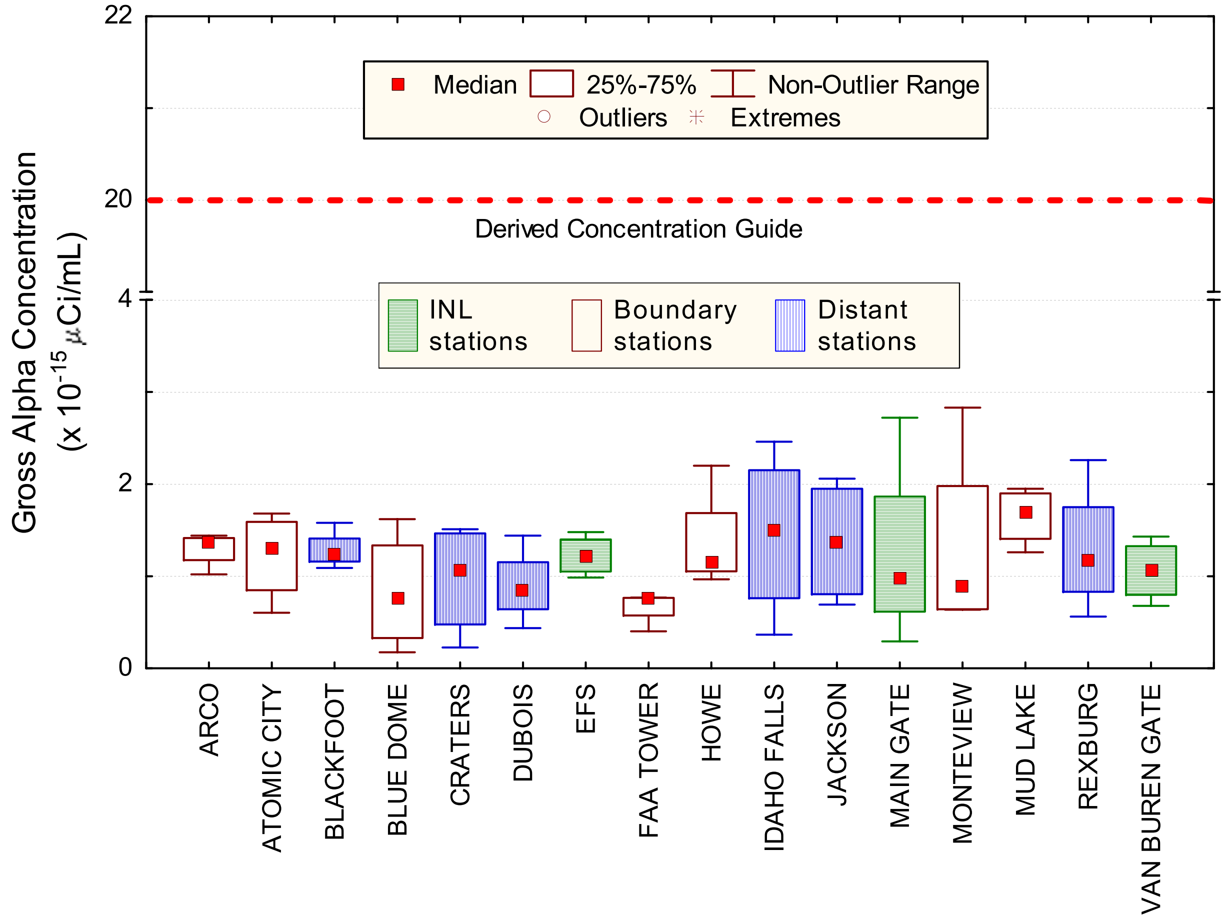

Figure 5. February gross alpha concentrations in air at ESER Program stations. Number of samples (N) = 4 at each station.

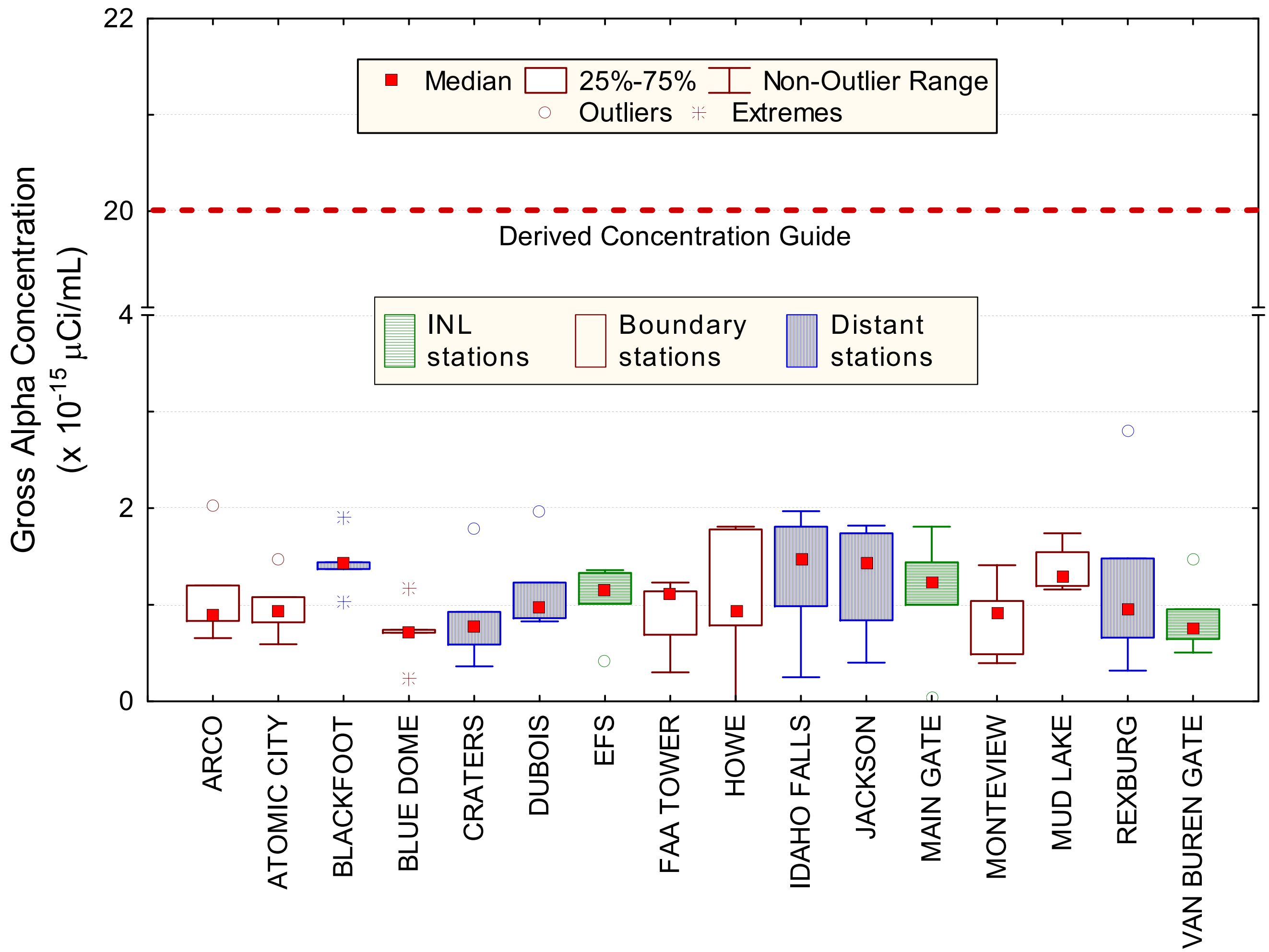

Figure 6. March gross alpha concentrations in air at ESER Program stations. Number of samples (N) = 5 at each station except for Mud Lake, where N = 4.

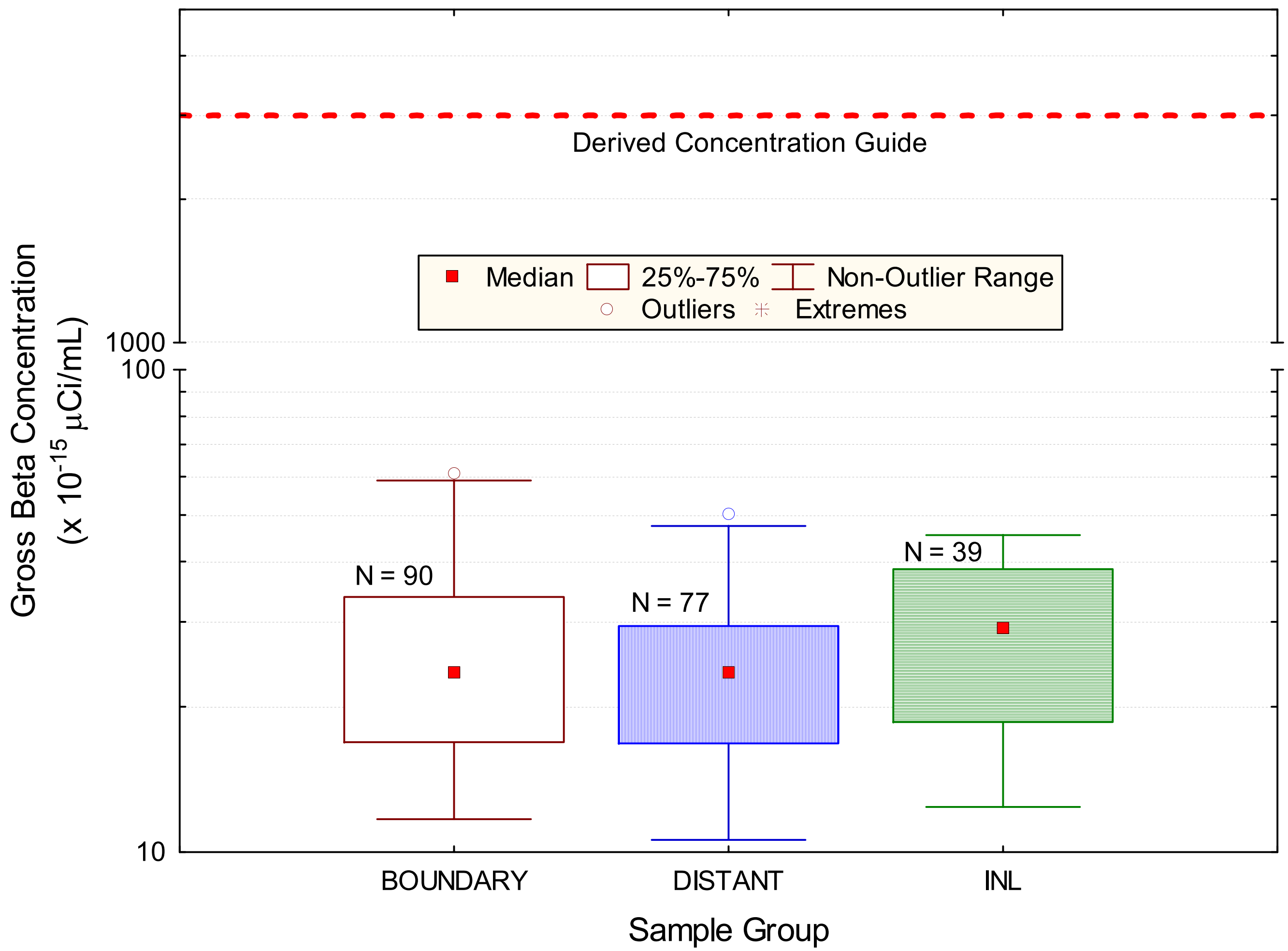

Figure 7. **Gross beta concentrations in air at ESER Program Boundary, Distant, and INL locations for the first quarter 2005.**

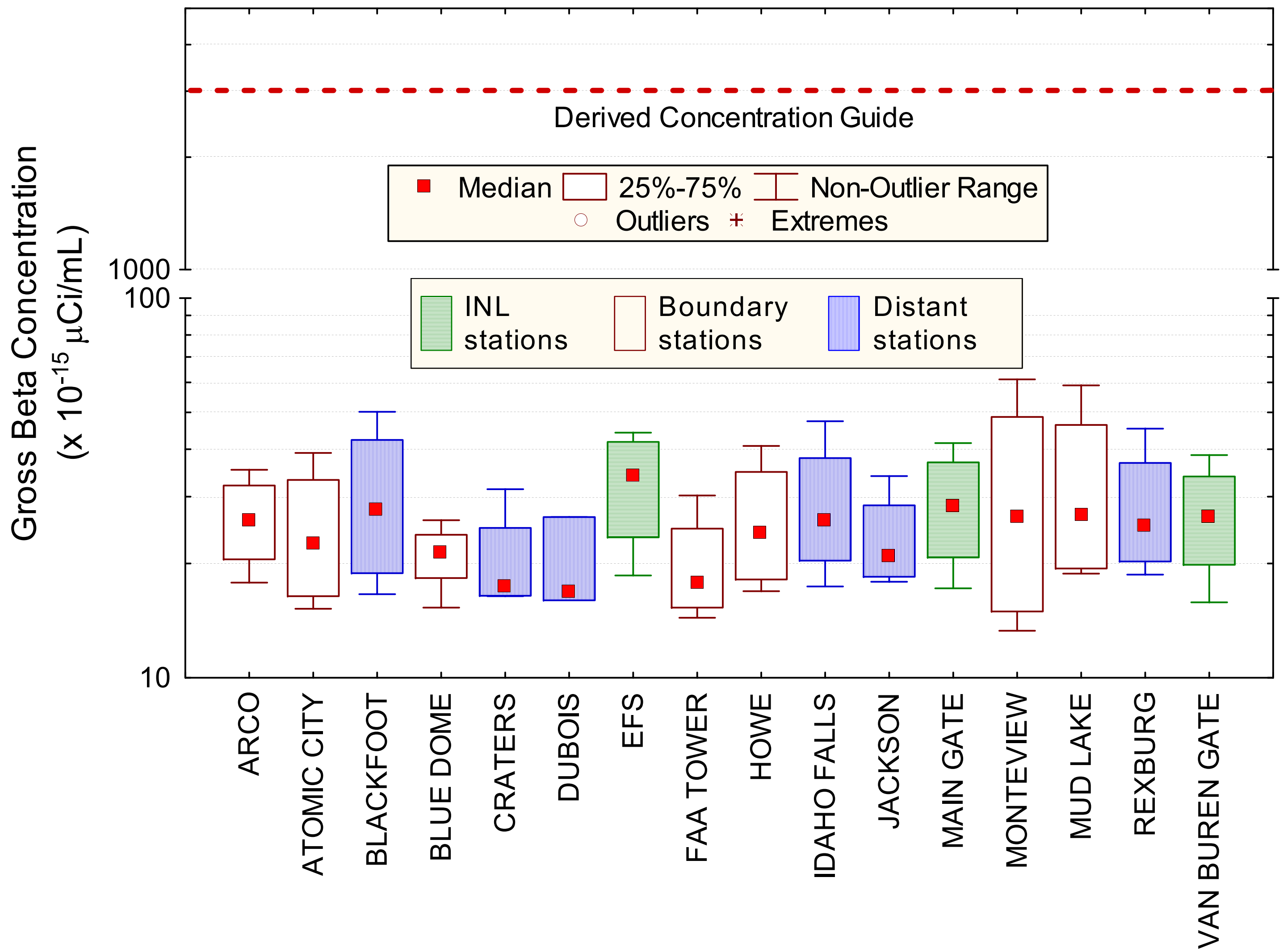

Figure 8. January gross beta concentrations in air at ESER Program stations. Number of samples (N) = 4 at each station except for Howe and Dubois where N = 3.

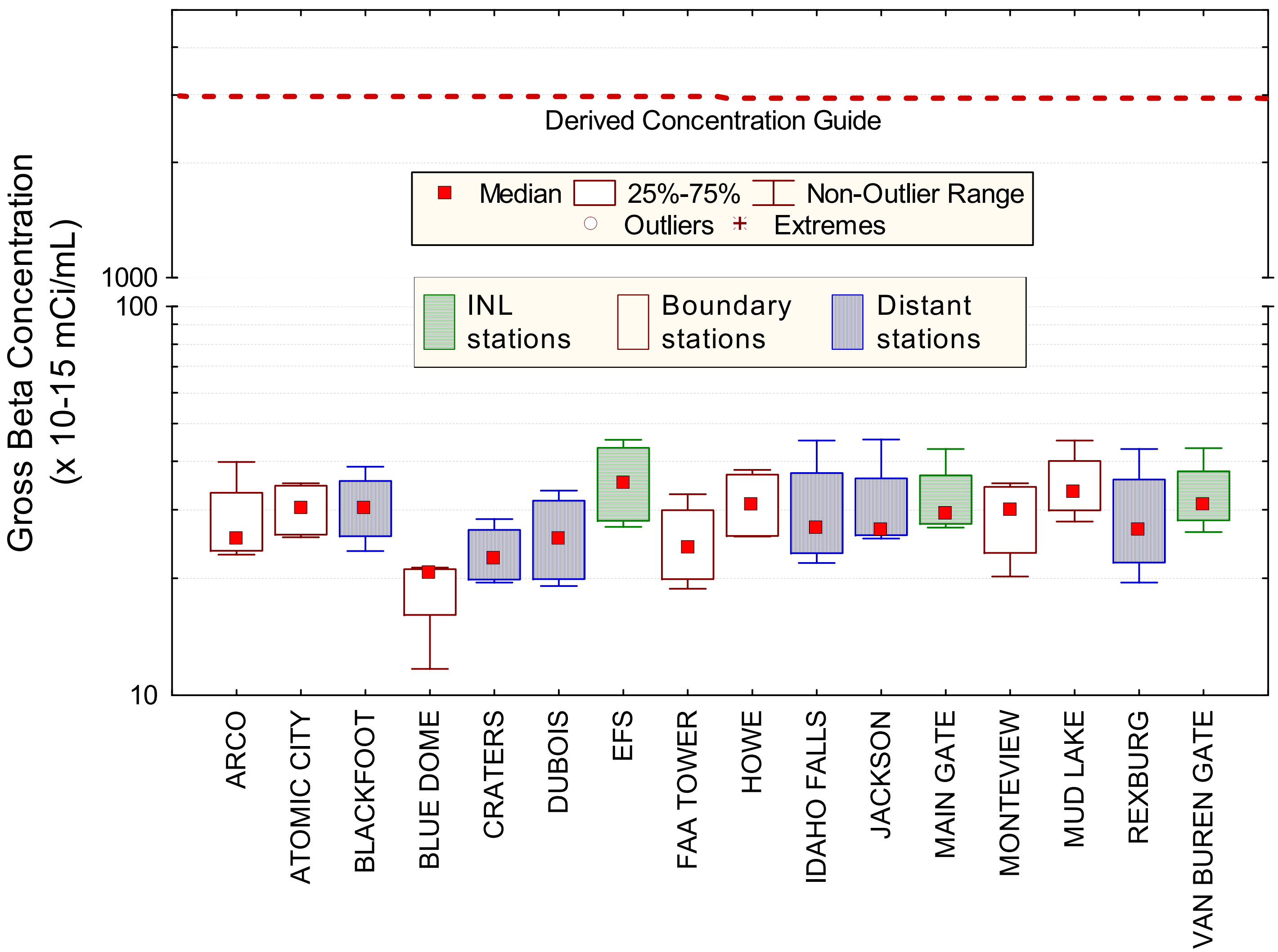

Figure 9. February gross beta concentrations in air at ESER Program stations. Number of samples (N) = 4 for each station.

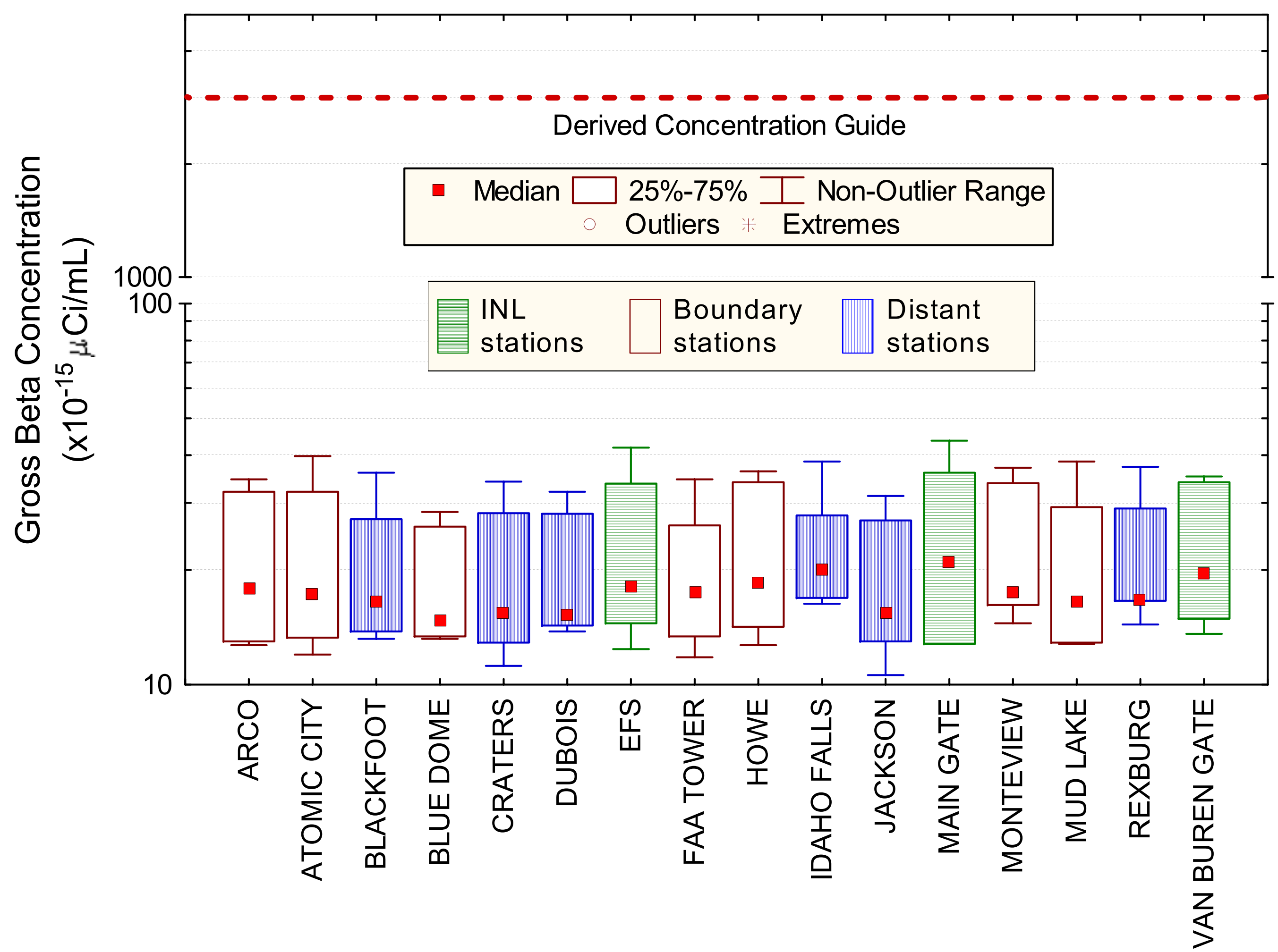

Figure 10. March gross beta concentrations in air at ESER Program stations. Number of samples (N) = 5 at each station except for Mud Lake, where N = 4.

ATMOSPHERIC MOISTURE SAMPLING

Eighteen atmospheric moisture samples were collected using molecular sieve and silica gel material during the first quarter of 2005. Samples were grouped as follows: five each from Atomic City, Idaho Falls, and Blackfoot, and three from Rexburg. Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., molecular sieve or 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.

Four of the samples exceeded their respective 3s values (one each from Blackfoot and Rexburg, and two from Atomic City). All sample results were well below the DOE DCG for tritium in air of 1×10^{-7} μCi/mL (3.7×10^{-3} Bq/mL). The maximum value was $(6.44 \pm 0.95) \times 10^{-13}$ μCi/mL of air ($[23.82 \pm 3.51] \times 10^{-9}$ Bq/mL of air). All results for atmospheric moisture samples are shown in Table C-4, Appendix C.

PM_{10} AIR SAMPLING

The EPA began using a standard for concentrations of airborne particulate matter (PM) less than 10 micrometers in diameter (PM_{10}) in 1987 (40 CFR 50.6, 1996). Particles of this size can be inhaled deep into the lungs and are considered to be responsible for most of the adverse health effects associated with airborne particulate pollution. The air quality standards for these particulates are an annual average of 50 μg/m^3, with a maximum 24-hour concentration of 150 μg/m^3.

The ESER Program operates three PM_{10} samplers, one each at the Rexburg CMS and Blackfoot CMS, and in Atomic City. Sampling of PM_{10} is informational only as no chemical analyses are conducted for contaminants. A twenty-four hour sampling period is scheduled to run once every six days. Equipment problems nullified one sample from the Atomic City location on February 2, 2005. In addition, the result collected from Atomic City on January 5 was not used as it represented a 2-week sample. The maximum 24-hour concentration was 33.11 μg/m^3 on February 26, 2005, at Rexburg. The minimum, maximum, and average results of the 24-hour samples are summarized in Table 1. None of the results exceeds the maximum 24-hour air quality standard established by EPA of 150 μg/m^3. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

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

	Concentration[a]		
Location	**Minimum**	**Maximum**	**Average**
Atomic City	0.14	10.12	3.79
Blackfoot, CMS	0.27	25.39	12.32
Rexburg, CMS	0.00	33.11	15.46

a. All concentrations are in (μg/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 INL. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INL. Surface and/or drinking water are sampled twice each year at 19 locations around the INL. This occurs during the second and fourth quarters. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 20 mL. Samples are taken of a monthly composite from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the first quarter of 2005 produced only enough precipitation for a total of five samples – one from CFA and two each from the EFS and Idaho Falls.

Tritium was not detected above the sample's 3s value in any sample. Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere. Tritium measured in first quarter ESER samples were within the range of values measured elsewhere. The EPA's ERAMS program collects precipitation samples from across the United States. From 1978 to 2001 tritium measured in those samples ranged from -2.00 to 7.38×10^6 pCi/L (-7.4 to 2.7×10^4 Bq/L) (EPA 2003). Data for all first quarter 2005 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

5. AGRICULTURAL PRODUCTS AND WILDLIFE SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, doves, and marmots are sampled. Milk is sampled throughout the year. Sheep are sampled during the second quarter. Lettuce and wheat are sampled during the third quarter, while potatoes and waterfowl are collected during the fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk and large game animals sampled during the first quarter of 2005. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses is provided in Appendix B. There are no regulatory standards for radionuclide concentrations in agricultural products or wildlife tissues.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls and monthly at nine other locations around the INL (Figure 11) during the first quarter of 2005. All samples were analyzed for gamma emitting radionuclides. Samples are analyzed for ^{90}Sr during the second and fourth quarters.

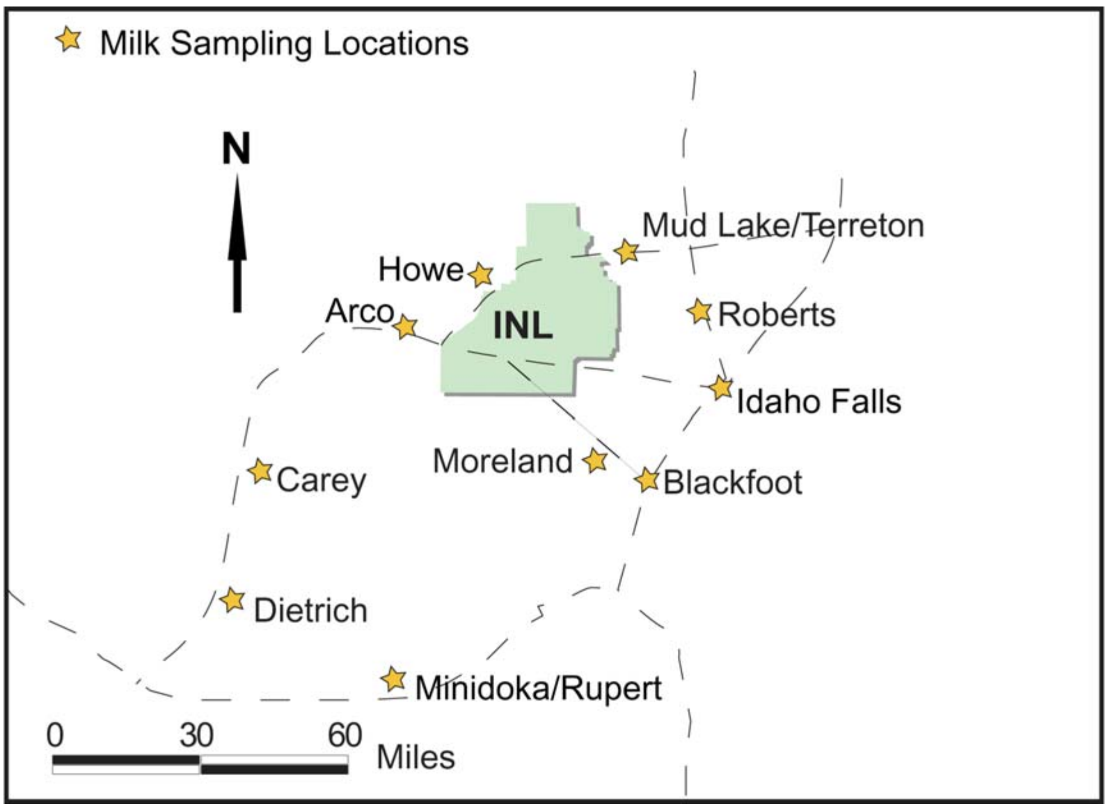

Figure 11. ESER Program milk sampling locations.

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

LARGE GAME ANIMAL SAMPLING

One game animal (a pronghorn antelope) was sampled during the first quarter of 2005. It was killed as a result of vehicular collisions on an INL road. Efforts were made to collect samples of thyroid, liver, and muscle tissue from the animal, but due to its condition at the time of sampling, a liver sample was not collected. Cesium-137 and ^{131}I data are listed in Appendix C, Table C-8. Cesium-137 and ^{131}I were not detected in either of the tissue collected.

6. QUALITY ASSURANCE

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

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

The following discussion summarizes the results of the quality assurance program for the period from January 1 to March 31, 2005.

METHOD UNCERTAINTY

The Quality Assurance Project Plan (QAPP) establishes data quality and method quality objectives for the ESER surveillance program (Stoller 2002). Since the primary concern is with detection, the lower bound for the method uncertainty is set at zero. The upper bound is defined by the ESER program as the maximum concentration in the non-outlier range of data from the past seven years. Each individual result is checked for acceptance on the basis of the result, whether it is below the lower limit (i.e., a negative value), greater than the upper limit, or between the lower and upper limit (the most common occurrence). The calculated method uncertainty is then compared to the 1s measured uncertainty. A sample is deemed acceptable when the measured 1s uncertainty is less than the calculated uncertainty. The upper bound values are currently being evaluated and revised. Preliminary results indicate that more calculated method uncertainties for detected results were acceptable.

DATA COMPLETENESS

The QAPP specifies a 98 percent completeness goal for all regularly scheduled sample types. Data completeness for sample collection and delivery was 100 percent during the first quarter for all samples types with the following exceptions. A number of precipitation samples were not collected due to the lack of precipitation. The liver was not collected from the one game animal sampled. There were three air samples that had volumes below the 7,000 ft^3 or 200 m^3 threshold listed in the air sampling procedure as being a valid sample. If these are not considered valid samples, the completeness of the air filter data set is 98.8 percent.

DATA PRECISION

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

$|X-Y| < 3\,(\text{sqrt}(\sigma_x^2 + \sigma_y^2))$, 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. The following sections of this report first check the sample results using the 3 standard deviation criterion. If this criterion is not met, the results are then listed for the relative percent difference.

Field Duplicate Samples

Duplicate milk samples were collected from Rupert on March 1 and analyzed for gamma-emitting radionuclides. Duplicate milk samples were also collected from Terreton on March 1 and analyzed for gamma-emitting radionuclides. All results were within the 3σ criteria.

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the first quarter of 2005 these samplers, designated as QA-1 and QA-2, were in operation at the INL Main Gate and Howe, respectively. Particulate filters receive the standard analysis for gross alpha and gross beta; charcoal cartridges are analyzed specifically for iodine-131. All gross alpha and gross beta results for the co-located samplers met the acceptability criteria. Charcoal cartridge results are difficult to present because cartridges are counted in batches of ten.

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 analyses were within the 3s criterion with the exception of ^{7}Be at the Howe and QA-2 stations.

A comparison of duplicate results can also show bias in the sampling system. For example, if one set of results is consistently lower or higher than the other one might suspect that this bias was due to a leak in the system or variations in the calibration of the flow meter. Figures 14 and 15 show the difference in results (Main sampler - QA duplicate sampler) over time. The figures show that the bias is small and not consistent in one direction, indicating that there is no obvious bias in the duplicate sampling systems in these cases.

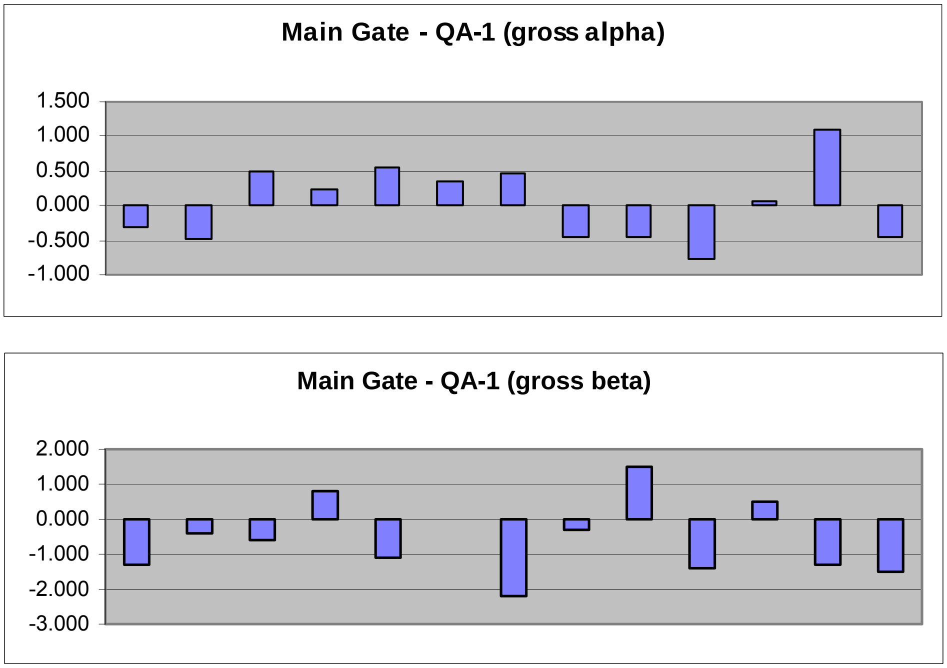

Figure 12. Difference in QA-1/Main Gate gross alpha and gross beta activities.

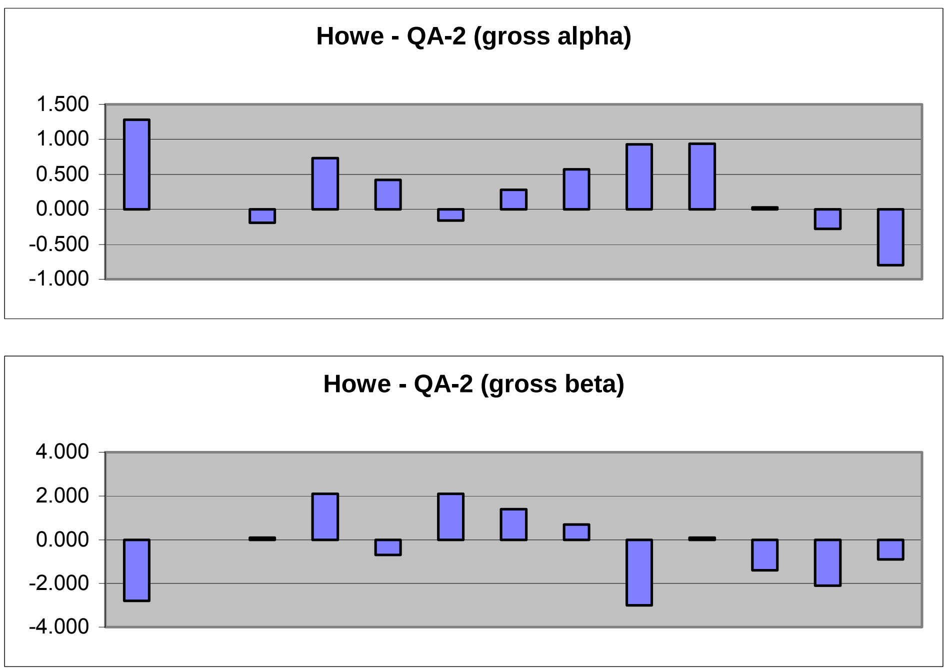

Figure 13. Difference in QA-2/Howe gross alpha and gross beta activities.

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 3s criterion, although it considers the former test meaningless for analyses producing fewer than 15 total counts and questionable even where counts are on the order of 100. The latter criterion is applied in nearly all cases at the levels seen in environmental samples analyzed for the ESER program. Results of the EAL split sample analyses met the criteria for acceptance during the first quarter 2005.

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 first quarter is presented below.

- 48 low-volume air filters were recounted for alpha activity. All were within the 3σ criterion.
- One water sample was recounted for alpha activity. The result was within the 3σ criterion.
- 48 low-volume air filters were recounted for beta activity. All were within the 3σ criterion.
- 1 water sample was recounted for beta activity. The result was within the 3σ criterion.
- 17 milk samples were recounted for potassium-40. All were within the 3σ criterion.
- One group of charcoal cartridges was recounted for iodine-131. The result was within the 3σ criterion.
- 10 low volume composites were recounted for beryllium-7. All were within the 3σ criterion.
- Two water samples were recounted twice each for tritium activity. Results of the original recount were outside the 3σ criterion but within the 20 percent criterion. One of the second recount results was outside both criteria. ISU attributed this to statistical fluctuations.
- Two precipitation samples were recounted for tritium. Both results were within the 3σ criterion.
- Two atmospheric moisture samples were recounted for tritium. One result was outside the 3σ criterion but within the 20 percent criterion.

DATA ACCURACY

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

Spike Samples Submitted with Field Samples

No spike samples were scheduled for analysis during the first quarter of 2005.

Internal Laboratory Spikes

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

During the first quarter of 2005, 24 analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. Geometries tested included low-volume air filter composites, single charcoal cartridge screening, 10-charcoal cartridge screening, 500 ml 1.0

g/cc samples, and one-liter 1.0 g/cc samples. A total of 176 analytical results were generated. All of the results were within the ±20 percent range.

Water samples spiked with tritium received 13 analyses during the quarterly reporting period. All were well within the ±20 percent criterion, and in fact all were within 6percent of the known value with one exception. Gross beta spikes analyzed in the first quarter were within 20 percent of the expected values; three of five gross alpha spikes were within 20 percent and all were within three standard deviations.

Severn-Trent analyzes a laboratory control sample (LCS) with each batch of samples submitted by the ESER. During the first quarter this consisted only of strontium-90 and actinides in air. The results for plutonium-239/240 and americium-241 were within the acceptability criteria; however, the result for strontium-90 was outside the criterion for that radionuclide (-14.1 percent vs. ±10 percent).

BLANKS

Field blanks

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

The Quality Assurance Project Plan does not specify requirements for blank performance, but ideally the result should be within ±2σ of zero and preferably within ±1σ of zero on most analyses. It would be expected, based on counting statistics for a sample that was truly a blank (i.e., the true value of the analyte was zero), that 68.3 percent of analyses would fall within one standard deviation, 95.5 percent would fall within two standard deviations, and 99.7 percent would fall within three standard deviations. With a few exceptions in gross alpha and gross beta analyses, all results were within the 2σ significance level.

Reagent Blanks

The Environmental Assessment Laboratory prepares and analyzes reagent blanks to help determine if the analysis will yield a zero result when no activity is present. ISU considers the result within specification if the concentration is less than the minimum detectable concentration (MDC) for the analysis. One such blank was analyzed for tritium in the first quarter for water. The blank was below the MDC for the analysis and less than one standard deviation. A water blank analyzed for gross alpha and gross beta was also below the MDA for the analysis and within three standard deviations for both parameters.

Severn-Trent analyzes a blank with each set of results. First quarter blanks were less than two standard deviations of zero for strontium-90, plutonium-238, plutonium-239/240 and americium-241 in air.

7. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING MEDIA AND SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Idaho Falls, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Idaho Falls, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
^{90}Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	4 to 13 weeks	Blackfoot, Idaho Falls, Rexburg	Atomic City	None
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	CFA
Tritium	weekly	None	None	EFS
PM-10				
Particulate Mass	every 6th day	Rexburg, Blackfoot	Atomic City	None
WATER SAMPLING				
SURFACE WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Twin Falls, Buhl, Hagerman, Idaho Falls, Bliss	None	None
DRINKING WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Aberdeen, Carey, Idaho Falls, Fort Hall, Minidoka, Moreland, Roberts, Shoshone, Tabor	Arco, Atomic City, Howe, Monteview, Mud Lake	None
ENVIRONMENTAL RADIATION SAMPLING				
TLDs				
Gamma Radiation	semiannual	Aberdeen, Blackfoot, Craters of the Moon, Idaho Falls, Minidoka, Jackson WY, Rexburg, Roberts	Arco, Atomic City, Birch Creek, Howe, Monteview, Mud Lake	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek	None
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Mud Lake	None
WHEAT				
Gamma Spec, ^{90}Sr	annually	Am. Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Tabor, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois	None	No. INL (Circular Butte), So. INL (Tractor Flats)
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Fort Hall, Hiese, Market Lake, Mud Lake	None	INL Waste disposal ponds
Marmots				
Gamma Spec, ^{90}Sr, Transuranics	varies	Pocatello zoo, Tie Canyon	None	RWMC

APPENDIX B

SUMMARY OF MDC'S AND DCG'S

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Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During First quarter 2005

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	1.01×10^{-15} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.94×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	3.06×10^{-16} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	1.95×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}$Pu	2.61×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	1.15×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	7.6×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.14×10^{-21} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	5.23×10^{-13} µCi/mL$_{air}$	1×10^{-7} µCi/mL$_{air}$
Air (precipitation)	^{3}H	1.15×10^{-13} µCi/mL	2×10^{-3} µCi/mL
Drinking Water	Gross Alpha[c]	1.3×10^{-3} pCi/L	30 pCi/L
	Gross Beta[d]	2.8×10^{-3} pCi/L	100 pCi/L
	^{3}H	0.087 pCi/L	2.0×10^{6} pCi/L
Surface Water	Gross Alpha	1.3×10^{-3} pCi/L	30 pCi/L
	Gross Beta	2.8×10^{-3} pCi/L	100 pCi/L
	^{3}H	0.087 pCi/L	2.0×10^{6} pCi/L
Milk	^{131}I	1.0 pCi/L	--[g]
	^{137}Cs	4.8 pCi/L	--
Lettuce	^{137}Cs	6.09 pCi/kg	--
	^{90}Sr	0.086 pCi/g	--
Wheat	^{137}Cs	6.09 pCi/kg	--
	^{90}Sr	0.086 pCi/g	--
Game Animal Tissue[h]	^{137}Cs	6.09 pCi/kg	--
Waterfowl	^{241}Am	3.95×10^{-3} pCi/g	--
	^{241}Am	3.95×10^{-3} pCi/g	--
	^{124}Sb	0.068 pCi/g	--
	^{141}Ce	0.16 pCi/g	--
	^{144}Ce	0.13 pCi/g	--
	^{134}Cs	0.033 pCi/g	--
	^{137}Cs	0.029 pCi/g	--
	^{51}Cr	1.55 pCi/g	--
	^{58}Co	0.059 pCi/g	--
	^{60}Co	0.032 pCi/g	--
	^{152}Eu	0.066 pCi/g	--
	^{181}Hf	0.10 pCi/g	--
	^{54}Mn	0.033 pCi/g	--
	^{95}Nb	0.15 pCi/g	--

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
	^{238}Pu	4.33 x 10^{-3} pCi/g	--
	$^{239/240}Pu$	5.06 x 10^{-3} pCi/g	--
	^{40}K	0.27 pCi/g	--
	^{103}Ru	0.11 pCi/g	--
	^{110m}Ag	0.047 pCi/g	--
	^{90}Sr	0.086 pCi/g	--
	^{65}Zn	0.079 pCi/g	--
	^{95}Zr	0.12 pCi/g	--

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 DCG for ^{228}Ra

e The approximate MDC is based on an average filtered air volume (pressure corrected) of 570 m^3/week.

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

g -- means there is no established DCG for this media.

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

APPENDIX C

SAMPLE ANALYSIS RESULTS

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

Sampling Group and Location		Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 1s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
BOUNDARY								
	ARCO	01/05/2005	1.24 ± 0.42	4.59 ± 1.57		17.80 ± 0.97	6.59 ± 0.36	Y
		01/12/2005	0.39 ± 0.44	1.45 ± 1.63		23.20 ± 1.08	8.58 ± 0.40	Y
		01/19/2005	1.61 ± 0.53	5.96 ± 1.96	Y	28.90 ± 1.29	10.69 ± 0.48	Y
		01/26/2005	1.48 ± 0.46	5.48 ± 1.69	Y	35.30 ± 1.28	13.06 ± 0.47	Y
		02/02/2005	1.44 ± 0.47	5.33 ± 1.72	Y	39.80 ± 1.32	14.73 ± 0.49	Y
		02/09/2005	1.39 ± 0.48	5.14 ± 1.76		26.60 ± 1.18	9.84 ± 0.44	Y
		02/16/2005	1.02 ± 0.40	3.77 ± 1.49		23.00 ± 1.03	8.51 ± 0.38	Y
		02/23/2005	1.33 ± 0.46	4.92 ± 1.70		24.10 ± 1.17	8.92 ± 0.43	Y
		03/02/2005	0.89 ± 0.45	3.29 ± 1.67		34.60 ± 1.32	12.80 ± 0.49	Y
		03/09/2005	2.03 ± 0.50	7.51 ± 1.86	Y	32.10 ± 1.31	11.88 ± 0.48	Y
		03/16/2005	1.20 ± 0.42	4.44 ± 1.57		17.90 ± 1.06	6.62 ± 0.39	Y
		03/23/2005	0.83 ± 0.36	3.08 ± 1.33		13.00 ± 0.96	4.81 ± 0.35	Y
		03/30/2005	0.66 ± 0.34	2.43 ± 1.27		12.70 ± 0.89	4.70 ± 0.33	Y
	ATOMIC CITY	01/05/2005	1.53 ± 0.42	5.66 ± 1.55	Y	15.20 ± 0.89	5.62 ± 0.33	Y
		01/12/2005	0.08 ± 0.33	0.29 ± 1.24		17.60 ± 0.84	6.51 ± 0.31	Y
		01/19/2005	0.79 ± 0.44	2.93 ± 1.61		27.30 ± 1.16	10.10 ± 0.43	Y
		01/26/2005	1.19 ± 0.37	4.40 ± 1.36	Y	39.10 ± 1.15	14.47 ± 0.43	Y
		02/02/2005	1.68 ± 0.50	6.22 ± 1.85	Y	35.10 ± 1.30	12.99 ± 0.48	Y
		02/09/2005	1.50 ± 0.44	5.55 ± 1.61	Y	34.10 ± 1.18	12.62 ± 0.44	Y
		02/16/2005	1.09 ± 0.54	4.03 ± 1.98		25.50 ± 1.32	9.44 ± 0.49	Y
		02/23/2005	0.61 ± 0.35	2.24 ± 1.28		26.30 ± 1.05	9.73 ± 0.39	Y
		03/02/2005	0.93 ± 0.47	3.43 ± 1.74		39.80 ± 1.41	14.73 ± 0.52	Y
		03/09/2005	0.82 ± 0.45	3.03 ± 1.65		32.10 ± 1.35	11.88 ± 0.50	Y
		03/16/2005	1.48 ± 0.49	5.48 ± 1.81	Y	17.20 ± 1.16	6.36 ± 0.43	Y
		03/23/2005	1.08 ± 0.32	4.00 ± 1.19	Y	12.00 ± 0.81	4.44 ± 0.30	Y
		03/30/2005	0.59 ± 0.40	2.19 ± 1.49		13.30 ± 1.05	4.92 ± 0.39	Y
	BLUE DOME	01/05/2005	0.05 ± 0.35	0.18 ± 1.28		15.30 ± 0.93	5.66 ± 0.34	Y
		01/12/2005	0.23 ± 0.37	0.84 ± 1.37		21.30 ± 0.94	7.88 ± 0.35	Y
		01/19/2005	0.83 ± 0.38	3.08 ± 1.41		21.60 ± 0.97	7.99 ± 0.36	Y
		01/26/2005	0.79 ± 0.34	2.92 ± 1.27		26.00 ± 1.00	9.62 ± 0.37	Y
		02/02/2005	1.62 ± 0.47	5.99 ± 1.74	Y	11.70 ± 0.89	4.33 ± 0.33	Y
		02/09/2005	1.05 ± 0.37	3.89 ± 1.35		21.30 ± 0.92	7.88 ± 0.34	Y
		02/16/2005	0.18 ± 0.40	0.65 ± 1.49		20.50 ± 1.10	7.59 ± 0.41	Y
		02/23/2005	0.49 ± 0.33	1.79 ± 1.22		20.90 ± 0.96	7.73 ± 0.36	Y
		03/02/2005	1.17 ± 0.46	4.33 ± 1.71		28.40 ± 1.22	10.51 ± 0.45	Y
		03/09/2005	0.72 ± 0.40	2.68 ± 1.48		26.00 ± 1.17	9.62 ± 0.43	Y
		03/16/2005	0.71 ± 0.39	2.63 ± 1.44		14.70 ± 1.00	5.44 ± 0.37	Y
		03/23/2005	0.74 ± 0.36	2.74 ± 1.32		13.20 ± 0.97	4.88 ± 0.36	Y
		03/30/2005	0.24 ± 0.34	0.89 ± 1.24		13.40 ± 0.95	4.96 ± 0.35	Y
	FAA TOWER	01/05/2005	0.48 ± 0.36	1.79 ± 1.32		14.40 ± 0.87	5.33 ± 0.32	Y
		01/12/2005	0.08 ± 0.36	0.28 ± 1.34		16.20 ± 0.87	5.99 ± 0.32	Y
		01/19/2005	0.68 ± 0.38	2.51 ± 1.42		19.20 ± 0.96	7.10 ± 0.36	Y
		01/26/2005	0.71 ± 0.34	2.61 ± 1.27		30.20 ± 1.07	11.17 ± 0.40	Y
		02/02/2005	0.75 ± 0.42	2.77 ± 1.56		32.90 ± 1.23	12.17 ± 0.46	Y
		02/09/2005	0.77 ± 0.39	2.85 ± 1.44		27.00 ± 1.08	9.99 ± 0.40	Y
		02/16/2005	0.40 ± 0.40	1.49 ± 1.47		21.00 ± 1.07	7.77 ± 0.40	Y
		02/23/2005	0.76 ± 0.35	2.82 ± 1.28		18.80 ± 0.93	6.96 ± 0.34	Y
		03/02/2005	1.11 ± 0.42	4.11 ± 1.55		34.60 ± 1.21	12.80 ± 0.45	Y
		03/09/2005	0.69 ± 0.41	2.56 ± 1.50		26.20 ± 1.19	9.69 ± 0.44	Y
		03/16/2005	1.23 ± 0.43	4.55 ± 1.60		17.50 ± 1.07	6.48 ± 0.40	Y
		03/23/2005	1.14 ± 0.40	4.22 ± 1.46		13.40 ± 1.00	4.96 ± 0.37	Y
		03/30/2005	0.30 ± 0.37	1.11 ± 1.37		11.80 ± 0.99	4.37 ± 0.37	Y
	HOWE	01/05/2005	1.68 ± 0.47	6.22 ± 1.74	Y	16.90 ± 0.99	6.25 ± 0.37	Y
		01/12/2005	1.30 ± 0.43	4.81 ± 1.59	Y	19.40 ± 0.92	7.18 ± 0.34	Y
		01/19/2005	1.15 ± 0.40	4.26 ± 1.46		28.90 ± 1.06	10.69 ± 0.39	Y
		01/26/2005	1.85 ± 0.38	6.85 ± 1.39	Y	40.80 ± 1.11	15.10 ± 0.41	Y
		02/02/2005	2.20 ± 0.47	8.14 ± 1.73	Y	38.00 ± 1.21	14.06 ± 0.45	Y
		02/09/2005	0.97 ± 0.36	3.58 ± 1.34		35.90 ± 1.10	13.28 ± 0.41	Y
		02/16/2005	1.14 ± 0.39	4.22 ± 1.46		25.60 ± 1.03	9.47 ± 0.38	Y
		02/23/2005	1.17 ± 0.36	4.33 ± 1.35	Y	25.80 ± 1.00	9.55 ± 0.37	Y
		03/02/2005	1.78 ± 0.48	6.59 ± 1.76	Y	36.30 ± 1.28	13.43 ± 0.47	Y
		03/09/2005	1.81 ± 0.44	6.70 ± 1.62	Y	34.00 ± 1.22	12.58 ± 0.45	Y
		03/16/2005	0.79 ± 0.39	2.91 ± 1.42		18.50 ± 1.04	6.85 ± 0.38	Y
		03/23/2005	0.93 ± 0.33	3.43 ± 1.22		14.20 ± 0.89	5.25 ± 0.33	Y
		03/30/2005	-0.12 ± 0.30	-0.43 ± 1.11		12.70 ± 0.93	4.70 ± 0.34	Y

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

Sampling Group and Location		Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 1s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
BOUNDARY								
	HOWE (Q/A-2)	01/05/2005	0.40 ± 0.40	1.48 ± 1.47		19.70 ± 1.05	7.29 ± 0.39	Y
	a	01/12/2005	4.76 ± 5.88	17.61 ± 21.76		296.00 ± 14.30	109.52 ± 5.29	Y
		01/19/2005	1.34 ± 0.52	4.96 ± 1.92		28.80 ± 1.29	10.66 ± 0.48	Y
		01/26/2005	1.12 ± 0.42	4.14 ± 1.54		38.70 ± 1.28	14.32 ± 0.47	Y
		02/02/2005	1.78 ± 0.45	6.59 ± 1.65	Y	38.70 ± 1.22	14.32 ± 0.45	Y
		02/09/2005	1.13 ± 0.44	4.18 ± 1.63		33.80 ± 1.23	12.51 ± 0.46	Y
		02/16/2005	0.86 ± 0.42	3.19 ± 1.57		24.20 ± 1.11	8.95 ± 0.41	Y
		02/23/2005	0.60 ± 0.40	2.21 ± 1.49		25.10 ± 1.17	9.29 ± 0.43	Y
		03/02/2005	0.85 ± 0.43	3.16 ± 1.58		39.30 ± 1.32	14.54 ± 0.49	Y
		03/09/2005	0.87 ± 0.47	3.21 ± 1.75		33.90 ± 1.42	12.54 ± 0.53	Y
		03/16/2005	0.76 ± 0.42	2.80 ± 1.54		19.90 ± 1.14	7.36 ± 0.42	Y
		03/23/2005	1.21 ± 0.40	4.48 ± 1.48	Y	16.30 ± 1.04	6.03 ± 0.38	Y
		03/30/2005	0.68 ± 0.38	2.51 ± 1.39		13.60 ± 0.98	5.03 ± 0.36	Y
	MONTEVIEW	01/05/2005	0.44 ± 0.40	1.61 ± 1.47		16.60 ± 1.00	6.14 ± 0.37	Y
		01/12/2005	1.73 ± 0.44	6.40 ± 1.63	Y	13.30 ± 0.81	4.92 ± 0.30	Y
		01/19/2005	0.73 ± 0.44	2.70 ± 1.61		36.20 ± 1.28	13.39 ± 0.47	Y
		01/26/2005	2.50 ± 0.47	9.25 ± 1.74	Y	61.10 ± 1.46	22.61 ± 0.54	Y
		02/02/2005	2.83 ± 0.55	10.47 ± 2.02	Y	35.10 ± 1.28	12.99 ± 0.47	Y
		02/09/2005	0.64 ± 0.40	2.35 ± 1.48		33.60 ± 1.21	12.43 ± 0.45	Y
		02/16/2005	1.13 ± 0.47	4.18 ± 1.74		20.20 ± 1.11	7.47 ± 0.41	Y
		02/23/2005	0.65 ± 0.40	2.40 ± 1.46		26.30 ± 1.16	9.73 ± 0.43	Y
		03/02/2005	1.41 ± 0.51	5.22 ± 1.88		37.10 ± 1.41	13.73 ± 0.52	Y
		03/09/2005	1.04 ± 0.40	3.85 ± 1.49		33.80 ± 1.23	12.51 ± 0.46	Y
		03/16/2005	0.40 ± 0.42	1.47 ± 1.57		17.40 ± 1.18	6.44 ± 0.44	Y
		03/23/2005	0.49 ± 0.33	1.81 ± 1.21		14.50 ± 0.97	5.37 ± 0.36	Y
		03/30/2005	0.91 ± 0.39	3.35 ± 1.45		16.20 ± 1.02	5.99 ± 0.38	Y
	MUD LAKE	01/05/2005	1.02 ± 0.42	3.77 ± 1.57		18.80 ± 1.01	6.96 ± 0.37	Y
		01/12/2005	0.02 ± 0.34	0.07 ± 1.27		20.00 ± 0.90	7.40 ± 0.33	Y
		01/19/2005	0.94 ± 0.44	3.49 ± 1.63		33.80 ± 1.24	12.51 ± 0.46	Y
		01/26/2005	1.50 ± 0.45	5.55 ± 1.68	Y	58.90 ± 1.53	21.79 ± 0.57	Y
		02/02/2005	1.95 ± 0.50	7.22 ± 1.86	Y	45.20 ± 1.40	16.72 ± 0.52	Y
		02/09/2005	1.26 ± 0.42	4.66 ± 1.54	Y	34.90 ± 1.17	12.91 ± 0.43	Y
		02/16/2005	1.85 ± 0.46	6.85 ± 1.71	Y	28.00 ± 1.12	10.36 ± 0.41	Y
		02/23/2005	1.55 ± 0.39	5.74 ± 1.45	Y	31.80 ± 1.10	11.77 ± 0.41	Y
	b	03/02/2005	0.50 ± 1.31	1.84 ± 4.85		36.10 ± 3.13	13.36 ± 1.16	Y
		03/09/2005	1.35 ± 0.48	5.00 ± 1.78		38.50 ± 1.43	14.25 ± 0.53	Y
		03/16/2005	1.23 ± 0.43	4.55 ± 1.58		20.00 ± 1.10	7.40 ± 0.41	Y
		03/23/2005	1.16 ± 0.33	4.29 ± 1.21	Y	12.80 ± 0.82	4.74 ± 0.30	Y
		03/30/2005	1.74 ± 0.42	6.44 ± 1.54	Y	13.00 ± 0.90	4.81 ± 0.33	Y
DISTANT								
	BLACKFOOT CMS	01/05/2005	0.93 ± 0.38	3.44 ± 1.42		16.60 ± 0.91	6.14 ± 0.34	Y
		01/12/2005	0.36 ± 0.43	1.32 ± 1.60		21.10 ± 1.04	7.81 ± 0.38	Y
		01/19/2005	2.21 ± 0.49	8.18 ± 1.79	Y	34.40 ± 1.20	12.73 ± 0.44	Y
		01/26/2005	0.21 ± 0.38	0.77 ± 1.41		50.20 ± 1.47	18.57 ± 0.54	Y
		02/02/2005	1.58 ± 0.46	5.85 ± 1.69	Y	38.70 ± 1.27	14.32 ± 0.47	Y
		02/09/2005	1.23 ± 0.43	4.55 ± 1.57		27.80 ± 1.11	10.29 ± 0.41	Y
		02/16/2005	1.09 ± 0.40	4.03 ± 1.49		32.50 ± 1.14	12.03 ± 0.42	Y
		02/23/2005	1.24 ± 0.43	4.59 ± 1.59		23.50 ± 1.12	8.70 ± 0.41	Y
		03/02/2005	1.91 ± 0.47	7.07 ± 1.74	Y	36.00 ± 1.25	13.32 ± 0.46	Y
		03/09/2005	1.37 ± 0.42	5.07 ± 1.55	Y	27.20 ± 1.14	10.06 ± 0.42	Y
		03/16/2005	1.43 ± 0.41	5.29 ± 1.50	Y	16.50 ± 0.97	6.11 ± 0.36	Y
		03/23/2005	1.04 ± 0.35	3.85 ± 1.30		13.20 ± 0.91	4.88 ± 0.33	Y
		03/30/2005	1.44 ± 0.38	5.33 ± 1.42	Y	13.80 ± 0.88	5.11 ± 0.33	Y
	CRATERS	01/05/2005	1.75 ± 0.48	6.48 ± 1.77	Y	16.40 ± 0.99	6.07 ± 0.37	Y
		01/12/2005	0.16 ± 0.41	0.58 ± 1.52		16.50 ± 0.95	6.11 ± 0.35	Y
		01/19/2005	1.15 ± 0.61	4.26 ± 2.24		18.20 ± 1.32	6.73 ± 0.49	Y
		01/26/2005	1.06 ± 0.54	3.92 ± 1.98		31.40 ± 1.46	11.62 ± 0.54	Y
		02/02/2005	1.51 ± 0.42	5.59 ± 1.54	Y	28.40 ± 1.06	10.51 ± 0.39	Y
		02/09/2005	0.73 ± 0.45	2.69 ± 1.67		24.90 ± 1.18	9.21 ± 0.44	Y
		02/16/2005	1.42 ± 0.50	5.25 ± 1.86		19.50 ± 1.13	7.22 ± 0.42	Y
		02/23/2005	0.23 ± 0.47	0.84 ± 1.72		20.20 ± 1.29	7.47 ± 0.48	Y
		03/02/2005	0.77 ± 0.50	2.86 ± 1.84		34.10 ± 1.42	12.62 ± 0.53	Y
		03/09/2005	1.79 ± 0.54	6.62 ± 2.00	Y	28.20 ± 1.38	10.43 ± 0.51	Y
		03/16/2005	0.93 ± 0.43	3.43 ± 1.57		15.50 ± 1.07	5.74 ± 0.40	Y
		03/23/2005	0.36 ± 0.39	1.35 ± 1.45		12.90 ± 1.12	4.77 ± 0.41	Y
		03/30/2005	0.59 ± 0.42	2.18 ± 1.54		11.20 ± 1.04	4.14 ± 0.38	Y

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

Sampling Group and Location		Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL			GROSS ALPHA Result ± 1s Uncertainty x 10^{-11} Bq/mL			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15}µCi/mL)			GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)			Result > 3s
BOUNDARY																
	DUBOIS	01/05/2005	0.94	±	0.44	3.48	±	1.61		16.80	±	1.01	6.22	±	0.37	Y
		01/12/2005	1.38	±	0.42	5.11	±	1.56	Y	16.00	±	0.85	5.92	±	0.31	Y
	c	01/19/2005	1.26	±	1.08	4.66	±	4.00		20.40	±	2.23	7.55	±	0.83	Y
		01/26/2005	1.46	±	0.37	5.40	±	1.38	Y	26.50	±	0.98	9.81	±	0.36	Y
		02/02/2005	0.87	±	0.44	3.20	±	1.61		33.60	±	1.25	12.43	±	0.46	Y
		02/09/2005	0.44	±	0.33	1.62	±	1.23		29.70	±	1.04	10.99	±	0.38	Y
		02/16/2005	1.44	±	0.50	5.33	±	1.84		20.70	±	1.14	7.66	±	0.42	Y
		02/23/2005	0.85	±	0.35	3.13	±	1.30		19.10	±	0.93	7.07	±	0.35	Y
		03/02/2005	1.96	±	0.55	7.25	±	2.05	Y	32.10	±	1.37	11.88	±	0.51	Y
		03/09/2005	0.86	±	0.39	3.19	±	1.43		28.10	±	1.15	10.40	±	0.43	Y
		03/16/2005	0.98	±	0.46	3.62	±	1.71		15.20	±	1.14	5.62	±	0.42	Y
		03/23/2005	1.23	±	0.37	4.55	±	1.36	Y	14.30	±	0.93	5.29	±	0.34	Y
		03/30/2005	0.83	±	0.42	3.07	±	1.57		13.80	±	1.06	5.11	±	0.39	Y
	IDAHO FALLS	01/05/2005	0.77	±	0.53	2.85	±	1.97		17.40	±	1.22	6.44	±	0.45	Y
		01/12/2005	0.68	±	0.53	2.53	±	1.95		23.30	±	1.20	8.62	±	0.44	Y
		01/19/2005	1.64	±	0.52	6.07	±	1.94	Y	28.40	±	1.26	10.51	±	0.47	Y
		01/26/2005	1.48	±	0.50	5.48	±	1.86		47.40	±	1.53	17.54	±	0.57	Y
		02/02/2005	2.46	±	0.60	9.10	±	2.22	Y	45.20	±	1.55	16.72	±	0.57	Y
		02/09/2005	1.84	±	0.47	6.81	±	1.75	Y	29.40	±	1.16	10.88	±	0.43	Y
		02/16/2005	0.37	±	0.51	1.35	±	1.89		24.50	±	1.35	9.07	±	0.50	Y
		02/23/2005	1.16	±	0.44	4.29	±	1.62		21.90	±	1.12	8.10	±	0.41	Y
		03/02/2005	0.99	±	0.48	3.65	±	1.79		38.50	±	1.42	14.25	±	0.53	Y
		03/09/2005	1.81	±	0.55	6.70	±	2.02	Y	27.80	±	1.38	10.29	±	0.51	Y
		03/16/2005	1.97	±	0.62	7.29	±	2.31	Y	20.00	±	1.43	7.40	±	0.53	Y
		03/23/2005	1.48	±	0.44	5.48	±	1.64	Y	16.90	±	1.11	6.25	±	0.41	Y
		03/30/2005	0.25	±	0.42	0.92	±	1.56		16.30	±	1.19	6.03	±	0.44	Y
	JACKSON	01/05/2005	0.58	±	0.41	2.15	±	1.51		17.90	±	1.02	6.62	±	0.38	Y
		01/12/2005	0.52	±	0.44	1.94	±	1.61		22.90	±	1.05	8.47	±	0.39	Y
		01/19/2005	0.76	±	0.44	2.81	±	1.61		19.00	±	1.05	7.03	±	0.39	Y
		01/26/2005	2.88	±	0.58	10.66	±	2.13	Y	34.00	±	1.36	12.58	±	0.50	Y
		02/02/2005	2.06	±	0.52	7.62	±	1.92	Y	45.50	±	1.43	16.84	±	0.53	Y
		02/09/2005	1.84	±	0.49	6.81	±	1.79	Y	26.80	±	1.15	9.92	±	0.43	Y
		02/16/2005	0.92	±	0.59	3.39	±	2.18		26.30	±	1.46	9.73	±	0.54	Y
		02/23/2005	0.69	±	0.45	2.56	±	1.66		25.30	±	1.26	9.36	±	0.47	Y
		03/02/2005	0.84	±	0.37	3.10	±	1.37		31.30	±	1.10	11.58	±	0.41	Y
		03/09/2005	1.43	±	0.43	5.29	±	1.58	Y	27.00	±	1.15	9.99	±	0.43	Y
		03/16/2005	1.74	±	0.47	6.44	±	1.74	Y	15.40	±	1.05	5.70	±	0.39	Y
		03/23/2005	1.82	±	0.41	6.73	±	1.52	Y	13.00	±	0.92	4.81	±	0.34	Y
		03/30/2005	0.40	±	0.33	1.48	±	1.22		10.60	±	0.86	3.92	±	0.32	Y
	REXBURG CMS	01/05/2005	1.09	±	0.43	4.03	±	1.60		18.70	±	1.02	6.92	±	0.38	Y
		01/12/2005	0.63	±	0.46	2.33	±	1.71		21.80	±	1.07	8.07	±	0.40	Y
		01/19/2005	1.34	±	0.51	4.96	±	1.87		28.30	±	1.26	10.47	±	0.47	Y
		01/26/2005	2.59	±	0.58	9.58	±	2.15	Y	45.30	±	1.54	16.76	±	0.57	Y
		02/02/2005	2.26	±	0.53	8.36	±	1.96	Y	43.00	±	1.40	15.91	±	0.52	Y
		02/09/2005	1.24	±	0.45	4.59	±	1.68		28.80	±	1.18	10.66	±	0.44	Y
		02/16/2005	0.56	±	0.43	2.08	±	1.59		24.40	±	1.16	9.03	±	0.43	Y
		02/23/2005	1.10	±	0.45	4.07	±	1.68		19.50	±	1.12	7.22	±	0.41	Y
		03/02/2005	1.48	±	0.49	5.48	±	1.83		37.30	±	1.37	13.80	±	0.51	Y
		03/09/2005	2.81	±	0.54	10.40	±	2.00	Y	29.00	±	1.26	10.73	±	0.47	Y
		03/16/2005	0.96	±	0.43	3.56	±	1.57		16.60	±	1.08	6.14	±	0.40	Y
		03/23/2005	0.32	±	0.32	1.18	±	1.19		16.80	±	1.02	6.22	±	0.38	Y
		03/30/2005	0.66	±	0.35	2.44	±	1.31		14.40	±	0.94	5.33	±	0.35	Y
INEEL																
	EFS	01/05/2005	2.16	±	0.49	7.99	±	1.83	Y	18.60	±	1.01	6.88	±	0.37	Y
		01/12/2005	1.16	±	0.42	4.29	±	1.55		28.30	±	1.04	10.47	±	0.38	Y
		01/19/2005	1.83	±	0.49	6.77	±	1.82	Y	39.40	±	1.31	14.58	±	0.48	Y
		01/26/2005	2.09	±	0.51	7.73	±	1.87	Y	44.20	±	1.42	16.35	±	0.53	Y
		02/02/2005	1.32	±	0.46	4.88	±	1.71		45.40	±	1.39	16.80	±	0.51	Y
		02/09/2005	1.48	±	0.47	5.48	±	1.73	Y	41.20	±	1.34	15.24	±	0.50	Y
		02/16/2005	0.99	±	0.48	3.65	±	1.78		27.10	±	1.25	10.03	±	0.46	Y
		02/23/2005	1.12	±	0.48	4.14	±	1.78		29.10	±	1.32	10.77	±	0.49	Y
		03/02/2005	1.33	±	0.53	4.92	±	1.95		41.90	±	1.52	15.50	±	0.56	Y
		03/09/2005	1.16	±	0.45	4.29	±	1.66		33.70	±	1.32	12.47	±	0.49	Y
		03/16/2005	1.01	±	0.45	3.74	±	1.67		18.00	±	1.15	6.66	±	0.43	Y
		03/23/2005	1.36	±	0.44	5.03	±	1.61	Y	14.50	±	1.08	5.37	±	0.40	Y
		03/30/2005	0.41	±	0.38	1.53	±	1.41		12.40	±	1.01	4.59	±	0.37	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty x 10^{-15} µCi/mL	GROSS ALPHA Result ± 1s Uncertainty x 10^{-11} Bq/mL	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15}µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-10} Bq/mL)	GROSS BETA Result > 3s
BOUNDARY							
MAIN GATE	01/05/2005	0.90 ± 0.38	3.33 ± 1.39		17.20 ± 0.91	6.36 ± 0.33	Y
	01/12/2005	0.56 ± 0.42	2.09 ± 1.56		24.30 ± 1.04	8.99 ± 0.38	Y
	01/19/2005	2.61 ± 0.55	9.66 ± 2.05	Y	32.40 ± 1.28	11.99 ± 0.47	Y
	01/26/2005	1.54 ± 0.54	5.70 ± 1.98		41.50 ± 1.53	15.36 ± 0.57	Y
	02/02/2005	2.72 ± 0.47	10.06 ± 1.74	Y	43.00 ± 1.22	15.91 ± 0.45	Y
	02/09/2005	1.01 ± 0.40	3.74 ± 1.49		30.60 ± 1.13	11.32 ± 0.42	Y
	02/16/2005	0.94 ± 0.50	3.47 ± 1.85		27.00 ± 1.30	9.99 ± 0.48	Y
	02/23/2005	0.29 ± 0.45	1.08 ± 1.67		28.20 ± 1.36	10.43 ± 0.50	Y
	03/02/2005	1.24 ± 0.54	4.59 ± 1.99		43.70 ± 1.58	16.17 ± 0.58	Y
	03/09/2005	1.81 ± 0.57	6.70 ± 2.10	Y	36.00 ± 1.54	13.32 ± 0.57	Y
	03/16/2005	1.00 ± 0.48	3.70 ± 1.78		21.00 ± 1.27	7.77 ± 0.47	Y
	03/23/2005	1.44 ± 0.46	5.33 ± 1.68	Y	12.80 ± 1.08	4.74 ± 0.40	Y
	03/30/2005	0.05 ± 0.33	0.17 ± 1.21		12.80 ± 0.96	4.74 ± 0.35	Y
MAIN GATE (Q/A-1)	01/05/2005	1.21 ± 0.46	4.48 ± 1.69		18.50 ± 1.04	6.85 ± 0.38	Y
	01/12/2005	1.04 ± 0.53	3.85 ± 1.97		24.70 ± 1.20	9.14 ± 0.44	Y
	01/19/2005	2.13 ± 0.54	7.88 ± 2.00	Y	33.00 ± 1.31	12.21 ± 0.48	Y
	01/26/2005	1.30 ± 0.50	4.81 ± 1.84		40.70 ± 1.46	15.06 ± 0.54	Y
	02/02/2005	2.17 ± 0.54	8.03 ± 1.99	Y	44.10 ± 1.44	16.32 ± 0.53	Y
	02/09/2005	0.65 ± 0.53	2.41 ± 1.95		30.60 ± 1.43	11.32 ± 0.53	Y
	02/16/2005	0.48 ± 0.54	1.76 ± 2.00		29.20 ± 1.47	10.80 ± 0.54	Y
	02/23/2005	0.75 ± 0.49	2.77 ± 1.82		28.50 ± 1.39	10.55 ± 0.51	Y
	03/02/2005	1.68 ± 0.59	6.22 ± 2.17		42.20 ± 1.61	15.61 ± 0.60	Y
	03/09/2005	2.58 ± 0.61	9.55 ± 2.26	Y	37.40 ± 1.56	13.84 ± 0.58	Y
	03/16/2005	0.95 ± 0.50	3.50 ± 1.84		20.50 ± 1.31	7.59 ± 0.48	Y
	03/23/2005	0.35 ± 0.35	1.31 ± 1.31		14.10 ± 1.05	5.22 ± 0.39	Y
	03/30/2005	0.50 ± 0.39	1.85 ± 1.43		14.30 ± 1.04	5.29 ± 0.38	Y
VAN BUREN GATE	01/05/2005	1.41 ± 0.42	5.22 ± 1.55	Y	15.80 ± 0.91	5.85 ± 0.33	Y
	01/12/2005	1.05 ± 0.49	3.89 ± 1.83		23.90 ± 1.12	8.84 ± 0.41	Y
	01/19/2005	1.80 ± 0.51	6.66 ± 1.89	Y	29.20 ± 1.23	10.80 ± 0.46	Y
	01/26/2005	1.55 ± 0.49	5.74 ± 1.82	Y	38.60 ± 1.40	14.28 ± 0.52	Y
	02/02/2005	0.68 ± 0.46	2.51 ± 1.70		43.20 ± 1.44	15.98 ± 0.53	Y
	02/09/2005	0.92 ± 0.46	3.39 ± 1.71		32.10 ± 1.28	11.88 ± 0.47	Y
	02/16/2005	1.43 ± 0.51	5.29 ± 1.90		26.30 ± 1.25	9.73 ± 0.46	Y
	02/23/2005	1.22 ± 0.49	4.51 ± 1.80		30.10 ± 1.33	11.14 ± 0.49	Y
	03/02/2005	0.75 ± 0.40	2.77 ± 1.49		35.20 ± 1.23	13.02 ± 0.46	Y
	03/09/2005	0.65 ± 0.47	2.39 ± 1.73		34.00 ± 1.45	12.58 ± 0.54	Y
	03/16/2005	1.48 ± 0.47	5.48 ± 1.74	Y	19.50 ± 1.15	7.22 ± 0.43	Y
	03/23/2005	0.96 ± 0.38	3.53 ± 1.39		13.60 ± 0.99	5.03 ± 0.36	Y
	03/30/2005	0.51 ± 0.43	1.87 ± 1.58		14.90 ± 1.14	5.51 ± 0.42	Y

Red text denotes invalid sample:
a 01/12/2005 Howe (QA-2) due to broken sampler housing.
b 03/02/2005 Mud Lake invalid due to a power outage.
c 01/19/2005 Dubois invalid due to a clogged filter.

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY								
ARCO	1/5/2005	-2.00	±	2.48	-7.40	±	9.19	
	1/12/2005	-1.49	±	2.13	-5.50	±	7.87	
	1/19/2005	-0.14	±	2.73	-0.50	±	10.10	
	1/26/2005	0.44	±	1.88	1.65	±	6.95	
	2/2/2005	4.69	±	2.57	17.35	±	9.49	
	2/9/2005	-0.81	±	2.37	-2.99	±	8.78	
	2/16/2005	-0.54	±	1.54	-2.02	±	5.71	
	2/23/2005	2.25	±	2.25	8.32	±	8.32	
	3/2/2005	0.92	±	1.97	3.41	±	7.29	
	3/9/2005	0.34	±	1.60	1.25	±	5.92	
	3/16/2005	0.82	±	1.57	3.02	±	5.80	
	3/23/2005	0.76	±	2.08	2.81	±	7.69	
	3/30/2005	0.16	±	1.33	0.58	±	4.91	
ATOMIC CITY	1/5/2005	-1.89	±	2.35	-6.99	±	8.69	
	1/12/2005	-1.17	±	1.68	-4.34	±	6.21	
	1/19/2005	-0.12	±	2.42	-0.44	±	8.96	
	1/26/2005	0.35	±	1.47	1.29	±	5.43	
	2/2/2005	5.01	±	2.74	18.54	±	10.14	
	2/9/2005	-0.70	±	2.05	-2.58	±	7.59	
	2/16/2005	-0.75	±	2.13	-2.78	±	7.87	
	2/23/2005	1.81	±	1.81	6.70	±	6.70	
	3/2/2005	0.95	±	2.03	3.51	±	7.53	
	3/9/2005	0.35	±	1.67	1.30	±	6.17	
	3/16/2005	0.94	±	1.80	3.46	±	6.65	
	3/23/2005	0.62	±	1.70	2.29	±	6.27	
	3/30/2005	0.19	±	1.62	0.71	±	6.00	
BLUE DOME	1/5/2005	-2.77	±	1.89	-10.25	±	7.00	
	1/12/2005	0.26	±	1.26	0.96	±	4.65	
	1/19/2005	-0.95	±	1.47	-3.50	±	5.46	
	1/26/2005	0.95	±	2.01	3.53	±	7.45	
	2/2/2005	-0.03	±	1.78	-0.10	±	6.58	
	2/9/2005	-1.26	±	1.22	-4.68	±	4.52	
	2/16/2005	0.84	±	2.38	3.10	±	8.82	
	2/23/2005	-0.31	±	1.28	-1.15	±	4.73	
	3/2/2005	1.11	±	1.78	4.12	±	6.60	
	3/9/2005	-0.53	±	2.07	-1.95	±	7.65	
	3/16/2005	1.49	±	2.17	5.51	±	8.01	
	3/23/2005	1.29	±	1.47	4.78	±	5.43	
	3/30/2005	4.30	±	2.11	15.92	±	7.81	
FAA TOWER	1/5/2005	-2.60	±	1.77	-9.62	±	6.57	
	1/12/2005	0.26	±	1.27	0.97	±	4.72	
	1/19/2005	-0.99	±	1.54	-3.65	±	5.69	
	1/26/2005	0.96	±	2.04	3.57	±	7.53	
	2/2/2005	-0.03	±	1.73	-0.09	±	6.41	
	2/9/2005	-1.43	±	1.38	-5.28	±	5.10	
	2/16/2005	0.79	±	2.25	2.92	±	8.32	
	2/23/2005	-0.31	±	1.27	-1.14	±	4.71	
	3/2/2005	0.98	±	1.57	3.64	±	5.83	
	3/9/2005	-0.54	±	2.11	-1.99	±	7.82	
	3/16/2005	1.52	±	2.21	5.62	±	8.17	
	3/23/2005	1.33	±	1.51	4.92	±	5.59	
	3/30/2005	4.75	±	2.33	17.57	±	8.61	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)			Result > 3s
HOWE	1/5/2005	-2.91	±	1.99	-10.78	±	7.36	
	1/12/2005	0.26	±	1.27	0.97	±	4.69	
	1/19/2005	-0.92	±	1.44	-3.41	±	5.32	
	1/26/2005	0.83	±	1.75	3.07	±	6.48	
	2/2/2005	-0.02	±	1.55	-0.08	±	5.72	
	2/9/2005	-1.23	±	1.18	-4.54	±	4.38	
	2/16/2005	0.68	±	1.93	2.51	±	7.14	
	2/23/2005	-0.30	±	1.22	-1.10	±	4.53	
	3/2/2005	1.04	±	1.67	3.85	±	6.16	
	3/9/2005	-0.48	±	1.89	-1.78	±	6.98	
	3/16/2005	1.43	±	2.09	5.31	±	7.72	
	3/23/2005	1.12	±	1.27	4.13	±	4.70	
	3/30/2005	4.23	±	2.08	15.66	±	7.68	
HOWE (Q/A-2)	1/5/2005	-2.96	±	2.02	-10.96	±	7.48	
	1/12/2005	4.10	±	19.86	15.17	±	73.48	
	1/19/2005	-1.26	±	1.96	-4.65	±	7.25	
	1/26/2005	1.11	±	2.34	4.09	±	8.65	
	2/2/2005	-0.02	±	1.55	-0.08	±	5.73	
	2/9/2005	-1.54	±	1.48	-5.68	±	5.48	
	2/16/2005	0.78	±	2.21	2.87	±	8.19	
	2/23/2005	-0.38	±	1.56	-1.40	±	5.77	
	3/2/2005	1.05	±	1.67	3.87	±	6.19	
	3/9/2005	-0.62	±	2.42	-2.28	±	8.96	
	3/16/2005	1.57	±	2.29	5.82	±	8.47	
	3/23/2005	1.32	±	1.50	4.90	±	5.56	
	3/30/2005	4.43	±	2.17	16.41	±	8.05	
MONTEVIEW	1/5/2005	-2.96	±	2.02	-10.94	±	7.47	
	1/12/2005	0.26	±	1.24	0.95	±	4.60	
	1/19/2005	-1.10	±	1.71	-4.05	±	6.32	
	1/26/2005	0.99	±	2.08	3.65	±	7.70	
	2/2/2005	-0.03	±	1.77	-0.10	±	6.55	
	2/9/2005	-1.49	±	1.44	-5.51	±	5.32	
	2/16/2005	0.85	±	2.42	3.15	±	8.97	
	2/23/2005	-0.36	±	1.50	-1.35	±	5.55	
	3/2/2005	1.19	±	1.91	4.41	±	7.07	
	3/9/2005	-0.49	±	1.93	-1.81	±	7.13	
	3/16/2005	1.74	±	2.53	6.43	±	9.36	
	3/23/2005	1.24	±	1.41	4.59	±	5.21	
	3/30/2005	4.39	±	2.15	16.25	±	7.97	
MUD LAKE	1/5/2005	-2.83	±	1.93	-10.47	±	7.15	
	1/12/2005	0.25	±	1.21	0.93	±	4.49	
	1/19/2005	-1.08	±	1.68	-4.00	±	6.23	
	1/26/2005	1.11	±	2.34	4.09	±	8.65	
	2/2/2005	-0.03	±	1.76	-0.10	±	6.51	
	2/9/2005	-1.39	±	1.34	-5.14	±	4.97	
	2/16/2005	0.73	±	2.09	2.71	±	7.73	
	2/23/2005	-0.30	±	1.24	-1.12	±	4.61	
	3/2/2005	3.79	±	6.07	14.02	±	22.45	
	3/9/2005	-0.58	±	2.27	-2.13	±	8.39	
	3/16/2005	1.49	±	2.17	5.51	±	8.01	
	3/23/2005	1.04	±	1.18	3.83	±	4.36	
	3/30/2005	4.05	±	1.98	14.97	±	7.34	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} μCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
DISTANT								
BLACKFOOT CMS	1/5/2005	-1.88	±	2.34	-6.96	±	8.64	
	1/12/2005	-1.47	±	2.10	-5.42	±	7.76	
	1/19/2005	-0.11	±	2.22	-0.41	±	8.23	
	1/26/2005	0.44	±	1.86	1.63	±	6.88	
	2/2/2005	4.51	±	2.47	16.68	±	9.12	
	2/9/2005	-0.72	±	2.11	-2.65	±	7.79	
	2/16/2005	-0.53	±	1.49	-1.95	±	5.51	
	2/23/2005	2.11	±	2.11	7.81	±	7.81	
	3/2/2005	0.83	±	1.78	3.07	±	6.58	
	3/9/2005	0.30	±	1.41	1.10	±	5.23	
	3/16/2005	0.74	±	1.42	2.74	±	5.27	
	3/23/2005	0.70	±	1.92	2.59	±	7.10	
	3/30/2005	0.15	±	1.27	0.55	±	4.70	
CRATERS	1/5/2005	-2.15	±	2.67	-7.94	±	9.87	
	1/12/2005	-1.44	±	2.06	-5.34	±	7.64	
	1/19/2005	-0.17	±	3.44	-0.63	±	12.74	
	1/26/2005	0.59	±	2.48	2.18	±	9.19	
	2/2/2005	4.08	±	2.23	15.10	±	8.26	
	2/9/2005	-0.85	±	2.49	-3.13	±	9.22	
	2/16/2005	-0.67	±	1.90	-2.49	±	7.04	
	2/23/2005	2.76	±	2.76	10.23	±	10.23	
	3/2/2005	1.05	±	2.25	3.89	±	8.33	
	3/9/2005	0.39	±	1.83	1.43	±	6.78	
	3/16/2005	0.87	±	1.66	3.20	±	6.16	
	3/23/2005	0.94	±	2.58	3.48	±	9.53	
	3/30/2005	0.20	±	1.70	0.74	±	6.27	
DUBOIS	1/5/2005	-2.98	±	2.04	-11.04	±	7.54	
	1/12/2005	0.25	±	1.23	0.94	±	4.55	
	1/19/2005	-2.99	±	4.66	-11.05	±	17.23	
	1/26/2005	0.92	±	1.93	3.39	±	7.15	
	2/2/2005	-0.03	±	1.76	-0.10	±	6.52	
	2/9/2005	-1.26	±	1.22	-4.66	±	4.50	
	2/16/2005	0.87	±	2.48	3.22	±	9.17	
	2/23/2005	-0.31	±	1.28	-1.15	±	4.72	
	3/2/2005	1.24	±	1.99	4.60	±	7.37	
	3/9/2005	-0.49	±	1.92	-1.80	±	7.09	
	3/16/2005	1.74	±	2.53	6.45	±	9.38	
	3/23/2005	1.18	±	1.34	4.38	±	4.98	
	3/30/2005	4.93	±	2.42	18.23	±	8.94	
IDAHO FALLS	1/5/2005	-3.88	±	2.65	-14.35	±	9.80	
	1/12/2005	0.36	±	1.73	1.32	±	6.41	
	1/19/2005	-1.22	±	1.91	-4.52	±	7.05	
	1/26/2005	1.31	±	2.76	4.84	±	10.21	
	2/2/2005	-0.03	±	2.08	-0.11	±	7.68	
	2/9/2005	-1.52	±	1.46	-5.61	±	5.42	
	2/16/2005	1.04	±	2.97	3.85	±	10.98	
	2/23/2005	-0.38	±	1.57	-1.41	±	5.80	
	3/2/2005	1.19	±	1.90	4.40	±	7.05	
	3/9/2005	-0.64	±	2.53	-2.39	±	9.37	
	3/16/2005	2.16	±	3.14	7.99	±	11.62	
	3/23/2005	1.40	±	1.59	5.17	±	5.87	
	3/30/2005	5.47	±	2.68	20.25	±	9.93	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
JACKSON	1/5/2005	-2.15	±	2.67	-7.96	±	9.89	
	1/12/2005	-1.44	±	2.06	-5.33	±	7.63	
	1/19/2005	-1.94	±	2.20	-7.19	±	8.14	
	1/26/2005	0.50	±	2.10	1.84	±	7.79	
	2/2/2005	4.91	±	2.69	18.16	±	9.94	
	2/9/2005	-0.77	±	2.27	-2.85	±	8.38	
	2/16/2005	-0.86	±	2.43	-3.18	±	8.99	
	2/23/2005	2.43	±	2.43	8.99	±	8.99	
	3/2/2005	0.73	±	1.57	2.72	±	5.82	
	3/9/2005	0.30	±	1.42	1.11	±	5.27	
	3/16/2005	0.85	±	1.64	3.15	±	6.06	
	3/23/2005	0.72	±	1.98	2.68	±	7.33	
	3/30/2005	0.16	±	1.35	0.59	±	5.01	
REXBURG CMS	1/5/2005	-2.87	±	1.96	-10.62	±	7.25	
	1/12/2005	0.31	±	1.51	1.15	±	5.59	
	1/19/2005	-1.21	±	1.89	-4.49	±	7.00	
	1/26/2005	1.36	±	2.87	5.02	±	10.61	
	2/2/2005	-0.03	±	1.81	-0.10	±	6.70	
	2/9/2005	-1.58	±	1.53	-5.85	±	5.65	
	2/16/2005	0.83	±	2.38	3.08	±	8.79	
	2/23/2005	-0.40	±	1.66	-1.49	±	6.13	
	3/2/2005	1.14	±	1.82	4.21	±	6.74	
	3/9/2005	-0.56	±	2.19	-2.06	±	8.09	
	3/16/2005	1.57	±	2.29	5.81	±	8.46	
	3/23/2005	1.26	±	1.43	4.66	±	5.29	
	3/30/2005	4.11	±	2.02	15.21	±	7.46	
INEEL								
EFS	1/5/2005	-2.10	±	2.61	-7.76	±	9.64	
	1/12/2005	-1.24	±	1.78	-4.59	±	6.57	
	1/19/2005	-0.12	±	2.37	-0.43	±	8.76	
	1/26/2005	0.46	±	1.92	1.68	±	7.11	
	2/2/2005	4.70	±	2.57	17.38	±	9.51	
	2/9/2005	-0.76	±	2.23	-2.80	±	8.25	
	2/16/2005	-0.67	±	1.90	-2.49	±	7.04	
	2/23/2005	2.46	±	2.46	9.10	±	9.10	
	3/2/2005	1.03	±	2.21	3.82	±	8.19	
	3/9/2005	0.33	±	1.57	1.23	±	5.82	
	3/16/2005	0.91	±	1.75	3.37	±	6.47	
	3/23/2005	0.86	±	2.36	3.18	±	8.72	
	3/30/2005	0.19	±	1.59	0.69	±	5.87	
MAIN GATE	1/5/2005	-1.84	±	2.29	-6.81	±	8.46	
	1/12/2005	-1.37	±	1.96	-5.08	±	7.27	
	1/19/2005	-0.13	±	2.54	-0.47	±	9.40	
	1/26/2005	0.54	±	2.27	1.99	±	8.39	
	2/2/2005	3.90	±	2.13	14.42	±	7.89	
	2/9/2005	-0.69	±	2.04	-2.57	±	7.56	
	2/16/2005	-0.71	±	2.01	-2.62	±	7.42	
	2/23/2005	2.60	±	2.60	9.60	±	9.60	
	3/2/2005	1.07	±	2.29	3.96	±	8.47	
	3/9/2005	0.41	±	1.93	1.50	±	7.13	
	3/16/2005	0.98	±	1.88	3.61	±	6.95	
	3/23/2005	0.90	±	2.46	3.33	±	9.11	
	3/30/2005	0.17	±	1.47	0.64	±	5.42	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)			Result > 3s
MAIN GATE (Q/A-1)	1/5/2005	-2.20	±	2.73	-8.13	±	10.11	
	1/12/2005	-1.69	±	2.41	-6.24	±	8.92	
	1/19/2005	-0.13	±	2.61	-0.48	±	9.64	
	1/26/2005	0.51	±	2.13	1.87	±	7.89	
	2/2/2005	5.09	±	2.78	18.83	±	10.30	
	2/9/2005	-1.01	±	2.98	-3.75	±	11.03	
	2/16/2005	-0.82	±	2.33	-3.04	±	8.60	
	2/23/2005	2.66	±	2.66	9.83	±	9.83	
	3/2/2005	1.13	±	2.41	4.17	±	8.93	
	3/9/2005	0.40	±	1.92	1.50	±	7.11	
	3/16/2005	1.03	±	1.98	3.82	±	7.34	
	3/23/2005	0.84	±	2.30	3.11	±	8.52	
	3/30/2005	0.19	±	1.57	0.69	±	5.81	
VAN BUREN GATE	1/5/2005	-1.92	±	2.39	-7.10	±	8.83	
	1/12/2005	-1.54	±	2.21	-5.71	±	8.17	
	1/19/2005	-0.13	±	2.55	-0.47	±	9.42	
	1/26/2005	0.48	±	2.04	1.79	±	7.55	
	2/2/2005	5.18	±	2.83	19.16	±	10.48	
	2/9/2005	-0.83	±	2.45	-3.08	±	9.07	
	2/16/2005	-0.68	±	1.93	-2.53	±	7.15	
	2/23/2005	2.44	±	2.44	9.02	±	9.02	
	3/2/2005	0.82	±	1.76	3.05	±	6.53	
	3/9/2005	0.38	±	1.80	1.40	±	6.66	
	3/16/2005	0.88	±	1.70	3.27	±	6.29	
	3/23/2005	0.78	±	2.13	2.88	±	7.88	
	3/30/2005	0.21	±	1.75	0.76	±	6.48	

Red text denotes invalid sample due to insuffient volume collected (less than 8,000 ft^3 [226.5 m^3])

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($x 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	3/30/2005	CESIUM-137	110.00	±	115.00	407.00	±	425.50	
		STRONTIUM-90	-56.30	±	44.00	-208.31	±	162.80	
ATOMIC CITY	3/30/2005	CESIUM-137	57.20	±	79.30	211.64	±	293.41	
		STRONTIUM-90	-44.40	±	40.00	-164.28	±	148.00	
BLUE DOME	3/30/2005	CESIUM-137	-379.00	±	227.00	-1402.30	±	839.90	
		STRONTIUM-90	-51.20	±	41.00	-189.44	±	151.70	
FAA TOWER	3/30/2005	AMERICIUM-241	0.00	±	0.33	0.00	±	1.22	
		CESIUM-137	-155.00	±	232.00	-573.50	±	858.40	
		PLUTONIUM-238	0.00	±	0.72	0.00	±	2.66	
		PLUTONIUM-239/40	3.52	±	1.50	13.02	±	5.55	
HOWE	3/30/2005	AMERICIUM-241	0.26	±	0.58	0.97	±	2.15	
		CESIUM-137	15.70	±	110.00	58.09	±	407.00	
		PLUTONIUM-238	0.36	±	0.36	1.31	±	1.33	
		PLUTONIUM-239/40	1.42	±	0.72	5.25	±	2.66	
HOWE (Q/A-2)	3/30/2005	AMERICIUM-241	0.00	±	0.42	0.00	±	1.55	
		CESIUM-137	40.40	±	121.00	149.48	±	447.70	
		PLUTONIUM-238	0.00	±	0.64	0.00	±	2.37	
		PLUTONIUM-239/40	0.91	±	0.91	3.35	±	3.37	
MONTEVIEW	3/30/2005	AMERICIUM-241	-0.28	±	0.64	-1.05	±	2.37	
		CESIUM-137	185.00	±	121.00	684.50	±	447.70	
		PLUTONIUM-238	-1.78	±	1.00	-6.59	±	3.70	
		PLUTONIUM-239/40	5.34	±	1.80	19.76	±	6.66	
MUD LAKE	3/30/2005	CESIUM-137	148.00	±	91.70	547.60	±	339.29	
		STRONTIUM-90	-80.70	±	43.00	-298.59	±	159.10	

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($x 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-13}$ Bq/mL)			Result > 3s
DISTANT									
BLACKFOOT	3/30/2005	CESIUM-137	-449.00	±	228.00	-1661.30	±	843.60	
		STRONTIUM-90	-59.20	±	41.00	-219.04	±	151.70	
.	3/30/2005	AMERICIUM-241	-0.66	±	0.66	-2.45	±	2.44	
		CESIUM-137	-155.00	±	136.00	-573.50	±	503.20	
		PLUTONIUM-238	0.00	±	0.49	0.00	±	1.81	
		PLUTONIUM-239/40	0.70	±	0.70	2.57	±	2.59	
DUBOIS	3/30/2005	CESIUM-137	-504.00	±	242.00	-1864.80	±	895.40	
		STRONTIUM-90	-86.50	±	44.00	-320.05	±	162.80	
IDAHO FALLS	3/30/2005	AMERICIUM-241	0.86	±	0.86	3.17	±	3.18	
		CESIUM-137	1.57	±	98.80	5.81	±	365.56	
		PLUTONIUM-238	0.00	±	0.47	0.00	±	1.74	
		PLUTONIUM-239/40	2.98	±	1.00	11.03	±	3.70	
JACKSON	3/30/2005	CESIUM-137	-218.00	±	117.00	-806.60	±	432.90	
		STRONTIUM-90	-58.70	±	45.00	-217.19	±	166.50	
REXBURG CMS	3/30/2005	AMERICIUM-241	0.28	±	0.28	1.04	±	1.04	
		CESIUM-137	107.00	±	100.00	395.90	±	370.00	
		PLUTONIUM-238	0.33	±	0.58	1.23	±	2.15	
		PLUTONIUM-239/40	0.33	±	0.33	1.23	±	1.22	
INL									
EXPERIMENTAL FIELD STATION	3/30/2005	AMERICIUM-241	0.00	±	0.46	0.00	±	1.70	
		CESIUM-137	-273.00	±	254.00	-1010.10	±	939.80	
		PLUTONIUM-238	0.31	±	0.31	1.14	±	1.15	
		PLUTONIUM-239/40	0.92	±	0.54	3.42	±	2.00	
MAIN GATE	3/30/2005	CESIUM-137	-4.12	±	117.00	-15.24	±	432.90	
		STRONTIUM-90	-85.20	±	47.00	-315.24	±	173.90	
MAIN GATE (Q/A-1)	3/30/2005	CESIUM-137	37.10	±	145.00	137.27	±	536.50	
		STRONTIUM-90	-83.90	±	51.00	-310.43	±	188.70	
VAN BUREN GATE	3/30/2005	AMERICIUM-241	-0.32	±	0.56	-1.20	±	2.07	
		CESIUM-137	-267.00	±	131.00	-987.90	±	484.70	
		PLUTONIUM-238	0.00	±	0.96	0.00	±	3.55	
		PLUTONIUM-239/40	0.96	±	0.68	3.54	±	2.52	

TABLE C-4: Tritium Concentrations in Atmospheric Moisture.

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty (x 10^{-13} µCi/mL_{air})			Result ± 1s Uncertainty (x 10^{-9} Bq/mL_{air})			Collection Medium	Result > 3s
BOUNDARY										
ATOMIC CITY	11/23/2004	01/04/2005	5.39	±	0.94	19.95	±	3.47	Molecular Sieve	Y
ATOMIC CITY	11/01/2004	01/04/2005	1.03	±	1.89	3.82	±	6.99	Silica Gel	
ATOMIC CITY	01/04/2005	02/23/2005	1.68	±	0.80	6.21	±	2.95	Molecular Sieve	
ATOMIC CITY	01/04/2005	02/23/2005	6.44	±	0.95	23.82	±	3.51	Silica Gel	Y
ATOMIC CITY	02/23/2005	03/31/2005	0.61	±	0.56	2.25	±	2.09	Molecular Sieve	
DISTANT										
BLACKFOOT CMS	11/30/2004	01/14/2005	0.20	±	0.16	0.73	±	0.59	Molecular Sieve	
BLACKFOOT CMS	12/14/2004	01/14/2005	0.17	±	0.10	0.62	±	0.37	Silica Gel	
BLACKFOOT CMS	01/14/2005	02/15/2005	0.17	±	0.11	0.64	±	0.41	Molecular Sieve	
BLACKFOOT CMS	01/14/2005	02/15/2005	0.98	±	0.17	3.61	±	0.63	Silica Gel	Y
BLACKFOOT CMS	02/15/2005	03/15/2005	0.24	±	0.11	0.89	±	0.40	Molecular Sieve	
IDAHO FALLS	12/16/2004	01/27/2005	0.27	±	0.12	1.00	±	0.44	Silica Gel	
IDAHO FALLS	12/23/2005	01/27/2005	0.14	±	0.10	0.50	±	0.39	Molecular Sieve	
IDAHO FALLS	01/27/2005	02/24/2005	0.13	±	0.08	0.49	±	0.30	Molecular Sieve	
IDAHO FALLS	01/27/2005	02/28/2005	0.21	±	0.08	0.76	±	0.31	Silica Gel	
IDAHO FALLS	02/24/2005	03/24/2005	0.11	±	0.08	0.40	±	0.30	Molecular Sieve	
REXBURG CMS	12/20/2004	01/17/2005	0.72	±	0.58	2.66	±	2.15	Silica Gel	
REXBURG CMS	01/17/2005	02/15/2005	1.14	±	0.43	4.22	±	1.58	Molecular Sieve	
REXBURG CMS	01/17/2005	02/15/2005	4.08	±	0.53	15.10	±	1.98	Silica Gel	Y

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

Location	Sampling Date	Concentration (μg/m³)	Comments
ATOMIC CITY	1/3/2005	Not used	Two week sample
	1/9/2005	0.14	
	1/15/2005	3.10	
	1/21/2005	4.53	
	1/27/2005	7.18	
	2/2/2005	Invalid	Motor failure-only ran 2 hours
	2/8/2005	10.12	
	2/14/2005	0.96	
	2/20/2005	0.82	
	2/26/2005	3.04	
	3/4/2005	3.70	
	3/10/2005	4.00	
	3/16/2005	8.42	
	3/22/2005	3.10	
	3/28/2005	0.14	
BLACKFOOT	1/3/2005	10.90	
	1/9/2005	4.30	
	1/15/2005	21.60	
	1/21/2005	23.75	
	1/27/2005	25.39	
	2/2/2005	14.24	
	2/8/2005	12.12	
	2/14/2005	0.66	
	2/20/2005	0.88	
	2/26/2005	23.48	
	3/4/2005	10.75	
	3/10/2005	17.69	
	3/16/2005	18.18	
	3/22/2005	0.27	
	3/28/2005	0.62	
REXBURG	1/3/2005	9.60	
	1/9/2005	2.66	
	1/15/2005	30.49	
	1/21/2005	24.79	
	1/27/2005	23.70	
	2/2/2005	29.33	
	2/8/2005	15.89	
	2/14/2005	1.56	
	2/20/2005	2.75	
	2/26/2005	33.11	
	3/4/2005	16.95	
	3/10/2005	25.56	
	3/16/2005	13.69	
	3/22/2005	1.86	
	3/28/2005	0.00	

TABLE C-6: Tritium Concentrations in Precipitation.

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
Idaho Falls	12/02/2004	2/3/2005	-11.70	±	24.30	-0.43	±	0.90	
	2/3/2005	3/7/2005	-14.90	±	24.30	-0.55	±	0.90	
CFA	2/1/2005	3/1/2005	-29.50	±	24.30	-1.09	±	0.90	
EFS	3/16/2005	3/23/2005	-21.60	±	23.50	-0.80	±	0.87	
	3/23/2005	3/30/2005	9.68	±	24.30	0.36	±	0.90	

Table C-7: Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi†/L)	Iodine-131 Result ± 1s Uncertainty (Bq‡/L)	Iodine-131 Result > 3s	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Cesium-137 Result > 3s
BLACKFOOT							
	1/4/2005	-0.79 ± 1.11	-0.029 ± 0.041		0.71 ± 0.91	0.026 ± 0.034	
	2/1/2005	-0.94 ± 0.92	-0.035 ± 0.034		0.35 ± 0.81	0.013 ± 0.030	
	3/1/2005	3.90 ± 2.11	0.144 ± 0.078		-0.17 ± 2.67	-0.006 ± 0.099	
CAREY							
	1/4/2005	-2.38 ± 2.01	-0.088 ± 0.074		-2.17 ± 1.22	-0.080 ± 0.045	
	2/2/2005	-3.73 ± 1.18	-0.138 ± 0.044		-0.57 ± 0.90	-0.021 ± 0.033	
	3/1/2005	-1.28 ± 1.77	-0.047 ± 0.066		1.66 ± 1.02	0.061 ± 0.038	
DIETRICH							
	1/4/2005	0.08 ± 0.92	0.003 ± 0.034		1.97 ± 0.86	0.073 ± 0.032	
	2/1/2005	1.33 ± 1.41	0.049 ± 0.052		0.23 ± 1.16	0.009 ± 0.043	
	3/1/2005	0.16 ± 0.91	0.006 ± 0.034		-0.17 ± 0.81	-0.006 ± 0.030	
HOWE							
	1/4/2005	-1.56 ± 2.50	-0.058 ± 0.093		5.38 ± 2.68	0.199 ± 0.099	
	2/1/2005	0.03 ± 1.10	0.001 ± 0.041		-0.48 ± 0.89	-0.018 ± 0.033	
	3/1/2005	0.53 ± 1.19	0.020 ± 0.044		-1.05 ± 0.91	-0.039 ± 0.034	
IDAHO FALLS							
	1/4/2005	2.02 ± 2.66	0.075 ± 0.099		4.75 ± 2.72	0.176 ± 0.101	
	1/12/2005	-1.52 ± 1.04	-0.056 ± 0.039		-1.31 ± 0.92	-0.049 ± 0.034	
	1/19/2005	-0.58 ± 0.89	-0.022 ± 0.033		0.49 ± 0.80	0.018 ± 0.030	
	1/26/2005	2.62 ± 1.05	0.097 ± 0.039		-0.39 ± 0.89	-0.014 ± 0.033	
	2/1/2005	-0.52 ± 1.71	-0.019 ± 0.063		0.23 ± 1.04	0.009 ± 0.039	
	2/9/2005	0.85 ± 1.00	0.031 ± 0.037		-0.05 ± 0.92	-0.002 ± 0.034	
	2/16/2005	0.91 ± 1.97	0.034 ± 0.073		4.00 ± 2.67	0.148 ± 0.099	
	2/23/2005	-0.14 ± 1.02	-0.005 ± 0.038		0.42 ± 0.91	0.015 ± 0.034	
	3/2/2005	0.56 ± 2.31	0.021 ± 0.086		2.62 ± 2.70	0.097 ± 0.100	
	3/9/2005	-0.75 ± 1.00	-0.028 ± 0.037		-0.49 ± 0.89	-0.018 ± 0.033	
	3/16/2005	0.95 ± 1.04	0.035 ± 0.039		0.29 ± 0.91	0.011 ± 0.034	
	3/23/2005	0.06 ± 0.97	0.002 ± 0.036		1.19 ± 0.90	0.044 ± 0.033	
MORELAND							
	1/4/2005	-0.62 ± 1.00	-0.023 ± 0.037		-0.69 ± 0.86	-0.025 ± 0.032	
	2/1/2005	-2.65 ± 1.98	-0.098 ± 0.073		2.40 ± 2.70	0.089 ± 0.100	
	3/1/2005	0.14 ± 0.84	0.005 ± 0.031		-0.93 ± 0.87	-0.034 ± 0.032	

Table C-7: Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

		Iodine-131							Cesium-137						
Location	Sampling Date	Result ± 1s Uncertainty (pCi[†]/L)			Result ± 1s Uncertainty (Bq[‡]/L)			Result > 3s	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
ROBERTS															
	1/4/2005	-2.30	±	1.20	-0.085	±	0.044		-0.46	±	0.89	-0.017	±	0.033	
	2/1/2005	-2.80	±	1.69	-0.104	±	0.063		2.73	±	1.06	0.101	±	0.039	
	3/1/2005	0.74	±	0.98	0.027	±	0.036		1.42	±	0.83	0.053	±	0.031	
RUPERT															
	1/4/2005	0.89	±	1.08	0.033	±	0.040		0.89	±	0.82	0.033	±	0.030	
	2/1/2005	-0.10	±	1.02	-0.004	±	0.038		-1.91	±	0.94	-0.071	±	0.035	
	3/1/2005	-2.56	±	1.64	-0.095	±	0.061		0.65	±	1.03	0.024	±	0.038	
TERRETON															
	1/4/2005	-1.01	±	1.59	-0.037	±	0.059		1.70	±	1.07	0.063	±	0.040	
	2/1/2005	-1.32	±	2.27	-0.049	±	0.084		1.17	±	2.69	0.043	±	0.100	
	3/1/2005	0.89	±	2.29	0.033	±	0.085		5.29	±	2.74	0.196	±	0.101	

Table C-8: Cesium-137 and Iodine-131 in Game Animals.

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg wet weight)			Result >3s
PRONGHORN	2/1/2005	Muscle	^{131}I	-7.41	±	4.49	-27.42	±	16.61	
			^{137}Cs	1.27	±	1.29	4.70	±	4.77	
		Thyroid	^{131}I	-140.00	±	100.00	-518.00	±	370.00	
			^{137}Cs	-43.30	±	106.00	-160.21	±	392.20	

APPENDIX D

STATISTICAL ANALYSIS RESULT

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

Parameter	p[b]
Gross Alpha	
Quarter	0.19
January	0.04
February	0.94
March	0.27
Gross Beta	
Quarter	0.11
January	0.40
February	0.06
March	0.77

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

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

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

Mann-Whitney U Test[a]		
Parameter	**Week**	**p[b]**
Gross Alpha		
	January 5th	0.76
	January 12th	0.32
	January 19th	0.10
	January 26th	0.83
	February 2nd	0.89
	February 9th	0.77
	February 16th	0.87
	February 23d	0.87
	March 2nd	0.87
	March 9th	0.17
	March 16th	0.25
	March 23d	0.57
	March 30th	0.67
Gross Beta		
	January 5th	0.35
	January 12th	0.39
	January 19th	0.37
	January 26th	0.89
	February 2nd	0.35
	February 9th	0.39
	February 16th	0.94
	February 23d	0.12
	March 2nd	0.75
	March 9th	0.20
	March 16th	0.17
	March 23d	0.32
	March 30th	0.57

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

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