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

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EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the fourth quarter of 2004 could be directly linked with INEEL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States or were consistent with levels measured historically at the INEEL. All detected radionuclide concentrations were well below guidelines set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public (See Table E-1.).

This report for the fourth quarter, 2004, contains results from the Environmental Surveillance, Education and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Engineering and Environmental Laboratory's (INEEL) offsite environment, October 1 through December 31, 2004. All sample types (media) and the sampling schedule followed during 2004 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including air filters and charcoal cartridges, atmospheric moisture, and 10-micron particulate matter (PM_{10}) (Section 3);
- Water sampling, specifically collection of precipitation (Section 4);
- Agricultural product sampling, including milk, lettuce, wheat, large game animals, and marmots (Section 5);
- Environmental radiation (Section 6); and
- Quality assurance program information (Section 7).

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 fourth quarter of 2004. Because of this, these data were statistically analyzed using nonparametric methods, including the use of the median to represent central tendency. At no time during the fourth quarter were gross alpha or gross beta concentrations from Boundary locations statistically higher than corresponding data sets for Distant locations, as one would expect if the INEEL were a significant source of radionuclide contamination. There were no statistical differences between gross alpha or gross beta results when grouped by location on a quarterly basis. Statistical analysis by month also showed no statistical difference between locations for gross alpha or gross beta.

Weekly comparisons of gross beta concentrations at Distant and Boundary locations showed no statistical differences during the fourth quarter of 2004. Gross alpha results were statistically greater at Distant locations than at Boundary locations during the week of October 27, 2004. Analysis of stations within each group showed no differences between locations suggesting natural variations.

During the fourth 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). Two samples collected from air monitoring stations located at the Blackfoot and the Mud Lake QA (Q/A-2) samplers had concentrations of ^{241}Am greater than their related 3s values. Duplicate measurements made at these locations did not have detectable concentrations of ^{241}Am, indicating natural variation. Strontium-90 was measured above 3s in the sample collected at Monteview. All values are within the range of those measured in the past and are far less than their respective DOE Derived Concentration Guide (DCG) values.

Fourteen atmospheric moisture samples were obtained during the fourth quarter of 2004 and analyzed for tritium. Six samples each were collected from Atomic City and Idaho Falls and one each from Blackfoot and 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 seven samples- three from the Central Facilities Area and from the EFS. Tritium was detected above the 3s values in all samples but one. The maximum concentration was below any comparison standards.

Fourteen drinking water samples were collected from southeast Idaho. Tritium was detected in half of these samples at levels below regulatory throughout southeast Idaho. One sample, collected from Hagerman, had a detectable concentration of tritium that was well within regulatory limits.

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

Milk samples were collected as part of the biannual program in which samples are analyzed for ^{90}Sr and tritium. Two of the sample had detectable concentrations of ^{90}Sr. Tritium was detected in four samples. Results were below the appropriate DCGs for water and within EPA measurements made in Region 10.

Eleven potato samples and were collected from farms around the INEEL and from Colorado. Strontium-90 was detected two samples, at levels consistent with historical measurements.

Five large game animals were sampled during the fourth quarter of 2004. Two pronghorn antelope and two elk were killed as a result of vehicular collisions. Samples were also collected from a whitetail deer killed by a hunter in Montana. Every effort was made to collect thyroid, liver, and muscle tissue from each animal. However, certain tissues could not be collected from all animals due to their condition at the time of collection. Cesium-137 and iodine-131 was not measured above the 3s value in any animal tissue.

Six waterfowl were collected from the TRA sewage treatment lagoon and from Market Lake. Cesium-137 was detected in two TRA coots. The maximum dose to a human from eating one of these coots was estimated to be 0.002 mrem.

No marmots were collected for radionuclide analysis during the fourth quarter of 2004.

Thermoluminscent devices (TLD) were used to measure direct radiation around the INEEL. Results were consistent with those measured historically.

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

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Independent statistical comparisons of gross alpha and gross beta data indicate no differences between INEEL, Boundary, and Distant locations when data were compared on quarterly and monthly bases. No statistical differences in gross beta concentrations measured on a weekly basis. However, statistical differences were observed in gross alpha results during the week of October 27. However, this difference can be attributed to natural variation in the data. All gross alpha and gross beta results were within historical levels and were far less than applicable DOE DCGs.
		Gamma emitting radionuclides (including ^{137}Cs), select actinides (^{238}Pu, $^{239,240}Pu$, & ^{241}Am) and ^{90}Sr	One composite sample, collected at Howe, had a $^{239,240}Pu$ measurement that was greater than its 3s uncertainty value. A measurement made at Blackfoot had a ^{90}Sr measurements which exceeded its 3s value. The remaining radionuclides of interest were not 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 12 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	All but one of seven samples 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.

Media	Sample Type	Analysis	Results
Drinking Water	Liquid	Gross alpha, gross beta and tritium	Gross alpha was not detected in any of the 14 samples collected. Nine samples had detectable concentrations of gross beta. Tritium was detected in half of the samples at levels below the DCG and EPA ERAMS measurements made in Region 10.
Surface Water	Liquid	Gross alpha, gross beta and tritium	Gross alpha was not detected in any of the 6 samples collected. Four samples had detectable concentrations of gross beta. Tritium was detected in one of the samples at levels below the DCG and EPA ERAMS measurements made in 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. Two of four milk samples collected for biannual measurements, had detectable concentrations of ^{90}Sr Tritium was detected in four of the five of biannual milk samples. All results were within historical measurements and within results reported by the EPA ERAMS program for Region 10.
Potatoes	Solid	Gamma emitting radionuclides (including ^{137}Cs), and ^{90}Sr	Eleven potato samples were collected. Strontium-90 was detected in two samples. The measurement was within historical concentrations. Cesium-137 was not detected in any sample.
Large Game Animals	Solid	Gamma emitting radionuclides (including ^{137}Cs)	Four game animals killed on INEEL roads and one animal collected from Montana were analyzed. No radionuclides were detected above their 3s values.

Media	Sample Type	Analysis	Results
Waterfowl	Tissue	Iodine-131, gamma emitting radionuclides (including ^{137}Cs), ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, ^{241}Am	Six waterfowl samples were collected from the TRA TRA sewage treatment lagoon and from the control location at Market Lake. Cesium-137 was detected, within historical values, in the edible tissue of two Coots sampled from TRA. The estimated dose for a person eating the Coot is 0.002 mrem.
Marmots	Tissue	Gamma emitting radionuclides (including ^{137}Cs), select actinides (^{238}Pu, ^{239,240}Pu, & ^{241}Am) and ^{90}Sr	No marmots were collected during 2004.
Direct radiation	TLD	Radiation analysis	Results were within historical and background measurements.

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

LIST OF UNITS

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

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Engineering and Environmental Laboratory (INEEL) are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act, and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2004). During calendar year 2004, environmental monitoring within the INEEL boundaries was primarily the responsibility of the INEEL Management and Operating (M&O) contractor, while monitoring outside the INEEL boundaries was conducted under the Environmental Surveillance, Education and Research (ESER) Program. The ESER Program is led by the S.M. Stoller Corporation in cooperation with its team members, including: the University of Idaho (UI) and Washington State University (WSU) for research, and MWH Global, Inc. and North Wind Environmental, Inc. for technical support. This report contains monitoring results from the ESER Program for samples collected during the fourth quarter of 2004 (July 1 – September 30, 2004).

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

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

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

Environmental samples collected include:

- air at 16 locations on and around the INEEL;
- moisture in air at four locations around the INEEL;
- surface water at five locations on the Snake River;
- drinking water at 14 locations around the INEEL;
- agricultural products, including milk at 10 dairies around the INEEL, potatoes from at least five local producers, wheat from approximately 10 local producers, lettuce from approximately nine home-owned gardens around the INEEL and one maintained by ESER at the EFS, and sheep from two operators which graze their sheep on the INEEL;
- soil from 12 locations around the INEEL biennially;
- environmental dosimeters from 15 locations semi-annually; and
- various numbers of wildlife including big game (pronghorn, mule deer, and elk), waterfowl, doves, and marmots sampled on and near the INEEL. Fish are also sampled as available (i.e., when there is flow in the Big Lost River).

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

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

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

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

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

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

Results are presented in this report with an analytical uncertainty term, s, where "s" is an estimated sample standard deviation (σ), assuming a Guassian or normal distribution. All results are reported in this document, even those that do not necessarily represent detections. The term "detected", as used for the discussion of results in this report, does not imply any degree of risk to the public or environment, but rather indicates that the radionuclide was measured at a concentration sufficient for the analytical instrument to record a value that is statistically different from background. The ESER has adopted guidelines developed by the

United States Geological Survey (Bartholmay, et al. 2003), based on an extension of a method proposed by Currie (1984), to interpret analytical results and make decisions concerning detection. Most of the following discussion is taken from the USGS report.

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

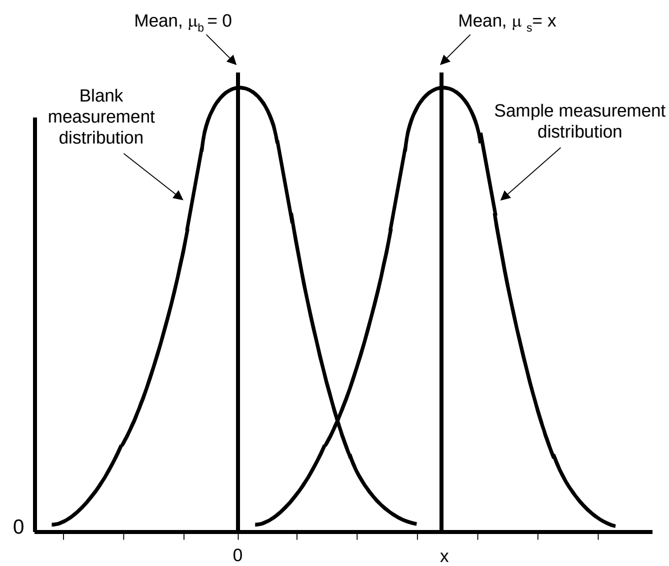

Figure 1. Example overlap of blank and sample measurement distributions.

In the laboratory, instrument signals must exceed a critical level of 1.6s before the qualitative decision can be made as to whether the radionuclide was detected in a sample. At 1.6s there is about a 95-percent probability that the correct conclusion—not detected—will be made. Given a large number of samples, approximately 5 percent of the samples with measured concentrations greater than or equal to 1.6s, which were concluded as being detected, might not contain the radionuclide. These are referred to as false positives. For purposes of simplicity and consistency with past reporting, the ESER has rounded the 1.6s critical level 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 usually detected at > 3s at a specific location, a sample result between 2s and 3s might be considered detected.

If a result is less than or equal to 2s there is little confidence that the radionuclide is present in the sample. Analytical results in this report are presented as the result value ± one standard deviation (1s) for reporting consistency with the annual report. To obtain the 2s or 3s values simply multiply the uncertainty term by 2 or 3. A more detailed discussion about confidence in detections may be found in Confidence in Detections under Helpful Information.

For more information concerning the ESER Program, contact the S.M. Stoller Corporation at (208) 525-9358, or visit the Program’s web page (http://www.stoller-eser.com).

2. THE INEEL

The INEEL is a nuclear energy research and environmental management facility. It is owned and administered by the U.S. Department of Energy, Idaho Operations Office (DOE-ID) and occupies about 890 mi^2 (2,300 km^2) of the upper Snake River Plain in Southeastern Idaho. The history of the INEEL began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested on the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the war, as the nation worked to develop nuclear power, the Atomic Energy Commission (AEC), predecessor to the DOE, became interested in the Naval Proving Ground and made plans for a facility to build, test, and perfect nuclear power reactors.

The Naval Proving Ground became the National Reactor Testing Station (NRTS) in 1949, under the AEC. By the end of 1951, a reactor at the NRTS became the first to produce useful amounts of electricity. Over time the site has operated 52 various types of reactors, associated research centers, and waste handling areas. The NRTS was renamed the Idaho National Engineering Laboratory (INEL) in 1974 and the INEEL in January 1997. With renewed interest in nuclear power the DOE announced in 2003 that Argonne National Laboratory and the INEEL would be the lead laboratories for development of the next generation of power reactors. Other activities at the INEEL include environmental cleanup, subsurface research, and technology development.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INEEL is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INEEL. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INEEL and analyzed for tritium. Concentrations of airborne particulates less than 10 micrometers in diameter (PM_{10}) were measured for comparison with EPA standards at three locations. Air sampling activities and results for the fourth quarter, 2004 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the fourth quarter of 2004 (Figure 2). Three of these samplers are located on the INEEL, nine are situated off the INEEL near the boundary, and six have been placed at locations distant to the INEEL. Samplers are divided into INEEL, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INEEL. Each replicate sampler is relocated every year to a new location. One replicate sampler was placed at the Blackfoot Community Monitoring Station (CMS) (Distant location) and one at Mud Lake (Boundary location) during 2004. 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.

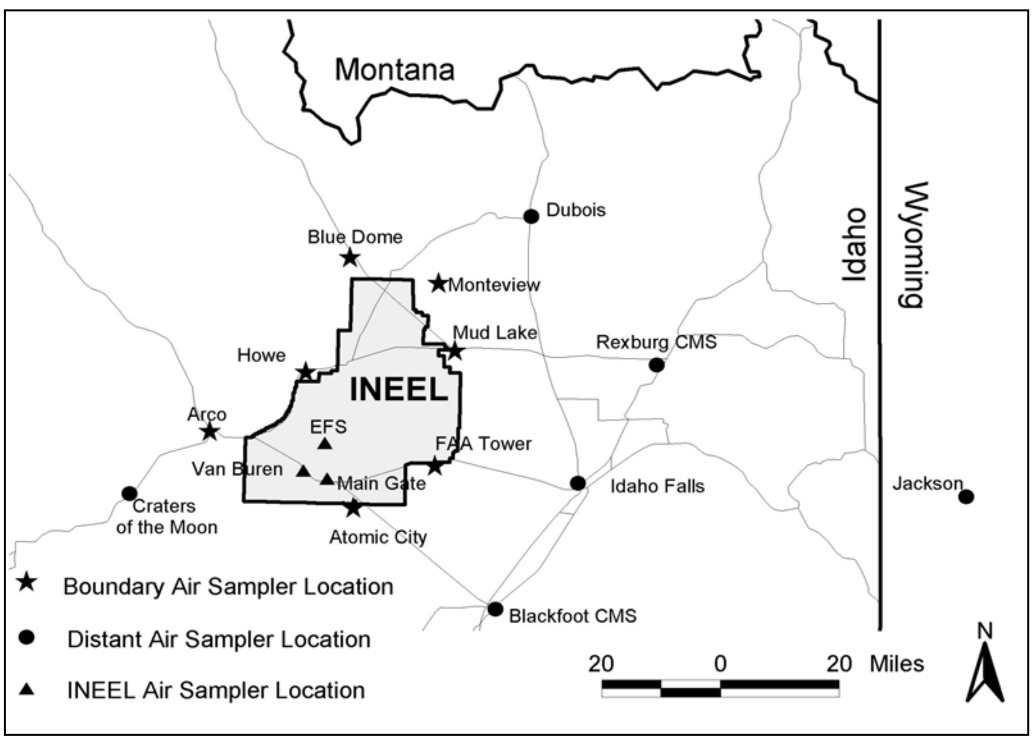

Figure 2. Low-volume air sampler locations.

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 INEEL, Boundary, and Distant locations for the fourth quarter of 2004 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 fourth 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 INEEL, Boundary, and Distant locations are similar for the fourth quarter. If the INEEL were a significant source of offsite contamination, concentrations of contaminants should be statistically greater at Boundary locations than at Distant locations. Because there is no discernable distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INEEL, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outliers and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. There were no statistical differences in gross alpha concentrations between groups for the fourth quarter.

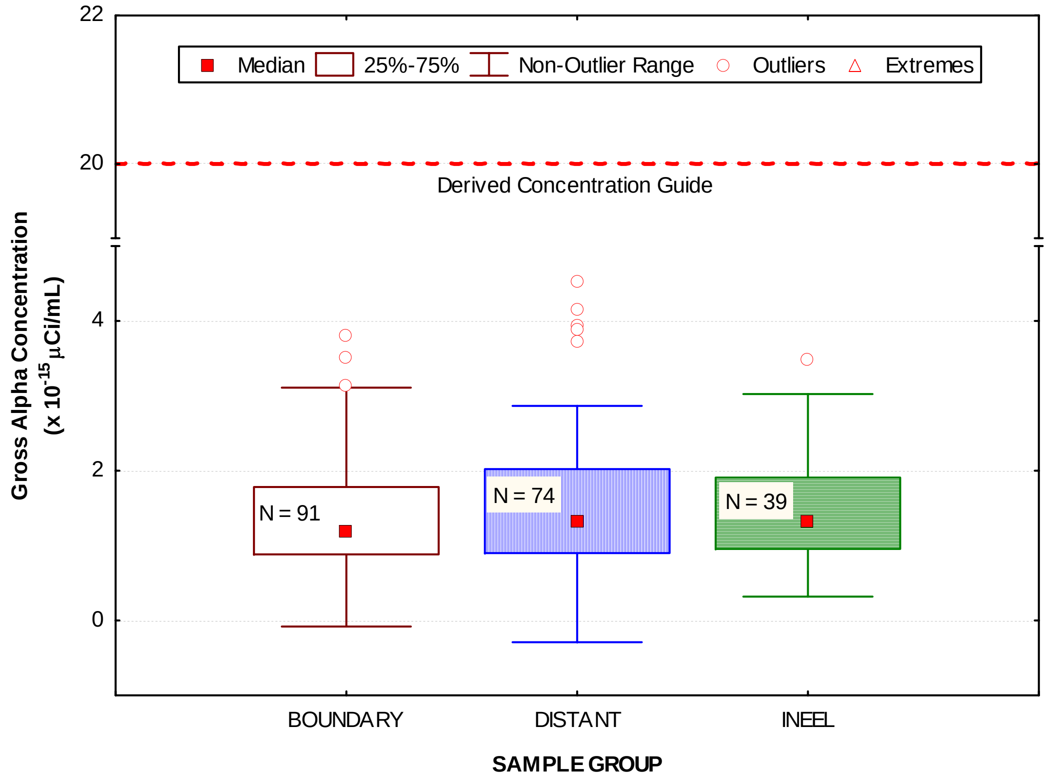

Figure 3. Gross alpha concentrations in air at ESER Program Boundary, Distant, and INEEL locations for the fourth quarter of 2004.

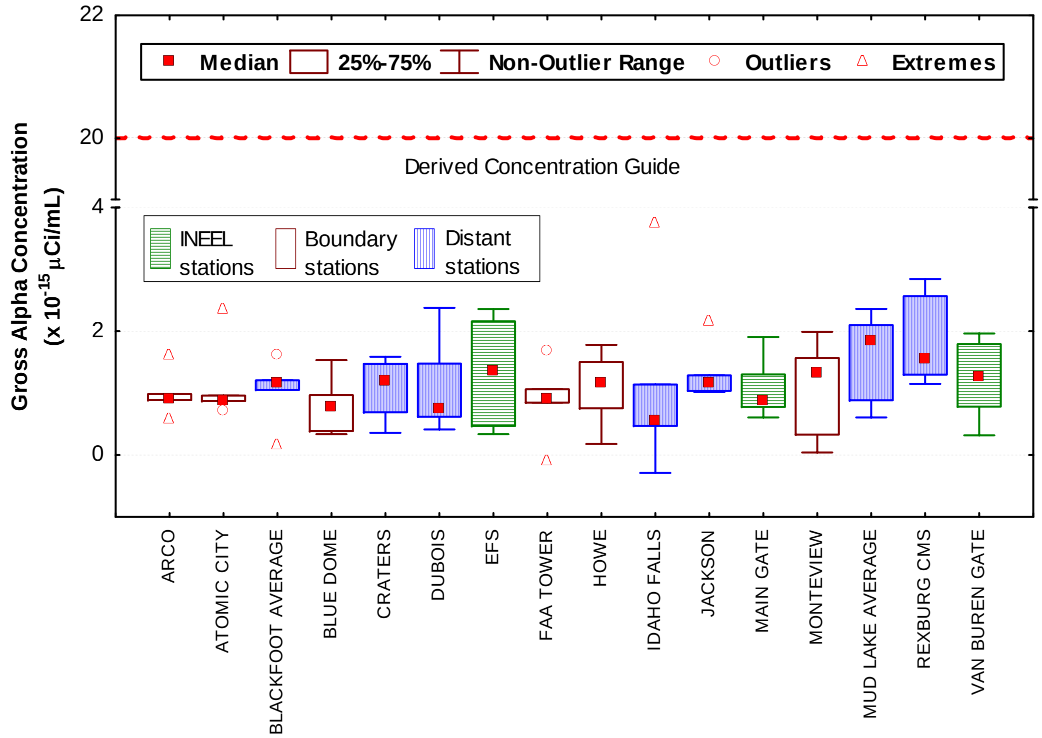

Figure 4. October gross alpha concentrations in air at ESER Program stations. Number of samples (N) = 4 at each station.

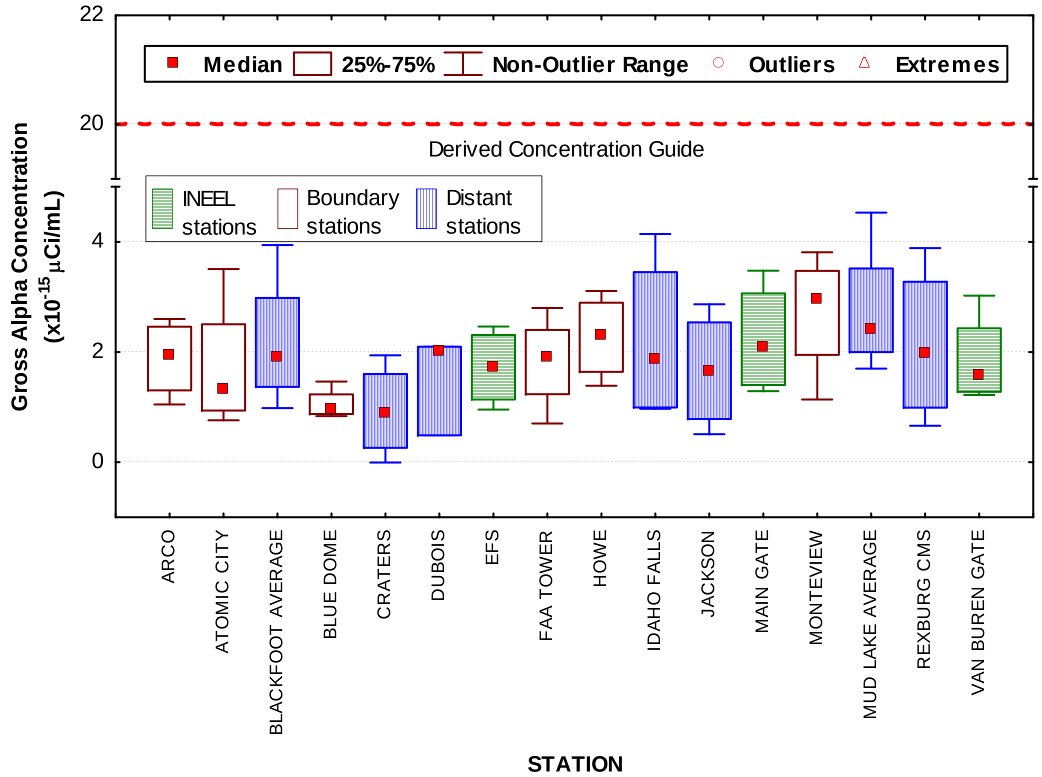

Figure 5. November gross alpha concentrations in air at ESER Program stations. Number of samples (N) = 4 at each station except for Craters of the Moon and Dubois where N = 3.

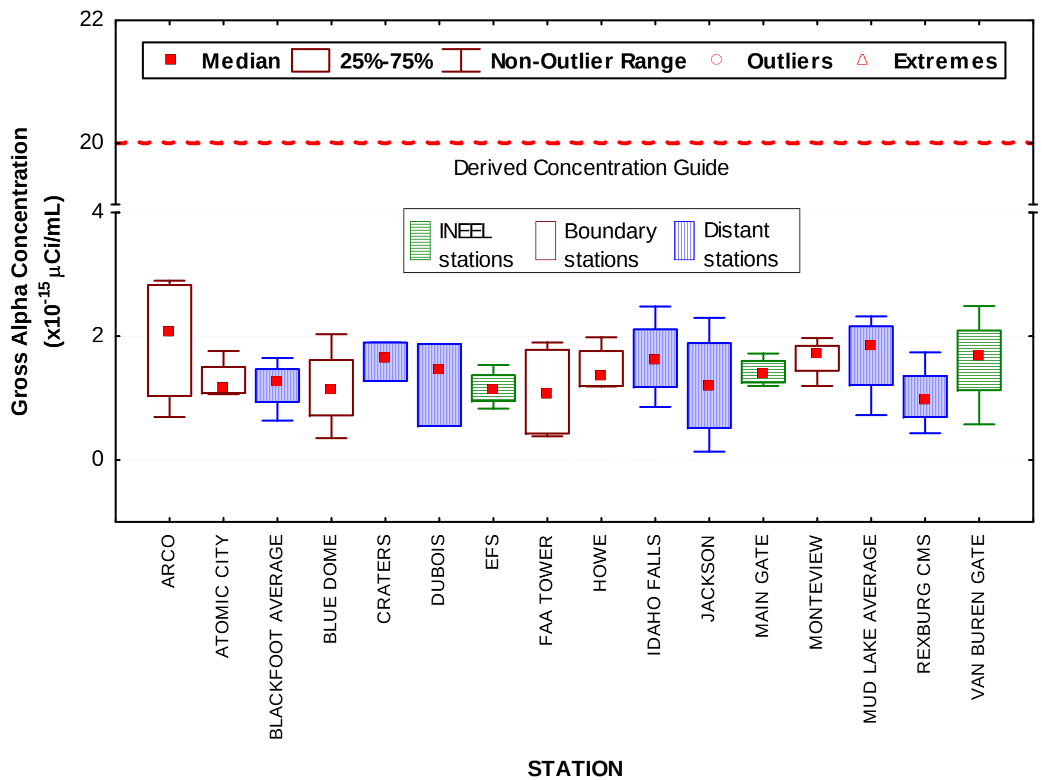

Figure 6. **December gross alpha concentrations in air at ESER Program stations.** Number of samples (N) = 5 at each station except for Craters of the Moon and Dubois, where N = 4.

Comparisons of gross alpha concentrations were made for each month of the quarter (Figures 4– 6). Again the Kruskal-Wallis test of multiple independent groups was used to determine if statistical differences exist between INEEL, Boundary, and Distant data groups. There were no statistical differences in gross alpha between groups for any month (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INEEL sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INEEL and would not aid in determining offsite impacts. Gross alpha concentrations measured at Distant locations were 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 INEEL, Boundary, and Distant locations for the fourth quarter of 2004 are shown in Figure 7 The data were tested and found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. As in the case of alpha activity, the quarterly data for each group appear to be similar and were determined, using the Kruskal-Wallace test, to be statistically the same (Table D-1).

Monthly median gross beta concentrations in air for each sampling group are shown in Figures 8 – 10. Statistical data are presented in Table D-1. 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 fourth 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 fourth quarter of 2004 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. One composite sample, collected at Howe, had a ^{239,240}Pu concentration of $(5.03 \pm 1.30) \times 10^{-18}$ μCi/mL ($[18.61 \pm 4.82] \times 10^{-13}$Bq/mL), which was greater than its associated 3s uncertainty value. The Derived Concentration Guide for $^{239/240}$Pu is 2×10^{-8} pCi/mL. A measurement of ^{90}Sr made at Blackfoot ($[39.6 \pm 12.00] \times 10^{-18}$ μCi/mL) ($[146.52 \pm 44.40] \times 10^{-13}$ Bq/mL) exceeded the 3s uncertainty level. The Derived Concentration Guide for ^{90}Sr is 5×10^{-5} pCi/mL. The remaining radionuclides of interest, ^{137}Cs, ^{238}Pu, and ^{241}Am, were not detected in any composite sample. All results for composite filter samples are shown in Table C-3, Appendix C.

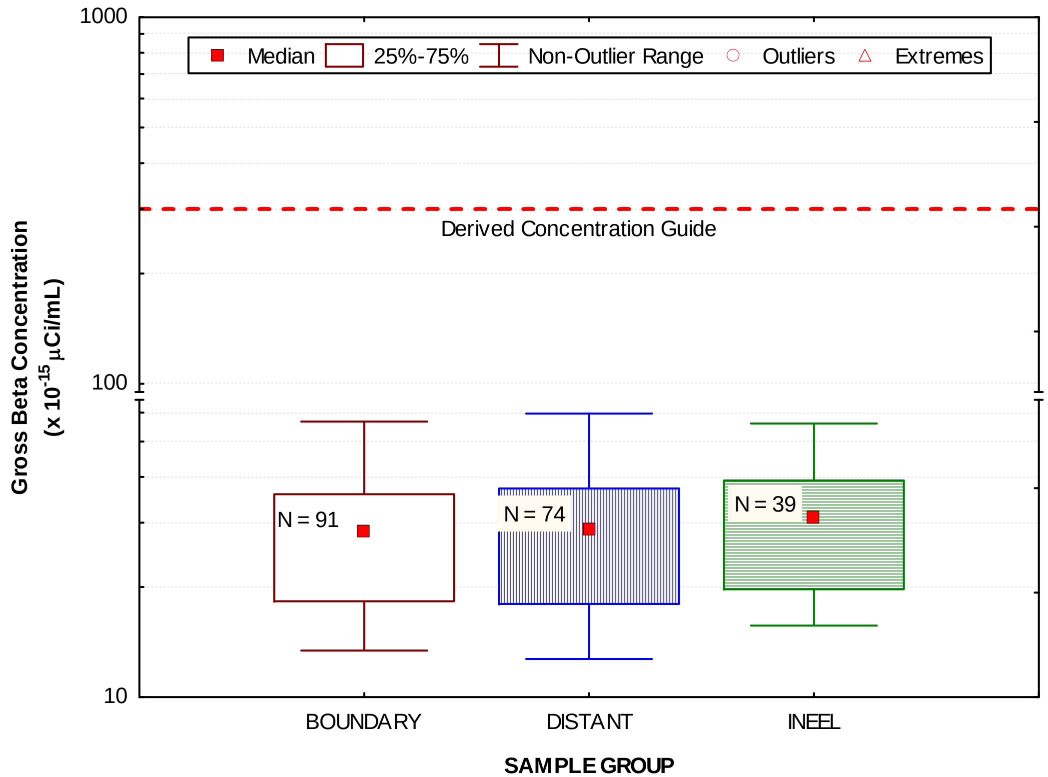

Figure 7. **Gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations for the fourth quarter 2004.**

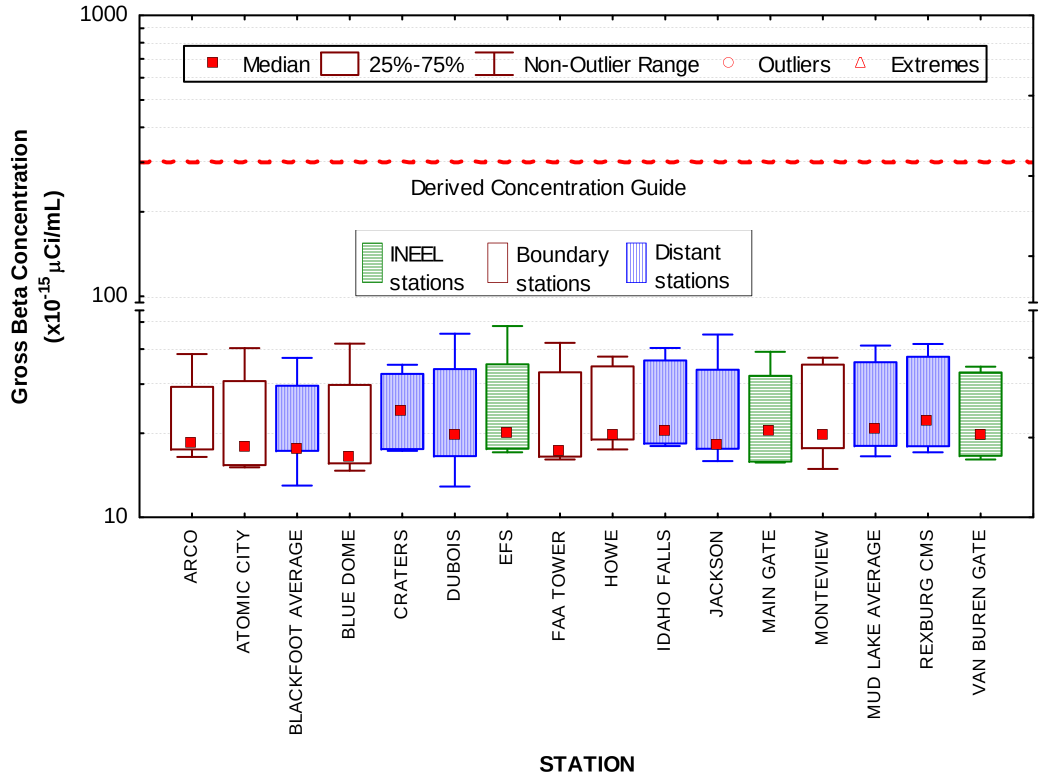

Figure 8. October gross beta concentrations in air at ESER Program stations. Number of samples (N) = 4 for each station.

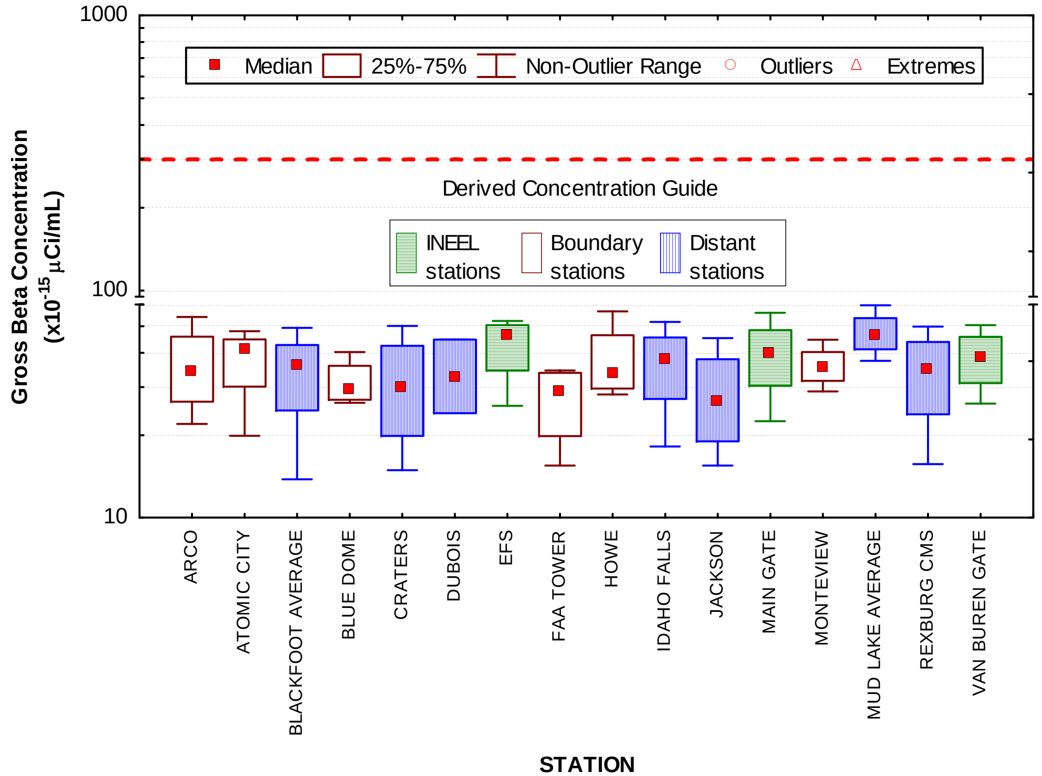

Figure 9. November gross beta concentrations in air at ESER Program stations. Number of samples (N) = 4 for each station except for Craters of the Moon and Duois, where N = 3.

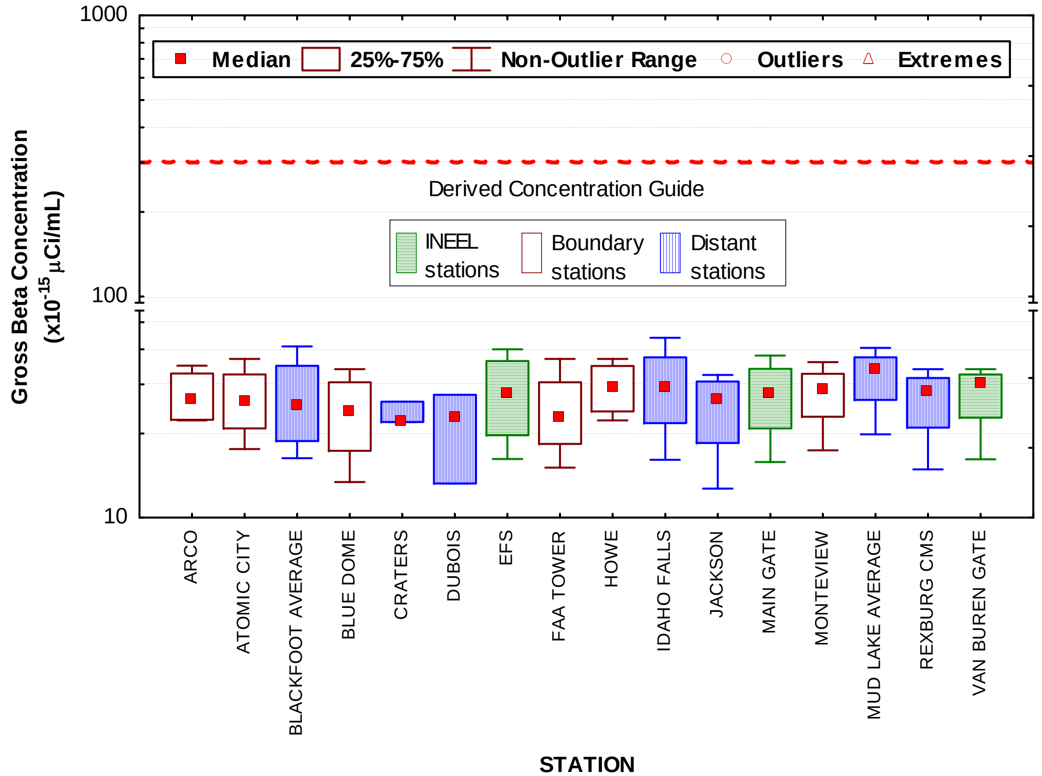

Figure 10. December gross beta concentrations in air at ESER Program stations. Number of samples (N) = 5 for each station except Craters of the Moon and Dubois, where N=4.

ATMOSPHERIC MOISTURE SAMPLING

Twelve atmospheric moisture samples were collected using molecular sieve material during the fourth quarter of 2004. Samples were grouped as follows: two each from Atomic City and Rexburg, and four each from Blackfoot and Idaho Falls. Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., molecular sieve) 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 Atomic City and Rexburg, and two from Blackfoot and Idaho Falls). All sample results were well below the DOE DCG for tritium in air of 1×10^{-7} μCi/mL (3.7×10^{-3} Bq/mL). The maximum value was $(7.75 \pm 1.80) \times 10^{-13}$ μCi/mL of air ($[28.66 \pm 6.67] \times 10^{-9}$ 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 October 23, 2004. The maximum 24-hour concentration was 38.44 µg/m^3 on October 5, 2004, 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	1.16	18.09	7.77
Blackfoot, CMS	1.89	35.31	12.20
Rexburg, CMS	3.18	38.44	14.52

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 INEEL. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INEEL. Surface and/or drinking water are sampled twice each year at 19 locations around the INEEL. This occurs during the second and fourth quarters and is reported 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.

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 fourth quarter of 2004 produced only enough precipitation for a total of seven samples – three from CFA (including one split sample) and four the EFS (including two split samples).

Tritium was detected above the sample's 3s value in all samples except the split from EFS on November 3, 2004. The maximum concentration of 200.00 ± 28.10 pCi/L (7.40 ± 1.04 Bq/L) from the EFS is well below the EPA limit for tritium in drinking water of 20,000 pCi/L.

Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere. Tritium measured in fourth 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 fourth quarter 2004 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

DRINKING WATER

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

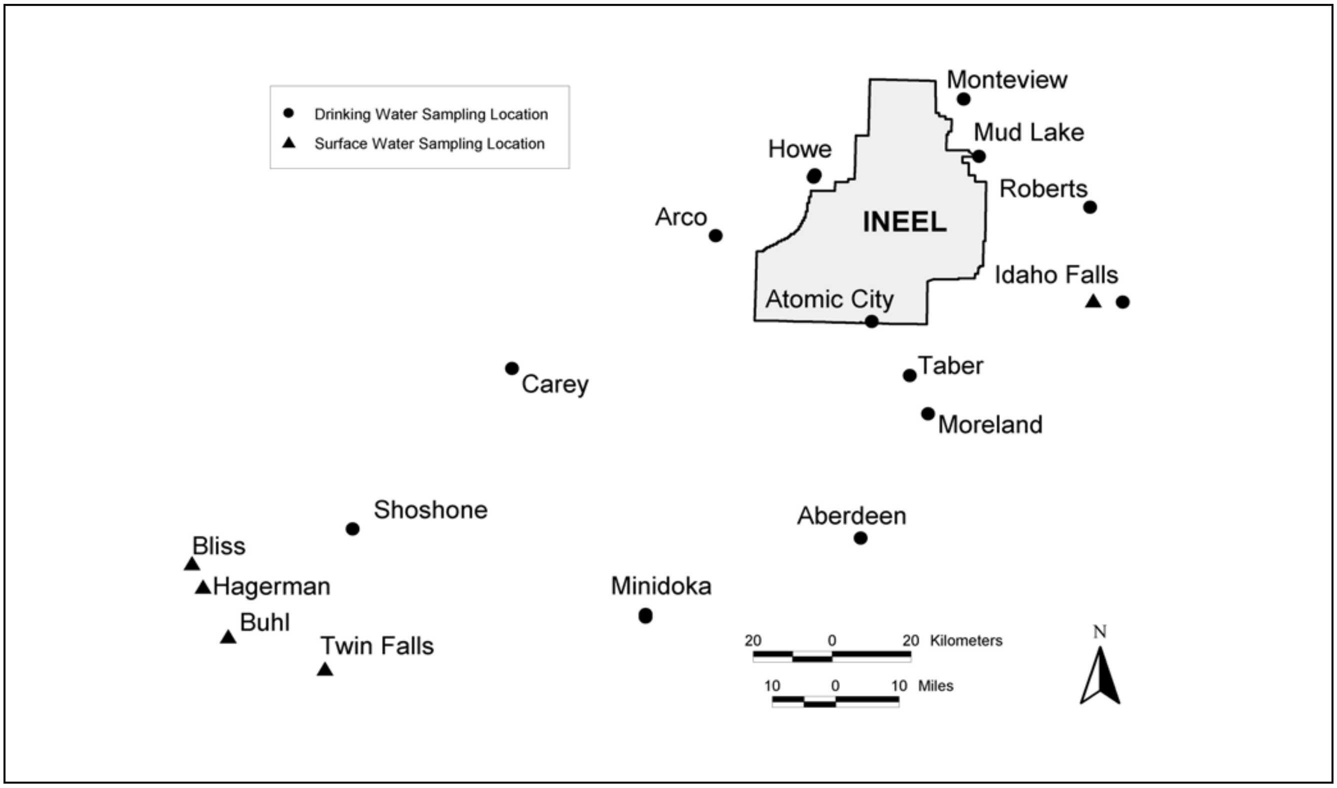

Figure 11. Drinking and Surface Water Sampling locations.

Gross alpha activity was not detected in any of the drinking water samples. Of the fourteen drinking water samples collected, all but five samples exceeded their 3s value for gross beta. Of those nine were positively detected (results were greater than 3s). These results are listed in Table 2. The EPA SDWA limits gross beta in drinking water based on an annual exposure of 4 mrem/yr. Since data are reported from the laboratory as a concentration (i.e., pCi/L) a screening concentration of 50 pCi/L is used to meet this level. The maximum concentration of gross beta detected, (6.75 ± 1.10) pCi/L ([0.25 ± 0.04] Bq/L), was once again from Fort Hall and was lower than the SDWA screening value. Levels of gross beta observed in drinking water are not unusual given the basaltic terrain (Twinning and Rattray 2003). All values are similar to those recorded in previous years, and are well below the levels outlined for drinking water protection (Table B-1).

Tritium was detected in half of the samples well below the DCG and within historical data collected by ESER and within EPA measurements made from 1995-2005 in Region 10 (Alaska, Idaho, Oregon, and Washington.) The maximum tritium concentration was (142.00 ± 30.20) pCi/L ([5.26 ± 1.12] Bq/L).

All drinking water sample results may be found in Appendix C, Table C-7.

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

Location	Result ± 1s	Limits for Comparison[a] SDWA	DOE DCG
Atomic City	4.92 ± 0.89	50	100
Fort Hall	6.75 ± 1.10	50	100
Howe	5.12 ± 1.01	50	100
Minidoka	5.31 ± 0.93	50	100
Monteview	3.04 ± 0.97	50	100
Monteview (duplicate)	3.75 ± 0.87	50	100
Moreland	4.18 ± 1.05	50	100
Mud Lake	4.22 ± 0.95	50	100
Roberts	2.99 ± 0.98	50	100

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

b. SDWA = Safe Drinking Water Act.

c. DCG = Derived concentration Guide.

Surface Water

Five surface water samples and one duplicate sample were collected from locations throughout southeast Idaho and were analyzed for tritium, gross alpha, and gross beta.

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

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

Location	Result ± 1s	Limits for Comparison[a] SDWA	DOE DCG
Bliss (Bliss Boat Dock)	7.14 ± 0.98	50	100
Buhl (Clear Spring)	3.85 ± 0.88	50	100
Hagerman (duplicate)	2.90 ± 0.92	50	100
Twin Falls(Alpheus Spring)	3.34 ± 1.06	50	100

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

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

One sample, collected from Hagerman, had a detectable concentration of tritium of 86.8 ± 25.8 pCi/mL (3.21 ± 0.96 Bq/L). This is well below the DCG for tritium in drinking water and within historical results. In addition, it is well within measurements made in Region 10 by EPA during 1995-2005 in the ERAMS program.

All surface water results can be found in Appendix C, Table C-7.

5. AGRICULTURAL PRODUCTS AND WILDLIFE SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, 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 fourth 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, potatoes, large game, and waterfowl sampled during the fourth quarter of 2004. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses is provided in Appendix B. There are no regulatory standards for radionuclide concentrations in agricultural products or wildlife tissues.

MILK SAMPLING

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

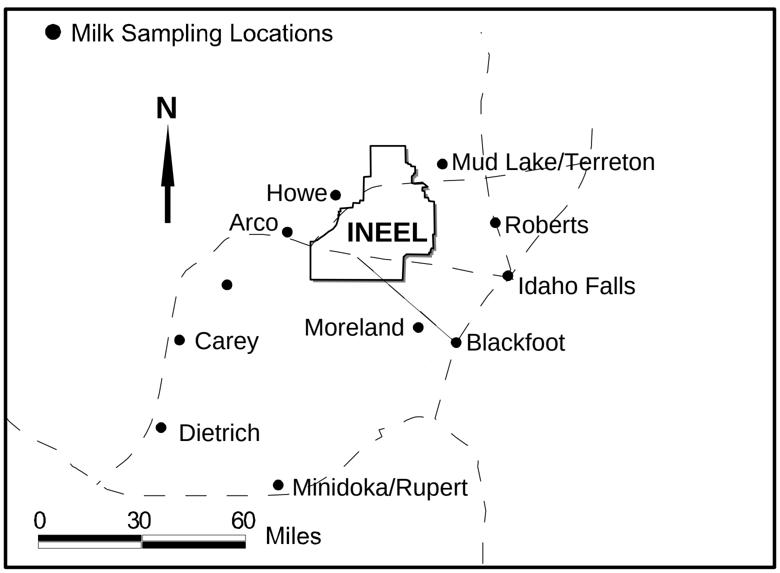

Figure 12. ESER Program milk sampling locations.

Data for weekly and monthly ^{131}I and ^{137}Cs measurements in milk samples are listed in Table C-8. No ^{131}I was detected (measured above the 3s value) in any milk sample during the fourth quarter. Neither ^{131}I nor ^{137}Cs was detected in any weekly or monthly milk sample.

Bi-annual ^{90}Sr and tritium concentrations measured in milk are reported in Table C-9. Two of four milk samples, collected at Dietrich and Roberts, had detectable concentrations of ^{90}Sr. The maximum ^{90}Sr result was (1.17 ± 0.18) pCi/L ([0.043 ± 0.007] Bq/L). This result is below the DCG for ^{90}Sr in drinking water of 100 pCi/L and within the range of historical results measured at the INEEL and background measurements made by EPA during the past 10 years in Region 10.

Tritium was detected in four of the five biannual milk samples. The maximum result, (107.00 ± 26.50) pCi/L ([3.96 ± 0.98] Bq/L), is below the DCG for tritium in drinking water of 2 x

10^6 pCi/L and within historical measurements at the INEEL and background measurements made by EPA during 1995-2005 in Region 10.

POTATOES

Eleven potato samples were collected from area growers and from out-of-state locations. All samples were analyzed for gamma emitting radionuclides and ^{90}Sr. No ^{137}Cs was measured in any sample. Strontium-90 was detected in two of the samples above their respective 3s values. The maximum concentration of ^{90}Sr was from a duplicate sample collected from Taber at (274 ± 75) pCi/kg (dry) (approximately [10 ± 3] Bq/kg). Strontium-90 was not detected in the other duplicate sample. This value is within historic concentrations measured in potatoes collected from farms surrounding the INEEL.

Data for ^{137}Cs and ^{90}Sr in all potato samples taken during the fourth quarter are listed in Table C -10 (Appendix C).

LARGE GAME ANIMAL SAMPLING

Five game animals were sampled during the fourth quarter of 2004. Four were killed as a result of vehicular collisions on INEEL roads. The accidents involved two pronghorn antelope and two elk. Samples were also collected from a whitetail deer killed in Montana by a hunter. Efforts were made to collect samples of thyroid, liver, and muscle tissue from each animal, but due to their condition at the time of sampling not all animals provided all samples. Cesium-137 and ^{131}I data for all big game samples are listed in Appendix C, Table C-11.

Each sample collected was analyzed for gamma-emitting radionuclides. Liver and muscle tissue of all animals had detectable concentrations of naturally occurring potassium-40. Cesium-137 and ^{131}I were not detected in any of the tissue of any animal.

WATERFOWL

Six waterfowl were collected during 2004: Four Coots from the control location of Market Lake and two from the Test Reactor Area (TRA) sewage treatment lagoon. All were analyzed for gamma emitting radionuclides with a subset analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. Concentrations of radionuclides measured in edible tissues are shown in Table C-12.

Cesium-137 was detected at concentrations greater than the 3s value in the muscle tissue of the two Coots collected from TRA. The maximum concentration was (0.20 ± 0.02) pCi/g ([733 ± 81 Bq/g]). No other radionuclides were measured above the 3s concentration in any edible tissue.

Waterfowl hunting is not allowed on the INEEL, but a maximum potential exposure scenario to humans would be someone collecting a contaminated duck and immediately consuming all muscle, liver, heart, and gizzard tissue (average 225 g). The maximum potential dose from eating 225 g (8 oz) of meat from the most contaminated waterfowl collected in 2004 was estimated to be 0.002 mrem (0.2 mSv). This dose is approximately equal to that estimated last year and orders of magnitude lower than the estimated dose of 0.89 mrem calculated in 2002. This is attributed primarily to the fact that the TRA Warm Waste Pond, containing low levels of radionuclides, is no longer in operation. This dose is far less than 363 mrem we receive each year from ambient sources and the 100 mrem per year DOE regulatory dose limit.

6. DIRECT RADIATION

An array of thermoluminescent dosimeters (TLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation (Figure 13). TLDs are changed out in May and again in November after six months in the field. The results of the spring sampling of TLDs exposed from May 2003 to November 2003 are discussed below.

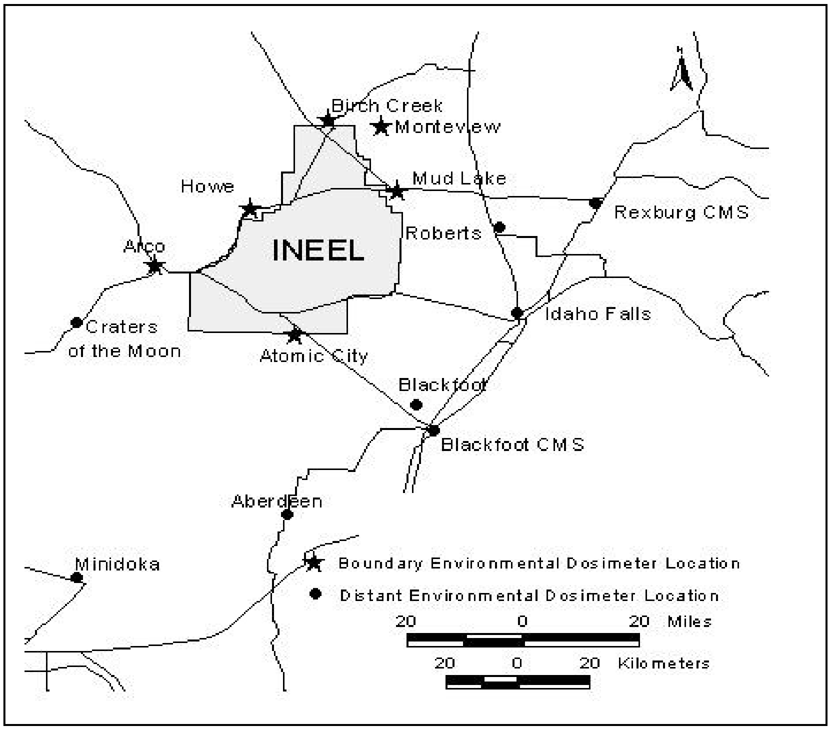

Figure 13. TLD sampling locations.

Similar to the low-volume air results the environmental dosimeter locations are also divided into Boundary and Distant groupings. Boundary average exposure rates ranged from a low of 0.28 mR/day at Blue Dome to a high of 0.35 mR/day at Atomic City and at Mud Lake. The overall Boundary average was 0.27 mR/day. The Distant group had a high of 0.38 mR/day at the Rexburg CMS and a low of 0.28 mR/day at the Blackfoot and Dubois locations. The overall average Distant value was 0.33 mR/day. There was no statistical difference between Boundary and Distant locations. Furthermore, all values are consistent with past readings. Table 5 lists the range and average exposure for both groups over a six-month period. All results are listed in Appendix C, Table C-13.

Table 4. TLD Exposures from May 2004 to November 2004.

	Total Exposure[a]	
	Boundary	**Distant**
Average	59.20	59.66
Maximum	64.10	69.30
Minimum	51.70	51.50

a All values shown are in milliroetgens (mR).

7. 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 October 1 to December 30, 2004.

METHOD UNCERTAINTY

The Quality Assurance Project Plan (QAPP) establishes data quality and method quality objectives for the ESER surveillance program (Stoller 2002). Since the primary concern is with detection, the lower bound for the method uncertainty is set at zero. The upper bound is defined by the ESER program as the maximum concentration in the nonoutlier 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 fourth quarter for all samples types with the following exceptions. A number of precipitation samples were not collected due to the lack of precipitation. Of the five game animals sampled, two thyroids and three livers were not collected. 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. A low-volume filter was missing at sample collection time from the station at Craters of the Moon on November 3.

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:

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

where:

X is the result of the regular sample
Y is the result of the duplicate sample
σ_x is the uncertainty of the regular sample
σ_y is the uncertainty of the duplicate sample

Another measure of duplicate sample results is the relative percent difference. This value is the difference in the two results divided by the mean of the two results. 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 Blackfoot on October 5 and analyzed for gamma-emitting radionuclides. Duplicate milk samples were also collected from Roberts on December 7 and analyzed for gamma-emitting radionuclides. All results were within the 3σ criteria.

Duplicate potato samples were collected from Howe and analyzed for gamma-emitting radionuclides and Strontium-90. The results met the 3σ acceptability criteria.

Duplicate drinking water samples were obtained from Minidoka on November 9 and analyzed for gross alpha and gross beta. Final tritium results were not available. Duplicate surface water samples were obtained from Bill Jones Fish Farm on May 11 and analyzed for gross alpha, gross beta, and tritium. All results reported to date were within the 3σ acceptability criteria.

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the fourth quarter of 2004 these samplers, designated as QA-1 and QA-2, were in operation at the Mountain View CMS and Mud Lake, respectively. Particulate filters receive the standard analysis for gross alpha and gross beta; charcoal cartridges are analyzed specifically for iodine-131. All gross alpha results for the co-located samplers met the acceptability criteria. Five of the gross beta results collected from duplicate stations at Mountain View did not meet the criteria. The relative percent differences ranged from 14 to 46 percent. The differences may be due to a faulty pump, which failed during the fourth week of December. Charcoal cartridge results are difficult to present because cartridges are counted in batches of nine.

Composite air samples from the two QA samplers were submitted for analysis at the end of the fourth quarter for gamma spectrometry at the EAL and for ^{90}Sr at Severn-Trent. All analyses were within the 3s criterion with the exception of ^{90}Sr at the Mountain View CMS and QA-1 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 ratio of results (QA duplicate sampler/main sampler) over time. A ratio of one means that the results of both samplers are exactly the same. The figures show that the bias is small (<4) and not consistent in Mud Lake results and Monteview gross alpha results, indicating that there is no obvious bias in the duplicate sampling systems in these cases. However, the gross beta results from Monteview indicate the QA-2 sample was consistently lower than the other sampler. This sampler stopped functioning in the fourth week of December indicating that the bias may be due to instrument malfunction.

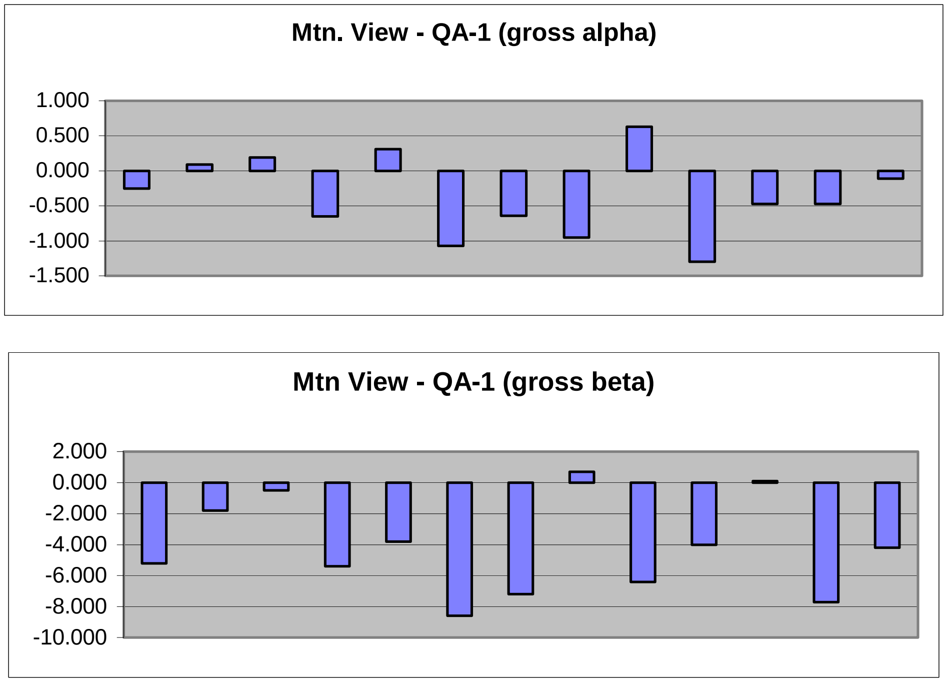

Figure 14. Ratio of QA-1/Mountain View CMS gross alpha and gross beta activities.

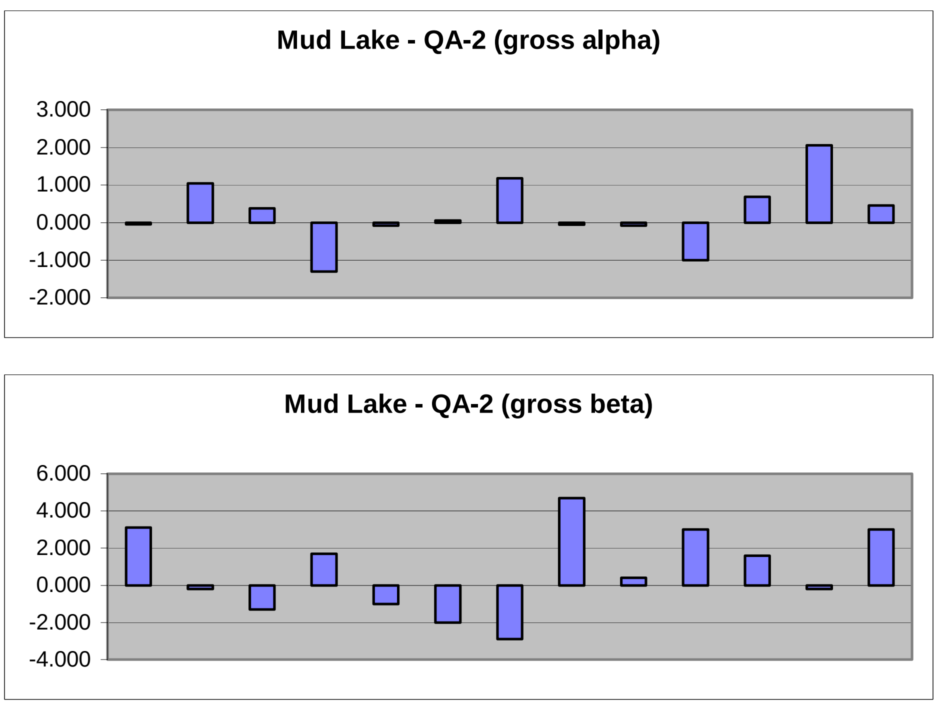

Figure 15. Ratio of QA-2/Mud Lake gross alpha and gross beta activities.

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 fourth quarter 2004.

Severn-Trent split milk and potato samples for Strontium-90 analysis. The milk result was within the 3σ criterion but the potato result was just outside. Waterfowl samples were also split and analyzed for gamma-emitting radionuclides, Strontium-90, and actinides. All results were within the 3σ criterion except for the Cesium-137 result.

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 fourth quarter is presented below.

- 41 low-volume air filters were recounted for alpha activity. All were within the 3σ criterion.
- 41 low-volume air filters were recounted for beta activity. One was outside the 3σ criterion but within the 20 percent criterion.
- 19 milk samples were recounted for potassium-40. All were within the 3σ criterion.
- 4 groups of charcoal cartridges were recounted for iodine-131. All were within the 3σ criterion.
- 2 tissue samples were recounted for cesium-137. Both were within the 3σ criterion.
- 9 low volume composites were recounted for beryllium-7. All were within the 3σ criterion.
- 7 soil samples were recounted for cesium-137; four were recounted twice. All results were within the 3σ criterion.
- 5 potato samples were recounted for potassium-40. Two results were outside the 3σ criterion but within the 20 percent criterion.
- 2 atmospheric moisture samples were recounted for tritium. Both results were within the 3σ 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

During the fourth quarter of 2004, spikes (samples prepared with known amounts of radionuclides) of the following types were obtained and submitted:

- Milk spike analyzed for Strontium-90 by Severn-Trent.
- Low-volume air filter analyzed for gross alpha and gross beta by the EAL.
- Low-volume air filter composite analyzed for actinides by Severn-Trent

The Quality Assurance Project Plan specifies a required accuracy of ±20 percent for gross alpha and gross beta in air and ±25 percent for Strontium-90 in milk and for actinides in air. A comparison is also provided using the 3 sigma standard. All spike samples met the criteria during the fourth quarter.

The Quality Assessment Program, administered through the Environmental Monitoring Laboratory was terminated following the June 2004 test session. A new performance testing program though the Radiological and Environmental Sciences Laboratory's Mixed Analyte Performance Evaluation Program (MAPEP) was initiated. Idaho State University's Environmental Assessment Laboratory analyzed the first set of samples in October 2004. Results are tabulated below.

Idaho State University Environmental Assessment Laboratory				
Matrix: Air Filter				
Nuclide	EAL value (Bq)	MAPEP value (Bq)	Relative difference	Evaluation[a]
Mn-54	3.0	3.0	1.61 percent	A
Co-57	2.3	2.4	5.26 percent	A
Co-60	2.3	2.3	-0.46 percent	A
Zn-65	4.2	4.0	-3.83 percent	A
Cs-134	2.5	2.9	+12.54 percent	A
Cs-137	1.8	2.0	+10.14 percent	A
Gross Alpha	0.14	0.14	+0.55 percent	A
Gross Beta	1.16	1.16	+0.26 percent	A
Matrix: Water				
Nuclide	EAL value (Bq/L)	MAPEP value (Bq/L)	Relative difference	Evaluation[a]
Mn-54	277.3	267.0	-3.9 percent	A
Co-57	183.9	185.0	+0.6 percent	A
Co-60	167.1	163.0	-2.5 percent	A
Zn-65	230.5	208.0	-10.8 percent	A
Cs-134	188.9	208.0	+9.2 percent	A
Cs-137	248.6	250.0	+0.5 percent	A
Gross Alpha	0.4	1.2	+65.1 percent	A
Gross Beta	4.3	4.1	-4.1 percent	A

Matrix: Soil				
Nuclide	EAL value (Bq)	MAPEP value (Bq)	Relative difference	Evaluation[a]
K-40	523.3	604.0	+13.35 percent	A
Mn-54	431.9	484.7	+10.89 percent	A
Co-57	316.5	399.6	+20.79 percent	W
Co-60	476.9	518.0	+7.93 percent	A
Zn-65	648.6	699.3	+7.26 percent	A
Cs-134	323.6	414.4	+21.92 percent	W
Cs-137	724.5	836.2	+13.36 percent	A
a. A = Acceptable, W = Acceptable with warning, N = Not acceptable				

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 fourth quarter of 2004, 17 analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. Geometries tested included low-volume air filter composites, 10-charcoal cartridge screening, 500 ml 1.0 g/cc samples, and one-liter 1.0 g/cc samples. A total of 114 analytical results were generated. All of the results were within the ±20 percent range except for one result for Sr-85. This result was within the three-sigma range, and the sample had decayed for 8.5 half-lives, which may have contributed to the result outside the 20 percent range.

Water samples spiked with tritium received 14 analyses during the quarterly reporting period. All were well within the ±20 percent criterion, and in fact all were within 6 percent of the known value with one exception. A tritium in milk spike was also about 7 of the known value. Gross alpha and beta spikes analyzed in the fourth quarter were within 10 percent of the expected values.

Severn-Trent analyzes a laboratory control sample (LCS) with each batch of samples submitted by the ESER. During the fourth quarter available results consisted of strontium-90 and actinides in air, strontium-90 in milk and potatoes, and gamma-emitters, strontium-90, and actinides in waterfowl tissue. All results met acceptability criteria.

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 $\pm 2\sigma$ of zero and preferably within $\pm 1\sigma$ 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 fourth 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 one standard deviation for both parameters.

Severn-Trent analyzes a blank with each set of results. Fourth quarter blanks were less than three standard deviations of zero for strontium-90, plutonium-238, plutonium-239/240 and americium-241 in air (for one of two blanks run). The other americium-241 blank was over three standard deviations of zero. Milk and potato blanks were within three standard deviations for strontium-90. For waterfowl blanks, all parameters were within three standard deviations of zero.

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APPENDIX A

SUMMARY OF SAMPLING MEDIA AND SCHEDULE

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

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

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

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

APPENDIX B

SUMMARY OF MDC'S AND DCG'S

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Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Fourth Quarter 2004

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	1.01×10^{-15} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.94×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	3.06×10^{-16} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	1.95×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}Pu$	2.61×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	1.15×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	7.6×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.14×10^{-21} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	5.23×10^{-13} $\mu Ci/mL_{air}$	1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	1.15×10^{-13} µCi/mL	2×10^{-3} µCi/mL
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

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY															
ARCO	10/06/2004	0.99	±	0.64	3.65	±	2.37		38.41	±	1.63	14.21	±	0.60	Y
	10/13/2004	1.61	±	0.52	5.97	±	1.91	Y	29.30	±	1.27	10.84	±	0.47	Y
	10/20/2004	0.59	±	0.47	2.17	±	1.73		16.46	±	1.05	6.09	±	0.39	Y
	10/27/2004	0.90	±	0.48	3.32	±	1.78		17.50	±	1.07	6.48	±	0.40	Y
	11/03/2004	0.89	±	0.50	3.28	±	1.85		18.30	±	1.13	6.77	±	0.42	Y
	11/10/2004	1.05	±	0.46	3.88	±	1.72		31.08	±	1.18	11.50	±	0.44	Y
	11/17/2004	2.32	±	0.59	8.59	±	2.18	Y	54.09	±	1.60	20.01	±	0.59	Y
	11/24/2004	2.60	±	0.56	9.62	±	2.06	Y	37.50	±	1.39	13.88	±	0.51	Y
	12/01/2004	1.56	±	0.53	5.77	±	1.95		22.00	±	1.12	8.14	±	0.41	Y
	12/08/2004	2.90	±	0.56	10.73	±	2.07	Y	35.00	±	1.30	12.95	±	0.48	Y
	12/15/2004	0.69	±	0.48	2.57	±	1.77		22.48	±	1.11	8.32	±	0.41	Y
	12/22/2004	2.76	±	0.52	10.21	±	1.94	Y	22.30	±	1.10	8.25	±	0.41	Y
	12/29/2004	1.38	±	0.49	5.11	±	1.79		30.60	±	1.26	11.32	±	0.47	Y
ATOMIC CITY	10/06/2004	0.88	±	0.51	3.27	±	1.89		40.36	±	1.42	14.93	±	0.53	Y
	10/13/2004	2.36	±	0.63	8.74	±	2.34	Y	30.76	±	1.44	11.38	±	0.53	Y
	10/20/2004	0.87	±	0.42	3.23	±	1.56		17.70	±	0.96	6.55	±	0.36	Y
	10/27/2004	0.70	±	0.48	2.60	±	1.76		15.10	±	1.03	5.59	±	0.38	Y
	11/03/2004	0.96	±	0.37	3.56	±	1.38		15.38	±	0.84	5.69	±	0.31	Y
	11/10/2004	0.76	±	0.50	2.81	±	1.86		41.61	±	1.43	15.39	±	0.53	Y
	11/17/2004	3.51	±	0.53	12.97	±	1.95	Y	47.95	±	1.29	17.74	±	0.48	Y
	11/24/2004	1.50	±	0.49	5.55	±	1.79	Y	40.30	±	1.40	14.91	±	0.52	Y
	12/01/2004	1.12	±	0.41	4.14	±	1.53		19.90	±	0.93	7.36	±	0.35	Y
	12/08/2004	1.10	±	0.51	4.07	±	1.89		37.00	±	1.40	13.69	±	0.52	Y
	12/15/2004	1.06	±	0.40	3.93	±	1.47		17.60	±	0.86	6.51	±	0.32	Y
	12/22/2004	1.76	±	0.47	6.51	±	1.74	Y	28.00	±	1.17	10.36	±	0.43	Y
	12/29/2004	1.25	±	0.45	4.63	±	1.67		24.10	±	1.11	8.92	±	0.41	Y
BLUE DOME	10/06/2004	0.78	±	0.50	5.54	±	1.84		41.85	±	1.43	15.49	±	0.53	Y
	10/13/2004	0.97	±	0.45	4.64	±	1.65		29.81	±	1.21	11.03	±	0.45	Y
	10/20/2004	0.39	±	0.40	0.98	±	1.47		15.60	±	0.94	5.77	±	0.35	Y
	10/27/2004	0.34	±	0.40	3.09	±	1.47		14.70	±	0.93	5.44	±	0.34	Y
	11/03/2004	1.53	±	0.44	4.48	±	1.63	Y	16.29	±	0.91	6.03	±	0.34	Y
	11/10/2004	0.91	±	0.46	5.50	±	1.72		27.65	±	1.15	10.23	±	0.43	Y
	11/17/2004	1.46	±	0.41	13.39	±	1.52	Y	40.25	±	1.16	14.89	±	0.43	Y
	11/24/2004	1.00	±	0.43	4.74	±	1.57		31.50	±	1.23	11.66	±	0.46	Y
	12/01/2004	0.84	±	0.39	4.81	±	1.45		26.30	±	1.01	9.73	±	0.37	Y
	12/08/2004	1.20	±	0.43	3.70	±	1.59		34.00	±	1.20	12.58	±	0.44	Y
	12/15/2004	0.35	±	0.37	3.74	±	1.35		13.40	±	0.81	4.96	±	0.30	Y
	12/22/2004	1.09	±	0.44	3.74	±	1.61		21.30	±	1.09	7.88	±	0.40	Y
	12/29/2004	2.03	±	0.43	4.55	±	1.58	Y	27.00	±	1.01	9.99	±	0.37	Y
FAA TOWER	10/06/2004	1.06	±	0.57	6.46	±	2.10		42.15	±	1.53	15.60	±	0.57	Y
	10/13/2004	1.67	±	0.56	4.30	±	2.06	Y	33.07	±	1.39	12.24	±	0.52	Y
	10/20/2004	0.85	±	0.43	0.31	±	1.59		17.38	±	0.97	6.43	±	0.36	Y
	10/27/2004	-0.08	±	0.45	5.51	±	1.65		16.50	±	1.10	6.11	±	0.41	Y
	11/03/2004	0.90	±	0.38	3.31	±	1.42		16.11	±	0.87	5.96	±	0.32	Y
	11/10/2004	2.01	±	0.53	9.47	±	1.96	Y	34.49	±	1.26	12.76	±	0.47	Y
	11/17/2004	2.80	±	0.53	15.77	±	1.96	Y	33.13	±	1.18	12.26	±	0.44	Y
	11/24/2004	1.77	±	0.46	8.25	±	1.69	Y	24.20	±	1.09	8.95	±	0.40	Y
	12/01/2004	0.70	±	0.43	2.47	±	1.61		15.50	±	0.94	5.74	±	0.35	Y
	12/08/2004	1.90	±	0.57	8.51	±	2.11	Y	37.00	±	1.40	13.69	±	0.52	Y
	12/15/2004	0.47	±	0.36	0.99	±	1.33		15.11	±	0.81	5.59	±	0.30	Y
	12/22/2004	0.39	±	0.36	5.48	±	1.32		24.00	±	1.06	8.88	±	0.39	Y
	12/29/2004	1.67	±	0.47	4.96	±	1.73	Y	21.60	±	1.06	7.99	±	0.39	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^{-11} Bq/mL)			GROSS BETA Result > 3s
HOWE	10/06/2004	1.50	±	0.48	5.55	±	1.76	Y	37.64	±	1.25	13.93	±	0.46	Y
	10/13/2004	1.78	±	0.54	6.59	±	2.00	Y	34.71	±	1.37	12.84	±	0.51	Y
	10/20/2004	0.76	±	0.40	2.80	±	1.49		19.75	±	0.97	7.31	±	0.36	Y
	10/27/2004	0.18	±	0.42	0.67	±	1.57		17.50	±	1.04	6.48	±	0.38	Y
	11/03/2004	1.15	±	0.40	4.26	±	1.47		18.99	±	0.92	7.03	±	0.34	Y
	11/10/2004	1.89	±	0.53	7.01	±	1.97	Y	31.06	±	1.23	11.49	±	0.46	Y
	11/17/2004	2.68	±	0.51	9.93	±	1.87	Y	56.71	±	1.41	20.98	±	0.52	Y
	11/24/2004	3.11	±	0.53	11.51	±	1.95	Y	36.00	±	1.25	13.32	±	0.46	Y
	12/01/2004	1.39	±	0.45	5.14	±	1.67	Y	28.20	±	1.09	10.43	±	0.40	Y
	12/08/2004	1.20	±	0.42	4.44	±	1.55		37.00	±	1.20	13.69	±	0.44	Y
	12/15/2004	1.98	±	0.47	7.33	±	1.74	Y	22.30	±	0.98	8.25	±	0.36	Y
	12/22/2004	1.19	±	0.38	4.40	±	1.41	Y	25.70	±	1.02	9.51	±	0.38	Y
	12/29/2004	1.54	±	0.41	5.70	±	1.52	Y	32.80	±	1.11	12.14	±	0.41	Y
MONTEVIEW	10/06/2004	1.31	±	0.52	4.85	±	1.91		37.28	±	1.35	13.79	±	0.50	Y
	10/13/2004	1.57	±	0.65	5.80	±	2.41		35.23	±	1.62	13.03	±	0.60	Y
	10/20/2004	0.33	±	0.43	1.23	±	1.58		19.60	±	1.07	7.25	±	0.39	Y
	10/27/2004	0.04	±	0.42	0.16	±	1.54		14.90	±	1.00	5.51	±	0.37	Y
	11/03/2004	1.99	±	0.45	7.37	±	1.68	Y	17.69	±	0.91	6.54	±	0.34	Y
	11/10/2004	2.76	±	0.71	10.22	±	2.62	Y	34.28	±	1.51	12.68	±	0.56	Y
	11/17/2004	3.81	±	0.56	14.09	±	2.08	Y	44.65	±	1.30	16.52	±	0.48	Y
	11/24/2004	3.14	±	0.54	11.62	±	2.00	Y	35.90	±	1.28	13.28	±	0.47	Y
	12/01/2004	1.14	±	0.48	4.22	±	1.76		28.90	±	1.18	10.69	±	0.44	Y
	12/08/2004	1.20	±	0.45	4.44	±	1.67		36.00	±	1.20	13.32	±	0.44	Y
	12/15/2004	1.73	±	0.45	6.39	±	1.66	Y	17.41	±	0.89	6.44	±	0.33	Y
	12/22/2004	1.97	±	0.50	7.29	±	1.85	Y	28.50	±	1.22	10.55	±	0.45	Y
	12/29/2004	1.69	±	0.45	6.25	±	1.67	Y	29.40	±	1.13	10.88	±	0.42	Y
MUD LAKE	10/06/2004	1.82	±	0.54	6.75	±	1.99	Y	42.78	±	1.41	15.83	±	0.52	Y
	10/13/2004	2.88	±	0.60	10.66	±	2.21	Y	35.80	±	1.38	13.25	±	0.51	Y
	10/20/2004	1.08	±	0.43	3.98	±	1.59		20.10	±	0.99	7.44	±	0.37	Y
	10/27/2004	-0.04	±	0.41	-0.16	±	1.51		17.40	±	1.04	6.44	±	0.38	Y
	11/03/2004	2.06	±	0.50	7.61	±	1.85	Y	17.50	±	0.99	6.47	±	0.37	Y
	11/10/2004	2.33	±	0.59	8.60	±	2.18	Y	46.44	±	1.50	17.18	±	0.55	Y
	11/17/2004	5.12	±	0.65	18.94	±	2.41	Y	58.20	±	1.52	21.53	±	0.56	Y
	11/24/2004	2.48	±	0.50	9.18	±	1.86	Y	47.40	±	1.40	17.54	±	0.52	Y
	12/01/2004	1.66	±	0.51	6.14	±	1.88	Y	37.60	±	1.30	13.91	±	0.48	Y
	12/08/2004	1.50	±	0.55	5.55	±	2.04		42.00	±	1.50	15.54	±	0.56	Y
	12/15/2004	1.07	±	0.45	3.96	±	1.66		20.67	±	1.00	7.65	±	0.37	Y
	12/22/2004	2.73	±	0.54	10.10	±	1.99	Y	32.80	±	1.28	12.14	±	0.47	Y
	12/29/2004	2.55	±	0.49	9.44	±	1.81	Y	36.00	±	1.21	13.32	±	0.45	Y
MUD LAKE (Q/A-2)	10/06/2004	1.86	±	0.61	6.89	±	2.26	Y	39.66	±	1.50	14.68	±	0.56	Y
	10/13/2004	1.84	±	0.58	6.81	±	2.16	Y	36.01	±	1.47	13.32	±	0.54	Y
	10/20/2004	0.70	±	0.50	2.58	±	1.84		21.38	±	1.18	7.91	±	0.44	Y
	10/27/2004	1.26	±	0.46	4.66	±	1.68		15.70	±	0.95	5.81	±	0.35	Y
	11/03/2004	2.14	±	0.48	7.92	±	1.77	Y	18.54	±	0.96	6.86	±	0.35	Y
	11/10/2004	2.27	±	0.56	8.38	±	2.06	Y	48.43	±	1.46	17.92	±	0.54	Y
	11/17/2004	3.94	±	0.68	14.59	±	2.51	Y	61.12	±	1.71	22.61	±	0.63	Y
	11/24/2004	2.53	±	0.53	9.36	±	1.97	Y	42.70	±	1.41	15.80	±	0.52	Y
	12/01/2004	1.74	±	0.59	6.44	±	2.16		37.20	±	1.43	13.76	±	0.53	Y
	12/08/2004	2.50	±	0.58	9.25	±	2.15	Y	39.00	±	1.40	14.43	±	0.52	Y
	12/15/2004	0.38	±	0.51	1.40	±	1.87		19.08	±	1.14	7.06	±	0.42	Y
	12/22/2004	0.67	±	0.43	2.47	±	1.60		33.00	±	1.30	12.21	±	0.48	Y
	12/29/2004	2.09	±	0.49	7.73	±	1.81	Y	33.00	±	1.21	12.21	±	0.45	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^{-11} Bq/mL)			GROSS BETA Result > 3s
DISTANT															
BLACKFOOT CMS	10/06/2004	1.50	±	0.52	5.54	±	1.93		34.58	±	1.30	12.80	±	0.48	Y
	10/13/2004	1.25	±	0.45	4.64	±	1.67		28.69	±	1.17	10.61	±	0.43	Y
	10/20/2004	0.27	±	0.39	0.98	±	1.45		17.27	±	0.97	6.39	±	0.36	Y
	10/27/2004	0.84	±	0.39	3.09	±	1.44		14.60	±	0.86	5.40	±	0.32	Y
	11/03/2004	1.21	±	0.35	4.48	±	1.30	Y	11.09	±	0.69	4.10	±	0.26	Y
	11/10/2004	1.49	±	0.47	5.50	±	1.72	Y	31.92	±	1.15	11.81	±	0.43	Y
	11/17/2004	3.62	±	0.60	13.39	±	2.22	Y	45.65	±	1.40	16.89	±	0.52	Y
	11/24/2004	1.28	±	0.43	4.74	±	1.58		35.80	±	1.25	13.25	±	0.46	Y
	12/01/2004	1.30	±	0.44	4.81	±	1.62		10.60	±	0.80	3.92	±	0.30	Y
	12/08/2004	1.00	±	0.43	3.70	±	1.59		39.00	±	1.20	14.43	±	0.44	Y
	12/15/2004	1.01	±	0.47	3.74	±	1.73		16.37	±	0.97	6.06	±	0.36	Y
	12/22/2004	1.01	±	0.74	3.74	±	2.75		25.10	±	1.78	9.29	±	0.66	Y
	12/29/2004	1.23	±	0.41	4.55	±	1.50	Y	19.20	±	0.95	7.10	±	0.35	Y
(Q/A-1)	10/06/2004	1.75	±	0.64	6.46	±	2.36		39.80	±	1.57	14.73	±	0.58	Y
	10/13/2004	1.16	±	0.55	4.30	±	2.05		30.50	±	1.41	11.28	±	0.52	Y
	10/20/2004	0.08	±	0.55	0.31	±	2.03		17.78	±	1.28	6.58	±	0.47	Y
	10/27/2004	1.49	±	0.56	5.51	±	2.07		20.00	±	1.19	7.40	±	0.44	Y
	11/03/2004	0.90	±	0.49	3.31	±	1.80		14.93	±	1.04	5.52	±	0.38	Y
	11/10/2004	2.56	±	0.68	9.47	±	2.51	Y	40.45	±	1.57	14.97	±	0.58	Y
	11/17/2004	4.26	±	0.75	15.77	±	2.76	Y	52.95	±	1.72	19.59	±	0.64	Y
	11/24/2004	2.23	±	0.60	8.25	±	2.21	Y	35.10	±	1.49	12.99	±	0.55	Y
	12/01/2004	0.67	±	0.54	2.47	±	1.98		17.00	±	1.14	6.29	±	0.42	Y
	12/08/2004	2.30	±	0.61	8.51	±	2.26	Y	43.00	±	1.50	15.91	±	0.56	Y
	12/15/2004	0.27	±	0.53	0.99	±	1.97		16.29	±	1.15	6.03	±	0.43	Y
	12/22/2004	1.48	±	0.59	5.48	±	2.18		32.80	±	1.53	12.14	±	0.57	Y
	12/29/2004	1.34	±	0.49	4.96	±	1.81		23.40	±	1.17	8.66	±	0.43	Y
MOON)	10/06/2004	0.36	±	0.61	1.33	±	2.25		35.20	±	1.59	13.02	±	0.59	Y
	10/13/2004	1.36	±	0.60	5.03	±	2.23		30.09	±	1.48	11.13	±	0.55	Y
	10/20/2004	1.02	±	0.61	3.78	±	2.26		17.83	±	1.28	6.60	±	0.47	Y
	10/27/2004	1.59	±	0.60	5.88	±	2.22		17.30	±	1.20	6.40	±	0.44	Y
	11/03/2004	Sample lost													
	11/10/2004	0.53	±	0.54	1.96	±	1.99		24.87	±	1.28	9.20	±	0.47	Y
	11/17/2004	1.26	±	0.57	4.67	±	2.10		50.17	±	1.63	18.56	±	0.60	Y
	11/24/2004	1.94	±	0.53	7.18	±	1.97	Y	34.70	±	1.38	12.84	±	0.51	Y
	12/01/2004	-0.01	±	0.51	-0.03	±	1.88		14.90	±	1.13	5.51	±	0.42	Y
	12/08/2004	1.90	±	0.53	7.03	±	1.96	Y	22.00	±	1.10	8.14	±	0.41	Y
	12/15/2004	-1.47	±	1.90	-5.43	±	7.03		5.67	±	3.28	2.10	±	1.21	
	12/22/2004	1.66	±	0.54	6.14	±	1.99	Y	22.00	±	1.24	8.14	±	0.46	Y
	12/29/2004	1.28	±	0.51	4.74	±	1.88		26.00	±	1.25	9.62	±	0.46	Y
DUBOIS	10/06/2004	1.48	±	0.63	5.47	±	2.32		45.39	±	1.65	16.79	±	0.61	Y
	10/13/2004	2.38	±	0.59	8.81	±	2.18	Y	33.93	±	1.40	12.55	±	0.52	Y
	10/20/2004	0.62	±	0.42	2.30	±	1.56		19.76	±	1.03	7.31	±	0.38	Y
	10/27/2004	0.42	±	0.63	1.54	±	2.32		12.90	±	1.29	4.77	±	0.48	Y
	11/03/2004	0.74	±	0.45	2.74	±	1.66		16.56	±	1.02	6.13	±	0.38	Y
	11/10/2004	-14.99	±	11.80	-55.46	±	43.67		11.69	±	19.92	4.33	±	7.37	
	11/17/2004	2.10	±	0.45	7.76	±	1.67	Y	44.74	±	1.23	16.55	±	0.45	Y
	11/24/2004	2.00	±	0.52	7.40	±	1.92	Y	32.40	±	1.32	11.99	±	0.49	Y
	12/01/2004	0.49	±	0.40	1.81	±	1.47		24.10	±	1.02	8.92	±	0.38	Y
	12/08/2004	-11.00	±	8.80	-40.70	±	32.56		33.00	±	17.00	12.21	±	6.29	
	12/15/2004	0.55	±	0.37	2.03	±	1.37		13.25	±	0.79	4.90	±	0.29	Y
	12/22/2004	1.47	±	0.53	5.44	±	1.97		27.50	±	1.33	10.18	±	0.49	Y
	12/29/2004	1.88	±	0.40	6.96	±	1.48	Y	22.80	±	0.92	8.44	±	0.34	Y

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

		GROSS ALPHA			GROSS BETA		
Sampling Group and Location	**Sampling Date**	**Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)**	**Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)**	**Result > 3s**	**Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)**	**Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)**	**Result > 3s**
IDAHO FALLS	10/06/2004	1.14 ± 0.53	4.22 ± 1.97		40.39 ± 1.44	14.94 ± 0.53	Y
	10/13/2004	3.73 ± 0.71	13.81 ± 2.61	Y	36.42 ± 1.53	13.47 ± 0.56	Y
	10/20/2004	-0.29 ± 0.42	-1.07 ± 1.56		18.00 ± 1.11	6.66 ± 0.41	Y
	10/27/2004	0.47 ± 0.49	1.74 ± 1.82		18.40 ± 1.15	6.81 ± 0.43	Y
	11/03/2004	0.55 ± 0.46	2.05 ± 1.69		20.34 ± 1.12	7.53 ± 0.42	Y
	11/10/2004	1.01 ± 0.60	3.74 ± 2.20		39.25 ± 1.55	14.52 ± 0.57	Y
	11/17/2004	4.14 ± 0.70	15.33 ± 2.59	Y	51.85 ± 1.62	19.18 ± 0.60	Y
	11/24/2004	2.76 ± 0.64	10.21 ± 2.36	Y	36.10 ± 1.53	13.36 ± 0.57	Y
	12/01/2004	0.97 ± 0.49	3.60 ± 1.80		18.20 ± 1.05	6.73 ± 0.39	Y
	12/08/2004	1.50 ± 0.58	5.55 ± 2.15		44.00 ± 1.60	16.28 ± 0.59	Y
	12/15/2004	0.86 ± 0.48	3.19 ± 1.77		16.10 ± 1.00	5.96 ± 0.37	Y
	12/22/2004	1.74 ± 0.58	6.44 ± 2.15		27.50 ± 1.40	10.18 ± 0.52	Y
	12/29/2004	2.48 ± 0.55	9.18 ± 2.04	Y	31.00 ± 1.28	11.47 ± 0.47	Y
JACKSON	10/06/2004	1.18 ± 0.55	4.36 ± 2.05		33.75 ± 1.39	12.49 ± 0.51	Y
	10/13/2004	2.17 ± 0.58	8.02 ± 2.15	Y	45.13 ± 1.55	16.70 ± 0.57	Y
	10/20/2004	1.02 ± 0.50	3.77 ± 1.86		17.97 ± 1.10	6.65 ± 0.41	Y
	10/27/2004	1.04 ± 0.54	3.85 ± 2.00		15.90 ± 1.13	5.88 ± 0.42	Y
	11/03/2004	1.29 ± 0.49	4.76 ± 1.81		17.60 ± 1.05	6.51 ± 0.39	Y
	11/10/2004	1.06 ± 0.53	3.91 ± 1.96		30.48 ± 1.30	11.28 ± 0.48	Y
	11/17/2004	2.87 ± 0.65	10.61 ± 2.40	Y	45.27 ± 1.56	16.75 ± 0.58	Y
	11/24/2004	2.21 ± 0.64	8.18 ± 2.37	Y	22.50 ± 1.38	8.33 ± 0.51	Y
	12/01/2004	0.51 ± 0.50	1.89 ± 1.83		15.50 ± 1.06	5.74 ± 0.39	Y
	12/08/2004	2.30 ± 0.53	8.51 ± 1.96	Y	29.00 ± 1.20	10.73 ± 0.44	Y
	12/15/2004	0.14 ± 0.45	0.51 ± 1.67		12.71 ± 0.96	4.70 ± 0.36	Y
	12/22/2004	0.90 ± 0.49	3.33 ± 1.80		24.30 ± 1.26	8.99 ± 0.47	Y
	12/29/2004	1.48 ± 0.47	5.48 ± 1.75	Y	32.40 ± 1.24	11.99 ± 0.46	Y
REXBURG CMS	10/06/2004	2.85 ± 0.61	10.53 ± 2.24	Y	41.76 ± 1.43	15.45 ± 0.53	Y
	10/13/2004	2.57 ± 0.61	9.49 ± 2.25	Y	37.59 ± 1.46	13.91 ± 0.54	Y
	10/20/2004	1.15 ± 0.49	4.26 ± 1.82		22.01 ± 1.13	8.14 ± 0.42	Y
	10/27/2004	1.30 ± 0.47	4.81 ± 1.75		17.10 ± 1.00	6.33 ± 0.37	Y
	11/03/2004	1.55 ± 0.46	5.74 ± 1.71	Y	17.98 ± 0.98	6.65 ± 0.36	Y
	11/10/2004	2.66 ± 0.61	9.86 ± 2.25	Y	32.02 ± 1.31	11.85 ± 0.49	Y
	11/17/2004	3.89 ± 0.68	14.38 ± 2.50	Y	49.87 ± 1.58	18.45 ± 0.58	Y
	11/24/2004	1.32 ± 0.46	4.88 ± 1.71		37.70 ± 1.35	13.95 ± 0.50	Y
	12/01/2004	0.66 ± 0.52	2.45 ± 1.94		15.70 ± 1.10	5.81 ± 0.41	Y
	12/08/2004	0.95 ± 0.49	3.52 ± 1.81		34.00 ± 1.30	12.58 ± 0.48	Y
	12/15/2004	0.43 ± 0.43	1.60 ± 1.61		14.89 ± 0.94	5.51 ± 0.35	Y
	12/22/2004	1.74 ± 0.48	6.44 ± 1.77	Y	29.20 ± 1.21	10.80 ± 0.45	Y
	12/29/2004	0.99 ± 0.46	3.65 ± 1.71		27.10 ± 1.21	10.03 ± 0.45	Y
INEEL							
EFS	10/06/2004	1.36 ± 0.73	5.04 ± 2.70		48.34 ± 1.90	17.89 ± 0.70	Y
	10/13/2004	2.36 ± 0.57	8.73 ± 2.11	Y	35.33 ± 1.38	13.07 ± 0.51	Y
	10/20/2004	0.34 ± 0.43	1.25 ± 1.61		20.08 ± 1.09	7.43 ± 0.40	Y
	10/27/2004	0.47 ± 0.48	1.73 ± 1.77		17.10 ± 1.10	6.33 ± 0.41	Y
	11/03/2004	2.16 ± 0.53	8.00 ± 1.98	Y	17.61 ± 1.04	6.52 ± 0.38	Y
	11/10/2004	2.15 ± 0.71	7.97 ± 2.63	Y	43.32 ± 1.70	16.03 ± 0.63	Y
	11/17/2004	2.46 ± 0.52	9.11 ± 1.93	Y	52.30 ± 1.42	19.35 ± 0.53	Y
	11/24/2004	1.32 ± 0.63	4.88 ± 2.32		48.70 ± 1.86	18.02 ± 0.69	Y
	12/01/2004	0.96 ± 0.54	3.53 ± 1.98		25.60 ± 1.25	9.47 ± 0.46	Y
	12/08/2004	1.20 ± 0.51	4.44 ± 1.89		40.00 ± 1.40	14.80 ± 0.52	Y
	12/15/2004	0.83 ± 0.51	3.08 ± 1.89		16.22 ± 1.06	6.00 ± 0.39	Y
	12/22/2004	1.07 ± 0.37	3.96 ± 1.36		23.20 ± 0.97	8.58 ± 0.36	Y
	12/29/2004	1.54 ± 0.49	5.70 ± 1.80	Y	32.70 ± 1.27	12.10 ± 0.47	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^{-11} Bq/mL)			GROSS BETA Result > 3s
MAIN GATE	10/06/2004	1.30	±	0.62	4.82	±	2.30		39.13	±	1.57	14.48	±	0.58	Y
	10/13/2004	1.91	±	0.58	7.06	±	2.14	Y	32.12	±	1.39	11.88	±	0.52	Y
	10/20/2004	0.78	±	0.50	2.88	±	1.86		20.24	±	1.16	7.49	±	0.43	Y
	10/27/2004	0.61	±	0.49	2.25	±	1.80		15.70	±	1.08	5.81	±	0.40	Y
	11/03/2004	0.88	±	0.44	3.25	±	1.63		15.84	±	0.97	5.86	±	0.36	Y
	11/10/2004	2.65	±	0.60	9.80	±	2.22	Y	40.84	±	1.41	15.11	±	0.52	Y
	11/17/2004	3.48	±	0.73	12.87	±	2.70	Y	56.03	±	1.79	20.73	±	0.66	Y
	11/24/2004	1.29	±	0.47	4.77	±	1.74		38.10	±	1.37	14.10	±	0.51	Y
	12/01/2004	1.52	±	0.50	5.62	±	1.86	Y	22.50	±	1.10	8.33	±	0.41	Y
	12/08/2004	1.20	±	0.55	4.44	±	2.04		38.00	±	1.40	14.06	±	0.52	Y
	12/15/2004	1.72	±	0.61	6.37	±	2.27		15.82	±	1.15	5.85	±	0.42	Y
	12/22/2004	1.49	±	0.52	5.51	±	1.91		30.10	±	1.34	11.14	±	0.50	Y
	12/29/2004	1.31	±	0.43	4.85	±	1.59	Y	25.90	±	1.09	9.58	±	0.40	Y
VAN BUREN GATE	10/06/2004	0.78	±	0.55	2.90	±	2.05		34.62	±	1.44	12.81	±	0.53	Y
	10/13/2004	1.96	±	0.58	7.26	±	2.15	Y	33.03	±	1.41	12.22	±	0.52	Y
	10/20/2004	0.32	±	0.46	1.18	±	1.71		19.73	±	1.13	7.30	±	0.42	Y
	10/27/2004	1.79	±	0.56	6.62	±	2.08	Y	16.60	±	1.10	6.14	±	0.41	Y
	11/03/2004	1.27	±	0.50	4.71	±	1.83		16.11	±	1.03	5.96	±	0.38	Y
	11/10/2004	1.33	±	0.58	4.94	±	2.14		41.04	±	1.50	15.19	±	0.56	Y
	11/17/2004	3.02	±	0.58	11.19	±	2.15	Y	50.45	±	1.47	18.67	±	0.54	Y
	11/24/2004	1.84	±	0.48	6.81	±	1.76	Y	35.90	±	1.28	13.28	±	0.47	Y
	12/01/2004	1.22	±	0.54	4.51	±	1.99		26.10	±	1.24	9.66	±	0.46	Y
	12/08/2004	1.70	±	0.53	6.29	±	1.96	Y	34.00	±	1.30	12.58	±	0.48	Y
	12/15/2004	0.58	±	0.51	2.14	±	1.89		16.18	±	1.08	5.99	±	0.40	Y
	12/22/2004	2.49	±	0.54	9.21	±	1.99	Y	29.40	±	1.26	10.88	±	0.47	Y
	12/29/2004	1.68	±	0.46	6.22	±	1.70	Y	31.00	±	1.18	11.47	±	0.44	Y

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

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	10/6/2004	-2.95	±	2.98	-10.92	±	11.03	
	10/13/2004	2.47	±	2.45	9.15	±	9.07	
	10/20/2004	-0.30	±	2.84	-1.09	±	10.51	
	10/27/2004	5.25	±	2.40	19.44	±	8.89	
	11/3/2004	1.32	±	3.24	4.88	±	11.99	
	11/10/2004	2.74	±	2.11	10.13	±	7.82	
	11/17/2004	-1.46	±	2.31	-5.39	±	8.54	
	11/24/2004	1.25	±	2.30	4.63	±	8.51	
	12/1/2004	-1.46	±	1.96	-5.40	±	7.26	
	12/8/2004	-1.93	±	2.73	-7.13	±	10.10	
	12/15/2004	0.51	±	1.96	1.87	±	7.24	
	12/22/2004	-0.53	±	2.21	-1.96	±	8.16	
	12/29/2004	0.61	±	2.48	2.25	±	9.19	
ATOMIC CITY	10/6/2004	-2.30	±	2.32	-8.50	±	8.59	
	10/13/2004	2.92	±	2.90	10.81	±	10.72	
	10/20/2004	-0.25	±	2.41	-0.93	±	8.92	
	10/27/2004	5.33	±	2.44	19.73	±	9.02	
	11/3/2004	0.92	±	2.26	3.41	±	8.37	
	11/10/2004	3.08	±	2.38	11.41	±	8.80	
	11/17/2004	-1.10	±	1.74	-4.06	±	6.43	
	11/24/2004	1.21	±	2.22	4.48	±	8.23	
	12/1/2004	-1.16	±	1.56	-4.30	±	5.79	
	12/8/2004	-2.13	±	3.01	-7.87	±	11.14	
	12/15/2004	0.39	±	1.51	1.45	±	5.60	
	12/22/2004	-0.52	±	2.18	-1.94	±	8.06	
	12/29/2004	0.57	±	2.35	2.12	±	8.68	

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								
BLUE DOME	10/6/2004	-0.52	±	3.04	-1.92	±	11.25	
	10/13/2004	1.03	±	1.65	3.82	±	6.11	
	10/20/2004	1.13	±	1.75	4.19	±	6.46	
	10/27/2004	1.23	±	1.55	4.56	±	5.72	
	11/3/2004	1.26	±	1.79	4.66	±	6.62	
	11/10/2004	0.85	±	1.55	3.13	±	5.74	
	11/17/2004	-2.00	±	1.45	-7.40	±	5.35	
	11/24/2004	0.19	±	1.43	0.71	±	5.29	
	12/1/2004	0.68	±	1.22	2.51	±	4.50	
	12/8/2004	0.58	±	1.76	2.13	±	6.49	
	12/15/2004	1.44	±	1.18	5.33	±	4.38	
	12/22/2004	-0.26	±	1.54	-0.97	±	5.70	
	12/29/2004	-0.08	±	1.32	-0.28	±	4.89	
FAA TOWER	10/6/2004	-0.58	±	3.41	-2.15	±	12.63	
	10/13/2004	1.22	±	1.95	4.52	±	7.22	
	10/20/2004	1.14	±	1.76	4.22	±	6.51	
	10/27/2004	1.48	±	1.86	5.48	±	6.88	
	11/3/2004	1.19	±	1.69	4.39	±	6.24	
	11/10/2004	0.85	±	1.56	3.15	±	5.79	
	11/17/2004	-2.37	±	1.71	-8.77	±	6.34	
	11/24/2004	0.19	±	1.39	0.69	±	5.14	
	12/1/2004	0.80	±	1.43	2.95	±	5.28	
	12/8/2004	0.73	±	2.23	2.71	±	8.23	
	12/15/2004	1.39	±	1.14	5.13	±	4.21	
	12/22/2004	-0.24	±	1.39	-0.87	±	5.14	
	12/29/2004	-0.09	±	1.61	-0.34	±	5.95	

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								
HOWE	10/6/2004	-0.45	±	2.63	-1.66	±	9.74	
	10/13/2004	1.16	±	1.85	4.28	±	6.83	
	10/20/2004	1.07	±	1.65	3.95	±	6.09	
	10/27/2004	1.35	±	1.69	4.98	±	6.25	
	11/3/2004	1.18	±	1.67	4.36	±	6.19	
	11/10/2004	0.88	±	1.61	3.24	±	5.95	
	11/17/2004	-2.17	±	1.57	-8.03	±	5.80	
	11/24/2004	0.18	±	1.36	0.68	±	5.03	
	12/1/2004	0.74	±	1.33	2.74	±	4.91	
	12/8/2004	0.56	±	1.70	2.06	±	6.28	
	12/15/2004	1.52	±	1.24	5.61	±	4.60	
	12/22/2004	-0.21	±	1.26	-0.79	±	4.67	
	12/29/2004	-0.08	±	1.36	-0.29	±	5.02	
MONTEVIEW	10/6/2004	-0.51	±	2.98	-1.88	±	11.01	
	10/13/2004	1.50	±	2.39	5.54	±	8.85	
	10/20/2004	1.23	±	1.90	4.55	±	7.01	
	10/27/2004	1.36	±	1.71	5.03	±	6.31	
	11/3/2004	1.21	±	1.72	4.48	±	6.36	
	11/10/2004	1.15	±	2.10	4.24	±	7.78	
	11/17/2004	-2.26	±	1.63	-8.35	±	6.03	
	11/24/2004	0.19	±	1.41	0.70	±	5.21	
	12/1/2004	0.82	±	1.46	3.03	±	5.42	
	12/8/2004	0.61	±	1.85	2.25	±	6.85	
	12/15/2004	1.48	±	1.21	5.47	±	4.49	
	12/22/2004	-0.27	±	1.57	-0.99	±	5.82	
	12/29/2004	-0.09	±	1.50	-0.32	±	5.55	

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								
MUD LAKE	10/6/2004	-0.50	±	2.93	-1.85	±	10.83	
	10/13/2004	1.15	±	1.84	4.25	±	6.79	
	10/20/2004	1.09	±	1.68	4.03	±	6.21	
	10/27/2004	1.35	±	1.69	4.98	±	6.25	
	11/3/2004	1.37	±	1.94	5.06	±	7.19	
	11/10/2004	0.93	±	1.71	3.44	±	6.32	
	11/17/2004	-2.43	±	1.76	-8.99	±	6.50	
	11/24/2004	0.18	±	1.36	0.68	±	5.04	
	12/8/2004	0.73	±	2.21	2.69	±	8.19	
	12/15/2004	1.61	±	1.32	5.95	±	4.88	
	12/22/2004	-0.26	±	1.56	-0.98	±	5.77	
	12/29/2004	-0.08	±	1.46	-0.31	±	5.41	
	12/1/2004	0.82	±	1.46	3.02	±	5.41	
MUD LAKE (Q/A-2)	10/6/2004	-0.58	±	3.42	-2.16	±	12.66	
	10/13/2004	1.27	±	2.02	4.68	±	7.48	
	10/20/2004	1.37	±	2.12	5.08	±	7.83	
	10/27/2004	1.23	±	1.55	4.56	±	5.72	
	11/3/2004	1.27	±	1.80	4.70	±	6.67	
	11/10/2004	0.87	±	1.59	3.21	±	5.88	
	11/17/2004	-2.87	±	2.07	-10.61	±	7.67	
	11/24/2004	0.20	±	1.48	0.74	±	5.49	
	12/1/2004	0.96	±	1.73	3.57	±	6.39	
	12/8/2004	0.70	±	2.12	2.58	±	7.84	
	12/15/2004	2.02	±	1.66	7.49	±	6.15	
	12/22/2004	-0.27	±	1.61	-1.01	±	5.95	
	12/29/2004	-0.09	±	1.56	-0.33	±	5.78	

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	10/6/2004	-2.19	±	2.21	-8.11	±	8.19	
	10/13/2004	2.21	±	2.19	8.16	±	8.09	
	10/20/2004	-2.58	±	24.75	-9.53	±	91.56	
	10/27/2004	4.14	±	1.89	15.30	±	7.00	
	11/3/2004	0.82	±	2.01	3.02	±	7.43	
	11/10/2004	2.58	±	1.99	9.55	±	7.37	
	11/17/2004	-1.31	±	2.07	-4.85	±	7.68	
	11/24/2004	1.07	±	1.97	3.97	±	7.30	
	12/1/2004	-1.23	±	1.65	-4.54	±	6.11	
	12/8/2004	-1.74	±	2.46	-6.42	±	9.09	
	12/15/2004	0.48	±	1.85	1.77	±	6.85	
	12/22/2004	-1.02	±	4.24	-3.77	±	15.70	
	12/29/2004	0.51	±	2.08	1.88	±	7.68	
BLACKFOOT CMS (Q/A-1)	10/6/2004	-2.71	±	2.74	-10.02	±	10.12	
	10/13/2004	2.85	±	2.83	10.56	±	10.47	
	10/20/2004	-0.38	±	3.63	-1.40	±	13.42	
	10/27/2004	5.76	±	2.63	21.30	±	9.74	
	11/3/2004	1.28	±	3.15	4.75	±	11.66	
	11/10/2004	3.65	±	2.81	13.49	±	10.40	
	11/17/2004	-1.67	±	2.64	-6.18	±	9.78	
	11/24/2004	1.45	±	2.67	5.38	±	9.88	
	12/1/2004	-1.68	±	2.25	-6.20	±	8.34	
	12/8/2004	-2.30	±	3.25	-8.50	±	12.04	
	12/15/2004	0.61	±	2.35	2.25	±	8.68	
	12/22/2004	-0.72	±	3.01	-2.67	±	11.14	
	12/29/2004	0.63	±	2.56	2.32	±	9.47	

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								
CRATERS	10/6/2004	-2.99	±	3.02	-11.07	±	11.17	
	10/13/2004	3.09	±	3.06	11.42	±	11.31	
	10/20/2004	-0.38	±	3.63	-1.40	±	13.44	
	10/27/2004	6.23	±	2.85	23.05	±	10.54	
	11/3/2004	1.25	±	3.07	4.62	±	11.35	
	11/10/2004	3.51	±	2.70	12.97	±	10.00	
	11/17/2004	-1.59	±	2.51	-5.87	±	9.28	
	11/24/2004	1.29	±	2.38	4.79	±	8.80	
	12/1/2004	-1.72	±	2.32	-6.38	±	8.58	
	12/8/2004	-2.05	±	2.91	-7.60	±	10.76	
	12/15/2004	0.00	±	0.00	0.00	±	0.00	
	12/22/2004	-0.64	±	2.67	-2.37	±	9.87	
	12/29/2004	0.66	±	2.69	2.44	±	9.97	
DUBOIS	10/6/2004	-0.62	±	3.66	-2.31	±	13.54	
	10/13/2004	1.21	±	1.93	4.46	±	7.13	
	10/20/2004	1.16	±	1.78	4.28	±	6.60	
	10/27/2004	1.99	±	2.50	7.37	±	9.25	
	11/3/2004	1.47	±	2.09	5.45	±	7.74	
	11/10/2004	27.88	±	51.18	103.14	±	189.38	
	11/17/2004	-2.04	±	1.47	-7.54	±	5.45	
	11/24/2004	0.21	±	1.57	0.78	±	5.82	
	12/1/2004	0.73	±	1.31	2.70	±	4.85	
	12/8/2004	16.36	±	49.78	60.54	±	184.19	
	12/15/2004	1.41	±	1.16	5.22	±	4.29	
	12/22/2004	-0.31	±	1.84	-1.16	±	6.82	
	12/29/2004	-0.07	±	1.25	-0.27	±	4.64	

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								
IDAHO FALLS	10/6/2004	-1.76	±	1.81	-6.51	±	6.69	
	10/13/2004	-0.54	±	3.15	-1.99	±	11.66	
	10/20/2004	1.33	±	2.12	4.92	±	7.86	
	10/27/2004	1.35	±	2.09	5.01	±	7.73	
	11/3/2004	1.51	±	1.89	5.58	±	7.00	
	11/10/2004	1.54	±	2.19	5.72	±	8.12	
	11/17/2004	1.10	±	2.01	4.06	±	7.45	
	11/24/2004	-2.97	±	2.14	-10.98	±	7.93	
	12/1/2004	0.25	±	1.87	0.93	±	6.93	
	12/8/2004	0.87	±	1.56	3.22	±	5.76	
	12/15/2004	0.79	±	2.39	2.91	±	8.86	
	12/22/2004	1.80	±	1.47	6.65	±	5.45	
	12/29/2004	-0.34	±	1.98	-1.24	±	7.31	
JACKSON	10/6/2004	-0.10	±	1.76	-0.38	±	6.51	
	10/13/2004	-2.46	±	2.49	-9.11	±	9.20	
	10/20/2004	2.62	±	2.60	9.70	±	9.61	
	10/27/2004	-0.30	±	2.89	-1.11	±	10.69	
	11/3/2004	5.88	±	2.69	21.76	±	9.95	
	11/10/2004	1.21	±	2.96	4.46	±	10.96	
	11/17/2004	3.21	±	2.48	11.88	±	9.17	
	11/24/2004	-1.58	±	2.51	-5.86	±	9.28	
	12/1/2004	-11.97	±	3.15	-44.29	±	11.67	
	12/8/2004	-1.57	±	2.11	-5.81	±	7.81	
	12/15/2004	-1.90	±	2.69	-7.03	±	9.95	
	12/22/2004	0.52	±	2.01	1.92	±	7.43	
	12/29/2004	0.07	±	2.19	0.27	±	8.10	

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								
REXBURG CMS	10/6/2004	-0.52	±	3.05	-1.92	±	11.28	
	10/13/2004	1.22	±	1.95	4.52	±	7.22	
	10/20/2004	1.27	±	1.96	4.69	±	7.23	
	10/27/2004	1.28	±	1.61	4.74	±	5.95	
	11/3/2004	1.33	±	1.89	4.91	±	6.98	
	11/10/2004	0.95	±	1.74	3.52	±	6.46	
	11/17/2004	-2.91	±	2.10	-10.76	±	7.78	
	11/24/2004	0.20	±	1.49	0.74	±	5.51	
	12/1/2004	0.99	±	1.77	3.66	±	6.56	
	12/8/2004	0.69	±	2.11	2.56	±	7.79	
	12/15/2004	1.71	±	1.41	6.34	±	5.20	
	12/22/2004	-0.26	±	1.53	-0.96	±	5.67	
	12/29/2004	-0.10	±	1.75	-0.37	±	6.47	
INEEL								
EFS	10/06/2004	-3.27	±	3.31	-12.12	±	12.24	
	10/13/2004	2.53	±	2.50	9.35	±	9.26	
	10/20/2004	-0.28	±	2.72	-1.05	±	10.05	
	10/27/2004	5.55	±	2.54	20.54	±	9.39	
	11/03/2004	1.19	±	2.91	4.39	±	10.78	
	11/10/2004	4.01	±	3.09	14.83	±	11.44	
	11/17/2004	-1.22	±	1.93	-4.52	±	7.15	
	11/24/2004	1.70	±	3.13	6.29	±	11.57	
	12/01/2004	-1.60	±	2.15	-5.91	±	7.94	
	12/08/2004	-2.06	±	2.92	-7.63	±	10.80	
	12/15/2004	0.54	±	2.09	2.00	±	7.73	
	12/22/2004	-0.43	±	1.81	-1.60	±	6.68	
	12/29/2004	0.59	±	2.43	2.20	±	9.00	

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
INEEL								
MAIN GATE	10/06/2004	-2.76	±	2.79	-10.21	±	10.30	
	10/13/2004	2.73	±	2.70	10.09	±	10.00	
	10/20/2004	-0.31	±	2.99	-1.15	±	11.06	
	10/27/2004	5.55	±	2.54	20.55	±	9.40	
	11/03/2004	1.14	±	2.79	4.21	±	10.33	
	11/10/2004	3.07	±	2.37	11.36	±	8.76	
	11/17/2004	-1.73	±	2.74	-6.40	±	10.12	
	11/24/2004	1.20	±	2.21	4.46	±	8.19	
	12/08/2004	-2.27	±	3.21	-8.39	±	11.89	
	12/15/2004	0.61	±	2.35	2.25	±	8.70	
	12/22/2004	-0.62	±	2.57	-2.28	±	9.49	
	12/29/2004	0.53	±	2.17	1.97	±	8.04	
	12/01/2004	-1.39	±	1.87	-5.15	±	6.92	
VAN BUREN GATE	10/06/2004	-2.58	±	2.60	-9.53	±	9.62	
	10/13/2004	2.73	±	2.70	10.09	±	10.00	
	10/20/2004	-0.30	±	2.91	-1.12	±	10.78	
	10/27/2004	5.60	±	2.56	20.71	±	9.47	
	11/03/2004	1.23	±	3.02	4.55	±	11.19	
	11/10/2004	3.40	±	2.62	12.56	±	9.69	
	11/17/2004	-1.33	±	2.10	-4.91	±	7.78	
	11/24/2004	1.13	±	2.07	4.17	±	7.66	
	12/08/2004	-2.07	±	2.93	-7.66	±	10.85	
	12/15/2004	0.56	±	2.15	2.06	±	7.96	
	12/22/2004	-0.57	±	2.36	-2.09	±	8.72	
	12/29/2004	0.54	±	2.21	2.00	±	8.19	
	12/01/2004	-1.56	±	2.09	-5.76	±	7.75	

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-239/240, and Strontium-90 Concentrations in Composite 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	12/31/2004	CESIUM-137	-156.00	±	121.00	-577.20	±	447.70	
		STRONTIUM-90	21.70	±	17.00	80.29	±	62.90	
ATOMIC CITY	12/31/2004	CESIUM-137	29.50	±	82.20	109.15	±	304.14	
		STRONTIUM-90	34.80	±	17.00	128.76	±	62.90	
BLUE DOME	12/31/2004	CESIUM-137	-290.00	±	220.00	-1073.00	±	814.00	
		STRONTIUM-90	-0.23	±	9.80	-0.84	±	36.26	
FAA TOWER	12/31/2004	AMERICIUM-241	2.50	±	0.85	9.25	±	3.15	
		CESIUM-137	195.00	±	86.40	721.50	±	319.68	
		CESIUM-137 (Recount)	167.00	±	91.50	617.90	±	338.55	
		PLUTONIUM-238	-1.66	±	0.97	-6.14	±	3.59	
		PLUTONIUM-239/40	1.11	±	0.79	4.11	±	2.92	
HOWE	12/31/2004	AMERICIUM-241	0.26	±	0.44	0.94	±	1.63	
		CESIUM-137	-49.60	±	108.00	-183.52	±	399.60	
		PLUTONIUM-238	1.26	±	0.63	4.66	±	2.33	
		PLUTONIUM-239/40	5.03	±	1.30	18.61	±	4.81	Y
MONTEVIEW	12/31/2004	AMERICIUM-241	0.94	±	0.83	3.48	±	3.07	
		CESIUM-137	-4.35	±	242.00	-16.10	±	895.40	
		PLUTONIUM-238	-0.30	±	0.52	-1.12	±	1.92	
		PLUTONIUM-239/40	0.30	±	0.80	1.12	±	2.96	
MUD LAKE	12/31/2004	CESIUM-137	84.50	±	86.90	312.65	±	321.53	
		STRONTIUM-90	9.65	±	11.00	35.71	±	40.70	
MUD LAKE (Q/A-2)	12/31/2004	CESIUM-137	-38.30	±	132.00	-141.71	±	488.40	
		STRONTIUM-90	3.78	±	12.00	13.99	±	44.40	
DISTANT									
BLACKFOOT	12/31/2004	CESIUM-137	56.30	±	106.00	208.31	±	392.20	
		STRONTIUM-90	39.60	±	12.00	146.52	±	44.40	Y

TABLE C-3. Quarterly Americium-241, Cesium-137, Plutonium-238, Plutonium-239/240, and Strontium-90 Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty (x 10^{-18} µCi/mL)			Result ± 1s Uncertainty (x 10^{-13} Bq/mL)			Result > 3s
(Q/A-1)	12/31/2004	CESIUM-137	-10.50	±	105.00	-38.85	±	388.50	
		STRONTIUM-90	-35.60	±	13.00	-131.72	±	48.10	
MOON	12/31/2004	CESIUM-137	2.00	±	0.91	7.40	±	3.37	
		PLUTONIUM-238	111.00	±	156.00	410.70	±	577.20	
		PLUTONIUM-239/40	0.95	±	1.30	3.51	±	4.81	
DUBOIS	12/31/2004	CESIUM-137	-28.70	±	137.00	-106.19	±	506.90	
		STRONTIUM-90	0.40	±	13.00	1.49	±	48.10	
IDAHO FALLS	12/31/2004	AMERICIUM-241	1.30	±	0.80	4.81	±	2.96	
		CESIUM-137	-571.00	±	283.00	-2112.70	±	1047.10	
		PLUTONIUM-238	0.00	±	0.61	0.00	±	2.26	
		PLUTONIUM-239/40	3.04	±	1.30	11.25	±	4.81	
JACKSON	12/31/2004	CESIUM-137	85.50	±	98.20	316.35	±	363.34	
		STRONTIUM-90	12.40	±	11.00	45.88	±	40.70	
REXBURG CMS	12/31/2004	AMERICIUM-241	0.95	±	0.55	3.50	±	2.04	
		CESIUM-137	-24.50	±	133.00	-90.65	±	492.10	
		CESIUM-137 (Recount)	-152.00	±	130.00	-562.40	±	481.00	
		PLUTONIUM-238	-0.91	±	1.10	-3.36	±	4.07	
		PLUTONIUM-239/40	0.45	±	0.79	1.68	±	2.92	
INL									
FIELD STATION	12/31/2004	AMERICIUM-241	3.25	±	2.30	12.03	±	8.51	
		CESIUM-137	-490.00	±	270.00	-1813.00	±	999.00	
		CESIUM-137 (Recount)	-467.00	±	274.00	-1727.90	±	1013.80	
		PLUTONIUM-238	-0.44	±	0.76	-1.61	±	2.81	
		PLUTONIUM-239/40	1.74	±	0.88	6.44	±	3.26	
MAIN GATE	12/31/2004	CESIUM-137	194.00	±	127.00	717.80	±	469.90	
	12/31/2004	STRONTIUM-90	16.90	±	15.00	62.53	±	55.50	
VAN BUREN GATE	12/31/2004	AMERICIUM-241	0.67	±	0.82	2.46	±	3.03	
		CESIUM-137	-148.00	±	135.00	-547.60	±	499.50	
		PLUTONIUM-238	0.44	±	0.98	1.61	±	3.63	
		PLUTONIUM-239/40	0.87	±	0.62	3.22	±	2.29	

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	10/01/2004	10/26/2004	0.49	±	0.19	1.81	±	0.69	Molecular Sieve	
ATOMIC CITY	09/28/2004	11/01/2004	0.44	±	0.13	1.62	±	0.47	Molecular Sieve	Y
DISTANT										
BLACKFOOT CMS	09/14/2004	10/07/2004	2.99	±	1.63	11.08	±	6.02	Molecular Sieve	
BLACKFOOT CMS	09/21/2004	10/12/2004	4.35	±	1.97	16.09	±	7.27	Molecular Sieve	
BLACKFOOT CMS	10/12/2004	11/01/2004	0.14	±	0.20	0.52	±	0.73	Molecular Sieve	
BLACKFOOT CMS	10/07/2004	11/01/2004	0.04	±	0.24	0.15	±	0.90	Molecular Sieve	
IDAHO FALLS	09/10/2004	10/04/2004	0.31	±	0.26	1.16	±	0.95	Molecular Sieve	
IDAHO FALLS	10/04/2004	11/01/2004	2.52	±	0.22	9.31	±	0.82	Molecular Sieve	Y
IDAHO FALLS	11/01/2004	11/29/2004	0.55	±	0.13	2.03	±	0.48	Molecular Sieve	Y
IDAHO FALLS	11/29/2004	12/23/2004	0.16	±	0.09	0.59	±	0.33	Molecular Sieve	
REXBURG CMS	09/14/2004	10/12/2004	7.75	±	1.80	28.66	±	6.67	Molecular Sieve	Y
REXBURG CMS	10/01/2004	10/19/2004	0.03	±	0.10	0.10	±	0.38	Molecular Sieve	

TABLE C-5. PM-10 Concentrations at Atomic City, Blackfoot CMS and Rexburg CMS

Location	Sampling Date	Concentration (μg/m^3)	Comments
ATOMIC CITY	10/5/2004	12.47	
	10/11/2004	4.03	
	10/17/2004	18.09	
	10/23/2004	0.20	Only ran 16.9 hours-tripped breaker
	10/29/2004	1.16	
	11/4/2004	3.17	
	11/10/2004	8.58	
	11/16/2004	8.58	
	11/22/2004	7.08	
	11/28/2004	7.53	
	12/4/2004	4.72	
	12/10/2004	6.93	
	12/16/2004	8.24	
	12/22/2004	7.13	
	12/28/2004	11.06	Two-week sample
BLACKFOOT	10/5/2004	16.97	
	10/11/2004	15.87	Ran for an extended period of time
	10/17/2004	35.31	
	10/23/2004	2.73	
	10/29/2004	1.89	
	11/4/2004	9.90	
	11/10/2004	9.64	
	11/16/2004	20.37	
	11/22/2004	17.20	
	11/28/2004	12.77	
	12/4/2004	11.38	
	12/10/2004	5.77	
	12/16/2004	7.75	
	12/22/2004	7.67	
	12/28/2004	7.80	
REXBURG	10/5/2004	38.44	
	10/11/2004	13.07	
	10/17/2004	20.29	
	10/23/2004	3.18	
	10/29/2004	4.62	
	11/4/2004	20.03	
	11/10/2004	20.61	
	11/16/2004	28.76	
	11/22/2004	13.05	
	11/28/2004	11.74	
	12/4/2004	9.47	
	12/10/2004	5.75	
	12/16/2004	11.52	
	12/22/2004	8.91	
	12/28/2004	8.31	

TABLE C-6. Monthly and Weekly Tritium Concentrations in Precipitation.

Location		Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
CFA		9/1/2004	10/1/2004	117.00	±	25.80	4.33	±	0.95	Y
	Split	10/1/2004	11/1/2004	94.30	±	25.60	3.49	±	0.95	Y
		10/1/2004	11/1/2004	105.00	±	25.90	3.89	±	0.96	Y
EFS		10/20/2004	10/27/2004	200.00	±	28.10	7.40	±	1.04	Y
	Split	10/20/2004	10/27/2004	168.00	±	27.40	6.22	±	1.01	Y
		10/27/2004	11/3/2004	133.00	±	26.20	4.92	±	0.97	Y
	Split	10/27/2004	11/3/2004	75.30	±	25.30	2.79	±	0.94	

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

Sampling Type and Location	Analyte	Sampling Date	Concentration Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
DRINKING WATER									
ARCO									
	GROSS ALPHA	11/10/2004	-0.16	±	0.77	-0.01	±	0.03	
	GROSS BETA	11/10/2004	1.08	±	0.90	0.04	±	0.03	
	TRITIUM	11/10/2004	137.00	±	31.30	5.07	±	1.16	Y
ATOMIC CITY									
	GROSS ALPHA	11/10/2004	1.15	±	0.81	0.04	±	0.03	
	GROSS BETA	11/10/2004	4.92	±	0.89	0.18	±	0.03	Y
	TRITIUM	11/10/2004	140.00	±	30.80	5.19	±	1.14	Y
CAREY									
	GROSS ALPHA	11/10/2004	0.52	±	0.74	0.02	±	0.03	
	GROSS BETA	11/10/2004	1.81	±	0.86	0.07	±	0.03	
	TRITIUM	11/10/2004	71.80	±	29.40	2.66	±	1.09	
FORT HALL									
	GROSS ALPHA	11/12/2004	-0.52	±	1.01	-0.02	±	0.04	
	GROSS BETA	11/12/2004	6.75	±	1.10	0.25	±	0.04	Y
	TRITIUM	11/12/2004	137.00	±	31.20	5.07	±	1.16	Y
HOWE									
	GROSS ALPHA	11/11/2004	0.13	±	0.99	0.00	±	0.04	
	GROSS BETA	11/11/2004	5.12	±	1.01	0.19	±	0.04	Y
	TRITIUM	11/11/2004	142.00	±	30.20	5.26	±	1.12	Y
IDAHO FALLS									
	GROSS ALPHA	11/11/2004	1.24	±	0.88	0.05	±	0.03	
	GROSS BETA	11/11/2004	1.22	±	0.86	0.05	±	0.03	
	TRITIUM	11/11/2004	87.60	±	31.70	3.24	±	1.17	
MINIDOKA									
	GROSS ALPHA	11/11/2004	0.58	±	0.78	0.02	±	0.03	
	GROSS BETA	11/11/2004	5.31	±	0.93	0.20	±	0.03	Y
	TRITIUM	11/11/2004	1.29	±	24.50	0.05	±	0.91	
MONTEVIEW									
	GROSS ALPHA	11/09/2004	0.71	±	0.93	0.03	±	0.03	
	GROSS BETA	11/09/2004	3.04	±	0.97	0.11	±	0.04	Y
	TRITIUM	11/09/2004	139.00	±	26.40	5.15	±	0.98	Y

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

Sampling Type and Location	Analyte	Sampling Date	Concentration Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
MONTEVIEW DUPLICATE									
	GROSS ALPHA (Duplicate)	11/09/2004	-0.44	±	0.74	-0.02	±	0.03	
	GROSS BETA (Duplicate)	11/09/2004	3.75	±	0.87	0.14	±	0.03	Y
	TRITIUM (Duplicate)	11/09/2004	-21.90	±	23.90	-0.81	±	0.89	
MORELAND									
	GROSS ALPHA	11/11/2004	1.31	±	1.18	0.05	±	0.04	
	GROSS BETA	11/11/2004	4.18	±	1.05	0.15	±	0.04	Y
	TRITIUM	11/11/2004	3.78	±	24.50	0.14	±	0.91	
MUD LAKE									
	GROSS ALPHA	11/10/2004	0.62	±	0.62	0.02	±	0.02	
	GROSS BETA	11/10/2004	4.22	±	0.95	0.16	±	0.04	Y
	TRITIUM	11/10/2004	78.80	±	25.30	2.92	±	0.94	Y
ROBERTS									
	GROSS ALPHA	11/08/2004	1.10	±	1.01	0.04	±	0.04	
	GROSS BETA	11/08/2004	2.99	±	0.98	0.11	±	0.04	Y
	TRITIUM	11/08/2004	54.60	±	25.00	2.02	±	0.93	
SHOSHONE									
	GROSS ALPHA	11/09/2004	0.94	±	0.86	0.03	±	0.03	
	GROSS BETA	11/09/2004	2.81	±	0.95	0.10	±	0.04	
	TRITIUM	11/09/2004	-13.80	±	22.70	-0.51	±	0.84	
TABER									
	GROSS ALPHA	11/09/2004	1.43	±	1.14	0.05	±	0.04	
	GROSS BETA	11/09/2004	2.73	±	1.00	0.10	±	0.04	
	TRITIUM	11/09/2004	81.90	±	25.60	3.03	±	0.95	Y
SURFACE WATER									
BLISS									
	GROSS ALPHA	11/09/2004	2.70	±	1.11	0.10	±	0.04	
	GROSS BETA	11/09/2004	7.14	±	0.98	0.26	±	0.04	Y
	TRITIUM	11/09/2004	70.50	±	32.20	2.61	±	1.19	
BUHL									
	GROSS ALPHA	11/09/2004	0.70	±	0.86	0.03	±	0.03	
	GROSS BETA	11/09/2004	3.85	±	0.88	0.14	±	0.03	Y
	TRITIUM	11/09/2004	-47.20	±	23.20	-1.75	±	0.86	

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

Sampling Type and Location	Analyte	Sampling Date	Concentration Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
HAGERMAN									
	GROSS ALPHA	11/09/2004	-0.42	±	0.75	-0.02	±	0.03	
	GROSS BETA	11/09/2004	1.44	±	0.89	0.05	±	0.03	
	TRITIUM	11/09/2004	86.80	±	25.80	3.21	±	0.96	Y
HAGERMAN									
DUPLICATE	GROSS ALPHA	11/09/2004	-0.77	±	0.71	-0.03	±	0.03	
	GROSS BETA	11/09/2004	2.90	±	0.92	0.11	±	0.03	Y
	TRITIUM	11/09/2004	39.60	±	30.50	1.47	±	1.13	
IDAHO FALLS									
	GROSS ALPHA	11/08/2004	-0.31	±	0.76	-0.01	±	0.03	
	GROSS BETA	11/08/2004	1.14	±	0.93	0.04	±	0.03	
	TRITIUM	11/08/2004	66.20	±	25.30	2.45	±	0.94	
TWIN FALLS									
	GROSS ALPHA	11/09/2004	-0.20	±	1.18	-0.01	±	0.04	
	GROSS ALPHA (Split)	11/09/2004	-0.08	±	0.96	0.00	±	0.04	
	GROSS BETA	11/09/2004	3.34	±	1.06	0.12	±	0.04	Y
	TRITIUM	11/09/2004	17.00	±	23.70	0.63	±	0.88	
	TRITIUM (Split)	11/09/2004	-16.80	±	23.90	-0.62	±	0.89	

TABLE C-8. Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk.

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi†/L)	Iodine-131 Result ± 1s Uncertainty (Bq‡/L)	Iodine-131 Result > 3s	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Cesium-137 Result > 3s
BLACKFOOT							
	10/05/2004	-0.41 ± 1.88	-0.015 ± 0.070		-0.79 ± 1.18	-0.029 ± 0.044	
Duplicate	10/05/2004	-3.45 ± 1.17	-0.128 ± 0.043		0.20 ± 0.85	0.007 ± 0.031	
	11/02/2004	1.53 ± 1.15	0.057 ± 0.043		1.24 ± 0.91	0.046 ± 0.034	
	12/07/2004	1.65 ± 0.98	0.061 ± 0.036		0.76 ± 0.87	0.028 ± 0.032	
CAREY							
	10/05/2004	-2.55 ± 2.27	-0.094 ± 0.084		2.98 ± 2.71	0.110 ± 0.100	
	11/02/2004	0.42 ± 1.49	0.016 ± 0.055		1.46 ± 1.14	0.054 ± 0.042	
	12/07/2004	1.50 ± 1.19	0.056 ± 0.044		-1.41 ± 0.93	-0.052 ± 0.035	
DIETRICH					±		
	10/05/2004	-0.24 ± 1.13	-0.009 ± 0.042		0.71 ± 0.96	0.026 ± 0.036	
	11/02/2004	-0.19 ± 0.91	-0.007 ± 0.034		0.53 ± 0.85	0.020 ± 0.031	
	12/07/2004	0.93 ± 1.49	0.034 ± 0.055		0.76 ± 1.13	0.028 ± 0.042	
HOWE							
	10/05/2004	0.07 ± 2.54	0.002 ± 0.094		4.95 ± 2.75	0.183 ± 0.102	
	11/02/2004	-0.14 ± 1.71	-0.005 ± 0.063		-1.12 ± 1.15	-0.041 ± 0.043	
	12/07/2004	0.91 ± 2.22	0.034 ± 0.082		2.35 ± 2.73	0.087 ± 0.101	
IDAHO FALLS							
	10/05/2004	0.40 ± 2.31	0.015 ± 0.086		-1.55 ± 1.17	-0.057 ± 0.043	
	10/13/2004	0.26 ± 2.19	0.010 ± 0.081		0.70 ± 2.68	0.026 ± 0.099	
	10/20/2004	0.23 ± 1.12	0.009 ± 0.041		-0.0113 ± 0.941	0.000 ± 0.035	
	10/27/2004	-0.98 ± 1.13	-0.036 ± 0.042		-0.428 ± 0.924	-0.016 ± 0.034	
	11/02/2004	-2.85 ± 2.53	-0.106 ± 0.094		3.84 ± 2.79	0.142 ± 0.103	
	11/10/2004	-2.89 ± 2.16	-0.107 ± 0.080		0.70 ± 2.74	0.026 ± 0.101	
	11/17/2004	-1.01 ± 1.99	-0.037 ± 0.074		5.43 ± 2.73	0.201 ± 0.101	
	11/24/2004	-1.32 ± 1.00	-0.049 ± 0.037		0.30 ± 0.91	0.011 ± 0.034	
	12/01/2004	0.00 ± 1.06	0.000 ± 0.039		0.70 ± 0.89	0.026 ± 0.033	
	12/07/2004	0.47 ± 1.93	0.017 ± 0.071		4.58 ± 2.74	0.170 ± 0.101	
	12/15/2004	0.20 ± 1.02	0.007 ± 0.038		-0.71 ± 0.91	-0.026 ± 0.034	
	12/22/2004	0.34 ± 0.99	0.013 ± 0.037		1.30 ± 0.91	0.048 ± 0.034	
	12/29/2004	0.01 ± 1.01	0.000 ± 0.037		-0.85 ± 0.90	-0.031 ± 0.033	

TABLE C-8. 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
MORELAND															
	10/05/2004	-0.58	±	1.69	-0.021	±	0.063		1.37	±	1.11	0.051	±	0.041	
	11/02/2004	-1.53	±	2.10	-0.057	±	0.078		3.13	±	2.73	0.116	±	0.101	
	12/07/2004	0.70	±	0.91	0.026	±	0.034		-1.11	±	0.81	-0.041	±	0.030	
ROBERTS															
	10/05/2004	0.35	±	1.35	0.013	±	0.050		-0.28	±	0.97	-0.010	±	0.036	
	11/02/2004	0.11	±	1.10	0.004	±	0.041		-0.14	±	0.92	-0.005	±	0.034	
	12/07/2004	0.18	±	1.68	0.007	±	0.062		1.59	±	1.05	0.059	±	0.039	
Duplicate	12/07/2004	-2.16	±	1.58	-0.080	±	0.059		-0.16	±	0.90	-0.006	±	0.033	
RUPERT															
	10/05/2004	0.64	±	2.14	0.024	±	0.079		2.04	±	2.70	0.076	±	0.100	
	11/02/2004	-1.32	±	0.99	-0.049	±	0.037		1.26	±	0.83	0.047	±	0.031	
	12/07/2004	-1.87	±	2.10	-0.069	±	0.078		6.02	±	2.63	0.223	±	0.097	
TERRETON															
	10/05/2004	1.65	±	2.09	0.061	±	0.077		0.71	±	1.09	0.026	±	0.040	
	11/02/2004	-1.48	±	1.99	-0.055	±	0.074		-0.57	±	1.15	-0.021	±	0.043	
	12/07/2004	0.07	±	1.05	0.003	±	0.039		0.44	±	0.91	0.016	±	0.034	

TABLE C-9. Bi-Annual Strontium-90 and Tritium Concentrations in Milk.

		Strontium-90						
Location	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
DIETRICH	11/02/2004	0.68	±	0.22	0.025	±	0.008	Y
HOWE	11/02/2004	0.65	±	0.22	0.024	±	0.008	
MORELAND	11/02/2004	0.32	±	0.27	0.012	±	0.010	
ROBERTS	11/02/2004	1.17	±	0.18	0.043	±	0.007	Y
		Tritium						
		Concentration ± 1s (pCi/L)			**Concentration ± 1s (Bq/L)**			**Result > 3s**
BLACKFOOT	12/07/2004	107.00	±	26.50	3.963	±	0.981	Y
CAREY	12/07/2004	49.80	±	25.20	1.844	±	0.933	
IDAHO FALLS	12/07/2004	79.90	±	25.20	2.959	±	0.933	Y
RUPERT	12/07/2004	78.50	±	25.90	2.907	±	0.959	Y
TERRETON	12/07/2004	78.20	±	25.90	2.896	±	0.959	Y

TABLE C-10. Cesium-137 and Strontium-90 Concentrations in Potatoes.

		Cesium-137						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty bq/kg**			
Sampling Date	**Location**							**Result > 3s**
9/29/2004	ARCO	0.99	±	1.53	0.04	±	0.06	
9/29/2004	ARCO	2.26	±	1.29	0.08	±	0.05	
10/7/2004	BLACKFOOT	-5.01	±	6.33	-0.19	±	0.23	
9/9/2004	COLORADO	2.10	±	1.57	0.08	±	0.06	
9/9/2004	COLORADO	-0.78	±	1.60	-0.03	±	0.06	
9/28/2004	HOWE	-2.41	±	1.53	-0.09	±	0.06	
9/28/2004	HOWE	-0.84	±	1.43	-0.03	±	0.05	
9/28/2004	HOWE	-5.92	±	5.75	-0.22	±	0.21	
9/28/2004	HOWE	-1.39	±	1.50	-0.05	±	0.06	
10/1/2004	IDAHO FALLS	-9.74	±	5.62	-0.36	±	0.21	
10/1/2004	MONTEVIEW	-6.25	±	5.83	-0.23	±	0.22	
9/30/2004	MUD LAKE	0.46	±	1.49	0.02	±	0.06	
9/30/2004	MUD LAKE	-7.31	±	5.66	-0.27	±	0.21	
10/5/2004	RUPERT	-5.92	±	5.44	-0.22	±	0.20	
10/5/2004	RUPERT	1.74	±	1.37	0.06	±	0.05	
10/5/2004	TABER	-0.29		1.34	-0.01	±	0.05	
		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty bq/kg**			**Result > 3s**
9/29/2004	ARCO	126.00	±	75.00	4.67	±	2.78	
10/7/2004	BLACKFOOT	99.60	±	60.00	3.69	±	2.22	
9/9/2004	COLORADO	6.79	±	65.00	0.25	±	2.41	
9/28/2004	HOWE	-59.80	±	75.00	-2.21	±	2.78	
9/28/2004	HOWE	101.00	±	99.00	3.74	±	3.67	
10/1/2004	IDAHO FALLS	-45.50	±	60.00	-1.69	±	2.22	
10/1/2004	MONTEVIEW	240.00	±	75.00	8.89	±	2.78	Y
9/30/2004	MUD LAKE	52.60	±	65.00	1.95	±	2.41	
10/5/2004	RUPERT	116.00	±	75.00	4.30	±	2.78	
10/5/2004	TABER	83.90	±	33.60	3.11	±	1.24	
9/20/2004	TABER	-51.00	±	65.00	-1.89	±	2.41	
9/20/2004	TABER	274.00	±	75.00	10.15	±	2.78	Y

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

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result >3s
PRONGHORN	10/7/2004	Muscle	^{131}I	-4.66	±	3.34	-17.26	±	12.36	
			^{137}Cs	-4.09	±	4.93	-15.15	±	18.24	
		Thyroid	^{131}I	-341.03	±	216.92	-1261.80	±	802.62	
			^{137}Cs	-453.85	±	382.05	-1679.23	±	1413.59	
PRONGHORN	10/11/2004	Muscle	^{131}I	2.99	±	2.65	11.06	±	9.82	
			^{137}Cs	0.00	±	1.35	0.00	±	5.01	
		Thyroid	^{131}I	74.26	±	171.49	274.74	±	634.51	
			^{137}Cs	-90.64	±	117.45	-335.36	±	434.55	
ELK	10/13/2004	Muscle	^{131}I	-23.27	±	17.97	-86.10	±	66.48	
			^{137}Cs	3.09	±	1.44	11.43	±	5.33	
ELK	10/15/2004	Liver	^{131}I	0.57	±	3.53	2.12	±	13.04	
			^{137}Cs	-4.93	±	4.07	-18.25	±	15.05	
		Muscle	^{131}I	0.48	±	1.28	1.76	±	4.75	
			^{137}Cs	2.31	±	1.36	8.54	±	5.03	
		Thyroid	^{131}I	-167.69	±	297.44	-620.46	±	1100.51	
			^{137}Cs	-36.92	±	151.54	-136.62	±	560.69	
WHITETAIL	11/10/2004	Liver	^{131}I	2.49	±	2.80	9.20	±	10.35	
Montana			^{137}Cs	1.14	±	1.55	4.20	±	5.75	
		Muscle	^{131}I	-0.17	±	3.54	-0.61	±	13.11	
			^{137}Cs	0.76	±	1.20	2.81	±	4.42	

TABLE C-12. Radionculide Concentrations in Edible Portions of Waterfowl.

Location / Species	Sampling Date	Analyte	Result ± Uncertainty(1s) (x 10^{-3}) pCi/g			Result ± Uncertainty(1s) (x 10^{-5}) Bq/g			Result > 3s
MARKET LAKE									
Coot	10/13/2004	AMERICIUM-241	0.17	±	0.37	0.61	±	1.37	
	10/13/2004	ANTIMONY-124	-17.00	±	22.00	-62.96	±	81.48	
	10/13/2004	CERIUM-141	37.70	±	50.00	139.63	±	185.19	
	10/13/2004	CERIUM-144	24.30	±	37.00	90.00	±	137.04	
	10/13/2004	CESIUM-134	4.28	±	10.00	15.85	±	37.04	
	10/13/2004	CESIUM-137	-3.65	±	8.00	-13.52	±	29.63	
	10/13/2004	CHROMIUM-51	52.00	±	500.00	192.59	±	1851.85	
	10/13/2004	COBALT-58	8.48	±	18.00	31.41	±	66.67	
	10/13/2004	COBALT-60	15.40	±	9.60	57.04	±	35.56	
	10/13/2004	EUROPIUM-152	4.36	±	21.00	16.15	±	77.78	
	10/13/2004	HAFNIUM-181	-39.70	±	31.00	-147.04	±	114.81	
	10/13/2004	MANGANESE-54	0.65	±	9.70	2.41	±	35.93	
	10/13/2004	NIOBIUM-95	17.20	±	43.00	63.70	±	159.26	
	10/13/2004	PLUTONIUM-238	0.54	±	0.54	1.99	±	2.00	
	10/13/2004	PLUTONIUM-239/40	1.07	±	0.62	3.96	±	2.30	
	10/13/2004	RUTHENIUM-103	-51.00	±	32.00	-188.89	±	118.52	
	10/13/2004	SILVER-110m	-0.25	±	14.00	-0.91	±	51.85	
	10/13/2004	STRONTIUM-90	-5.58	±	3.50	-20.67	±	12.96	
	10/13/2004	ZINC-65	-31.70	±	26.00	-117.41	±	96.30	
	10/13/2004	ZIRCONIUM-95	-6.79	±	35.00	-25.15	±	129.63	
MARKET LAKE	10/13/2004	AMERICIUM-241	0.835	±	0.59	3.09	±	2.19	
Coot	10/13/2004	ANTIMONY-124	-91.50	±	31.00	-338.89	±	114.81	
	10/13/2004	CERIUM-141	44.40	±	69.00	164.44	±	255.56	
	10/13/2004	CERIUM-144	-94.10	±	55.00	-348.52	±	203.70	
	10/13/2004	CESIUM-134	4.14	±	13.00	15.33	±	48.15	
	10/13/2004	CESIUM-137	3.46	±	11.00	12.81	±	40.74	
	10/13/2004	CHROMIUM-51	940.00	±	680.00	3481.48	±	2518.52	
	10/13/2004	COBALT-58	-16.50	±	26.00	-61.11	±	96.30	
	10/13/2004	COBALT-60	-5.72	±	13.00	-21.19	±	48.15	
	10/13/2004	EUROPIUM-152	-36.60	±	29.00	-135.56	±	107.41	
	10/13/2004	HAFNIUM-181	47.80	±	43.00	177.04	±	159.26	

TABLE C-12. Radionculide Concentrations in Edible Portions of Waterfowl.

Location Species	Sampling Date	Analyte	Result ± Uncertainty(1s) (x 10^{-3}) pCi/g			Result ± Uncertainty(1s) (x 10^{-5}) Bq/g			Result > 3s
	10/13/2004	MANGANESE-54	-8.71	±	13.00	-32.26	±	48.15	
	10/13/2004	NIOBIUM-95	106.00	±	61.00	392.59	±	225.93	
	10/13/2004	PLUTONIUM-238	0.00	±	0.44	0.00	±	1.63	
	10/13/2004	PLUTONIUM-239/40	1.44	±	0.73	5.33	±	2.70	
	10/13/2004	RUTHENIUM-103	55.20	±	46.00	204.44	±	170.37	
	10/13/2004	SILVER-110m	-13.50	±	19.00	-50.00	±	70.37	
	10/13/2004	STRONTIUM-90	1.88	±	2.80	6.96	±	10.37	
	10/13/2004	ZINC-65	44.30	±	33.00	164.07	±	122.22	
	10/13/2004	ZIRCONIUM-95	-96.00	±	48.00	-355.56	±	177.78	
MARKET LAKE	10/13/2004	AMERICIUM-241	1.33	±	0.77	4.93	±	2.85	
Coot	10/13/2004	ANTIMONY-124	26.30	±	27.00	97.41	±	100.00	
	10/13/2004	CERIUM-141	-55.90	±	68.00	-207.04	±	251.85	
	10/13/2004	CERIUM-144	-146.00	±	53.00	-540.74	±	196.30	
	10/13/2004	CESIUM-134	25.70	±	12.00	95.19	±	44.44	
	10/13/2004	CESIUM-137	4.18	±	10.00	15.48	±	37.04	
	10/13/2004	CHROMIUM-51	-219.00	±	670.00	-811.11	±	2481.48	
	10/13/2004	COBALT-58	2.68	±	23.00	9.93	±	85.19	
	10/13/2004	COBALT-60	-10.70	±	11.00	-39.63	±	40.74	
	10/13/2004	EUROPIUM-152	13.90	±	27.00	51.48	±	100.00	
	10/13/2004	HAFNIUM-181	-0.37	±	40.00	-1.37	±	148.15	
	10/13/2004	MANGANESE-54	-12.30	±	12.00	-45.56	±	44.44	
	10/13/2004	NIOBIUM-95	68.70	±	55.00	254.44	±	203.70	
	10/13/2004	PLUTONIUM-238	0.00	±	0.38	0.00	±	1.41	
	10/13/2004	PLUTONIUM-239/40	1.40	±	0.72	5.19	±	2.67	
	10/13/2004	RUTHENIUM-103	-127.00	±	43.00	-470.37	±	159.26	
	10/13/2004	SILVER-110m	22.10	±	18.00	81.85	±	66.67	
	10/13/2004	STRONTIUM-90		±		0.00	±	0.00	
	10/13/2004	ZINC-65	-165.00	±	30.00	-611.11	±	111.11	
	10/13/2004	ZIRCONIUM-95	-83.80	±	43.00	-310.37	±	159.26	
MARKET LAKE	10/13/2004	AMERICIUM-241	2.36	±	0.98	8.74	±	3.63	
Coot	10/13/2004	ANTIMONY-124	-2.90	±	15.00	-10.74	±	55.56	
	10/13/2004	CERIUM-141	-20.70	±	33.00	-76.67	±	122.22	
	10/13/2004	CERIUM-144	-30.40	±	27.00	-112.59	±	100.00	

TABLE C-12. Radionculide Concentrations in Edible Portions of Waterfowl.

Location Species	Sampling Date	Analyte	Result ± Uncertainty(1s) (x 10^{-3}) pCi/g			Result ± Uncertainty(1s) (x 10^{-5}) Bq/g			Result > 3s
	10/13/2004	CESIUM-134	2.99	±	6.20	11.07	±	22.96	
	10/13/2004	CESIUM-137	3.93	±	16.00	14.56	±	59.26	
	10/13/2004	CHROMIUM-51	-147.00	±	330.00	-544.44	±	1222.22	
	10/13/2004	COBALT-58	-0.97	±	12.00	-3.58	±	44.44	
	10/13/2004	COBALT-60	7.87	±	6.50	29.15	±	24.07	
	10/13/2004	EUROPIUM-152	1.99	±	13.00	7.37	±	48.15	
	10/13/2004	HAFNIUM-181	-21.70	±	21.00	-80.37	±	77.78	
	10/13/2004	MANGANESE-54	13.50	±	7.00	50.00	±	25.93	
	10/13/2004	NIOBIUM-95	7.91	±	28.00	29.30	±	103.70	
	10/13/2004	PLUTONIUM-238	0.18	±	0.40	0.66	±	1.48	
	10/13/2004	PLUTONIUM-239/40	1.77	±	0.80	6.56	±	2.96	
	10/13/2004	RUTHENIUM-103	2.24	±	23.00	8.30	±	85.19	
	10/13/2004	SILVER-110m	-18.00	±	10.00	-66.67	±	37.04	
	10/13/2004	STRONTIUM-90	1.68	±	2.60	6.22	±	9.63	
	10/13/2004	ZINC-65	-19.00	±	18.00	-70.37	±	66.67	
	10/13/2004	ZIRCONIUM-95	3.20	±	24.00	11.85	±	88.89	
TRA	10/22/2004	AMERICIUM-241	1.26	±	0.64	4.67	±	2.37	
Coot	10/22/2004	ANTIMONY-124	-18.80	±	25.00	-69.63	±	92.59	
	10/22/2004	CERIUM-141	46.60	±	44.00	172.59	±	162.96	
	10/22/2004	CERIUM-144	-41.80	±	46.00	-154.81	±	170.37	
	10/22/2004	CESIUM-134	13.00	±	11.00	48.15	±	40.74	
	10/22/2004	CESIUM-137	198.00	±	22.00	733.33	±	81.48	Y
	10/22/2004	CHROMIUM-51	338.00	±	400.00	1251.85	±	1481.48	
	10/22/2004	COBALT-58	-2.36	±	17.00	-8.74	±	62.96	
	10/22/2004	COBALT-60	20.60	±	11.00	76.30	±	40.74	
	10/22/2004	EUROPIUM-152	-56.10	±	26.00	-207.78	±	96.30	
	10/22/2004	HAFNIUM-181	7.55	±	28.00	27.96	±	103.70	
	10/22/2004	MANGANESE-54	16.50	±	11.00	61.11	±	40.74	
	10/22/2004	NIOBIUM-95	10.00	±	37.00	37.04	±	137.04	
	10/22/2004	PLUTONIUM-238	0.00	±	0.42	0.00	±	1.56	
	10/22/2004	PLUTONIUM-239/40	0.68	±	0.49	2.53	±	1.81	
	10/22/2004	RUTHENIUM-103	36.10	±	30.00	133.70	±	111.11	
	10/22/2004	SILVER-110m	1.03	±	15.00	3.81	±	55.56	
	10/22/2004	STRONTIUM-90	5.94	±	4.60	22.00	±	17.04	

TABLE C-12. Radionculide Concentrations in Edible Portions of Waterfowl.

Location Species	Sampling Date	Analyte	Result ± Uncertainty(1s) (x 10^{-3}) pCi/g			Result ± Uncertainty(1s) (x 10^{-5}) Bq/g			Result > 3s
	10/22/2004	ZINC-65	26.70	±	28.00	98.89	±	103.70	
	10/22/2004	ZIRCONIUM-95	0.10	±	33.00	0.37	±	122.22	
TRA	10/22/2004	AMERICIUM-241	1.29	±	0.76	4.78	±	2.81	
Coot	10/22/2004	ANTIMONY-124	-6.38	±	15.00	-23.63	±	55.56	
	10/22/2004	CERIUM-141	3.27	±	28.00	12.11	±	103.70	
	10/22/2004	CERIUM-144	29.10	±	29.00	107.78	±	107.41	
	10/22/2004	CESIUM-134	-3.66	±	7.20	-13.56	±	26.67	
	10/22/2004	CESIUM-137	75.90	±	20.00	281.11	±	74.07	Y
	10/22/2004	CHROMIUM-51	98.70	±	270.00	365.56	±	1000.00	
	10/22/2004	COBALT-58	-15.20	±	12.00	-56.30	±	44.44	
	10/22/2004	COBALT-60	6.54	±	7.70	24.22	±	28.52	
	10/22/2004	EUROPIUM-152	5.61	±	15.00	20.78	±	55.56	
	10/22/2004	HAFNIUM-181	-11.60	±	18.00	-42.96	±	66.67	
	10/22/2004	MANGANESE-54	8.85	±	7.50	32.78	±	27.78	
	10/22/2004	NIOBIUM-95	-35.40	±	26.00	-131.11	±	96.30	
	10/22/2004	PLUTONIUM-238	-0.16	±	0.16	-0.60	±	0.59	
	10/22/2004	PLUTONIUM-239/40	1.77	±	0.81	6.56	±	3.00	
	10/22/2004	RUTHENIUM-103	-43.50	±	20.00	-161.11	±	74.07	
	10/22/2004	SILVER-110m	-1.02	±	10.00	-3.78	±	37.04	
	10/22/2004	STRONTIUM-90	3.30	±	4.10	12.22	±	15.19	
	10/22/2004	ZINC-65	20.60	±	22.00	76.30	±	81.48	
	10/22/2004	ZIRCONIUM-95	13.70	±	23.00	50.74	±	85.19	

TABLE C-13. Environmental Radiation Results.

Location	Start Date	End Date	Radiation Measurement ± 1s Uncertainty mR			Exposure mR/day
BOUNDARY						
ARCO	05/04/2004	11/02/2004	62.00	±	12.20	0.34
ATOMIC CITY	05/04/2004	11/02/2004	64.10	±	12.60	0.35
BIRCH CREEK	05/03/2004	11/01/2004	53.20	±	10.40	0.29
BLUE DOME	05/03/2004	11/01/2004	51.70	±	10.10	0.28
HOWE	05/04/2004	11/02/2004	59.10	±	11.60	0.32
MONTEVIEW	05/04/2004	11/01/2004	60.30	±	11.80	0.33
MUD LAKE	05/03/2004	11/01/2004	64.00	±	12.60	0.35
					Boundary Average	**0.32**
DISTANT						
ABERDEEN	05/04/2004	11/02/2004	64.60	±	12.70	0.35
BLACKFOOT	05/04/2004	11/02/2004	52.00	±	10.20	0.28
CRATERS	05/04/2004	11/02/2004	60.20	±	11.80	0.33
DUBOIS	05/03/2004	11/01/2004	51.50	±	10.10	0.28
IDAHO FALLS	05/03/2004	11/01/2004	61.50	±	12.10	0.34
MINIDOKA	05/04/2004	11/02/2004	52.70	±	10.30	0.29
REXBURG	05/03/2004	11/01/2004	69.30	±	13.60	0.38
ROBERTS	05/03/2004	11/01/2004	65.50	±	12.80	0.36
					Distant Average	**0.33**
OUT-OF-STATE						
JACKSON	05/03/2004	11/02/2004	50.20	±	10.90	0.27

APPENDIX D

STATISTICAL ANALYSIS RESULT

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

Parameter	p^b
Gross Alpha	
Quarter	0.50
October	0.83
November	0.52
December	0.82
Gross Beta	
Quarter	0.62
October	0.99
November	0.69
December	0.97

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

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

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

Mann-Whitney U Test[a]		
Parameter	**Week**	**p[b]**
Gross Alpha		
	October 6th	0.15
	October 13th	0.20
	October 20th	0.39
	October 27th	0.03
	November 3d	1.00
	November 10th	0.75
	November 17th	0.25
	November 24th	0.78
	December 1st	0.12
	December 8th	0.47
	December 15th	0.26
	December 22nd	1.00
	December 29th	1.00
Gross Beta		
	October 6th	0.67
	October 13th	0.15
	October 20th	0.09
	October 27th	0.57
	November 3d	0.75
	November 10th	0.75
	November 17th	0.32
	November 24th	1.00
	December 1st	0.17
	December 8th	0.94
	December 15th	0.15
	December 22nd	0.15
	December 29th	0.89

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

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