S.M. Stoller Corporation
Environmental Surveillance, Education and Research Program
ISSN NUMBER 1089-5469

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

December 2004

Contributors:
Christopher Martin, Marilyn Case

Program conducted for the U.S. Department of Energy, Idaho Operations Office
Under Contract DE-AC07-00ID13658

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

EXECUTIVE SUMMARY

None of the radionuclides detected in any of the samples collected during the fourth quarter of 2003 could be directly linked with INEEL activities. Levels of detected radionuclides were no different than values measured at other locations across the United States and/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, 2003, contains results from the Environmental Surveillance, Education and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Engineering and Environmental Laboratory's (INEEL) offsite environment, October 1 through December 31, 2003. All sample media and the sampling schedule followed during 2003 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including low-volume air sampling with air filters and charcoal cartridges, collection of atmospheric moisture, and sampling of particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) (Section 3);
- Water sampling, including precipitation, surface water, and drinking water (Section 4);
- Agricultural product sampling, including collection of milk, potatoes, large game animals, and waterfowl (Section 5);
- Environmental radiation (Section 6); and
- Quality assurance program information (Section 7).

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

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

Gross alpha and gross beta measurements are used as general indicators of the presence of radionuclides in many media. Gross alpha and gross beta in air, as measured on air filters, results were found to have no discernable statistical distribution during the fourth quarter of 2003. Because of this, these data were statistically analyzed using nonparametric methods, including the use of the median to represent central tendency. Neither quarterly nor monthly statistical analyses of gross alpha and gross beta concentrations during the fourth quarter showed statistical variation between INEEL, Boundary or Distant locations. One would expect to see significant variation if the INEEL were a significant source of radionuclide contamination. Gross alpha concentrations were statistically different for the week ending December 3, 2003, with the Boundary locations being higher than the Distant locations. Gross beta concentrations measured at Boundary locations were greater than those measured at Distant locations during

the weeks ending November 12, December 3, and December 10, 2003. There was no discernable pattern (a particular station being consistently high or low) for any of the weeks evaluated. This suggests natural variation in atmospheric concentrations most likely related to weather conditions near the stations.

During the fourth quarter, iodine-131 (^{131}I) was not detected in any batch of charcoal cartridges.

Selected quarterly composite filter samples were analyzed for gamma emitting radionuclides, strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}Pu$), and americium-241 (^{241}Am). Americium-241 was detected in one sample collected from Blackfoot. The result was within the range of those measured in the past and is likely due to the resuspension of fallout from past nuclear weapons testing. In addition, the result was far less than DOE Derived Concentration Guide (DCG) value.

Twenty-six atmospheric moisture samples were obtained during the fourth quarter of 2003 and analyzed for tritium; one from Blackfoot, six from Rexburg, six and one duplicate from Idaho Falls, and twelve from Atomic City. Four sample results, two from Idaho Falls and one each from Atomic City and Rexburg exceeded their respective 3s values. The maximum value from Atomic City of $(6.8 \pm 2.1) \times 10^{-13}$ $\mu Ci/mL_{air}$ ($[2.5 \pm 0.8] \times 10^{-7}$ Bq/mL_{air}) is well below the DCG for tritium in air of 1×10^{-7} $\mu Ci/mL$ (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. The maximum 24-hour concentration of particulates was 173.7 $\mu g/m^3$ on October 23, 2003, in Blackfoot. This value exceeds the EPA maximum 24-hour concentration of 150 $\mu g/m^3$. The 24-hour maximum was also exceeded at Rexburg for the same week. These high concentrations for this week are most likely related to agricultural activities in the areas of the samplers.

Sufficient precipitation occurred to allow collection of two monthly composite samples from Idaho Falls, three monthly composite samples from the Central Facilities Area (CFA) on the INEEL, and five weekly samples from the Experimental Field Station (EFS) on the INEEL. Tritium was detected in four samples: two each from CFA and the EFS. There is no DCG for tritium in precipitation, but in drinking water it is 2.0×10^6 pCi/L (74,074 Bq/L). The Safe Drinking Water Act sets a limit of 20,000 pCi/L (740 Bq/L) for tritium in drinking water. The maximum level of tritium measured in fourth quarter precipitation samples ([363.0 ± 61.8] pCi/L or [13.4 ± 2.3] Bq/L) were well below the DCG value and the Safe Drinking Water Act Limit.

During the fourth quarter of 2003, 14 drinking water samples (13 and a duplicate) were collected from tap locations around the Snake River Plain. Due to quality assurance concerns no gross alpha or tritium results are available. Gross beta was detected in 13 samples. The maximum concentration of 8.3 ± 0.1 pCi/L was from Fort Hall. This value is below the EPA screening level of 50 pCi/L.

Surface water samples from five locations were collected in November 2003. No gross alpha or tritium concentrations are available due to quality assurance concerns. Four samples plus the duplicate had detectable gross beta. The maximum concentration of 7.4 ± 0.1 pCi/L was from Twin Falls. This level is consistent with naturally occurring beta concentrations and in line with historical measurements. It is also below the EPA screening level of 50 pCi/L.

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL. All samples were analyzed for gamma emitting radionuclides. Iodine-131 and ^{137}Cs concentrations were not detected in any milk sample. Selected samples were also analyzed for tritium and strontium-90 during the fourth quarter. No tritium was detected in any sample. Strontium-90 was detected in three samples with a maximum concentration of 1.3 ± 0.5 pCi/L from Dietrich. This value is well below the EPA limit of 8 pCi/L for ^{90}Sr in drinking water.

Potatoes were collected early in the fourth quarter. A total of eleven samples were collected from in state and out of state locations and analyzed for gamma-emitting radionuclides and ^{90}Sr. No gamma emitters were detected in any sample. Strontium-90 was detected in four samples with the maximum concentration detected from the Howe area of 4040 ± 960 pCi/kg.

Nine large game animals (six mule deer, two pronghorn, and an elk) were sampled during the fourth quarter of 2003. All were killed as a result of vehicular collisions. Thyroid, liver, and muscle tissue was sampled. Only one animal, a pronghorn collected on the INEEL at the end of October had measurable radionuclides in its tissue. Cesium-137 was detected in the liver and muscle tissue of this animal. Iodine-131 was also detected in the liver of the animal.

Waterfowl have been collected since the mid-1980s to evaluate the potential movement of radionuclides off the INEEL through ducks using the various waste ponds on the site. During 2003, a total of eleven waterfowl were collected, three each from a control location (Mud Lake) and ANL-W sewage lagoon, and five from the TRA sewage lagoon. All samples are analyzed for gamma-emitters, ^{90}Sr, and actinides. Four waterfowl, two each from Mud Lake and TRA had detectable ^{90}Sr in the edible portion of the sample. The sample from TRA also had a detectable concentration of cerium-141. Based on the assumption of immediate consumption of 225 g of the most contaminated sample the potential dose to an individual would be 0.002 mrem, far less than the EPA annual dose limit of 10 mrem.

Environmental dosimeter locations are also divided into Boundary and Distant groupings. Boundary exposure rates ranged from a low of 0.27 mR/day to 0.36 mR/day. The overall Boundary average was 0.30 mR/day. The Distant group ranged from 0.24 mR/day to 0.37 mR/day, with an overall average exposure also of 0.31 mR/day. No statistical difference existed between Boundary and Distant locations. All exposure results are consistent with those measured historically.

Quality assurance checks and samples submitted for analysis during the fourth quarter 2003 met most QA requirements. QA issues arose with method uncertainty and recount accuracy for tritium and gross alpha measurements in water, as measured by criteria established in the ESER Quality Assurance Project Plan. These issues are being resolved with the laboratory to avoid future problems.

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

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, Gross beta	Statistical comparisons of all gross alpha and gross beta data collected during the fourth quarter indicate no differences between INEEL, Boundary, and Distant locations. Weekly statistical differences in gross alpha and gross beta results were observed between Boundary and Distant location groups on four occasions. These differences are attributed to natural variation in the data and to meteorological conditions (i.e., temperature inversions). 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	Americium-241 was detected in one sample collected from Blackfoot CMS. The detected result was well below the DOE DCG and within historical measurements.
	Charcoal Cartridge	Iodine-131	None of the cartridges had measurable ^{131}I.
	PM_{10}	Particulate matter	The regulatory limit was exceeded for the week of October 23 at both Blackfoot and Rexburg. The exceedance was likely due to local agricultural activities.
Atmospheric Moisture	Liquid	Tritium	Four of 26 atmospheric moisture samples had detectable concentrations of tritium. No sample result exceeded the DCG for tritium in air.
Precipitation	Liquid	Tritium	Four of 10 samples had measurable concentrations of tritium. For comparison purpose tritium results are compared to the regulatory limit in drinking water. All samples were well below this level.
Drinking Water	Liquid	Gross alpha, Gross beta, Tritium	Thirteen of 14 samples had detectable gross beta concentrations. No samples were above regulatory guidelines. Due to QA concerns no tritium or gross alpha measurements are reported.
Surface Water	Liquid	Gross alpha, Gross beta, Tritium	Four of five samples had detectable gross beta concentrations. No samples were above regulatory guidelines. Due to QA concerns no tritium or gross alpha measurements are reported.
Milk	Liquid	Iodine-131, gamma emitting radionuclides (including ^{137}Cs), ^{90}Sr, Tritium	Tritium, ^{131}I, and ^{137}Cs were not reported above the 3s level in any sample collected during the fourth quarter of 2003. Strontium-90 was detected in three samples. No sample was above the regulatory limit for ^{90}Sr in drinking water.

Potatoes	Solid	gamma emitting radionuclides (including ^{137}Cs), ^{90}Sr	Four of the 11 samples were collected had detectable ^{90}Sr concentrations. Concentrations were consistent with historic levels.
Game Animals	Tissue	Iodine-131, gamma emitting radionuclides (including ^{137}Cs)	Iodine-131 and ^{137}Cs were not reported above the 3s level in any sample collected during the fourth quarter of 2003.
Waterfowl	Tissue	Gamma emitting radionuclides (including ^{137}Cs), ^{90}Sr, ^{241}Am, ^{238}Pu, $^{239/240}Pu$	Eleven samples were collected in 2003, three each from the control location of Mud Lake and ANL-W sewage lagoon, and five from the TRA sewage lagoon. Four samples had detectable ^{90}Sr in their edible tissue. One sample had cerium-141. The maximum potential dose is 0.002 mrem.
Environmental Radiation	TLD	Ambient ionizing radiation	Values were consistent with expected exposures given the altitude and location of the TLD's. There were no statistical differences between Boundary and Distant location results.

TABLE OF CONTENTS

Executive Summary i
Table of Contents vi
List of Figures vii
List of Tables vii
List of Abbreviations ix
List of Units x
1. ESER Program Description 1
2. THE INEEL 2-1
3. Air Sampling 3-1
    Low-Volume Air Sampling 3-1
    Atmospheric Moisture Sampling 3-10
    PM_{10} Air Sampling 3-10
4. Water Sampling 4-1
    Precipitation Sampling 4-1
    Drinking Water 4-1
    Surface Water 4-3
5. Agricultural Product and Wildlife Sampling 5-1
    Milk Sampling 5-1
    Potatoes 5-2
    Large Game Animal Sampling 5-2
    Waterfowl 5-2
6. Direct Radiation 6-1
7. Quality Assurance 7-1
    Method Uncertainty 7-1
    Data Completeness 7-1
    Data Precision 7-1
    Data Accuracy 7-5
    Blanks 7-5
8. References 8-1
Appendix A Summary of Sampling Media and Schedule ..... A - 1
Appendix B Summary of MDCs and DCGs ..... B - 1

Appendix C Sample Analysis Results ..... C - 1
Appendix D Statistical Analysis Results ..... D - 1

LIST OF FIGURES

Figure 1. Example overlap of blank and sample measurement distributions. 1-3
Figure 2. Low-volume air sampler locations. 3-1
Figure 3. Gross alpha concentrations in air at ESER Program Boundary, Distant, and INEEL sample group locations for the fourth quarter of 2003. 3-1
Figure 4. October gross alpha concentrations in air at ESER Program stations. 3-2
Figure 5. November gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. 3-3
Figure 6. December gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. 3-4
Figure 7. Gross beta concentrations in air at ESER Program Boundary, Distant, and INEEL sample group locations for the fourth quarter 2003. 3-6
Figure 8. October gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. 3-7
Figure 9. November gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. 3-8
Figure 10. December gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. 3-9
Figure 11. Drinking and Surface Water Sampling locations. 4-2
Figure 12. ESER Program milk sampling locations. 5-1
Figure 13. TLD sampling locations. 6-1
Figure 14. Ratio of QA-1/Blackfoot gross alpha and gross beta activities. 7-4
Figure 15. Ratio of QA-2/Mud Lake gross alpha and gross beta activities. 7-4

LIST OF TABLES

Table 1. Summary of 24-hour PM_{10} values. 3-10
Table 2. Drinking water gross beta results greater than (>) 3s. 4-2
Table 3. Surface water gross beta results greater than (>) 3s. 4-3
Table 4. Measured radionuclides in edible tissues of waterfowl. 5-2
Table 5. TLD Exposures from May 2003 to November 2003. 6-1
Table 6. Analytical results determined to be unacceptable. 7-2
Table A-1 Summary of the ESER Program's Sampling Schedule. ..... A -1
Table B-1 Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Fourth Quarter 2003. ..... B - 1

Table C-1 Weekly Gross Alpha and Gross Beta Concentrations in Air (4th Quarter 2003). C - 1

Table C-2 Weekly Iodine-131 Activity in Air (4th Quarter 2003). ..... C - 10

Table C-3 Quarterly Cesium-137, Amerecium-241, Plutonium-238, Plutonium-239/240, & Strontium-90 Concentrations in Composited Air Filters. ..... C - 16

Table C-4 Tritium concentrations in Atmospheric Moisture. ..... C - 19

Table C-5 PM_{10} Concentrations at Atomic City, Blackfoot CMS, and Rexburg CMS (4th Quarter 2003). ..... C - 21

Table C-6 Monthly and Weekly Tritium concentrations in Precipitation (4th Quarter 2003).C - 23

Table C-7 Gross Alpha, Gross Beta and Tritium Concentrations in Drinking Water ..... C - 24

Table C-8 Gross Alpha, Gross Beta and Tritium Concentrations in Surface Water ..... C - 26

Table C-9 Weekly and Monthly Iodine-131 & Cesium-137 Concentrations in Milk. ..... C - 28

Table C-10 Cesium-137 and Strontium-90 Concentrations in Potatoes. ..... C - 31

Table C-11 Cesium-137 and Iodine-131 Concentrations in Game Animals (4th Quarter 2003). ..... C - 33

Table C-12 Radionuclide Concentrations in Waterfowl (2003). ..... C - 34

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

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

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
ANL-W	Argonne National Laboratory-West
CFA	Central Facilities Area
CMS	community monitoring station
DCG	Derived Concentration Guide
DOE	Department of Energy
DOE – ID	Department of Energy Idaho Operations Office
EAL	Environmental Assessment Laboratory
EFS	Experimental Field Station
EPA	Environmental Protection Agency
ERAMS	Environmental Radiation Ambient Monitoring System
ESER	Environmental Surveillance, Education and Research
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISU	Idaho State University
MDC	minimum detectable concentration
M&O	Management and Operating
NRTS	National Reactor Testing Station
PM	particulate matter
PM_{10}	particulate matter less than 10 micrometers in diameter
SI	Systeme International d'Unites
TLDs	thermoluminescent dosimeters
TRA	Test Reactor Area
UI	University of Idaho
USGS	United States Geological Survey
WSU	Washington State University

LIST OF UNITS

Bq	becquerel
Ci	curie
g	gram
L	liter
µCi	microcurie
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 the maintenance of an environmental management system that effectively monitors impacts of DOE activities on and off of DOE facilities (DOE 2003). During calendar year 2003, environmental monitoring within the INEEL boundaries was primarily the responsibility of the INEEL Management and Operating (M&O) contractor, while monitoring outside the INEEL boundaries was conducted under the Environmental Surveillance, Education and Research (ESER) Program. The ESER Program is led by the S.M. Stoller Corporation in cooperation with its team members, including: the University of Idaho (UI) and Washington State University (WSU) for research, and MWH Global, Inc., and North Wind Environmental, Inc. for technical support. This report contains monitoring results from the ESER Program for samples collected during the fourth quarter of 2003 (October 1 – December 31, 2003).

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

- Verify compliance with applicable environmental laws, regulations, and DOE Orders;
- Characterize and define spatial and temporal trends in radioactivity and radionuclide concentrations within 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 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;
- precipitation at three locations on and around the INEEL;
- surface water at five locations on the Snake River;
- drinking water at 14 locations around the INEEL;
- agricultural products, including milk at 10 dairies around the INEEL, potatoes from at least five local producers, wheat from approximately 10 local producers, lettuce from approximately nine home-owned gardens around the INEEL, and sheep from two operators which graze their sheep on the INEEL;
- soil from 13 locations around the INEEL biennially;
- environmental dosimeters from 16 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 utilized two laboratories to perform analyses on routine environmental samples collected during the quarter reported here. The Environmental Assessment Laboratory (EAL) operated by the Idaho State University (ISU) 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, Washington.

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

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident, the EPA may request additional sampling be performed through the Environmental Radiation Ambient Monitoring System (ERAMS) network (EPA 2004). The EPA established the ERAMS network in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, drinking water, and milk samples for radiochemistry analysis. The ESER Program currently operates a high-volume air sampler and precipitation sampling equipment in Idaho Falls for this national program and routinely sends samples to EPA's Eastern Environmental Radiation Facility for analyses. The ERAMS data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA ERAMS website (http://www.epa.gov/enviro/html/erams/).

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

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

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

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

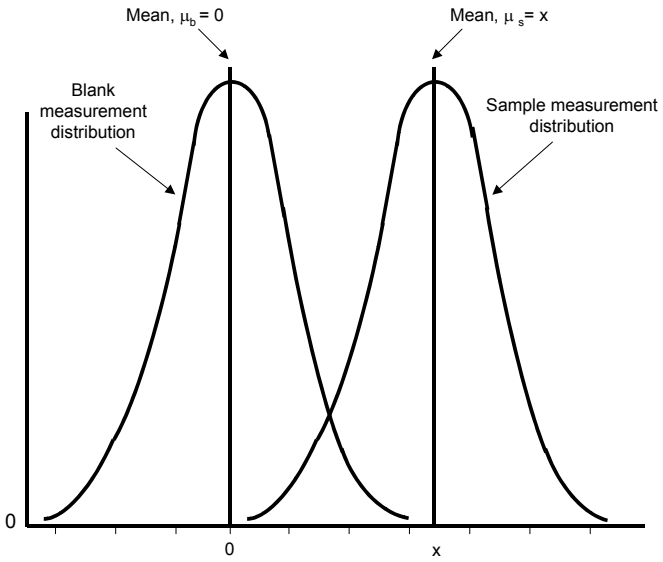

Figure 1. Example overlap of blank and sample measurement distributions.

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

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

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

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

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

2. THE INEEL

The INEEL is a nuclear energy research and environmental management facility. It is owned and administered by the U.S. Department of Energy, Idaho Operations Office (DOE-ID) and occupies about 890 mi^2 (2,300 km^2) of the upper Snake River Plain in Southeastern Idaho. The history of the INEEL began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested in an area of the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the Second World War, as the nation worked to develop peaceful uses of 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 fourth to produce useful amounts of electricity. Over time the site assembled and 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 2002 that Argonne National Laboratory and the INEEL will be the lead laboratories for development of the next generation of power reactors. Other activities at the INEEL include environmental cleanup, subsurface research, and technology development.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INEEL is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INEEL. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly at 16 locations using low-volume air samplers for the duration of the quarter. Moisture in the atmosphere was sampled at four locations around the INEEL and analyzed for tritium. Concentrations of airborne particulates less than 10 micrometers in diameter (PM_{10}) were measured for comparison with EPA standards at three locations. Air sampling activities and results for the fourth quarter, 2003 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) values (DOE 1993) 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 2003 (Figure 2). Three of these samplers are located on the INEEL, eight (7 samplers plus a replicate) are situated off the INEEL near the boundary, and seven (6 samplers plus a replicate) have been placed at locations distant to the INEEL. Samplers are divided into INEEL, Boundary, and Distant groups for statistical purposes 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 Blackfoot (Distant location) and one at Mud Lake (Boundary location) during 2003. An average volume of 16,145 ft^3 (457 m^3) of air was sampled at each location, each week, at an average flow rate of approximately 1.6 ft^3/min (0.05 m^3/min). Particulates in air were collected on glass fiber particulate filters with a 1.2-µm pore size. Gases passing through the filter were collected with an activated charcoal cartridge.

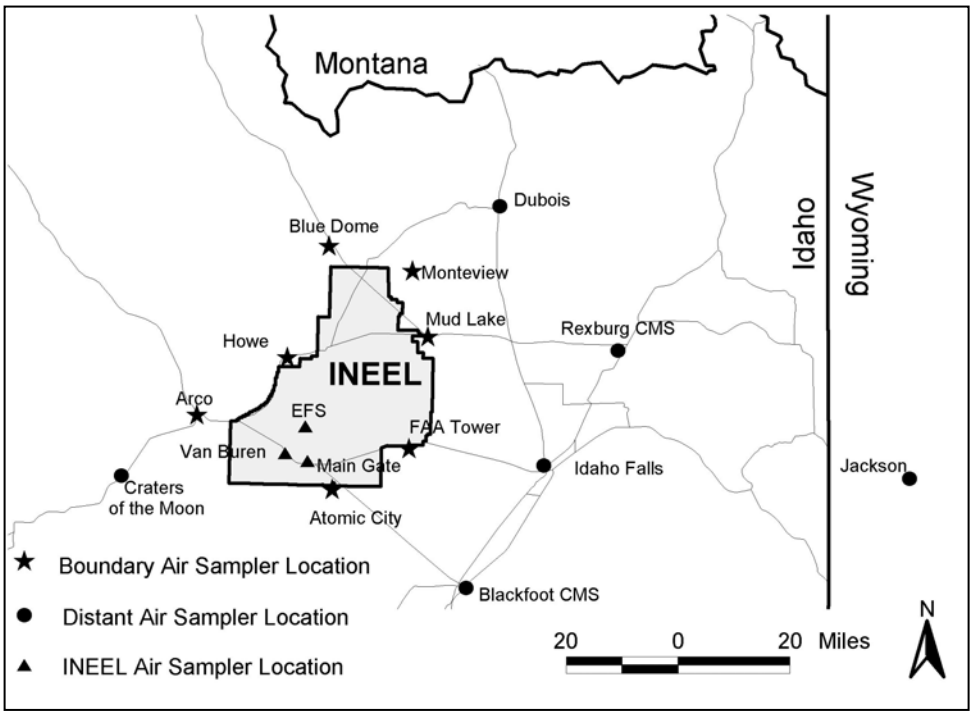

Figure 2. Low-volume air sampler locations.

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

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

Charcoal cartridges were analyzed for gamma-emitting radionuclides, specifically for iodine-131 (^{131}I). Iodine-131 is of particular interest because it is produced in relatively large quantities by nuclear fission, is readily accumulated in human and animal thyroids, and has a half-life of eight days. This means that any elevated level of ^{131}I in the environment must 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 2003 are shown in Figure 3. The data were tested for normality prior to statistical analyses. For the most part the data showed no discernable distribution. Box and whisker plots are commonly used when there is no assumed distribution. Each data group in Figure 3 is presented as a box and whisker plot, with a median value (the small red square), a box enclosing values between the 25th and 75th percentiles, and whiskers representing the non-outlier range. 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 (open red circles) are defined as values that are greater than 1.5 times the height of the box, above or below the box. Extreme values (open red triangles) 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. 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 was 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, allows for the inclusion of outliers and extreme values bit gives them less weight, 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. A p-value of 1.00 indicates the values are identical. 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.

Comparisons of gross alpha concentrations were made for each month of the quarter (Figures 4 – 6). 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) during the quarter.

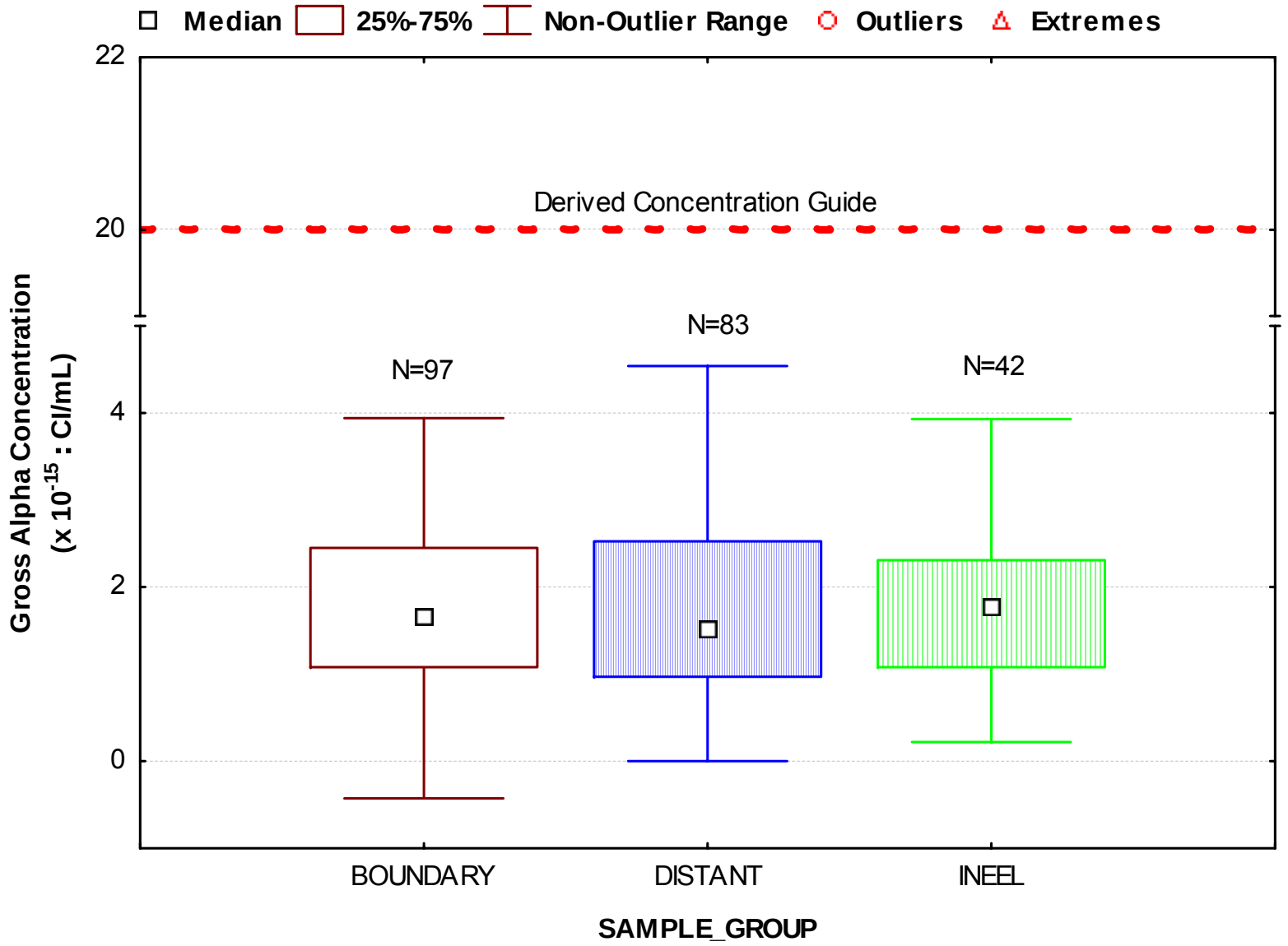

Figure 3. **Gross alpha concentrations in air at ESER Program Boundary, Distant, and INEEL sample group locations for the fourth quarter of 2003.**

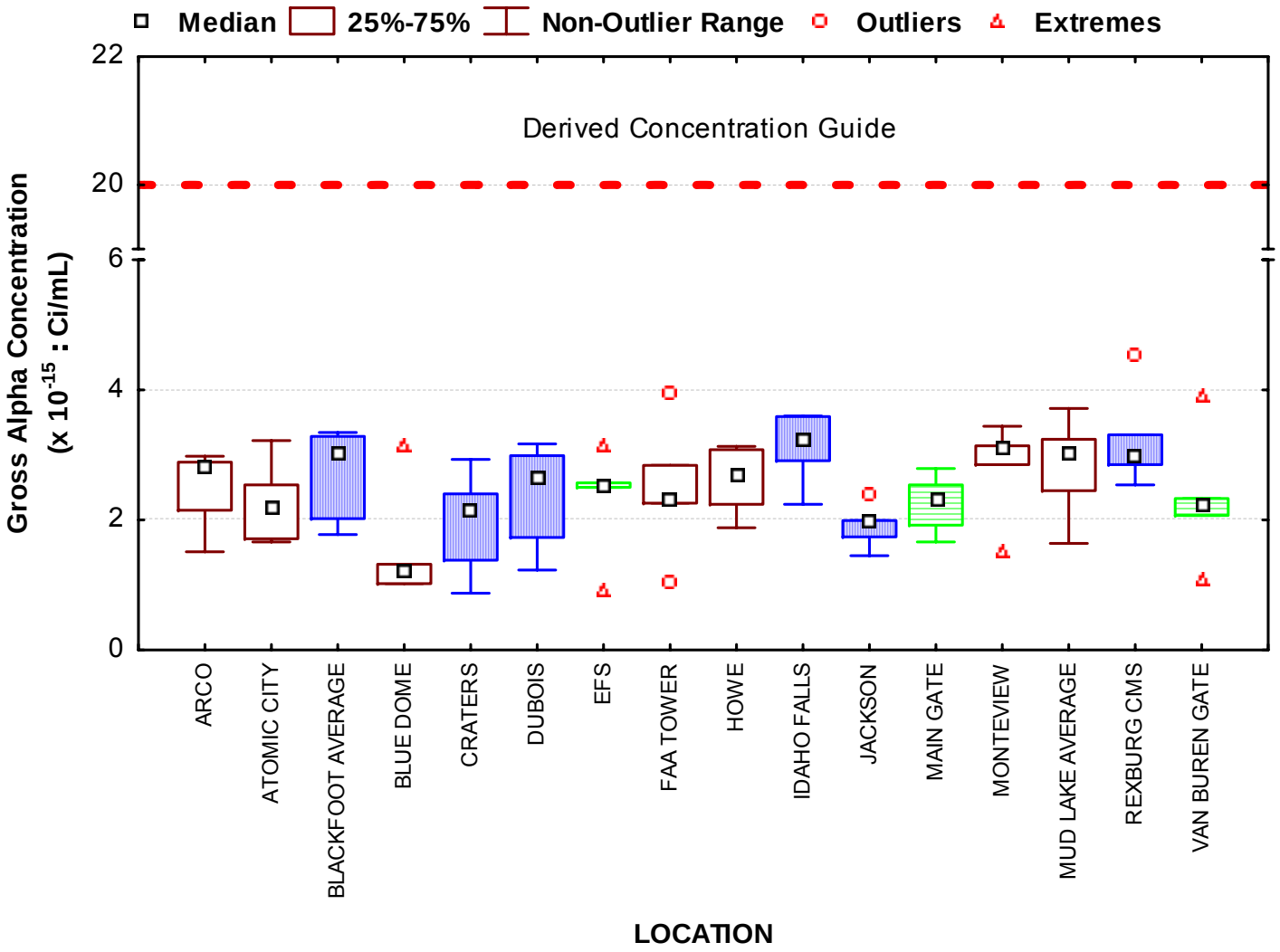

Figure 4. **October gross alpha concentrations in air at ESER Program stations**. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 for each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

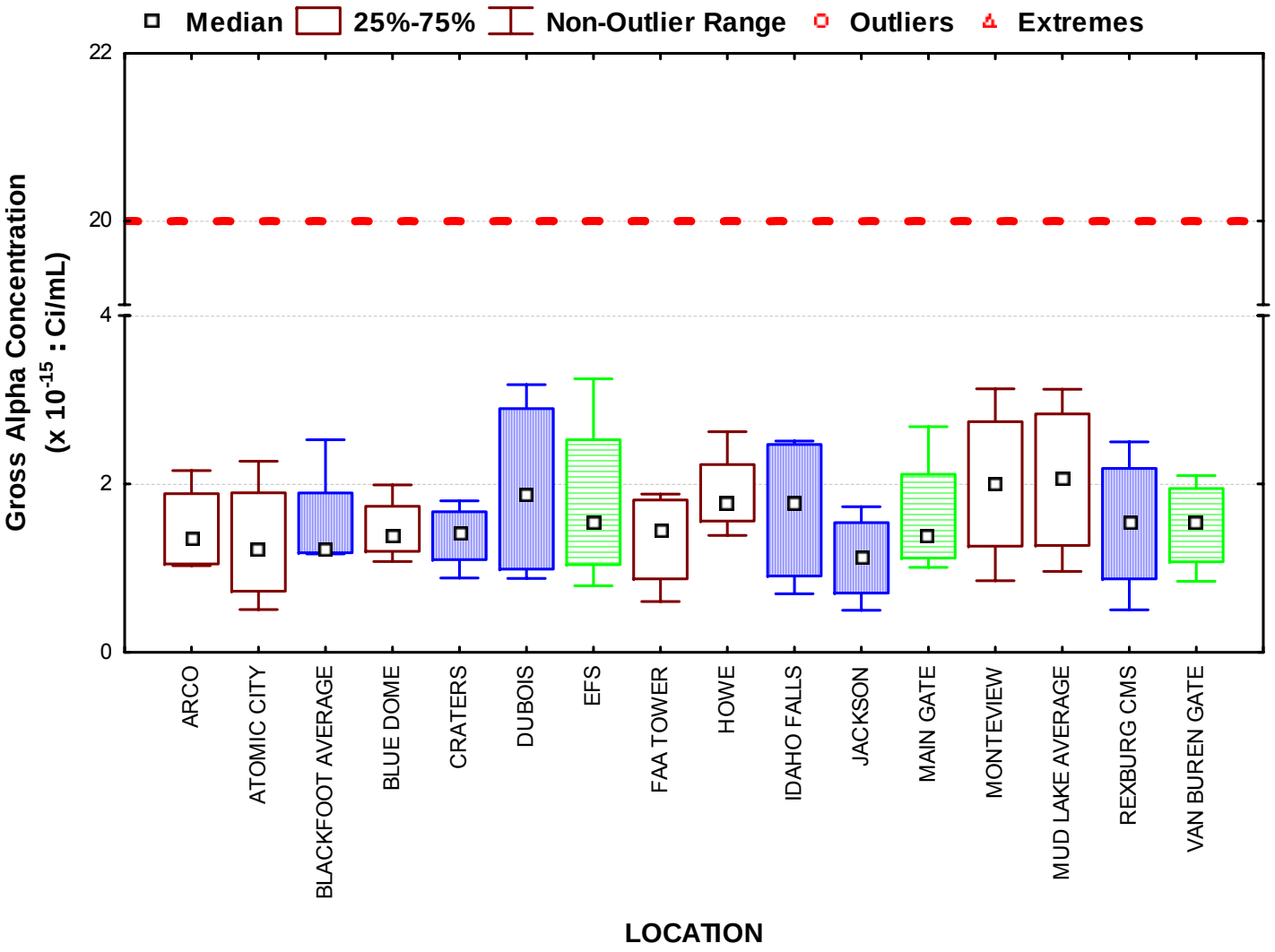

Figure 5. **November gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number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

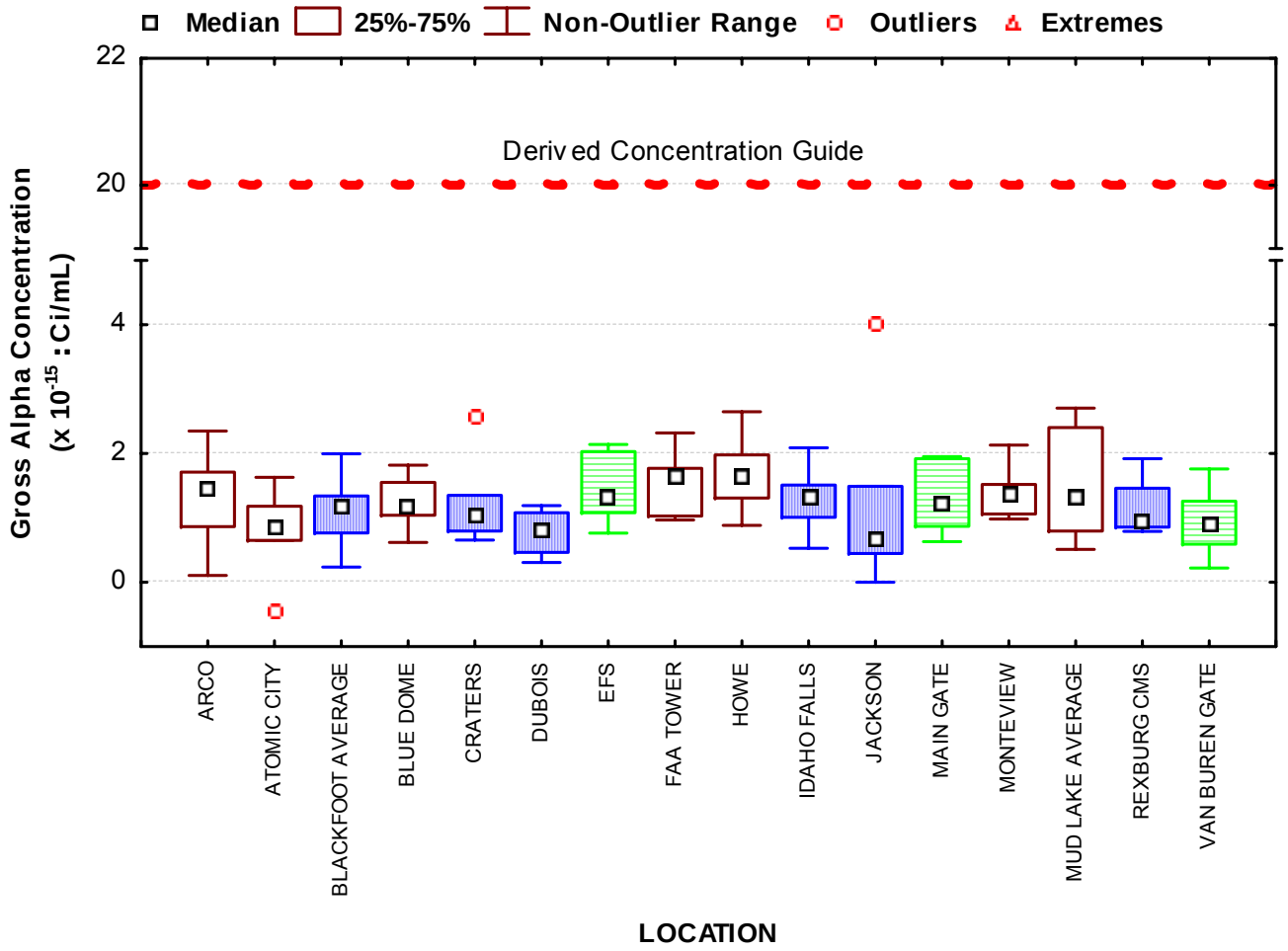

Figure 6. **December gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number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

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 standard t-test for independent samples. INEEL sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INEEL and would not aid in determining offsite impacts. The gross alpha concentrations measured at Boundary locations were statistically greater than those measured at Distant locations only for the week ending December 3, 2003 (Table D-2). Evaluation by station for the week in question showed that the concentrations from Jackson, Rexburg, and Craters of the Moon appeared to be much lower than the other stations. All these sites are in close proximity to the surrounding mountain ranges and may not have been affected as much by atmospheric conditions out on the Snake River Plain. More detail on the statistical tests used can be found in Determining Statistical Differences under Helpful Information.

Gross beta results are presented in Table C-1. Gross beta concentrations in air for Boundary, Distant, and INEEL locations for the fourth quarter of 2003 are shown in Figure 7. The data showed no discernable distribution. 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 (Figure 7 and 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 was no statistical difference, using the Kruskal-Wallace test, between monthly median gross beta concentrations of the different groups for any month during the quarter.

Comparison of weekly Boundary and Distant data sets, using the Mann Whitney U test, indicated a statistical difference between the two location groups for the weeks ending November 12, and December 3 and 10, 2003 (Table D-2). The Boundary group was statistically greater than the Distant group in each case. Throughout the quarter the Boundary group stations tended to track higher than the Distant group. Evaluation for each week by station revealed a wide scatter for each station and no clear pattern in the difference for the weeks of November 12 or December 3. The week of December 10 revealed the western Boundary stations (Arco, Atomic City and Blue Dome) were unusually low compared to other stations.

All results were well within historical measurements made at the INEEL for all locations. The INEEL results thus do not implicate any release from the INEEL.

Iodine-131 was not detected (at a level greater than the associated 3s value) in any batch of charcoal cartridges. Each batch contained eight charcoal cartridges. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

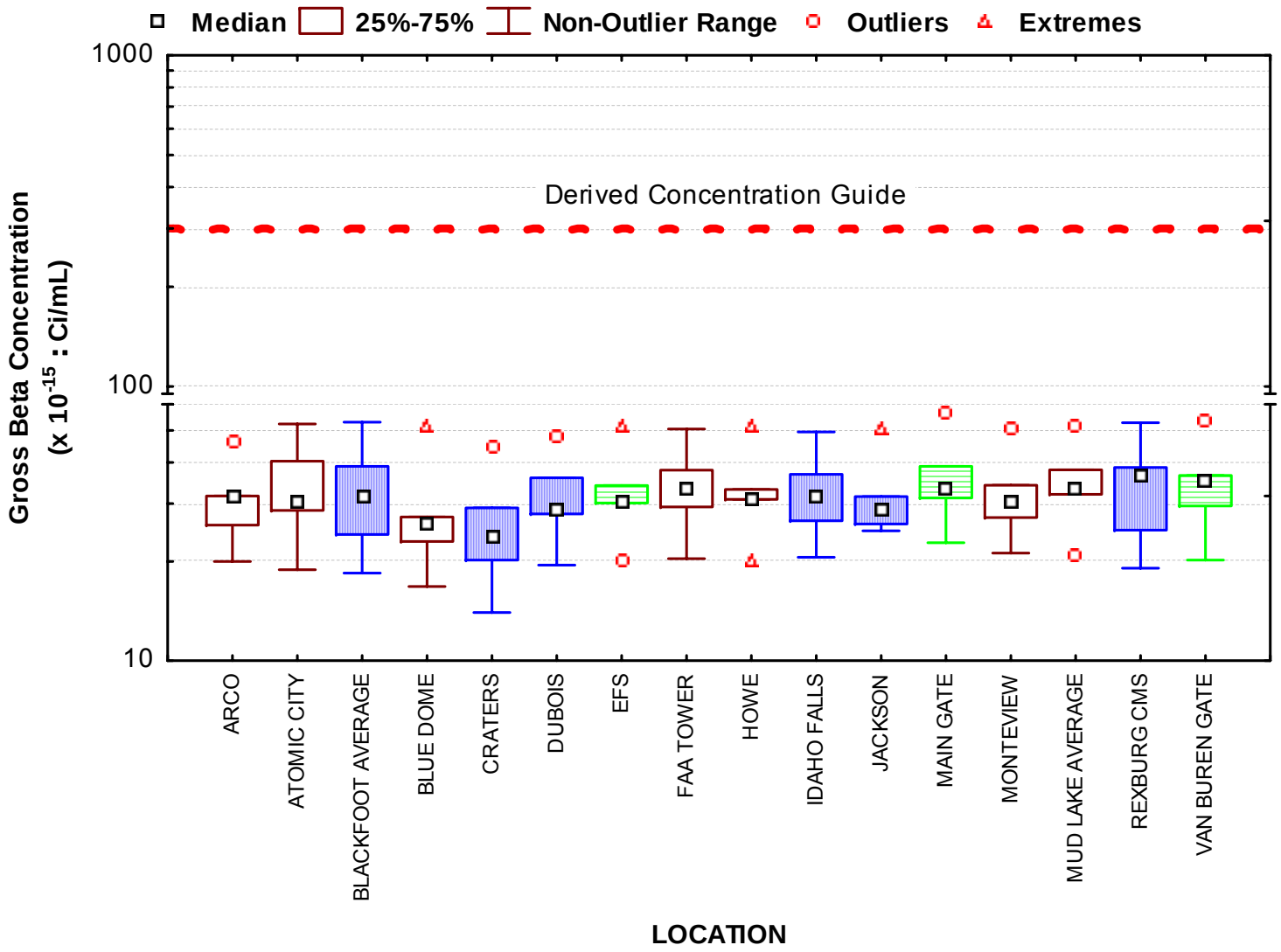

Figure 7. Gross beta concentrations in air at ESER Program Boundary, Distant, and INEEL sample group locations for the fourth quarter 2003.

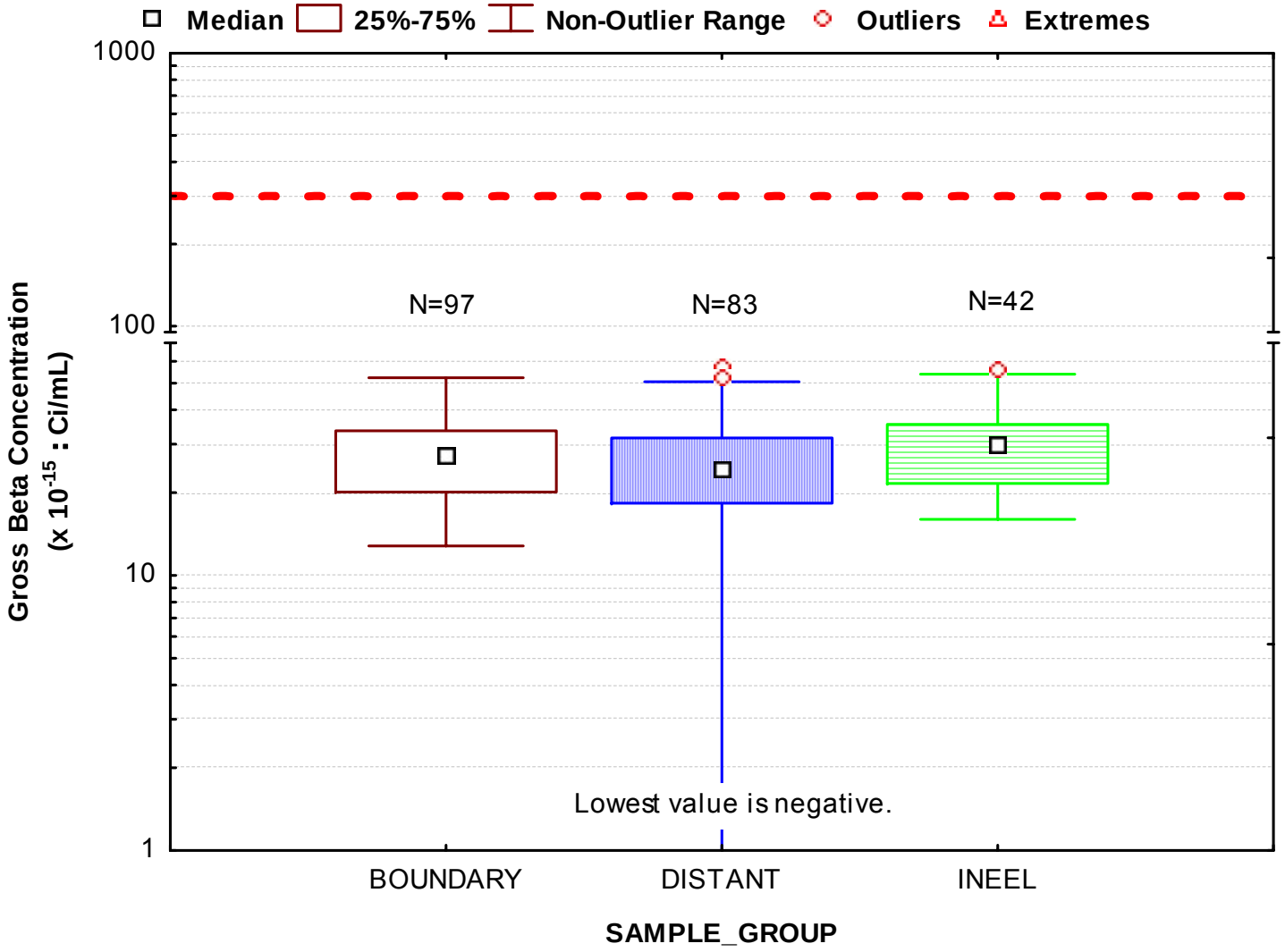

Figure 8. **October gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number of samples (N) = 5 for each location except for Mud Lake, where N = 4.])

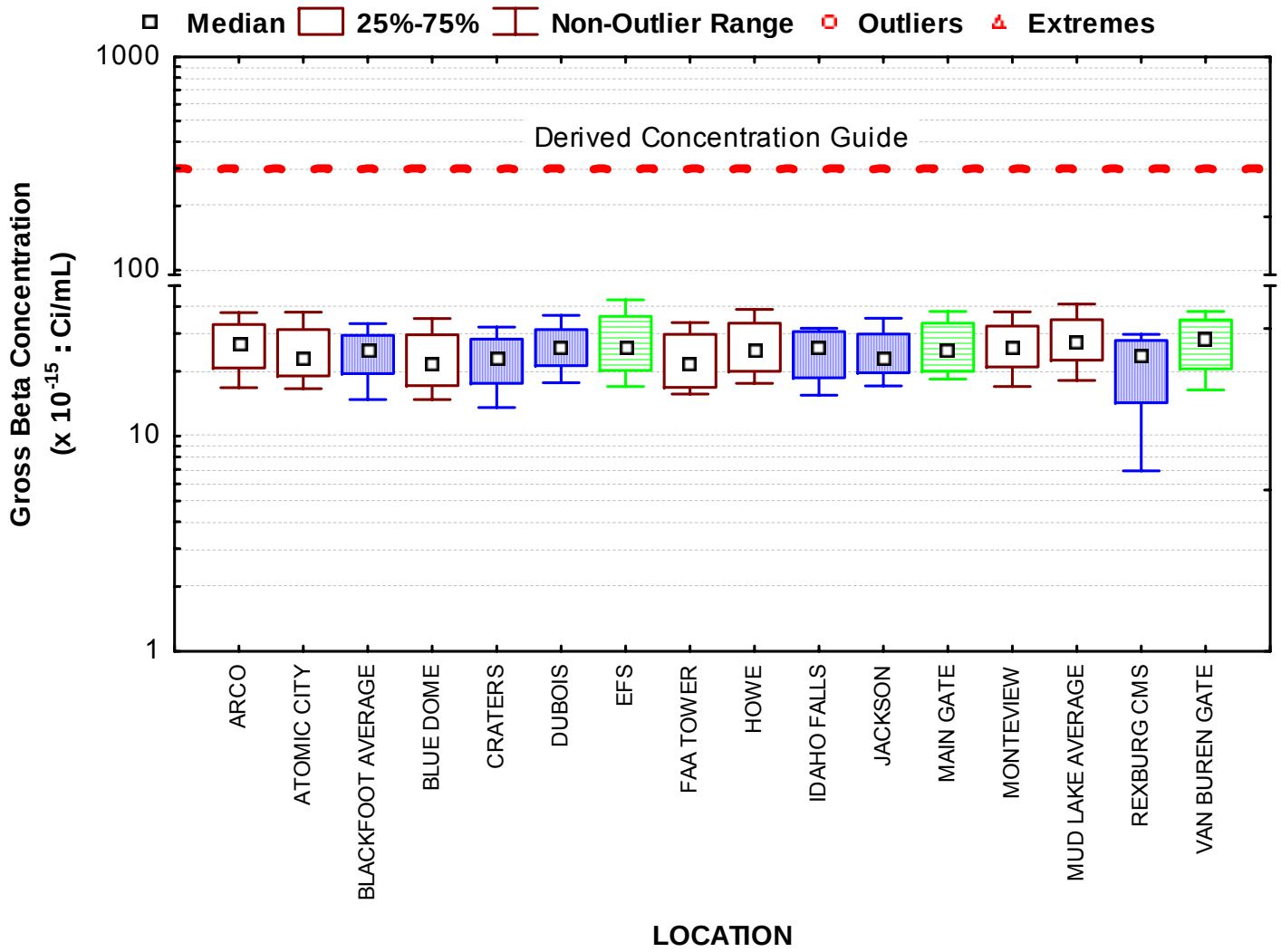

Figure 9. **November gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number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

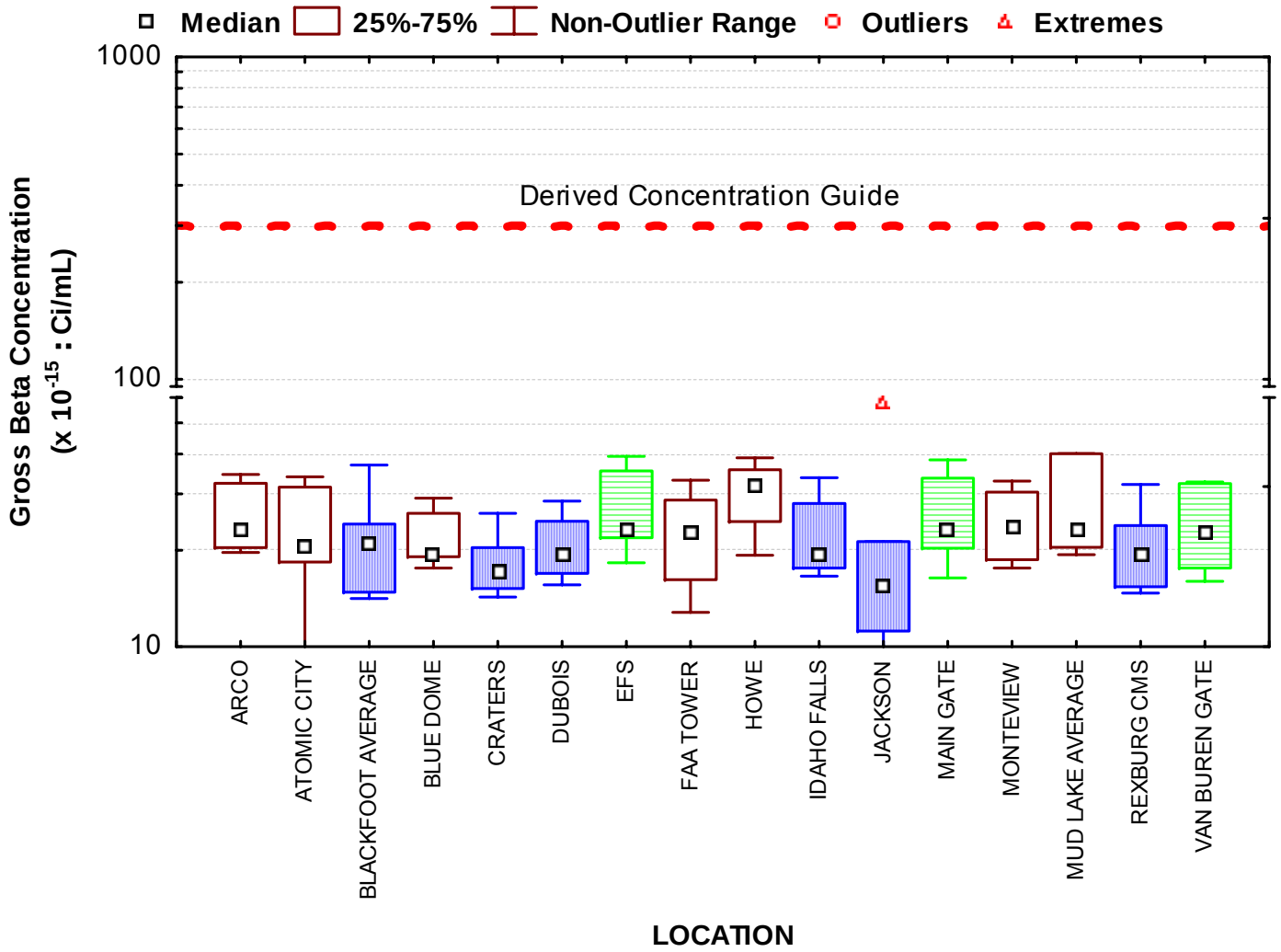

Figure 10. **December gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations.** Stations belonging to INEEL, Boundary, or Distant locations are represented by boxes that are patterned with vertical green stripes, no fill, or horizontal blue stripes, respectively. [Number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

Weekly filters for the fourth quarter of 2003 were composited by location and analyzed for gamma-emitting radionuclides, including ^{137}Cs. Composites were also analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. Americium-241 was detected above the 3s uncertainty value at the Blackfoot Community Monitoring Station (CMS). The concentration was (8.5 ± 1.5) x 10^{-18} μCi/mL ([3.2 ± 0.6] x 10^{-13} Bq/mL). Occasional detection of human-made radionuclides is not unusual and represents natural variations in concentrations of radionuclides introduced into the environment by historical nuclear weapons testing. The ^{241}Am concentration measured during this quarter was consistent with those recorded in the past and far less than its DCG value of 2 x 10^{-14} μCI/mL. All results for composite filter samples are shown in Table C-3, Appendix C.

ATMOSPHERIC MOISTURE SAMPLING

Twenty six atmospheric moisture samples were obtained during the fourth quarter of 2003: one sample from Blackfoot, six samples from Rexburg, six samples and a duplicate sample from Idaho Falls, and twelve samples from Atomic City. Atmospheric moisture is collected by pulling air through a column of absorbent material (i.e., silica gel or 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 samples were detected above their 3s values. Two samples came from Idaho Falls, and one each from Atomic City and Rexburg. Concentrations ranged from (3.4 ± 1.1) × 10^{-13} μCi/mL of air (1.3 ± 0.4) × 10^{-8} Bq/mL) at Idaho Falls to (6.8 ± 2.1) × 10^{-13} μCi/mL of air (2.5 ± 0.8) × 10^{-8} Bq/mL) at Atomic City. All were silica gel absorbent, but there was no common date. All seven sample results were well below the DOE DCG for tritium in air of 1 × 10^{-7} μCi/mL. All results are shown on Table C-4 of 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 one in Atomic City. Sampling of PM_{10} is informational only as no chemical analyses are conducted for contaminants. A twenty-four hour sampling period is scheduled to run once every six days. All measurements were acceptable during the quarter. The maximum 24-hour concentration was 173.7 μg/m^3 on October 23, 2003, at Blackfoot. The average, maximum, and minimum results of the 24-hour samples are summarized in Table 1. One sample each from Rexburg and Blackfoot exceeded the maximum 24-hour air quality standard established by EPA. Since both exceedances were on the same date it is likely the high particulate load is related to agricultural activities (e.g., potato harvest) in the areas of the samplers. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

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

	Concentration[a]		
Location	**Minimum**	**Maximum**	**Average**

Atomic City	1.3	50.5	11.3
Blackfoot, CMS	2.5	173.7	21.8
Rexburg, CMS	1.2	153.9	22.6

a. All concentrations are in ($\gamma g/m^3$).

PAGE INTENTIONALLY LEFT BLANK

4. WATER SAMPLING

The ESER program samples precipitation, surface water, and drinking water. Monthly composite precipitation samples are collected from Idaho Falls and the Central Facilities Area (CFA) on the INEEL. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INEEL. Surface and/or drinking water are sampled twice each year at 19 locations around the INEEL. This occurs during the second and fourth quarters and is therefore reported here. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) values is provided in Appendix B.

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 20 mL. Samples are taken of a monthly composite from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the fourth quarter of 2003 produced enough precipitation for a total of 10 samples – two Idaho Falls, three from CFA, and five from the EFS.

Tritium was measured above the sample's 3s value in four samples: two each from CFA and the EFS all collected in October. Tritium was also questionably detected in two additional samples, one each from Idaho Falls and EFS. While there is no regulatory limit for tritium in precipitation, the DOE DCG and maximum contaminant level set by EPA for tritium in drinking water can be used as a measure for comparison. The highest tritium concentration, 363.0 ± 61.8 pCi/L (13.4 ± 2.3 Bq/L), was measured in a sample collected from the EFS in the October 8. This value is many times lower than the DCG value (2×10^6 pCi/L) and the EPA Safe Drinking Water Act (SDWA) maximum contaminant level (20,000 pCi/L) for tritium in drinking water.

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 1996 through 2002, tritium measured in Region 10 (Alaska, Idaho, Oregon, and Washington) samples ranged from 0 to 1953 ± 71pCi/L (72.53 ± 2.63 Bq/L) (EPA 2004). Data for all fourth quarter 2003 precipitation samples collected by the ESER Program are listed in Table C-6 (Appendix C).

DRINKING WATER

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

Due to samples not meeting the ESER Program quality assurance requirements for analysis gross alpha and tritium results are not reported. The ESER Program is pursuing this issue with the laboratory.

Of the fourteen drinking water samples collected. Nine had positively detected ions of gross beta activity (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 was once again from Fort Hall and was lower than the SDWA screening value. Levels of gross beta observed in drinking water

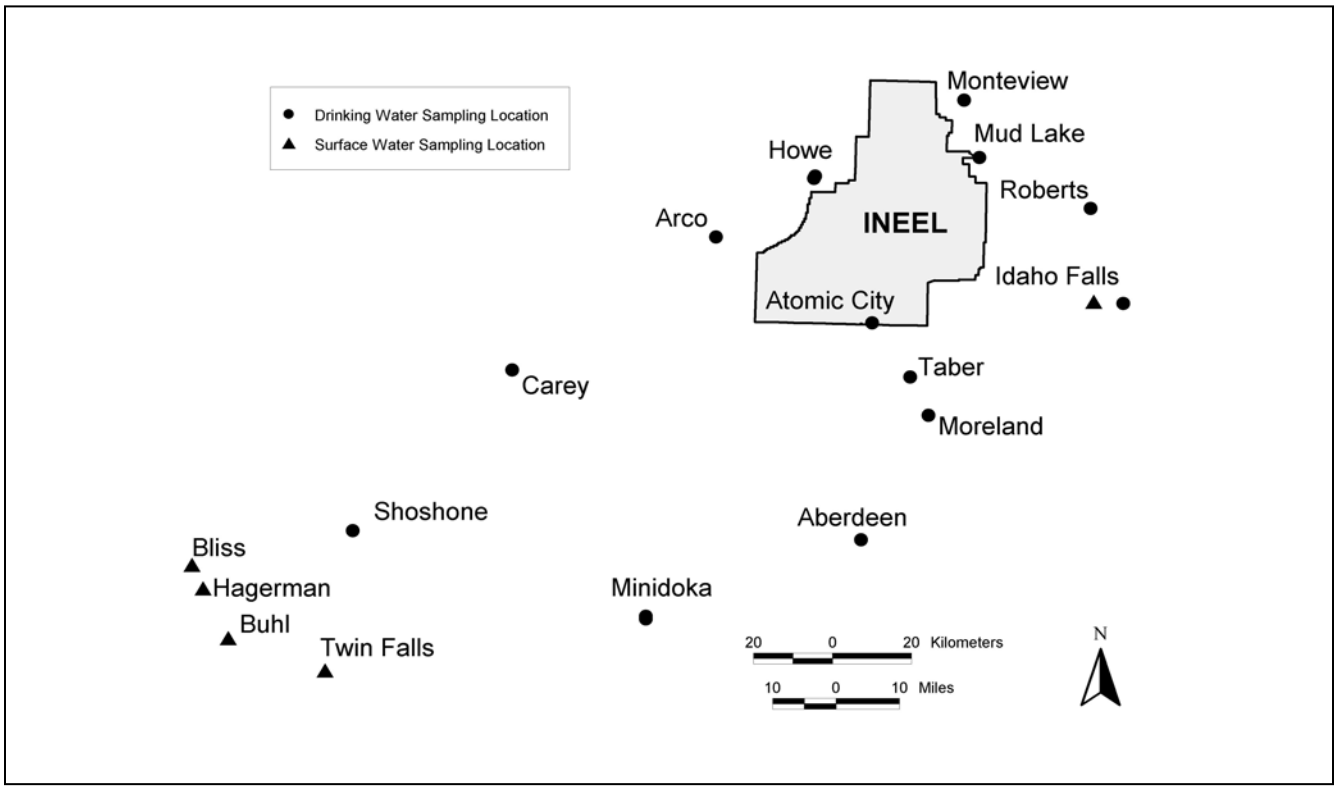

Figure 11. Drinking and Surface Water Sampling locations.

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

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

		Limits for Comparison[a]	
Location	**Result ± 1s**	**SDWA**	**DOE DCG**
Aberdeen	5.08 ± 1.00	50	100
Atomic City	2.89 ± 0.85	50	100
Fort Hall	8.37 ± 0.11	50	100
Minidoka	3.86 ± 0.92	50	100
Monteview	4.13 ± 0.89	50	100
Moreland	7.79 ± 0.12	50	100
Mud Lake	5.38 ± 0.91	50	100
Mud Lake (Duplicate)	4.35 ± 0.93	50	100
Taber	5.16 ± 0.99	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. Again due to QA concerns no gross alpha or tritium results are reported. The ESER Program is pursuing this issue with the laboratory.

Four 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)	4.89 ± 0.97	50	100
Buhl (Clear Spring)	3.13 ± 0.89	50	100
Hagerman(Bill Jones Fish Farm)	4.55 ± 0.91	50	100
Twin Falls(Alpheus Spring)	7.14 ± 0.11	50	100
Twin Falls (duplicate)	7.47 ± 0.11	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. All gross beta results can be found in Appendix C, Table C-7.

5. AGRICULTURAL PRODUCT AND WILDLIFE SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, and marmots are sampled. Milk is sampled throughout the year. Sheep are sampled during the second quarter. Lettuce and wheat are sampled during the third quarter, while potatoes and waterfowl are collected during the fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk, potatoes, large game, and waterfowl sampled during the fourth quarter of 2003. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses is provided in Appendix B. There no regulatory standards for radionuclide concentrations in agricultural products and wildlife tissues.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL (Figure 12) during the fourth quarter of 2003. All samples were analyzed for gamma emitting radionuclides. Selected samples are analyzed for ^{90}Sr and tritium during the fourth quarter. Data for ^{131}I and ^{137}Cs in milk samples are listed in Table C-7. No tritium, ^{131}I, or ^{137}Cs was detected (at a level greater than its 3s uncertainty) in any milk sample during this quarter.

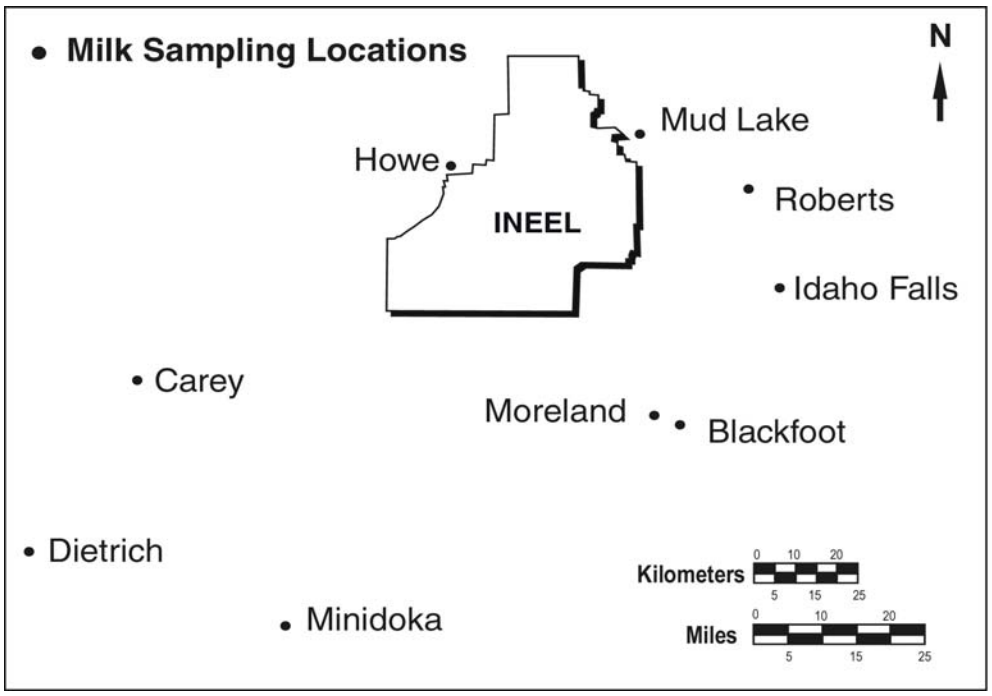

Figure 12. ESER Program milk sampling locations.

Strontium-90 was detected in three of four samples analyzed during the quarter (Table C-9). The maximum concentration of 1.28 ± 0.25 pCi/L was from Dietrich. Although there is no regulatory level for ^{90}Sr in milk the levels in drinking water can be used for comparison. The maximum concentration is below the EPA maximum contaminant level of 8 pCi/L and the DOE DCG of 1000 pCi/L.

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 four of the samples above their respective 3s values. The maximum concentration of ^{90}Sr was from Howe at 404 ± 96 pCi/kg (dry) (approximately 150 ± 36 Bq/kg [dry]). This value is consistent with historic concentrations.

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

Nine game animals, six mule deer, two pronghorn, and an elk, were sampled during the fourth quarter of 2003. All were killed as a result of vehicular collision. Samples of thyroid, liver, and muscle tissue were collected when possible. Cesium-137 and ^{131}I data for big game samples are listed in Appendix C, Table C-8. Each sample collected was analyzed for gamma-emitting radionuclides. Liver and muscle tissue of one pronghorn had detectable concentrations of ^{137}Cs. Iodine-131 was also detected in the liver of this animal.

WATERFOWL

Eleven waterfowl were collected during 2003: three each from the control location of Mud Lake and Argonne National Laboratory-West (ANL-W) sewage treatment lagoon, and five 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 4.

Five waterfowl had measurable levels of at least one radionuclide in edible tissue. Of the radionuclides measured at each location, Mud Lake had two positive samples, and the TRA sewage lagoon had three. Cerium-141 (^{141}Ce) was detected at concentrations greater than the 3s value in the muscle tissue of one of the waterfowl from TRA. ^{90}Sr was detected at concentrations greater than the 3s value in the muscle tissue of four of the waterfowl sampled. No other radionuclides were measured above the 3s concentration in any edible tissue.

Duck 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 ducks collected in 2003 was estimated to be 0.002 mrem (0.2 mSv). This dose is orders of magnitude lower than last years estimated dose of 0.89 mrem. This is attributed primarily to the fact that waterfowl from the TRA Warm Waste Pond, containing low levels of radionuclides, were not taken in 2003. 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. Results for all duck samples are listed in Table C-12 of Appendix C.

Table 4. Measured radionuclides in edible tissues of waterfowl.

Sample ID	Location	Radionuclide	Concentration ± 1s ($\times 10^{-3}$ pCi/g)	Concentration ± 1s ($\times 10^{-3}$ Bq/g)
03-WF-0004	TRA Sewage Lagoon	Cerium-141	176.0 ± 33.0	6.5 ± 2.0
03-WF-0019	Mud Lake	Strontium-90	10.6 ± 3.0	0.4 ± 0.1
03-WF-0028	Mud Lake	Strontium-90	20.4 ± 5.4	0.8 ± 0.2
03-WF-0007	TRA Sewage Lagoon	Strontium-90	18.7 ± 5.5	0.7 ± 0.2
03-WF-0013	TRA Sewage Lagoon	Strontium-90	18.0 ± 4.1	0.7 ± 0.2

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.

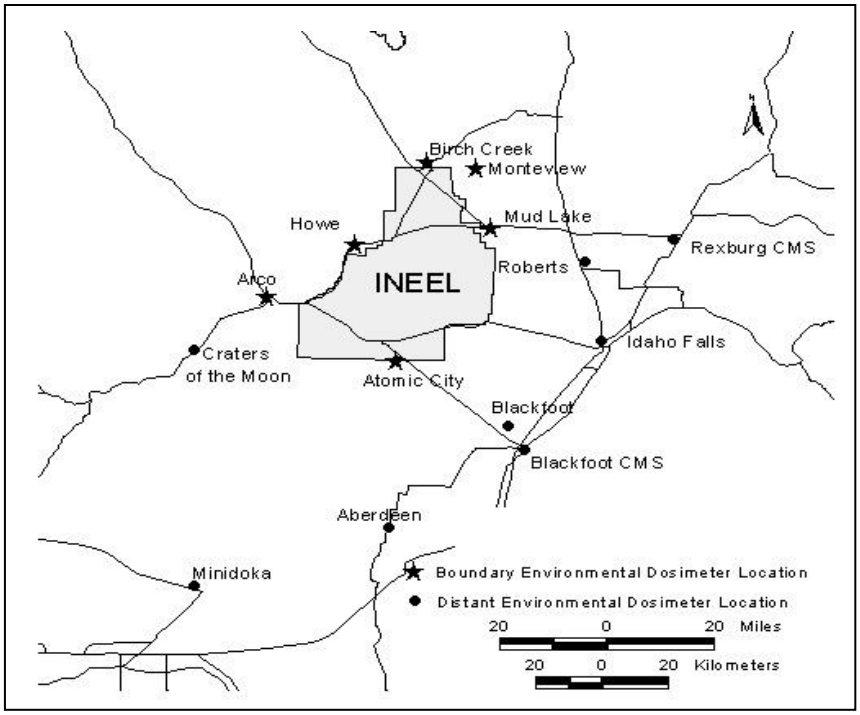

Figure 13. TLD sampling locations.

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 0.27 mR/day at Blue Dome to a high of 0.36 mR/day at Mud Lake. The overall Boundary average was 0.30 mR/day. The Distant group had a high of 0.37 mR/day at the Rexburg CMS and a low of 0.24 mR/day at the Aberdeen location. The overall average Distant value was 0.31 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 5. TLD Exposures from May 2003 to November 2003.

	Total Exposure[a]	
	Boundary	**Distant**
Average	55.32	56.10
Maximum	65.70	67.60
Minimum	50.30	44.90

a All values shown are in milliroetgens (mR).

PAGE INTENTIONALLY LEFT BLANK

7. QUALITY ASSURANCE

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

1. method uncertainty;
2. data completeness;
3. data accuracy, using spike and laboratory control samples;
4. data precision, using split samples, duplicate samples, and recounts; and
5. 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 31, 2003.

METHOD UNCERTAINTY

The Quality Assurance Project Plan (QAPP) establishes data quality and method quality objectives for the ESER surveillance program (Stoller 2002). Since the primary concern is with detection, the lower bound for the method uncertainty is set at zero. The upper bound is established as the average maximum concentration from the past seven years of applicable data. Each individual result is checked for acceptance on the basis of the result, whether it is below the lower limit (i.e., a negative value), greater than the upper limit, or between the lower and upper limit (the most common occurrence). The calculated method uncertainty is then compared to the 1s measured uncertainty. A sample is deemed acceptable when the measured 1s uncertainty is less than the calculated uncertainty. Those results that did not meet this requirement are shown in Table 6.

DATA COMPLETENESS

The QAPP specifies a 98 percent completeness goal for all regularly scheduled sample types. Data completeness was 100 percent during the fourth quarter for all sample types with the exception of low volume air which was 92 percent. The October 15 sample for the Mud Lake duplicate (Q/A-2) and the December 3 sample from Dubois were invalid due to insufficient sample volume collection. Dubois was the result of an electrical malfunction while the Mud Lake sample was due to a mechanical failure.

One of 33 ^{90}Sr analysis of waterfowl tissue was rejected due to a low yield.

DATA PRECISION

Data precision is a measure of the variability associated with a measurement system. Precision is measured using duplicate samples, split samples, and recounts. The QAPP specifies that sample results should agree within ±20 percent or 3s, whichever is greater. For environmental samples at levels that are within the normal range found by the ESER, the 3s criterion is the one that applies in nearly all cases. Mathematically, the 3s criterion is expressed as:

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

where:

X is the result of the regular sample

Y is the result of the duplicate sample

Table 6. Analytical results determined to be unacceptable.

Media		Radionuclide	Number Unacceptable[a]
Air		Gross alpha	4 / 379[b]
	filters and cartridges	Gross beta	0 / 371
		Cesium-137	142 / 389
		Iodine-131	352 / 389
		Americium-141	0 / 11
		Plutonium-238	0 / 10
		Plutonium-239/40	0 / 10
		Strontium-90	9 / 9
	moisture in air	Tritium	0 / 35
Precipitation		Tritium	0 / 17
Drinking Water		Gross alpha	14 / 21
		Gross beta	0 / 21
		Tritium	11 / 12
Surface Water		Gross alpha	6 / 10
		Gross beta	2 / 10
		Tritium	7 / 10
Milk		Cesium-137	1 / 93
		Iodine-131	0 / 92
		Strontium-90	1 / 5
		Tritium	0 / 6
Potatoes		Cesium-137	9 / 15
		Strontium-90	9 / 12
Wheat		Cesium-137	8 / 17
		Strontium-90	10 / 13
Game Animals		Cesium-137	13 / 35[c]
		Iodine-131	10 /36[c]
Waterfowl		Americium-141	10 / 34
		Cesium-137	0 /33
		Plutonium-238	1 / 34
		Plutonium-239/40	13 / 34
		Strontium-90	0 / 33

a. Format shown is number unacceptable / total number of analyses.
b. Total number of analyses varies due to different numbers of recounts for each radionuclide.
c. Unacceptable results are all associated with thyroids. Results are affected by small sample size.

σ_x is the uncertainty of the regular sample

σ_y is the uncertainty of the duplicate sample

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

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

Field Duplicate Samples

Duplicate samples collected during the fourth quarter included milk from Blackfoot, potatoes from Taber, drinking water from Mud Lake, and surface water from Twin Falls.

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

Duplicate air samplers are operated at two locations adjacent to regular air samplers. In the fourth quarter of 2003 these samplers, designated as Q/A-1 and Q/A-2, were in operation at the Blackfoot CMS and Mud Lake, respectively. Particulate filters were analyzed for gross alpha and gross beta activity. All valid results from the duplicate samplers met the 3s criterion for gross alpha during the fourth quarter. Eleven of 12 valid samples met the 3s criterion for gross beta activity during the same period. One sample from each location did not meet this criterion and had relative percent differences of 16 percent and 17 percent, respectively.

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. Only ^{241}Am was not within the 3s criterion.

A comparison of duplicate results can also show bias in the sampling system. For example, if one set of results is consistently lower or higher than the other one might suspect that this bias was due to a leak in the system or variations in the calibration of the flow meter. Figures 14 and 15 show the ratio of results (QA duplicate sampler/main sampler) over time. A ratio of one means that the results of both samplers are exactly the same. The figures show that the bias is small (<2) and not consistent, indicating that there is no obvious bias in the duplicate sampling systems. The average bias ratios during the fourth quarter are 1.0 and 1.0 for Blackfoot gross alpha and gross beta, respectively, and 0.9 and 1.0 for Mud Lake gross alpha and gross beta, respectively.

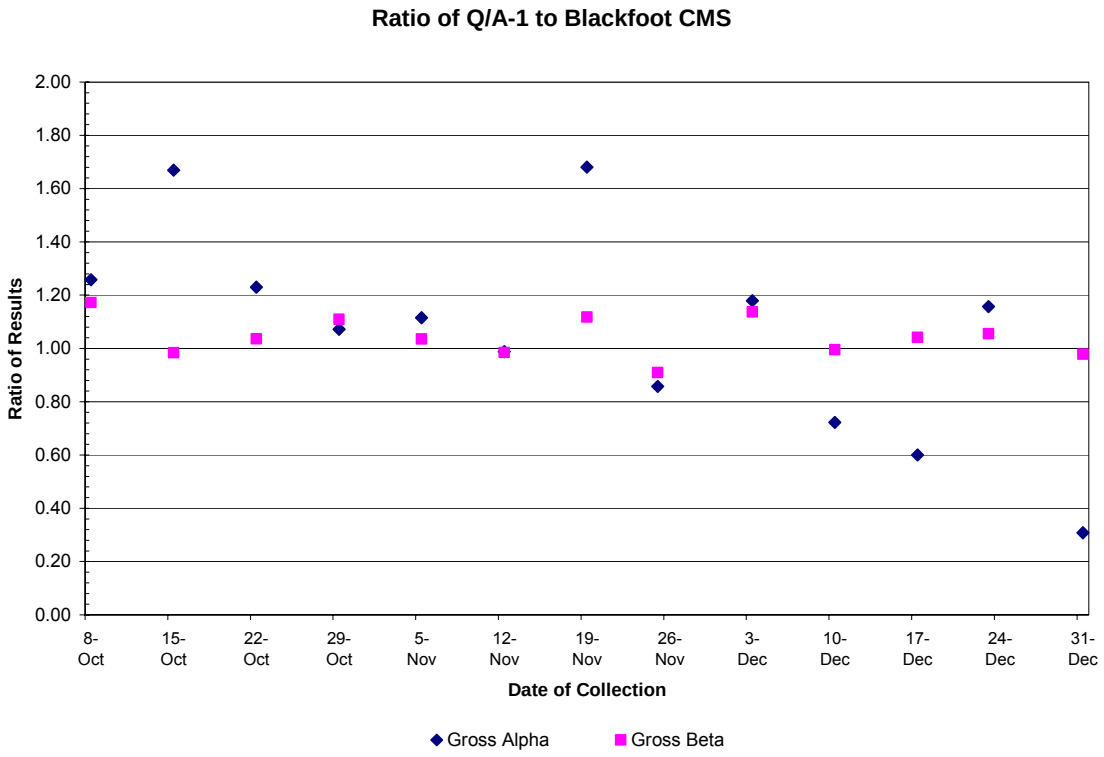

Figure 14. Ratio of QA-1/Blackfoot gross alpha and gross beta activities.

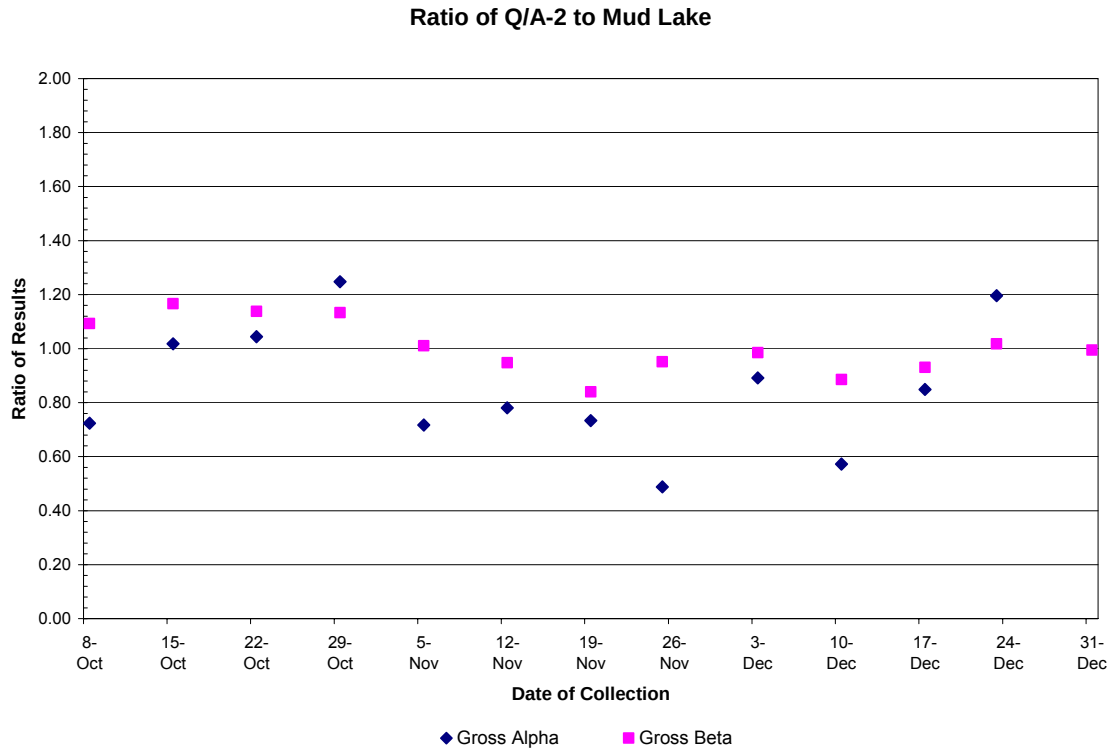

Figure 15. Ratio of QA-2/Mud Lake gross alpha and gross beta activities.

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 2003.

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

DATA ACCURACY

Accuracy is a measure of the degree to which a measured value agrees with the "true" value for a given parameter; accuracy includes elements of both bias and precision. During the fourth quarter of 2003, spikes of the following types were submitted for analyses by ESER:

- Strontium-90 in milk by Severn-Trent.

The current QAPP specifies a required accuracy of ±25 percent for ^{90}Sr in milk. The laboratory was within the accuracy criteria for this radionuclide. Revisions to the QAPP will require spikes to be within a certain calculated range based on the concentration of the spike added. The ^{90}Sr blank for the fourth quarter met also this new criterion.

Severn-Trent prepares an internal laboratory control sample (LCS) for analysis with each batch of samples submitted by the ESER. During the fourth quarter these consisted only of ^{90}Sr and actinides in air and waterfowl, ^{90}Sr in potatoes and milk, and ^{137}Cs in waterfowl. The QAPP specifies accuracies of ± 10 percent for ^{90}Sr and actinides in air, ± 20 percent for ^{90}Sr, ^{137}Cs, and actinides in waterfowl, and ± 25 percent for ^{90}Sr in potatoes and milk. Only the LCS for ^{137}Cs in waterfowl failed to meet the applicable criteria. All other waterfowl LCS results were within parameters: ^{90}Sr was +3.3 percent, $^{239/240}$Pu was +11.5 percent, and ^{241}Am was -2.0 percent. Since the ^{137}Cs LCS was higher than the acceptance criteria this would indicate a positive, or high, bias to the associated samples. Since ^{137}Cs was not detected above the 3s value in any sample the failure of this LCS had no impact on the sample results.

The ISU EAL also prepares internal laboratory spikes. During the fourth quarter of 2003, twelve analyses were conducted on NIST-traceable standards for gamma-emitting radionuclides. Geometries tested included low-volume air filter composites, a 10-charcoal cartridge batch screen, a single charcoal cartridge screen, and a 500 mL and 1000 mL water sample. A total of 48 analytical results were generated. All of the results within the ±20 percent range.

Nineteen tritium spiked analyses were also run during the quarter. All results met the ±20 percent criterion, with the exception of one result. However, this result was within the three sigma criterion (see *Data Precision* section). A tritium milk spike also was tested and met criteria.

BLANKS

The ESER Program submits field blanks along with the regular samples to test for the introduction of contamination during the process of field collection, laboratory preparation, and laboratory analysis. The current low-volume air sampling program includes the use of two field

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

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

The QAPP does not specify requirements for blank performance, but ideally the result should be within ±3s of zero on most analyses. Four gross alpha and one gross beta result were greater than the ±3s criterion. For those weeks where the blank samples exceeded the ±3s criterion calls into question the validity of the results from the associated field samples. An out-of-control blank could suggest significant filter contamination or laboratory contamination. Revisions to the QAPP will detail blank acceptance criteria, again based on the upper limit and method uncertainty. Using this method three gross alpha blank measurements were deemed to be at the warning level and two were considered out-of-control. These samples correlated with those that missed the ±3s criterion. In addition to the gross alpha results six ^{131}I results received a warning and three were deemed out-of-control.

The EAL also analyzes reagent blanks to help determine if the analysis will yield a zero result when no activity is present. Two such blanks were analyzed for tritium in water and one for tritium in milk during the fourth quarter. The results were less than the calculated MDCs or less than the 3s criterion. Severn-Trent also analyzes a laboratory blank with each sample set. The blanks were in control for ^{238}Pu, $^{239/240}Pu$ and ^{241}Am in air. All ^{90}Sr analyses (air, milk, and waterfowl) were outside the ±3s control limit. An out-of-control laboratory blank suggests laboratory contamination or other analytical problems.

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

- ^{137}Cs and ^{131}I in air filters/charcoal cartridges;
- ^{90}Sr in quarterly composites;
- Gross alpha and tritium in drinking and surface water;
- ^{137}Cs and ^{90}Sr in potatoes; and
- ^{90}Sr in wheat.

8. REFERENCES

Bartholomay, R.C., Knobel, L.L., and Rousseau, J.P., 2003, *Field Methods and Quality Plan for Quality-of-Water Activities, U.S. Geological Survey, Idaho National Engineering and Environmental Laboratory, Idaho*, DOE/ID-22182, January 2003.

Currie, L.A., 1984, *Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements*, NUREG/CR-4007, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

DOE Order 450.1, "Environmental Management System," U.S. Department of Energy, January 2003.

DOE Order 5400.1, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, January 1993.

40 CFR 50.6, "National Primary and Secondary Ambient Air Quality Standards for Particulate Matter," Code of Federal Regulations, Office of the Federal Register, 1996.

EPA, 2004. Environmental Radiation Ambient Monitoring System (ERAMS). Web-page: http://www.epa.gov/enviro/html/erams/

NRC, 2002, Fact Sheet on The Biological Effects of Radiation, Web page http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html. U.S. Nuclear Regulatory Commission, Washington, D.C.

Stoller, 2002, *Quality Assurance Project Plan for the INEEL Offsite Environmental Surveillance Program*, Environmental Surveillance, Education and Research Program, October, 2002.

Twinning, B.V, and Rattray, G., 2003, *Radiochemical and Chemical Constituents in Water from Selected Wells and Springs from the Southern Boundary of the Idaho National Engineering and Environmental Laboratory to the Hagerman Area, Idaho, 2001*, DOE/ID-22185, April 2003.

United Nations, 2000, *Sources and Effects of Ionizing Radiation*, United Nations Scientific Committee on the Effects of Atomic Radiation, UNSCEAR 2000 Report to the General Assembly, with Scientific Annexes, United Nations, New York, 2000, Vol. 1.

PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

SUMMARY OF SAMPLING MEDIA AND SCHEDULE

PAGE INTENTIONALLY LEFT BLANK

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INEEL
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Rexburg	Arco, Atomic City, Blue Dome, FAA Tower, Howe, Monteview, Mud Lake	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Rexburg	Arco, Atomic City, Blue Dome, FAA Tower, Howe, Monteview, Mud Lake	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 CMS	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, Fort Hall, Idaho Falls, Minidoka, Moreland, Roberts, Shoshone	Arco, Atomic City, Howe, Monteview, Mud Lake	None
ENVIRONMENTAL RADIATION SAMPLING				
TLDs				
Gamma Radiation	semi-annually	Aberdeen, Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Minidoka, Rexburg, Roberts	Arco, Atomic City, Birch Creek, Blue Dome, 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	Aberdeen, Blackfoot, Carey, St. Anthony	Atomic City, Birch Creek, Butte City, FAA Tower, Howe, Monteview, Mud Lake (2)	None
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich,	Howe, Terreton	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Moreland, Roberts, Rupert	Howe, Terreton	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Howe, Monteview, Mud Lake, Tabor	None
WHEAT				
Gamma Spec, ^{90}Sr	annually	Aberdeen, Carey, Idaho Falls, Menan, Rockford	Arco, Howe, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls	Arco, Atomic City, Howe, Monteview	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Occasional samples along roads near the INEEL	INEEL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois	None	N. INEEL, S. INEEL
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	None	Mud Lake	TRA sewage lagoon, ANL-W sewage lagoon
MARMOTS				
Gamma Spec, ^{90}Sr, Transuranics	varies	Pocatello zoo, Tie Canyon	None	RWMC

APPENDIX B

SUMMARY OF MDCS AND DCGS

PAGE INTENTIONALLY LEFT BLANK

The minimum detectable concentration (MDC) is used to assess measurement process capabilities. The MDC indicates the ability of the laboratory to detect an analyte in a sample at desired concentration levels. The ESER requires that the laboratory be able to detect radionuclides at levels normally expected in environmental samples, as observed historically in the region. These levels are typically well below regulatory limits. The MDC is instrument and analysis specific, and is established by the analytical laboratory at the beginning of each analytical run.

Table B-1. Summary of approximate minimum detectable concentrations for radiological analyses performed during fourth quarter 2003

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	8.2×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.6×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	4.1×10^{-13} µCi/mL	4×10^{-10} µCi/mL
	^{238}Pu	1.7×10^{-18} µCi/mL	3×10^{-14} µCi/mL
	$^{239/240}$Pu	2.3×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{241}Am	1.8×10^{-18} µCi/mL	2×10^{-14} µCi/mL
	^{90}Sr	6.0×10^{-17} µCi/mL	9×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	9.5×10^{-16} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)[f]	^{3}H	9.3×10^{-8} µCi/mL	1×10^{-7} µCi/mL
Air (precipitation)	^{3}H	9.7×10^{-8} µCi/mL	2×10^{-3} µCi/mL
Drinking Water	Gross Alpha	1.3×10^{-3} pCi/L	2.0×10^{-5} pCi/L
	Gross Beta	2.8×10^{-3} pCi/L	3.0×10^{-3} pCi/L
	^{3}H	0.087 pCi/L	2.0×10^{6} pCi/L
Surface Water	Gross Alpha	1.3×10^{-3} pCi/L	2.0×10^{-5} pCi/L
	Gross Beta	2.8×10^{-3} pCi/L	3.0×10^{-3} pCi/L
	^{3}H	0.087 pCi/L	2.0×10^{6} pCi/L
Milk	^{131}I	0.5 pCi/L	--
	^{137}Cs	2.9 pCi/L	--
	^{90}Sr	0.68 pCi/L	--
	^{3}H	0.088 pCi/L	--
Potatoes	^{137}Cs	8.6×10^{-3} pCi/g	--
	^{90}Sr	3.4×10^{-7} pCi/g	--
Game Animal Tissue[g]	$^{137}Cs_{(Muscle/Liver)}$	4.1 pCi/kg	--
	$^{137}Cs_{(Thyroid)}$	765.8 pCi/kg	--
	$^{131}I_{(Muscle/Liver)}$	4.2 pCi/kg	--
	$^{131}I_{(Thyroid)}$	765.8 pCi/kg	--
Waterfowl	^{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	--

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Waterfowl (continued)	^{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	--
	^{238}Pu	4.33×10^{-3} pCi/g	--
	$^{239/240}$Pu	5.06×10^{-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, taken as the most restrictive radionuclide, and is equivalent to the DCGs for ^{239,240}Pu and ^{241}Am.

d The DCG for gross beta, taken as the most restrictive radionuclide, and is equivalent to the DCGs for ^{228}Ra.

e The approximate MDC is based on an average filtered air volume (pressure corrected) of 464 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 13 m^3, assuming an average sampling period of eight weeks.

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

PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

SAMPLE ANALYSIS RESULTS

PAGE INTENTIONALLY LEFT BLANK

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
BOUNDARY							
ARCO	10/01/2003	2.89 ± 0.48	10.69 ± 1.78	Y	31.60 ± 1.23	116.92 ± 4.55	Y
	10/08/2003	2.98 ± 0.44	11.03 ± 1.62	Y	46.50 ± 1.27	172.05 ± 4.70	Y
	10/15/2003	1.51 ± 0.37	5.59 ± 1.35	Y	20.00 ± 0.97	74.00 ± 3.58	Y
	10/22/2003	2.83 ± 0.43	10.47 ± 1.59	Y	31.60 ± 1.12	116.92 ± 4.14	Y
	10/29/2003	2.15 ± 0.43	7.96 ± 1.58	Y	25.80 ± 1.11	95.46 ± 4.11	Y
	11/05/2003	1.07 ± 0.34	3.96 ± 1.25	Y	28.60 ± 1.01	105.82 ± 3.74	Y
	11/12/2003	2.16 ± 0.37	7.99 ± 1.37	Y	37.50 ± 1.15	138.75 ± 4.26	Y
	11/19/2003	1.61 ± 0.36	5.96 ± 1.31	Y	24.70 ± 0.97	91.39 ± 3.57	Y
	11/25/2003	1.03 ± 0.44	3.81 ± 1.62		16.80 ± 1.11	62.16 ± 4.11	Y
	12/03/2003	2.35 ± 0.37	8.70 ± 1.37	Y	32.40 ± 1.03	119.88 ± 3.81	Y
	12/10/2003	0.86 ± 0.33	3.20 ± 1.21		20.40 ± 1.01	75.48 ± 3.74	Y
	12/17/2003	0.11 ± 0.27	0.39 ± 1.01		23.30 ± 0.99	86.21 ± 3.66	Y
	12/23/2003	1.46 ± 0.43	5.40 ± 1.58	Y	34.50 ± 1.42	127.65 ± 5.25	Y
	12/31/2003	1.71 ± 0.39	6.33 ± 1.45	Y	19.70 ± 0.87	72.89 ± 3.22	Y
ATOMIC CITY	10/01/2003	1.71 ± 0.42	6.33 ± 1.57	Y	30.40 ± 1.25	112.48 ± 4.63	Y
	10/08/2003	3.22 ± 0.50	11.91 ± 1.84	Y	52.30 ± 1.45	193.51 ± 5.37	Y
	10/15/2003	1.66 ± 0.37	6.14 ± 1.38	Y	18.90 ± 0.95	69.93 ± 3.50	Y
	10/22/2003	2.54 ± 0.38	9.40 ± 1.41	Y	40.30 ± 1.14	149.11 ± 4.22	Y
	10/29/2003	2.18 ± 0.42	8.07 ± 1.56	Y	28.60 ± 1.13	105.82 ± 4.18	Y
	11/05/2003	1.52 ± 0.34	5.62 ± 1.25	Y	24.90 ± 0.91	92.13 ± 3.35	Y
	11/12/2003	2.27 ± 0.40	8.40 ± 1.48	Y	37.70 ± 1.23	139.49 ± 4.55	Y
	11/19/2003	0.94 ± 0.34	3.49 ± 1.24		21.50 ± 0.98	79.55 ± 3.61	Y
	11/25/2003	0.51 ± 0.37	1.88 ± 1.38		16.60 ± 1.06	61.42 ± 3.92	Y
	12/03/2003	1.63 ± 0.29	6.03 ± 1.06	Y	31.50 ± 0.90	116.55 ± 3.33	Y
	12/10/2003	0.87 ± 0.32	3.20 ± 1.17		20.70 ± 0.98	76.59 ± 3.64	Y
	12/17/2003	-0.43 ± 0.13	-1.58 ± 0.48		-0.43 ± 0.31	-1.58 ± 1.15	
	12/23/2003	1.18 ± 0.36	4.37 ± 1.32	Y	33.90 ± 1.27	125.43 ± 4.70	Y
	12/31/2003	0.65 ± 0.32	2.40 ± 1.20		18.40 ± 0.83	68.08 ± 3.08	Y
BLUE DOME	10/01/2003	1.32 ± 0.31	4.88 ± 1.16	Y	26.00 ± 0.97	96.20 ± 3.59	Y
	10/08/2003	3.14 ± 0.43	11.62 ± 1.60	Y	52.20 ± 1.29	193.14 ± 4.77	Y
	10/15/2003	1.02 ± 0.28	3.77 ± 1.04	Y	16.80 ± 0.79	62.16 ± 2.94	Y
	10/22/2003	1.23 ± 0.29	4.55 ± 1.07	Y	27.30 ± 0.94	101.01 ± 3.49	Y
	10/29/2003	1.02 ± 0.27	3.77 ± 0.99	Y	23.00 ± 0.84	85.10 ± 3.10	Y
	11/05/2003	1.08 ± 0.30	4.00 ± 1.12	Y	24.00 ± 0.86	88.80 ± 3.19	Y
	11/12/2003	1.99 ± 0.31	7.36 ± 1.15	Y	35.20 ± 0.99	130.24 ± 3.65	Y
	11/19/2003	1.32 ± 0.35	4.88 ± 1.29	Y	19.50 ± 0.91	72.15 ± 3.37	Y
	11/25/2003	1.48 ± 0.41	5.48 ± 1.53	Y	14.80 ± 0.95	54.76 ± 3.51	Y
	12/03/2003	1.55 ± 0.31	5.74 ± 1.15	Y	26.10 ± 0.92	96.57 ± 3.39	Y
	12/10/2003	1.04 ± 0.26	3.85 ± 0.95	Y	19.30 ± 0.77	71.41 ± 2.85	Y
	12/17/2003	0.62 ± 0.24	2.29 ± 0.90		19.10 ± 0.76	70.67 ± 2.82	Y
	12/23/2003	1.82 ± 0.33	6.73 ± 1.23	Y	29.10 ± 1.00	107.67 ± 3.70	Y
	12/30/2003	1.19 ± 0.38	4.40 ± 1.39	Y	17.60 ± 0.86	65.12 ± 3.19	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
FAA TOWER	10/01/2003	2.26 ± 0.43	8.36 ± 1.58	Y	33.40 ± 1.21	123.58 ± 4.48	Y
	10/08/2003	3.94 ± 0.54	14.58 ± 1.99	Y	50.50 ± 1.45	186.85 ± 5.37	Y
	10/15/2003	1.07 ± 0.39	3.96 ± 1.45		20.40 ± 1.12	75.48 ± 4.14	Y
	10/22/2003	2.33 ± 0.41	8.62 ± 1.51	Y	37.90 ± 1.21	140.23 ± 4.48	Y
	10/29/2003	2.84 ± 0.45	10.51 ± 1.68	Y	29.30 ± 1.12	108.41 ± 4.14	Y
	11/05/2003	1.74 ± 0.41	6.44 ± 1.51	Y	25.70 ± 1.04	95.09 ± 3.85	Y
	11/12/2003	1.88 ± 0.37	6.96 ± 1.37	Y	33.70 ± 1.16	124.69 ± 4.29	Y
	11/19/2003	1.14 ± 0.34	4.22 ± 1.26	Y	18.00 ± 0.90	66.60 ± 3.32	Y
	11/25/2003	0.60 ± 0.39	2.23 ± 1.44		15.70 ± 1.06	58.09 ± 3.92	Y
	12/03/2003	1.77 ± 0.39	6.55 ± 1.43	Y	28.70 ± 1.11	106.19 ± 4.11	Y
	12/10/2003	1.65 ± 0.41	6.11 ± 1.53	Y	22.50 ± 1.11	83.25 ± 4.11	Y
	12/17/2003	1.03 ± 0.32	3.81 ± 1.20	Y	16.20 ± 0.83	59.94 ± 3.07	Y
	12/23/2003	2.32 ± 0.50	8.58 ± 1.83	Y	33.10 ± 1.42	122.47 ± 5.25	Y
	12/31/2003	0.97 ± 0.37	3.58 ± 1.36		12.80 ± 0.79	47.36 ± 2.91	Y
HOWE	10/01/2003	2.24 ± 0.39	8.29 ± 1.45	Y	30.90 ± 1.09	114.33 ± 4.03	Y
	10/08/2003	3.13 ± 0.45	11.58 ± 1.68	Y	51.40 ± 1.34	190.18 ± 4.96	Y
	10/15/2003	1.88 ± 0.36	6.96 ± 1.33	Y	20.10 ± 0.90	74.37 ± 3.33	Y
	10/22/2003	2.69 ± 0.38	9.95 ± 1.41	Y	33.10 ± 1.04	122.47 ± 3.85	Y
	10/29/2003	3.08 ± 0.48	11.40 ± 1.78	Y	30.90 ± 1.18	114.33 ± 4.37	Y
	11/05/2003	1.84 ± 0.41	6.81 ± 1.51	Y	28.20 ± 1.06	104.34 ± 3.92	Y
	11/12/2003	2.62 ± 0.39	9.69 ± 1.46	Y	38.80 ± 1.17	143.56 ± 4.33	Y
	11/19/2003	1.73 ± 0.36	6.40 ± 1.31	Y	22.40 ± 0.92	82.88 ± 3.40	Y
	11/25/2003	1.39 ± 0.44	5.14 ± 1.64	Y	17.60 ± 1.08	65.12 ± 4.00	Y
	12/03/2003	1.98 ± 0.33	7.33 ± 1.21	Y	38.90 ± 1.04	143.93 ± 3.85	Y
	12/10/2003	1.31 ± 0.31	4.85 ± 1.14	Y	24.60 ± 0.93	91.02 ± 3.44	Y
	12/17/2003	0.88 ± 0.30	3.27 ± 1.10		19.30 ± 0.85	71.41 ± 3.14	Y
	12/23/2003	2.65 ± 0.42	9.81 ± 1.55	Y	35.70 ± 1.20	132.09 ± 4.44	Y
	12/30/2003	1.66 ± 0.53	6.14 ± 1.96	Y	32.00 ± 1.33	118.40 ± 4.92	Y
MONTEVIEW	10/01/2003	3.44 ± 0.49	12.73 ± 1.82	Y	27.20 ± 1.13	100.64 ± 4.18	Y
	10/08/2003	3.12 ± 0.44	11.54 ± 1.61	Y	50.40 ± 1.28	186.48 ± 4.74	Y
	10/15/2003	1.53 ± 0.33	5.66 ± 1.22	Y	21.20 ± 0.89	78.44 ± 3.30	Y
	10/22/2003	3.14 ± 0.39	11.62 ± 1.44	Y	34.10 ± 1.01	126.17 ± 3.74	Y
	10/29/2003	2.85 ± 0.42	10.55 ± 1.55	Y	30.20 ± 1.06	111.74 ± 3.92	Y
	11/05/2003	1.67 ± 0.33	6.18 ± 1.22	Y	27.10 ± 0.90	100.27 ± 3.31	Y
	11/12/2003	3.13 ± 0.38	11.58 ± 1.41	Y	37.80 ± 1.04	139.86 ± 3.85	Y
	11/19/2003	2.35 ± 0.37	8.70 ± 1.36	Y	24.90 ± 0.90	92.13 ± 3.34	Y
	11/25/2003	0.85 ± 0.30	3.15 ± 1.11		17.00 ± 0.84	62.90 ± 3.09	Y
	12/03/2003	2.13 ± 0.32	7.88 ± 1.17	Y	32.90 ± 0.92	121.73 ± 3.40	Y
	12/10/2003	1.06 ± 0.28	3.92 ± 1.04	Y	23.80 ± 0.89	88.06 ± 3.30	Y
	12/17/2003	0.98 ± 0.27	3.64 ± 1.00	Y	18.70 ± 0.76	69.19 ± 2.83	Y
	12/23/2003	1.52 ± 0.34	5.62 ± 1.25	Y	30.40 ± 1.09	112.48 ± 4.03	Y
	12/30/2003	1.35 ± 0.39	5.00 ± 1.45	Y	17.60 ± 0.87	65.12 ± 3.23	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
MUD LAKE	10/01/2003	3.73 ± 0.53	13.80 ± 1.97	Y	34.10 ± 1.29	126.17 ± 4.77	Y
	10/08/2003	4.31 ± 0.51	15.95 ± 1.89	Y	49.40 ± 1.33	182.78 ± 4.92	Y
	10/15/2003	1.64 ± 0.34	6.07 ± 1.27	Y	21.10 ± 0.91	78.07 ± 3.38	Y
	10/22/2003	3.17 ± 0.49	11.73 ± 1.82	Y	35.50 ± 1.29	131.35 ± 4.77	Y
	10/29/2003	2.18 ± 0.39	8.07 ± 1.42	Y	30.00 ± 1.06	111.00 ± 3.92	Y
	11/05/2003	1.84 ± 0.35	6.81 ± 1.28	Y	28.20 ± 0.92	104.34 ± 3.41	Y
	11/12/2003	3.51 ± 0.44	12.99 ± 1.61	Y	42.20 ± 1.19	156.14 ± 4.40	Y
	11/19/2003	2.93 ± 0.42	10.84 ± 1.56	Y	29.30 ± 1.02	108.41 ± 3.77	Y
	11/25/2003	1.29 ± 0.36	4.77 ± 1.32	Y	18.60 ± 0.93	68.82 ± 3.43	Y
	12/03/2003	2.86 ± 0.39	10.58 ± 1.44	Y	40.40 ± 1.10	149.48 ± 4.07	Y
	12/10/2003	1.73 ± 0.34	6.40 ± 1.26	Y	24.40 ± 0.94	90.28 ± 3.49	Y
	12/17/2003	0.86 ± 0.27	3.18 ± 1.00	Y	20.10 ± 0.80	74.37 ± 2.96	Y
	12/23/2003	2.19 ± 0.40	8.10 ± 1.47	Y	39.70 ± 1.26	146.89 ± 4.66	Y
	12/30/2003	0.04 ± 0.33	0.13 ± 1.23		20.50 ± 0.96	75.85 ± 3.54	Y
MUD LAKE (Q/A-2)	10/01/2003	2.32 ± 0.37	8.58 ± 1.35	Y	33.00 ± 1.04	122.10 ± 3.85	Y
	10/08/2003	3.12 ± 0.47	11.54 ± 1.74	Y	54.00 ± 1.41	199.80 ± 5.22	Y
	10/15/2003	1.67 ± 0.77	6.18 ± 2.83		24.60 ± 1.96	91.02 ± 7.25	Y
	10/22/2003	3.31 ± 0.41	12.25 ± 1.53	Y	40.40 ± 1.13	149.48 ± 4.18	Y
	10/29/2003	2.72 ± 0.38	10.06 ± 1.42	Y	34.00 ± 1.03	125.80 ± 3.81	Y
	11/05/2003	1.32 ± 0.32	4.88 ± 1.18	Y	28.50 ± 0.93	105.45 ± 3.43	Y
	11/12/2003	2.74 ± 0.37	10.14 ± 1.37	Y	40.00 ± 1.09	148.00 ± 4.03	Y
	11/19/2003	2.15 ± 0.39	7.96 ± 1.44	Y	24.60 ± 0.97	91.02 ± 3.59	Y
	11/25/2003	0.63 ± 0.31	2.34 ± 1.15		17.70 ± 0.91	65.49 ± 3.37	Y
	12/03/2003	2.55 ± 0.35	9.44 ± 1.29	Y	39.80 ± 1.03	147.26 ± 3.81	Y
	12/10/2003	0.91 ± 0.27	3.35 ± 1.01	Y	21.60 ± 0.87	79.92 ± 3.21	Y
	12/17/2003	0.73 ± 0.28	2.70 ± 1.03		18.70 ± 0.82	69.19 ± 3.03	Y
	12/23/2003	2.62 ± 0.41	9.69 ± 1.52	Y	40.40 ± 1.23	149.48 ± 4.55	Y
	12/30/2003	0.99 ± 0.41	3.65 ± 1.53		20.40 ± 1.00	75.48 ± 3.69	Y
MUD LAKE AVERAGE	10/01/2003	3.03 ± 0.65	11.19 ± 2.39	Y	33.55 ± 1.66	124.14 ± 6.13	Y
	10/08/2003	3.72 ± 0.70	13.75 ± 2.57	Y	51.70 ± 1.94	191.29 ± 7.17	Y
	10/15/2003	1.64 ± 0.34	6.07 ± 1.27	Y	21.10 ± 0.91	78.07 ± 3.38	Y
	10/22/2003	3.24 ± 0.64	11.99 ± 2.38	Y	37.95 ± 1.71	140.42 ± 6.35	Y
	10/29/2003	2.45 ± 0.54	9.07 ± 2.01	Y	32.00 ± 1.48	118.40 ± 5.47	Y
	11/05/2003	1.58 ± 0.47	5.85 ± 1.74	Y	28.35 ± 1.31	104.90 ± 4.84	Y
	11/12/2003	3.13 ± 0.57	11.56 ± 2.11	Y	41.10 ± 1.61	152.07 ± 5.97	Y
	11/19/2003	2.54 ± 0.57	9.40 ± 2.12	Y	26.95 ± 1.41	99.72 ± 5.21	Y
	11/25/2003	0.96 ± 0.47	3.56 ± 1.75		18.15 ± 1.30	67.16 ± 4.81	Y
	12/03/2003	2.71 ± 0.52	10.01 ± 1.93	Y	40.10 ± 1.51	148.37 ± 5.58	Y
	12/10/2003	1.32 ± 0.44	4.88 ± 1.61	Y	23.00 ± 1.28	85.10 ± 4.74	Y
	12/17/2003	0.79 ± 0.39	2.94 ± 1.43		19.40 ± 1.15	71.78 ± 4.24	Y
	12/23/2003	2.41 ± 0.57	8.90 ± 2.11	Y	40.05 ± 1.76	148.19 ± 6.52	Y
	12/30/2003	0.51 ± 0.53	1.89 ± 1.96		20.45 ± 1.38	75.67 ± 5.12	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
DISTANT							
BLACKFOOT CMS	10/01/2003	2.42 ± 0.40	8.95 ± 1.47	Y	31.70 ± 1.09	117.29 ± 4.03	Y
	10/08/2003	2.91 ± 0.42	10.77 ± 1.57	Y	48.80 ± 1.26	180.56 ± 4.66	Y
	10/15/2003	1.33 ± 0.30	4.92 ± 1.10	Y	18.60 ± 0.80	68.82 ± 2.97	Y
	10/22/2003	3.00 ± 0.43	11.10 ± 1.58	Y	38.20 ± 1.18	141.34 ± 4.37	Y
	10/29/2003	1.95 ± 0.34	7.22 ± 1.24	Y	22.90 ± 0.87	84.73 ± 3.22	Y
	11/05/2003	1.13 ± 0.31	4.18 ± 1.16	Y	25.00 ± 0.90	92.50 ± 3.33	Y
	11/12/2003	2.54 ± 0.35	9.40 ± 1.28	Y	33.60 ± 0.98	124.32 ± 3.64	Y
	11/19/2003	0.94 ± 0.29	3.49 ± 1.07	Y	22.90 ± 0.88	84.73 ± 3.26	Y
	11/25/2003	1.26 ± 0.33	4.66 ± 1.21	Y	15.50 ± 0.81	57.35 ± 3.00	Y
	12/03/2003	1.23 ± 0.28	4.55 ± 1.02	Y	22.60 ± 0.83	83.62 ± 3.08	Y
	12/10/2003	1.37 ± 0.30	5.07 ± 1.10	Y	21.00 ± 0.84	77.70 ± 3.12	Y
	12/17/2003	0.30 ± 0.23	1.10 ± 0.84		14.50 ± 0.71	53.65 ± 2.62	Y
	12/23/2003	1.85 ± 0.36	6.85 ± 1.31	Y	35.90 ± 1.15	132.83 ± 4.26	Y
	12/31/2003	1.17 ± 0.37	4.33 ± 1.38	Y	14.30 ± 0.80	52.91 ± 2.96	Y
BLACKFOOT NOAA (Q/A-1)	10/01/2003	3.65 ± 0.56	13.51 ± 2.07	Y	31.50 ± 1.32	116.55 ± 4.88	Y
	10/08/2003	3.66 ± 0.59	13.54 ± 2.19	Y	57.20 ± 1.70	211.64 ± 6.29	Y
	10/15/2003	2.22 ± 0.41	8.21 ± 1.52	Y	18.30 ± 0.94	67.71 ± 3.48	Y
	10/22/2003	3.69 ± 0.53	13.65 ± 1.94	Y	39.60 ± 1.35	146.52 ± 5.00	Y
	10/29/2003	2.09 ± 0.37	7.73 ± 1.38	Y	25.40 ± 0.98	93.98 ± 3.61	Y
	11/05/2003	1.26 ± 0.41	4.66 ± 1.50	Y	25.90 ± 1.10	95.83 ± 4.07	Y
	11/12/2003	2.51 ± 0.41	9.29 ± 1.52	Y	33.10 ± 1.16	122.47 ± 4.29	Y
	11/19/2003	1.58 ± 0.37	5.85 ± 1.38	Y	25.60 ± 1.03	94.72 ± 3.81	Y
	11/25/2003	1.08 ± 0.43	4.00 ± 1.59		14.10 ± 1.03	52.17 ± 3.81	Y
	12/03/2003	1.45 ± 0.33	5.37 ± 1.22	Y	25.70 ± 0.98	95.09 ± 3.61	Y
	12/10/2003	0.99 ± 0.31	3.68 ± 1.13	Y	20.90 ± 0.93	77.33 ± 3.46	Y
	12/17/2003	0.18 ± 0.31	0.65 ± 1.16		15.10 ± 0.93	55.87 ± 3.45	Y
	12/23/2003	2.14 ± 0.39	7.92 ± 1.45	Y	37.90 ± 1.22	140.23 ± 4.51	Y
	12/31/2003	0.36 ± 0.37	1.34 ± 1.37		14.00 ± 0.88	51.80 ± 3.26	Y
BLACKFOOT AVERAGE	10/01/2003	3.04 ± 0.69	11.23 ± 2.54	Y	31.60 ± 1.71	116.92 ± 6.33	Y
	10/08/2003	3.29 ± 0.73	12.15 ± 2.69	Y	53.00 ± 2.12	196.10 ± 7.83	Y
	10/15/2003	1.78 ± 0.51	6.57 ± 1.87	Y	18.45 ± 1.24	68.27 ± 4.57	Y
	10/22/2003	3.35 ± 0.68	12.38 ± 2.51	Y	38.90 ± 1.79	143.93 ± 6.63	Y
	10/29/2003	2.02 ± 0.50	7.47 ± 1.86	Y	24.15 ± 1.31	89.36 ± 4.84	Y
	11/05/2003	1.20 ± 0.51	4.42 ± 1.90		25.45 ± 1.42	94.17 ± 5.26	Y
	11/12/2003	2.53 ± 0.54	9.34 ± 1.99	Y	33.35 ± 1.52	123.40 ± 5.63	Y
	11/19/2003	1.26 ± 0.47	4.67 ± 1.75		24.25 ± 1.36	89.73 ± 5.02	Y
	11/25/2003	1.17 ± 0.54	4.33 ± 2.00		14.80 ± 1.31	54.76 ± 4.85	Y
	12/03/2003	1.34 ± 0.43	4.96 ± 1.59	Y	24.15 ± 1.28	89.36 ± 4.75	Y
	12/10/2003	1.18 ± 0.43	4.37 ± 1.58		20.95 ± 1.26	77.52 ± 4.66	Y
	12/17/2003	0.24 ± 0.39	0.88 ± 1.43		14.80 ± 1.17	54.76 ± 4.33	Y
	12/23/2003	2.00 ± 0.53	7.38 ± 1.95	Y	36.90 ± 1.68	136.53 ± 6.20	Y
	12/31/2003	0.77 ± 0.52	2.83 ± 1.94		14.15 ± 1.19	52.36 ± 4.40	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
CRATERS	10/01/2003	2.40 ± 0.43	8.88 ± 1.58	Y	29.10 ± 1.13	107.67 ± 4.18	Y
	10/08/2003	2.13 ± 0.47	7.88 ± 1.74	Y	44.40 ± 1.45	164.28 ± 5.37	Y
	10/15/2003	0.88 ± 0.33	3.24 ± 1.20		14.00 ± 0.87	51.80 ± 3.23	Y
	10/22/2003	1.38 ± 0.33	5.11 ± 1.24	Y	20.20 ± 0.93	74.74 ± 3.46	Y
	10/29/2003	2.93 ± 0.46	10.84 ± 1.71	Y	23.70 ± 1.05	87.69 ± 3.89	Y
	11/05/2003	1.54 ± 0.38	5.70 ± 1.42	Y	24.30 ± 0.99	89.91 ± 3.67	Y
	11/12/2003	1.80 ± 0.34	6.66 ± 1.26	Y	32.10 ± 1.06	118.77 ± 3.92	Y
	11/19/2003	0.88 ± 0.32	3.27 ± 1.18		21.60 ± 0.95	79.92 ± 3.50	Y
	11/25/2003	1.32 ± 0.38	4.88 ± 1.40	Y	13.60 ± 0.88	50.32 ± 3.24	Y
	12/03/2003	0.80 ± 0.27	2.95 ± 1.00		20.40 ± 0.86	75.48 ± 3.17	Y
	12/10/2003	0.66 ± 0.26	2.42 ± 0.97		17.20 ± 0.83	63.64 ± 3.07	Y
	12/17/2003	1.05 ± 0.33	3.89 ± 1.20	Y	15.20 ± 0.81	56.24 ± 3.01	Y
	12/23/2003	2.56 ± 0.43	9.47 ± 1.59	Y	26.10 ± 1.10	96.57 ± 4.07	Y
	12/31/2003	1.35 ± 0.43	5.00 ± 1.60	Y	14.30 ± 0.89	52.91 ± 3.30	Y
DUBOIS	10/01/2003	2.99 ± 0.50	11.06 ± 1.86	Y	28.60 ± 1.23	105.82 ± 4.55	Y
	10/08/2003	3.17 ± 0.47	11.73 ± 1.72	Y	48.40 ± 1.34	179.08 ± 4.96	Y
	10/15/2003	1.23 ± 0.33	4.55 ± 1.20	Y	19.50 ± 0.91	72.15 ± 3.35	Y
	10/22/2003	2.66 ± 0.42	9.84 ± 1.55	Y	35.90 ± 1.17	132.83 ± 4.33	Y
	10/29/2003	1.73 ± 0.41	6.40 ± 1.50	Y	27.90 ± 1.15	103.23 ± 4.26	Y
	11/05/2003	0.88 ± 0.30	3.25 ± 1.11		24.80 ± 0.90	91.76 ± 3.32	Y
	11/12/2003	3.18 ± 0.43	11.77 ± 1.60	Y	36.40 ± 1.16	134.68 ± 4.29	Y
	11/19/2003	2.61 ± 0.41	9.66 ± 1.51	Y	26.20 ± 0.98	96.94 ± 3.62	Y
	11/25/2003	1.10 ± 0.40	4.07 ± 1.48		17.70 ± 1.03	65.49 ± 3.81	Y
	12/03/2003	0.14 ± 0.93	0.52 ± 3.46		20.10 ± 2.57	74.37 ± 9.51	Y
	12/10/2003	0.62 ± 0.25	2.30 ± 0.94		20.80 ± 0.87	76.96 ± 3.21	Y
	12/17/2003	0.97 ± 0.29	3.59 ± 1.06	Y	18.30 ± 0.80	67.71 ± 2.95	Y
	12/23/2003	1.19 ± 0.33	4.40 ± 1.23	Y	28.50 ± 1.12	105.45 ± 4.14	Y
	12/30/2003	0.31 ± 0.38	1.14 ± 1.39		15.60 ± 0.93	57.72 ± 3.43	Y
IDAHO FALLS	10/01/2003	3.59 ± 0.51	13.28 ± 1.87	Y	31.30 ± 1.20	115.81 ± 4.44	Y
	10/08/2003	3.60 ± 0.53	13.32 ± 1.95	Y	49.50 ± 1.45	183.15 ± 5.37	Y
	10/15/2003	2.24 ± 0.42	8.29 ± 1.54	Y	20.60 ± 0.99	76.22 ± 3.67	Y
	10/22/2003	3.23 ± 0.43	11.95 ± 1.58	Y	36.80 ± 1.13	136.16 ± 4.18	Y
	10/29/2003	2.91 ± 0.47	10.77 ± 1.75	Y	26.60 ± 1.12	98.42 ± 4.14	Y
	11/05/2003	2.43 ± 0.40	8.99 ± 1.46	Y	29.50 ± 0.99	109.15 ± 3.65	Y
	11/12/2003	2.51 ± 0.37	9.29 ± 1.35	Y	31.70 ± 1.01	117.29 ± 3.74	Y
	11/19/2003	1.12 ± 0.31	4.14 ± 1.14	Y	21.80 ± 0.89	80.66 ± 3.27	Y
	11/25/2003	0.70 ± 0.36	2.58 ± 1.34		15.50 ± 0.98	57.35 ± 3.62	Y
	12/03/2003	2.09 ± 0.33	7.73 ± 1.21	Y	28.00 ± 0.90	103.60 ± 3.33	Y
	12/10/2003	1.33 ± 0.30	4.92 ± 1.11	Y	19.20 ± 0.83	71.04 ± 3.07	Y
	12/17/2003	1.01 ± 0.33	3.74 ± 1.21	Y	16.60 ± 0.85	61.42 ± 3.14	Y
	12/23/2003	1.51 ± 0.35	5.59 ± 1.31	Y	33.70 ± 1.18	124.69 ± 4.37	Y
	12/30/2003	0.53 ± 0.44	1.95 ± 1.64		17.60 ± 1.06	65.12 ± 3.92	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
JACKSON	10/01/2003	1.74 ± 0.32	6.44 ± 1.19	Y	28.60 ± 0.95	105.82 ± 3.52	Y
	10/08/2003	2.41 ± 0.39	8.92 ± 1.44	Y	50.60 ± 1.26	187.22 ± 4.66	Y
	10/14/2003	1.45 ± 0.33	5.37 ± 1.23	Y	24.80 ± 0.97	91.76 ± 3.57	Y
	10/22/2003	1.99 ± 0.31	7.36 ± 1.15	Y	31.50 ± 0.93	116.55 ± 3.43	Y
	10/29/2003	1.97 ± 0.36	7.29 ± 1.31	Y	26.00 ± 0.96	96.20 ± 3.54	Y
	11/05/2003	0.50 ± 0.29	1.85 ± 1.07		22.30 ± 0.89	82.51 ± 3.29	Y
	11/12/2003	1.73 ± 0.33	6.40 ± 1.21	Y	35.30 ± 1.07	130.61 ± 3.96	Y
	11/19/2003	1.35 ± 0.36	5.00 ± 1.32	Y	24.30 ± 1.00	89.91 ± 3.70	Y
	11/25/2003	0.91 ± 0.32	3.37 ± 1.17		17.10 ± 0.87	63.27 ± 3.21	Y
	12/03/2003	0.45 ± 0.26	1.65 ± 0.97		21.30 ± 0.93	78.81 ± 3.44	Y
	12/10/2003	0.00 ± 0.00	0.00 ± 0.00		0.00 ± 0.00	0.00 ± 0.00	
	12/17/2003	0.65 ± 0.27	2.41 ± 1.01		15.40 ± 0.77	56.98 ± 2.84	Y
	12/23/2003	4.02 ± 0.52	14.87 ± 1.92	Y	57.60 ± 1.53	213.12 ± 5.66	Y
	12/30/2003	1.49 ± 0.52	5.51 ± 1.93		11.20 ± 0.97	41.44 ± 3.59	Y
REXBURG CMS	10/01/2003	2.85 ± 0.50	10.55 ± 1.86	Y	36.20 ± 1.36	133.94 ± 5.03	Y
	10/08/2003	4.54 ± 0.59	16.80 ± 2.18	Y	52.80 ± 1.54	195.36 ± 5.70	Y
	10/15/2003	2.97 ± 0.41	10.99 ± 1.52	Y	19.10 ± 0.86	70.67 ± 3.19	Y
	10/22/2003	3.31 ± 0.43	12.25 ± 1.59	Y	38.60 ± 1.15	142.82 ± 4.26	Y
	10/29/2003	2.54 ± 0.41	9.40 ± 1.52	Y	24.90 ± 1.00	92.13 ± 3.70	Y
	11/05/2003	1.87 ± 0.39	6.92 ± 1.43	Y	26.00 ± 0.98	96.20 ± 3.64	Y
	11/12/2003	2.50 ± 0.37	9.25 ± 1.37	Y	29.70 ± 1.00	109.89 ± 3.70	Y
	11/19/2003	1.24 ± 0.31	4.59 ± 1.14	Y	21.70 ± 0.87	80.29 ± 3.20	Y
	11/25/2003	0.51 ± 0.16	1.87 ± 0.59	Y	6.90 ± 0.40	25.53 ± 1.47	Y
	12/03/2003	0.96 ± 0.26	3.55 ± 0.96	Y	23.90 ± 0.85	88.43 ± 3.14	Y
	12/10/2003	1.46 ± 0.32	5.40 ± 1.17	Y	19.40 ± 0.85	71.78 ± 3.15	Y
	12/17/2003	0.79 ± 0.28	2.92 ± 1.03		15.40 ± 0.76	56.98 ± 2.80	Y
	12/23/2003	1.92 ± 0.40	7.10 ± 1.47	Y	32.10 ± 1.21	118.77 ± 4.48	Y
	12/31/2003	0.86 ± 0.37	3.16 ± 1.38		14.70 ± 0.84	54.39 ± 3.12	Y
INEEL							
EFS	10/01/2003	2.57 ± 0.46	9.51 ± 1.69	Y	30.40 ± 1.20	112.48 ± 4.44	Y
	10/08/2003	3.14 ± 0.47	11.62 ± 1.75	Y	51.40 ± 1.39	190.18 ± 5.14	Y
	10/15/2003	0.93 ± 0.33	3.43 ± 1.20		20.10 ± 0.97	74.37 ± 3.59	Y
	10/22/2003	2.50 ± 0.41	9.25 ± 1.53	Y	34.00 ± 1.16	125.80 ± 4.29	Y
	10/29/2003	2.52 ± 0.42	9.32 ± 1.54	Y	30.10 ± 1.09	111.37 ± 4.03	Y
	11/05/2003	1.80 ± 0.38	6.66 ± 1.41	Y	29.10 ± 1.02	107.67 ± 3.77	Y
	11/12/2003	3.25 ± 0.44	12.03 ± 1.62	Y	43.00 ± 1.24	159.10 ± 4.59	Y
	11/19/2003	1.29 ± 0.38	4.77 ± 1.39	Y	23.40 ± 1.04	86.58 ± 3.85	Y
	11/25/2003	0.79 ± 0.31	2.93 ± 1.15		17.00 ± 0.88	62.90 ± 3.24	Y
	12/03/2003	2.03 ± 0.34	7.51 ± 1.27	Y	35.40 ± 1.04	130.98 ± 3.85	Y
	12/10/2003	1.08 ± 0.31	4.00 ± 1.15	Y	23.30 ± 0.96	86.21 ± 3.56	Y
	12/17/2003	0.76 ± 0.31	2.83 ± 1.14		18.30 ± 0.88	67.71 ± 3.24	Y
	12/23/2003	2.14 ± 0.43	7.92 ± 1.59	Y	39.30 ± 1.35	145.41 ± 5.00	Y
	12/31/2003	1.34 ± 0.40	4.96 ± 1.48	Y	21.90 ± 0.96	81.03 ± 3.54	Y

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)	GROSS BETA Result > 3s
MAIN GATE	10/01/2003	1.92 ± 0.47	7.10 ± 1.75	Y	33.50 ± 1.40	123.95 ± 5.18	Y
	10/08/2003	2.79 ± 0.55	10.32 ± 2.05	Y	56.70 ± 1.72	209.79 ± 6.36	Y
	10/15/2003	1.66 ± 0.44	6.14 ± 1.62	Y	22.80 ± 1.16	84.36 ± 4.29	Y
	10/22/2003	2.54 ± 0.40	9.40 ± 1.49	Y	38.90 ± 1.18	143.93 ± 4.37	Y
	10/29/2003	2.31 ± 0.44	8.55 ± 1.62	Y	31.20 ± 1.18	115.44 ± 4.37	Y
	11/05/2003	1.23 ± 0.41	4.55 ± 1.51	Y	29.00 ± 1.15	107.30 ± 4.26	Y
	11/12/2003	2.68 ± 0.44	9.92 ± 1.61	Y	38.00 ± 1.26	140.60 ± 4.66	Y
	11/19/2003	1.55 ± 0.46	5.74 ± 1.69	Y	21.60 ± 1.15	79.92 ± 4.26	Y
	11/25/2003	1.01 ± 0.46	3.74 ± 1.69		18.40 ± 1.19	68.08 ± 4.40	Y
	12/03/2003	1.92 ± 0.40	7.10 ± 1.48	Y	38.30 ± 1.25	141.71 ± 4.63	Y
	12/10/2003	1.24 ± 0.44	4.59 ± 1.61		23.40 ± 1.26	86.58 ± 4.66	Y
	12/17/2003	0.63 ± 0.34	2.33 ± 1.27		16.40 ± 0.94	60.68 ± 3.47	Y
	12/23/2003	1.95 ± 0.44	7.22 ± 1.62	Y	33.60 ± 1.34	124.32 ± 4.96	Y
	12/31/2003	0.87 ± 0.47	3.22 ± 1.75		20.30 ± 1.12	75.11 ± 4.14	Y
VAN BUREN GATE	10/01/2003	2.07 ± 0.47	7.66 ± 1.72	Y	34.90 ± 1.37	129.13 ± 5.07	Y
	10/08/2003	3.93 ± 0.54	14.54 ± 2.00	Y	53.90 ± 1.50	199.43 ± 5.55	Y
	10/15/2003	1.09 ± 0.32	4.03 ± 1.20	Y	20.20 ± 0.94	74.74 ± 3.48	Y
	10/22/2003	2.33 ± 0.39	8.62 ± 1.45	Y	36.50 ± 1.16	135.05 ± 4.29	Y
	10/29/2003	2.23 ± 0.39	8.25 ± 1.45	Y	29.50 ± 1.06	109.15 ± 3.92	Y
	11/05/2003	1.31 ± 0.36	4.85 ± 1.32	Y	31.40 ± 1.06	116.18 ± 3.92	Y
	11/12/2003	2.10 ± 0.33	7.77 ± 1.22	Y	38.00 ± 1.05	140.60 ± 3.89	Y
	11/19/2003	1.79 ± 0.34	6.62 ± 1.27	Y	24.70 ± 0.91	91.39 ± 3.37	Y
	11/25/2003	0.84 ± 0.35	3.12 ± 1.31		16.40 ± 0.95	60.68 ± 3.52	Y
	12/03/2003	1.76 ± 0.31	6.51 ± 1.14	Y	32.30 ± 0.95	119.51 ± 3.50	Y
	12/10/2003	0.90 ± 0.31	3.34 ± 1.16		22.50 ± 0.99	83.25 ± 3.68	Y
	12/17/2003	0.22 ± 0.23	0.82 ± 0.84		16.00 ± 0.75	59.20 ± 2.76	Y
	12/23/2003	1.26 ± 0.33	4.66 ± 1.21	Y	32.70 ± 1.14	120.99 ± 4.22	Y
	12/31/2003	0.59 ± 0.36	2.19 ± 1.32		17.60 ± 0.89	65.12 ± 3.29	Y

Red text denotes invalid sample.

a 10/15/2003 Mud Lake (Q/A-2) invalid due to vacuum pump being out of adjustment

b 12/03/2003 Dubois invalid due to insufficient sample volume as a result of a tripped circuit breaker.

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)			Result > 3s
BOUNDARY								
ARCO	10/01/2003	-2.65	±	3.44	-9.82	±	12.74	
	10/08/2003	-2.03	±	1.97	-7.52	±	7.28	
	10/15/2003	3.11	±	3.16	11.49	±	11.67	
	10/22/2003	-0.16	±	2.94	-0.59	±	10.89	
	10/29/2003	-5.07	±	2.97	-18.76	±	10.99	
	11/05/2003	1.24	±	2.86	4.60	±	10.60	
	11/12/2003	0.55	±	2.55	2.04	±	9.44	
	11/19/2003	-2.12	±	2.74	-7.83	±	10.13	
	11/25/2003	5.36	±	3.92	19.85	±	14.51	
	12/03/2003	0.53	±	1.82	1.95	±	6.73	
	12/03/2003	-0.48	±	2.19	-1.78	±	8.11	
	12/10/2003	2.74	±	2.17	10.15	±	8.01	
	12/17/2003	2.04	±	2.85	7.55	±	10.53	
	12/23/2003	-1.57	±	2.54	-5.81	±	9.40	
	12/31/2003	0.88	±	2.16	3.25	±	7.98	
ATOMIC CITY	10/01/2003	-2.81	±	3.64	-10.38	±	13.48	
	10/08/2003	-2.36	±	2.28	-8.71	±	8.44	
	10/15/2003	3.09	±	3.14	11.44	±	11.62	
	10/22/2003	-0.14	±	2.53	-0.50	±	9.36	
	10/29/2003	-4.89	±	2.86	-18.08	±	10.59	
	11/05/2003	1.14	±	2.62	4.21	±	9.71	
	11/12/2003	0.62	±	2.85	2.28	±	10.54	
	11/19/2003	-2.36	±	3.06	-8.74	±	11.31	
	11/25/2003	5.02	±	3.67	18.57	±	13.58	
	12/03/2003	0.43	±	1.47	1.58	±	5.44	
	12/03/2003	-0.39	±	1.77	-1.44	±	6.56	
	12/10/2003	2.62	±	2.07	9.71	±	7.67	
	12/17/2003	1.50	±	2.09	5.54	±	7.73	
	12/23/2003	-1.32	±	2.13	-4.87	±	7.89	
	12/31/2003	0.85	±	2.09	3.15	±	7.73	
BLUE DOME	10/01/2003	1.43	±	1.72	5.30	±	6.38	
	10/08/2003	-2.30	±	2.76	-8.51	±	10.20	
	10/15/2003	1.05	±	1.60	3.89	±	5.92	
	10/22/2003	-1.96	±	1.73	-7.27	±	6.42	
	10/29/2003	1.53	±	1.32	5.67	±	4.88	
	11/05/2003	-0.47	±	1.62	-1.74	±	5.99	
	11/12/2003	-3.21	±	2.16	-11.88	±	7.98	
	11/19/2003	3.60	±	2.57	13.32	±	9.50	
	11/25/2003	-1.19	±	2.00	-4.40	±	7.40	
	11/25/2003	0.06	±	3.07	0.23	±	11.36	
	12/03/2003	2.36	±	2.55	8.72	±	9.42	
	12/10/2003	0.87	±	1.94	3.21	±	7.18	
	12/17/2003	-0.05	±	1.30	-0.18	±	4.80	
	12/23/2003	1.30	±	1.41	4.80	±	5.23	
	12/31/2003	-1.26	±	1.29	-4.66	±	4.79	
FAA TOWER	10/01/2003	1.76	±	2.12	6.52	±	7.84	
	10/08/2003	-2.91	±	3.49	-10.78	±	12.92	
	10/15/2003	1.61	±	2.45	5.96	±	9.08	
	10/22/2003	-2.39	±	2.11	-8.85	±	7.81	
	10/29/2003	2.12	±	1.83	7.85	±	6.76	
	11/05/2003	-0.61	±	2.11	-2.27	±	7.81	
	11/12/2003	-4.42	±	2.97	-16.35	±	10.99	
	11/19/2003	3.69	±	2.63	13.64	±	9.73	
	11/25/2003	-1.36	±	2.29	-5.05	±	8.49	
	11/25/2003	0.07	±	3.52	0.27	±	13.03	
	12/03/2003	3.06	±	3.30	11.30	±	12.22	
	12/10/2003	1.43	±	3.21	5.31	±	11.87	
	12/17/2003	-0.06	±	1.65	-0.23	±	6.10	
	12/23/2003	2.14	±	2.33	7.91	±	8.62	
	12/31/2003	-1.29	±	1.32	-4.76	±	4.89	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)			Result > 3s
HOWE	10/01/2003	1.55	±	1.87	5.74	±	6.90	
	10/08/2003	-2.50	±	3.00	-9.26	±	11.09	
	10/15/2003	1.15	±	1.74	4.24	±	6.46	
	10/22/2003	-2.01	±	1.78	-7.44	±	6.57	
	10/29/2003	2.22	±	1.91	8.22	±	7.08	
	11/05/2003	-0.60	±	2.06	-2.21	±	7.61	
	11/12/2003	-4.00	±	2.69	-14.82	±	9.96	
	11/19/2003	3.32	±	2.37	12.28	±	8.76	
	11/25/2003	-1.33	±	2.23	-4.91	±	8.26	
	11/25/2003	0.07	±	3.43	0.26	±	12.68	
	12/03/2003	2.17	±	2.34	8.02	±	8.67	
	12/10/2003	1.01	±	2.25	3.73	±	8.34	
	12/17/2003	-0.06	±	1.54	-0.21	±	5.68	
	12/23/2003	1.52	±	1.66	5.63	±	6.13	
	12/30/2003	3.62	±	1.81	13.41	±	6.69	
MONTEVIEW	10/01/2003	1.78	±	2.15	6.60	±	7.95	
	10/08/2003	-2.35	±	2.81	-8.69	±	10.41	
	10/15/2003	2583.61	±	1396.76	9559.35	±	5168.02	
	10/22/2003	1.10	±	1.67	4.06	±	6.19	
	10/29/2003	-1.87	±	1.65	-6.90	±	6.09	
	11/05/2003	1.88	±	1.62	6.94	±	5.98	
	11/12/2003	-0.46	±	1.58	-1.69	±	5.84	
	11/19/2003	-3.33	±	2.24	-12.34	±	8.29	
	11/25/2003	3.00	±	2.14	11.09	±	7.91	
	11/25/2003	0.05	±	2.34	0.18	±	8.65	
	12/03/2003	-0.91	±	1.52	-3.35	±	5.63	
	12/10/2003	1.99	±	2.15	7.35	±	7.94	
	12/17/2003	0.96	±	2.15	3.56	±	7.96	
	12/23/2003	-0.05	±	1.31	-0.18	±	4.86	
	12/31/2003	1.46	±	1.59	5.41	±	5.90	
MUD LAKE	10/01/2003	-1.28	±	1.32	-4.74	±	4.88	
	10/08/2003	1.91	±	2.29	7.05	±	8.48	
	10/15/2003	-2.55	±	3.05	-9.42	±	11.28	
	10/22/2003	1.14	±	1.74	4.22	±	6.43	
	10/29/2003	-2.77	±	2.45	-10.27	±	9.06	
	11/05/2003	1.88	±	1.62	6.96	±	5.99	
	11/12/2003	-0.47	±	1.61	-1.73	±	5.97	
	11/19/2003	-3.90	±	2.62	-14.43	±	9.70	
	11/25/2003	3.28	±	2.34	12.13	±	8.65	
	11/25/2003	-1.01	±	1.70	-3.74	±	6.29	
	12/03/2003	0.05	±	2.61	0.20	±	9.65	
	12/10/2003	2.33	±	2.52	8.61	±	9.31	
	12/17/2003	1.04	±	2.32	3.84	±	8.57	
	12/23/2003	-0.05	±	1.35	-0.19	±	5.00	
	12/31/2003	1.53	±	1.67	5.66	±	6.17	
MUD LAKE (Q/A-2)	10/01/2003	-1.37	±	1.41	-5.05	±	5.20	
	10/08/2003	-1.91	±	2.48	-7.06	±	9.16	
	10/15/2003	-2.19	±	2.12	-8.09	±	7.84	
	10/22/2003	8.14	±	8.27	30.12	±	30.59	
	10/29/2003	-0.13	±	2.47	-0.49	±	9.14	
	11/05/2003	-3.69	±	2.16	-13.66	±	8.00	
	11/12/2003	1.08	±	2.49	3.99	±	9.21	
	11/19/2003	0.47	±	2.19	1.75	±	8.09	
	11/25/2003	-2.13	±	2.76	-7.88	±	10.20	
	12/03/2003	3.86	±	2.83	14.29	±	10.45	
	12/03/2003	0.45	±	1.55	1.66	±	5.72	
	12/10/2003	-0.41	±	1.86	-1.52	±	6.90	
	12/17/2003	2.08	±	1.64	7.68	±	6.07	
	12/23/2003	1.72	±	2.40	6.36	±	8.86	
	12/31/2003	-1.09	±	1.77	-4.05	±	6.55	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)			Result > 3s
MUD LAKE AVERAGE	10/01/2003	1.07	±	2.62	3.94	±	9.68	
	10/08/2003	-0.33	±	3.47	-1.21	±	12.83	
	10/15/2003	-2.37	±	3.74	-8.77	±	13.83	
	10/22/2003	1.14	±	1.74	4.22	±	6.43	
	10/29/2003	-1.24	±	3.53	-4.58	±	13.06	
	11/05/2003	-1.10	±	2.76	-4.05	±	10.21	
	11/12/2003	0.30	±	2.96	1.13	±	10.97	
	11/19/2003	-1.58	±	3.38	-5.84	±	12.51	
	11/25/2003	0.63	±	3.60	2.32	±	13.33	
	12/03/2003	1.42	±	3.29	5.24	±	12.17	
	12/03/2003	0.29	±	2.82	1.06	±	10.42	
	12/10/2003	0.88	±	3.09	3.27	±	11.41	
	12/17/2003	1.57	±	2.81	5.81	±	10.41	
	12/23/2003	0.79	±	2.69	2.94	±	9.95	
	12/31/2003	0.19	±	2.44	0.69	±	9.01	
DISTANT								
BLACKFOOT CMS	10/01/2003	-2.16	±	2.80	-7.98	±	10.36	
	10/08/2003	-1.94	±	1.88	-7.16	±	6.94	
	10/15/2003	2.41	±	2.45	8.91	±	9.05	
	10/22/2003	-0.15	±	2.80	-0.56	±	10.34	
	10/29/2003	-3.67	±	2.15	-13.56	±	7.95	
	11/05/2003	1.12	±	2.59	4.16	±	9.58	
	11/12/2003	0.45	±	2.10	1.68	±	7.77	
	11/19/2003	-1.91	±	2.48	-7.08	±	9.16	
	11/25/2003	3.45	±	2.52	12.76	±	9.33	
	12/03/2003	0.48	±	1.65	1.77	±	6.09	
	12/03/2003	-0.44	±	1.98	-1.61	±	7.34	
	12/10/2003	2.01	±	1.59	7.44	±	5.87	
	12/17/2003	1.59	±	2.22	5.89	±	8.21	
	12/23/2003	-1.06	±	1.71	-3.92	±	6.34	
	12/31/2003	0.91	±	2.25	3.38	±	8.31	
BLACKFOOT CMS (Q/A-1)	10/01/2003	-2.98	±	3.87	-11.03	±	14.32	
	10/08/2003	-2.89	±	2.80	-10.69	±	10.36	
	10/15/2003	3.12	±	3.17	11.53	±	11.71	
	10/22/2003	-0.19	±	3.47	-0.69	±	12.82	
	10/29/2003	-4.15	±	2.43	-15.37	±	9.01	
	11/05/2003	1.52	±	3.51	5.63	±	12.98	
	11/12/2003	0.62	±	2.85	2.28	±	10.55	
	11/19/2003	-2.30	±	2.98	-8.51	±	11.01	
	11/25/2003	5.20	±	3.80	19.25	±	14.07	
	12/03/2003	-0.52	±	2.38	-1.94	±	8.81	
	12/03/2003	0.57	±	1.98	2.12	±	7.31	
	12/10/2003	2.39	±	1.89	8.85	±	6.99	
	12/17/2003	2.40	±	3.34	8.87	±	12.36	
	12/23/2003	-1.14	±	1.84	-4.21	±	6.82	
	12/31/2003	1.07	±	2.62	3.94	±	9.68	
BLACKFOOT AVERAGE	10/01/2003	-2.50	±	4.59	-9.26	±	17.00	
	10/08/2003	-2.32	±	3.18	-8.58	±	11.75	
	10/15/2003	2.72	±	3.90	10.05	±	14.44	
	10/22/2003	-0.17	±	4.38	-0.62	±	16.19	
	10/29/2003	-3.89	±	3.23	-14.41	±	11.94	
	11/05/2003	1.29	±	4.21	4.78	±	15.59	
	11/12/2003	0.52	±	3.42	1.93	±	12.65	
	11/19/2003	-2.09	±	3.82	-7.73	±	14.15	
	11/25/2003	4.15	±	4.29	15.35	±	15.87	
	12/03/2003	0.02	±	2.81	0.08	±	10.41	
	12/03/2003	0.02	±	2.81	0.08	±	10.41	
	12/10/2003	2.18	±	2.44	8.08	±	9.03	
	12/17/2003	1.91	±	3.77	7.08	±	13.96	
	12/23/2003	-1.10	±	2.51	-4.06	±	9.29	
	12/31/2003	0.98	±	3.42	3.64	±	12.65	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)			Result > 3s
CRATERS	10/01/2003	-2.44	±	3.17	-9.02	±	11.71	
	10/08/2003	-2.66	±	2.58	-9.86	±	9.55	
	10/15/2003	3.23	±	3.28	11.96	±	12.15	
	10/22/2003	-0.16	±	2.93	-0.58	±	10.84	
	10/29/2003	-4.89	±	2.87	-18.10	±	10.61	
	11/05/2003	1.35	±	3.10	4.98	±	11.49	
	11/12/2003	0.54	±	2.51	2.01	±	9.29	
	11/19/2003	-2.24	±	2.91	-8.31	±	10.75	
	11/25/2003	4.18	±	3.05	15.45	±	11.30	
	12/03/2003	-0.49	±	2.25	-1.83	±	8.31	
	12/03/2003	0.54	±	1.86	2.00	±	6.90	
	12/10/2003	2.23	±	1.76	8.25	±	6.52	
	12/17/2003	1.93	±	2.69	7.13	±	9.95	
	12/23/2003	-1.24	±	2.00	-4.58	±	7.42	
	12/31/2003	1.07	±	2.63	3.97	±	9.74	
DUBOIS	10/01/2003	1.99	±	2.39	7.36	±	8.86	
	10/08/2003	-2.60	±	3.12	-9.62	±	11.53	
	10/15/2003	1.18	±	1.80	4.38	±	6.67	
	10/22/2003	-2.35	±	2.07	-8.68	±	7.66	
	10/29/2003	2.27	±	1.96	8.40	±	7.24	
	11/05/2003	-0.49	±	1.70	-1.82	±	6.27	
	11/12/2003	-4.17	±	2.81	-15.45	±	10.38	
	11/19/2003	3.31	±	2.36	12.25	±	8.74	
	11/25/2003	0.07	±	3.18	0.24	±	11.77	
	11/25/2003	-1.23	±	2.07	-4.56	±	7.67	
	12/03/2003	12.69	±	13.72	46.96	±	50.75	
	12/10/2003	1.01	±	2.25	3.72	±	8.33	
	12/17/2003	-0.05	±	1.43	-0.20	±	5.28	
	12/23/2003	1.59	±	1.73	5.88	±	6.41	
	12/30/2003	-1.49	±	1.53	-5.51	±	5.67	
IDAHO FALLS	10/01/2003	1.80	±	2.17	6.66	±	8.02	
	10/08/2003	-2.95	±	3.54	-10.92	±	13.09	
	10/15/2003	1.32	±	2.01	4.88	±	7.43	
	10/22/2003	-2.15	±	1.90	-7.95	±	7.01	
	10/29/2003	2.25	±	1.94	8.34	±	7.18	
	11/05/2003	-0.51	±	1.75	-1.88	±	6.48	
	11/12/2003	-3.66	±	2.46	-13.54	±	9.10	
	11/19/2003	3.19	±	2.27	11.79	±	8.41	
	11/25/2003	-1.22	±	2.05	-4.50	±	7.57	
	11/25/2003	0.06	±	3.14	0.24	±	11.62	
	12/03/2003	2.16	±	2.34	8.00	±	8.64	
	12/10/2003	0.98	±	2.20	3.64	±	8.13	
	12/17/2003	-0.06	±	1.68	-0.23	±	6.23	
	12/23/2003	1.56	±	1.70	5.76	±	6.27	
	12/30/2003	-1.71	±	1.76	-6.32	±	6.50	
JACKSON	10/01/2003	-1.83	±	2.38	-6.78	±	8.81	
	10/08/2003	-1.86	±	1.80	-6.88	±	6.67	
	10/14/2003	2.70	±	2.74	10.00	±	10.16	
	10/22/2003	-0.11	±	2.13	-0.42	±	7.87	
	10/29/2003	-3.95	±	2.32	-14.63	±	8.57	
	11/05/2003	1.20	±	2.76	4.42	±	10.19	
	11/12/2003	0.51	±	2.37	1.90	±	8.77	
	11/19/2003	-2.29	±	2.96	-8.47	±	10.96	
	11/25/2003	3.64	±	2.66	13.45	±	9.84	
	12/03/2003	-0.55	±	2.50	-2.03	±	9.25	
	12/03/2003	0.60	±	2.07	2.22	±	7.67	
	12/10/2003	0.00	±	0.00	0.00	±	0.00	
	12/17/2003	1.74	±	2.43	6.44	±	8.98	
	12/23/2003	-1.22	±	1.97	-4.50	±	7.28	
	12/30/2003	1.33	±	3.25	4.90	±	12.04	

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-19}$ Bq/mL)			Result > 3s
REXBURG CMS	10/01/2003	-0.19	±	2.92	-0.70	±	10.80	
	10/08/2003	2.02	±	2.43	7.47	±	8.99	
	10/15/2003	-3.11	±	3.72	-11.50	±	13.78	
	10/22/2003	1.10	±	1.68	4.08	±	6.21	
	10/29/2003	-2.14	±	1.89	-7.91	±	6.98	
	11/05/2003	1.95	±	1.68	7.22	±	6.22	
	11/12/2003	-0.55	±	1.90	-2.04	±	7.05	
	11/19/2003	-3.78	±	2.54	-13.98	±	9.39	
	11/25/2003	3.08	±	2.20	11.41	±	8.14	
	11/25/2003	-0.47	±	0.79	-1.74	±	2.92	
	12/03/2003	0.02	±	1.21	0.09	±	4.49	
	12/10/2003	2.21	±	2.38	8.16	±	8.82	
	12/17/2003	1.02	±	2.28	3.77	±	8.42	
	12/23/2003	-0.06	±	1.46	-0.20	±	5.42	
	12/31/2003	1.67	±	1.82	6.18	±	6.74	
INEEL								
EFS	10/01/2003	1.84	±	2.22	6.82	±	8.21	
	10/08/2003	-2.66	±	3.19	-9.86	±	11.82	
	10/15/2003	1.30	±	1.98	4.82	±	7.34	
	10/22/2003	-2.39	±	2.11	-8.83	±	7.79	
	10/29/2003	1.97	±	1.70	7.29	±	6.28	
	11/05/2003	-0.54	±	1.87	-2.00	±	6.90	
	11/12/2003	-4.13	±	2.77	-15.27	±	10.26	
	11/19/2003	3.98	±	2.84	14.74	±	10.51	
	11/25/2003	-0.98	±	1.64	-3.61	±	6.07	
	11/25/2003	0.05	±	2.52	0.19	±	9.32	
	12/03/2003	2.32	±	2.51	8.58	±	9.27	
	12/10/2003	1.11	±	2.48	4.11	±	9.18	
	12/17/2003	-0.06	±	1.68	-0.23	±	6.20	
	12/23/2003	1.76	±	1.92	6.51	±	7.09	
	12/31/2003	-1.31	±	1.35	-4.85	±	4.99	
MAIN GATE	10/01/2003	2.22	±	2.67	8.22	±	9.89	
	10/08/2003	-3.59	±	4.30	-13.27	±	15.90	
	10/15/2003	1.61	±	2.46	5.97	±	9.09	
	10/22/2003	-2.24	±	1.98	-8.30	±	7.32	
	10/29/2003	2.22	±	1.92	8.23	±	7.09	
	11/05/2003	-0.67	±	2.29	-2.46	±	8.49	
	11/12/2003	-4.69	±	3.15	-17.34	±	11.65	
	11/19/2003	4.94	±	3.53	18.28	±	13.04	
	11/25/2003	0.08	±	3.87	0.29	±	14.33	
	11/25/2003	-1.50	±	2.52	-5.55	±	9.33	
	12/03/2003	3.05	±	3.30	11.29	±	12.20	
	12/10/2003	1.70	±	3.80	6.29	±	14.07	
	12/17/2003	-0.07	±	1.99	-0.28	±	7.35	
	12/23/2003	1.93	±	2.11	7.16	±	7.80	
	12/31/2003	-1.74	±	1.79	-6.45	±	6.64	
VAN BUREN GATE	10/01/2003	-1.34	±	1.37	-4.94	±	5.08	
	10/08/2003	-2.95	±	3.82	-10.90	±	14.15	
	10/15/2003	-2.43	±	2.35	-8.98	±	8.70	
	10/22/2003	2.95	±	2.99	10.91	±	11.08	
	10/29/2003	-0.15	±	2.80	-0.56	±	10.38	
	11/05/2003	-4.32	±	2.53	-15.98	±	9.36	
	11/12/2003	1.26	±	2.91	4.67	±	10.76	
	11/19/2003	0.47	±	2.16	1.73	±	7.99	
	11/25/2003	-1.91	±	2.48	-7.08	±	9.17	
	12/03/2003	4.29	±	3.14	15.88	±	11.61	
	12/03/2003	-0.42	±	1.90	-1.55	±	7.03	
	12/10/2003	0.46	±	1.58	1.69	±	5.83	
	12/17/2003	2.53	±	2.00	9.36	±	7.39	
	12/23/2003	1.64	±	2.28	6.05	±	8.44	
	12/31/2003	-1.13	±	1.82	-4.17	±	6.74	
		0.97		2.37	ft^3/min			

Red text denotes invalid sample.

a 10/15/2003 Mud Lake (Q/A-2) invalid due to vacuum pump being out of adjustment

b 12/03/2003 Dubois invalid due to insufficient sample volume as a result of a tripped circuit breaker.

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

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO									
	12/31/2003	AMERICIUM-241	0.78	±	0.78	2.88	±	2.89	
	12/31/2003	CESIUM-137	-322.80	±	143.00	-1194.37	±	529.10	
	12/31/2003	PLUTONIUM-238	0.00	±	0.53	0.00	±	1.96	
	12/31/2003	PLUTONIUM-239/40	3.47	±	1.30	12.84	±	4.81	
ATOMIC CITY									
	12/31/2003	AMERICIUM-241	2.92	±	1.10	10.80	±	4.07	
	12/31/2003	CESIUM-137	7.54	±	108.58	27.89	±	401.75	
	12/31/2003	PLUTONIUM-238	0.86	±	0.61	3.19	±	2.26	
	12/31/2003	PLUTONIUM-239/40	1.72	±	1.10	6.36	±	4.07	
BLUE DOME									
	12/31/2003	AMERICIUM-241	0.89	±	0.64	3.30	±	2.37	
	12/31/2003	CESIUM-137	-251.93	±	219.77	-932.12	±	813.13	
	12/31/2003	PLUTONIUM-238	0.60	±	0.60	2.22	±	2.22	
	12/31/2003	PLUTONIUM-239/40	1.80	±	1.00	6.66	±	3.70	
FAA TOWER									
	12/31/2003	CESIUM-137	20.71	±	144.42	76.63	±	534.34	
	12/31/2003	STRONTIUM-90	27.00	±	25.70	99.90	±	95.09	
HOWE									
	12/31/2003	CESIUM-137	119.21	±	104.92	441.06	±	388.21	
	12/31/2003	STRONTIUM-90	54.70	±	20.00	202.39	±	74.00	
MONTEVIEW									
	12/31/2003	CESIUM-137	9.46	±	208.92	34.99	±	773.02	
	12/31/2003	STRONTIUM-90	3.72	±	16.70	13.76	±	61.79	
MUD LAKE									
	12/31/2003	AMERICIUM-241	0.93	±	0.66	3.44	±	2.44	
	12/31/2003	CESIUM-137	31.20	±	117.55	115.44	±	434.94	
	12/31/2003	PLUTONIUM-238	0.61	±	0.61	2.26	±	2.26	

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

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
MUD LAKE (Q/A-2)									
	12/31/2003	AMERICIUM-241	1.62	±	0.82	5.99	±	3.03	
	12/31/2003	CESIUM-137	-1.11	±	116.93	-4.10	±	432.66	
	12/31/2003	PLUTONIUM-238	0.00	±	0.52	0.00	±	1.92	
	12/31/2003	PLUTONIUM-239/40	1.70	±	0.86	6.29	±	3.18	
DISTANT									
BLACKFOOT									
	12/31/2003	AMERICIUM-241	8.45	±	1.90	31.27	±	7.03	Y
	12/31/2003	CESIUM-137	24.74	±	223.42	91.52	±	826.64	
	12/31/2003	PLUTONIUM-238	1.46	±	0.85	5.40	±	3.15	
	12/31/2003	PLUTONIUM-239/40	1.95	±	0.98	7.22	±	3.63	
BLACKFOOT CMS (Q/A-1)									
	12/31/2003	AMERICIUM-241	0.98	±	0.98	3.63	±	3.63	
	12/31/2003	CESIUM-137	120.92	±	272.09	447.41	±	1006.72	
	12/31/2003	PLUTONIUM-238	0.46	±	0.46	1.68	±	1.70	
	12/31/2003	PLUTONIUM-239/40	0.91	±	0.91	3.36	±	3.37	
CRATERS									
	12/31/2003	CESIUM-137	239.55	±	270.95	886.33	±	1002.52	
	12/31/2003	STRONTIUM-90	22.40	±	23.60	82.88	±	87.32	
DUBOIS									
	12/31/2003	AMERICIUM-241	2.00	±	1.00	7.40	±	3.70	
	12/31/2003	CESIUM-137	74.43	±	272.94	275.38	±	1009.89	
	12/31/2003	PLUTONIUM-238	0.00	±	0.66	0.00	±	2.44	
	12/31/2003	PLUTONIUM-239/40	2.80	±	1.20	10.36	±	4.44	
IDAHO FALLS									
	12/31/2003	CESIUM-137	-173.94	±	254.83	-643.58	±	942.85	
	12/31/2003	STRONTIUM-90	-1.76	±	18.80	-6.51	±	69.56	
JACKSON									
	12/31/2003	AMERICIUM-241	0.37	±	0.65	1.38	±	2.41	
	12/31/2003	CESIUM-137	103.20	±	117.97	381.85	±	436.50	
	12/31/2003	PLUTONIUM-238	0.32	±	0.32	1.19	±	1.18	
	12/31/2003	PLUTONIUM-239/40	0.96	±	0.72	3.56	±	2.66	

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

Sample Group and Location	Collect Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
REXBURG CMS									
	12/31/2003	CESIUM-137	213.53	±	109.77	790.07	±	406.16	
	12/31/2003	STRONTIUM-90	26.80	±	19.60	99.16	±	72.52	
INEEL									
EFS									
	12/31/2003	CESIUM-137	-1.91	±	249.59	-7.05	±	923.49	
	12/31/2003	STRONTIUM-90	6.70	±	22.00	24.79	±	81.40	
MAIN GATE									
	12/31/2003	AMERICIUM-241	4.69	±	1.60	17.35	±	5.92	
	12/31/2003	CESIUM-137	-341.29	±	303.29	-1262.78	±	1122.16	
	12/31/2003	PLUTONIUM-238	-0.51	±	0.51	-1.87	±	1.89	
	12/31/2003	PLUTONIUM-239/40	-1.01	±	1.00	-3.74	±	3.70	
VAN BUREN GATE									
	12/31/2003	CESIUM-137	98.06	±	105.58	362.82	±	390.66	
	12/31/2003	STRONTIUM-90	17.50	±	18.30	64.75	±	67.71	

TABLE C-4: Tritium Concentrations in Atmospheric Moisture.

Location	Start Date	Collect Date	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Collection Medium	Result > 3s
ATOMIC CITY										
	08/27/2003	09/10/2003	3.97	±	1.59	14.70	±	5.90	SILICA GEL	
	07/17/2003	09/10/2003	1.28	±	1.21	4.74	±	4.48	MOLECULAR SIEVE	
	08/27/2003	09/10/2003	3.80	±	2.11	14.07	±	7.80	SILICA GEL	
	08/27/2003	09/26/2003	0.62	±	0.98	2.28	±	3.63	MOLECULAR SIEVE	
	09/10/2003	09/26/2003	4.32	±	2.96	15.98	±	10.96	SILICA GEL	
	09/10/2003	10/01/2003	2.85	±	1.73	10.54	±	6.39	SILICA GEL	
	09/26/2003	10/08/2003	6.83	±	2.11	25.27	±	7.82	SILICA GEL	Y
	09/10/2003	10/15/2003	1.01	±	0.86	3.74	±	3.18	MOLECULAR SIEVE	
	10/01/2003	10/20/2003	0.93	±	0.44	3.43	±	1.64	SILICA GEL	
	09/26/2003	10/22/2003	0.87	±	1.16	3.23	±	4.28	MOLECULAR SIEVE	
	10/15/2003	12/03/2003	0.87	±	1.46	3.23	±	5.41	MOLECULAR SIEVE	
	10/13/2003	12/03/2003	2.53	±	1.58	9.38	±	5.86	SILICA GEL	
BLACKFOOT CMS										
	10/08/2003	10/29/2003	2.68	±	2.24	9.92	±	8.29	SILICA GEL	
IDAHO FALLS										
	08/11/2003	09/04/2003	4.39	±	1.13	16.24	±	4.20	SILICA GEL	Y
	08/11/2003	09/04/2003	1.89	±	1.21	7.00	±	4.46	MOLECULAR SIEVE	
	09/04/2003	09/23/2003	5.15	±	3.15	19.07	±	11.65	SILICA GEL	
	09/04/2003	10/02/2003	-1.07	±	1.10	-3.96	±	4.06	MOLECULAR SIEVE	
	09/23/2003	10/14/2003	3.44	±	1.13	12.73	±	4.17	SILICA GEL	Y
	10/02/2003	11/10/2003	1.28	±	1.85	4.73	±	6.84	MOLECULAR SIEVE	
	10/14/2003	11/18/2003	-0.54	±	1.85	-2.00	±	6.86	SILICA GEL	
REXBURG CMS										
	08/27/2003	09/18/2003	0.17	±	0.42	0.63	±	1.56	SILICA GEL	
	08/27/2003	09/18/2003	-0.36	±	0.42	-1.32	±	1.55	MOLECULAR SIEVE	
	09/18/2003	10/09/2003	4.22	±	2.55	15.63	±	9.45	SILICA GEL	
	09/18/2003	10/21/2003	-0.96	±	0.89	-3.55	±	3.30	MOLECULAR SIEVE	
	10/09/2003	11/18/2003	5.22	±	1.48	19.32	±	5.49	SILICA GEL	Y
	10/21/2003	12/09/2003	3.61	±	1.56	13.35	±	5.75	MOLECULAR SIEVE	

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

Location	Sampling Date	Concentration (mg/m3)	Comments
ATOMIC CITY			
	09/05/2003	14.09	
	09/11/2003	2.10	
	09/17/2003	4.92	
	09/23/2003	17.85	
	09/29/2003	24.37	
	10/05/2003	25.51	
	10/11/2003	13.09	
	10/17/2003	13.76	
	10/23/2003	50.53	
	10/29/2003	18.06	
	11/04/2003	4.46	
	11/10/2003	2.15	
	11/16/2003	1.35	
	11/22/2003	4.78	
	11/28/2003	6.38	
	12/04/2003	2.62	
	12/10/2003	3.53	
	12/16/2003	5.35	
	12/22/2003	1.40	
	12/28/2003	6.88	
BLACKFOOT CMS			
	09/05/2003	17.72	
	09/11/2003	8.14	
	09/17/2003	8.21	
	09/23/2003	25.43	
	09/29/2003	31.18	
	10/05/2003	19.53	
	10/11/2003	11.20	
	10/17/2003	25.95	
	10/23/2003	173.70	
	10/29/2003	28.87	
	11/04/2003	20.61	
	11/10/2003	3.88	
	11/16/2003	2.87	
	11/22/2003	8.17	
	11/28/2003	7.86	
	12/04/2003	7.73	
	12/10/2003	6.43	
	12/16/2003	10.41	
	12/22/2003	2.50	
	12/28/2003	17.16	

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

		Concentration
REXBURG CMS		
	09/05/2003	33.03
	09/11/2003	7.96
	09/17/2003	8.48
	09/23/2003	31.93
	09/29/2003	34.41
	10/05/2003	23.32
	10/11/2003	16.15
	10/17/2003	35.02
	10/23/2003	153.88
	10/29/2003	23.25
	11/04/2003	4.94
	11/10/2003	5.74
	11/16/2003	1.15
	11/22/2003	5.28
	11/28/2003	10.03
	12/04/2003	15.46
	12/10/2003	7.44
	12/16/2003	13.87
	12/22/2003	3.70
	12/28/2003	16.04

TABEL C-6: Tritium Concentrations in Precipitation.

Location	Start Date	End Date	Concentration Result ± 1s Uncertainty (pCi/L)			Concentration Result ± 1s Uncertainty (Bq/L)			Result > 3s
CFA									
	09/02/2003	10/11/2003	83.20	±	25.80	3.08	±	0.96	Y
	10/01/2003	11/03/2003	120.00	±	26.60	4.44	±	0.99	Y
	11/03/2003	12/01/2003	22.30	±	24.50	0.83	±	0.91	
EFS									
	10/01/2003	10/08/2003	363.00	±	61.80	13.44	±	2.29	Y
	10/22/2003	10/29/2003	97.40	±	25.20	3.61	±	0.93	Y
	11/12/2003	11/19/2003	53.60	±	24.20	1.99	±	0.90	
	12/03/2003	12/10/2003	31.10	±	23.70	1.15	±	0.88	
	12/10/2003	12/17/2003	-25.00	±	22.90	-0.93	±	0.85	
IDAHO FALLS									
	10/03/2003	10/03/2003	117.00	±	53.90	4.33	±	2.00	
	11/10/2003	12/05/2003	5.43	±	23.10	0.20	±	0.86	

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

Sampling Type and Location	Analyte	Sampling Date	Concentration Result ± 1s Uncertainty (pCi/L)			Concentration Result ± 1s Uncertainty (Bq/L)			Result > 3s
DRINKING WATER									
ABERDEEN									
	GROSS ALPHA	11/17/2003	0.8	±	0.55	0.03	±	0.02	
	GROSS BETA	11/17/2003	5.1	±	1.00	0.19	±	0.04	Y
	TRITIUM	11/17/2003	50.50	±	23.00	1.87	±	0.85	
ARCO									
	GROSS ALPHA	11/12/2003	0.74	±	0.47	0.03	±	0.02	
	GROSS BETA	11/12/2003	2.52	±	0.88	0.09	±	0.03	
	TRITIUM	11/12/2003	-52.70	±	59.50	-1.95	±	2.20	
ATOMIC CITY									
	GROSS ALPHA	11/13/2003	-0.16	±	0.30	-0.01	±	0.01	
	GROSS BETA	11/13/2003	2.89	±	0.85	0.11	±	0.03	Y
	TRITIUM	11/13/2003	54.30	±	55.60	2.01	±	2.06	
CAREY									
	GROSS ALPHA	11/12/2003	1.28	±	0.49	0.05	±	0.02	
	GROSS BETA	11/12/2003	1.76	±	0.85	0.07	±	0.03	
	TRITIUM	11/12/2003	33.80	±	22.60	1.25	±	0.84	
FORT HALL									
	GROSS ALPHA	11/17/2003	0.19	±	0.48	0.01	±	0.02	
	GROSS BETA	11/17/2003	8.37	±	1.06	0.31	±	0.04	Y
	TRITIUM	11/17/2003	119.00	±	55.70	4.41	±	2.06	
HOWE									
	GROSS ALPHA	11/13/2003	0.00	±	0.34	0.00	±	0.01	
	GROSS BETA	11/13/2003	1.93	±	0.83	0.07	±	0.03	
	TRITIUM	11/13/2003	108.00	±	55.90	4.00	±	2.07	
IDAHO FALLS									
	GROSS ALPHA	11/14/2003	-0.24	±	0.35	-0.01	±	0.01	
	GROSS BETA	11/14/2003	1.64	±	0.84	0.06	±	0.03	
	TRITIUM	11/14/2003	69.80	±	23.30	2.59	±	0.86	
MINIDOKA									
	GROSS ALPHA	11/12/2003	0.71	±	0.47	0.03	±	0.02	
	GROSS BETA	11/12/2003	3.86	±	0.92	0.14	±	0.03	Y
	TRITIUM	11/12/2003	134.00	±	55.80	4.96	±	2.07	
	TRITIUM	11/12/2003	79.80	±	55.50	2.96	±	2.06	
MONTEVIEW									
	GROSS ALPHA	11/13/2003	-0.56	±	0.28	-0.02	±	0.01	
	GROSS BETA	11/13/2003	4.13	±	0.89	0.15	±	0.03	Y
	TRITIUM	11/13/2003	32.60	±	23.30	1.21	±	0.86	
MORELAND									
	GROSS ALPHA	11/17/2003	0.05	±	0.51	0.00	±	0.02	
	GROSS BETA	11/17/2003	7.79	±	1.18	0.29	±	0.04	Y
MUD LAKE									
	GROSS ALPHA	11/13/2003	-0.01	±	0.30	0.00	±	0.01	
	GROSS BETA	11/13/2003	5.38	±	0.91	0.20	±	0.03	Y
	TRITIUM	11/13/2003	22.50	±	22.30	0.83	±	0.83	
MUD LAKE DUPLICATE	GROSS ALPHA	11/13/2003	0.76	±	0.47	0.03	±	0.02	
	GROSS BETA	11/13/2003	4.35	±	0.93	0.16	±	0.03	Y
	TRITIUM	11/13/2003	-13.80	±	22.20	-0.51	±	0.82	
SHOSHONE									
	GROSS ALPHA	11/12/2003	1.28	±	0.49	0.05	±	0.02	
	GROSS BETA	11/12/2003	2.24	±	0.87	0.08	±	0.03	
	TRITIUM	11/12/2003	33.20	±	22.60	1.23	±	0.84	
TABER									
	GROSS ALPHA	11/12/2003	1.07	±	0.56	0.04	±	0.02	
	GROSS BETA	11/12/2003	5.16	±	0.99	0.19	±	0.04	Y
	TRITIUM	11/12/2003	83.60	±	23.70	3.10	±	0.88	Y

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

Sampling Type and Location	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
BLISS									
	GROSS ALPHA	11/12/2003	0.65	±	0.50	0.02	±	0.02	
	GROSS BETA	11/12/2003	4.89	±	0.97	0.18	±	0.04	Y
	TRITIUM	11/12/2003	157.62	±	54.80	5.84	±	2.03	
BUHL									
	GROSS ALPHA	11/12/2003	-0.20	±	0.37	-0.01	±	0.01	
	GROSS BETA	11/12/2003	3.13	±	0.89	0.12	±	0.03	Y
	TRITIUM	11/12/2003	0.87	±	23.15	0.03	±	0.86	
HAGERMAN									
	GROSS ALPHA	11/12/2003	1.07	±	0.44	0.04	±	0.02	
	GROSS BETA	11/12/2003	4.55	±	0.91	0.17	±	0.03	Y
	TRITIUM	11/12/2003	16.46	±	22.47	0.61	±	0.83	
IDAHO FALLS									
	GROSS ALPHA	11/14/2003	0.28	±	0.37	0.01	±	0.01	
	GROSS BETA	11/14/2003	2.55	±	0.85	0.09	±	0.03	
	TRITIUM	11/14/2003	12.66	±	22.37	0.47	±	0.83	
TWIN FALLS									
	GROSS ALPHA	11/12/2003	-0.09	±	0.34	0.00	±	0.01	
	GROSS BETA	11/12/2003	7.14	±	1.05	0.26	±	0.04	Y
	TRITIUM	11/12/2003	-14.91	±	21.67	-0.55	±	0.80	
TWIN FALLS DUPLICATE	GROSS ALPHA	11/12/2003	0.52	±	0.52	0.02	±	0.02	
	GROSS BETA	11/12/2003	7.47	±	1.05	0.28	±	0.04	Y
	TRITIUM	11/12/2003	94.66	±	25.31	3.51	±	0.94	Y

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

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi†/L)			Iodine-131 Result ± 1s Uncertainty (Bq‡/L)			Cesium-137 Result ± 1s Uncertainty (pCi/L)			Cesium-137 Result ± 1s Uncertainty (Bq/L)		
BLACKFOOT													
	10/07/2003	-0.36	±	1.68	-0.013	±	0.062	0.36	±	1.34	0.013	±	0.050
DUPLICATE	10/07/2003	0.49	±	0.85	0.018	±	0.031	0.41	±	0.79	0.015	±	0.029
	11/04/2003	2.16	±	1.78	0.080	±	0.066	2.09	±	2.44	0.077	±	0.090
	12/02/2003	-0.01	±	1.44	0.000	±	0.053	-2.05	±	2.20	-0.076	±	0.081
CAREY													
	10/07/2003	0.00	±	2.82	0.000	±	0.104	-1.85	±	3.45	-0.069	±	0.128
	11/05/2003	-0.16	±	1.91	-0.006	±	0.071	-0.28	±	2.43	-0.010	±	0.090
	12/02/2003	2.18	±	2.04	0.081	±	0.076	-1.92	±	3.00	-0.071	±	0.111
DIETRICH													
	10/07/2003	0.90	±	0.89	0.033	±	0.033	0.60	±	0.77	0.022	±	0.028
	11/04/2003	1.49	±	0.92	0.055	±	0.034	0.41	±	0.78	0.015	±	0.029
	12/02/2003	-0.71	±	0.83	-0.026	±	0.031	1.05	±	0.99	0.039	±	0.037
HOWE													
	10/07/2003	-0.41	±	1.63	-0.015	±	0.060	1.52	±	1.43	0.056	±	0.053
	11/04/2003	0.38	±	2.29	0.014	±	0.085	0.46	±	3.33	0.017	±	0.123
	12/02/2003	1.29	±	1.33	0.048	±	0.049	-3.72	±	2.23	-0.138	±	0.083
IDAHO FALLS													
	10/01/2003	0.87	±	1.78	0.032	±	0.066	3.53	±	2.41	0.131	±	0.089
	10/07/2003	3.30	±	1.64	0.122	±	0.061	-0.93	±	2.42	-0.035	±	0.090
	10/15/2003	-0.41	±	1.73	-0.015	±	0.064	-0.18	±	2.41	-0.007	±	0.089
	10/22/2003	0.47	±	1.61	0.017	±	0.060	2.24	±	2.38	0.083	±	0.088
	10/29/2003	-0.99	±	2.38	-0.037	±	0.088	-11.20	±	3.59	-0.415	±	0.133
	11/04/2003	2.89	±	1.51	0.107	±	0.056	1.39	±	1.37	0.051	±	0.051
	11/12/2003	1.05	±	0.83	0.039	±	0.031	0.89	±	0.78	0.033	±	0.029
	11/19/2003	0.93	±	0.70	0.035	±	0.026	-0.97	±	0.97	-0.036	±	0.036
	11/25/2003	1.44	±	1.24	0.053	±	0.046	-0.85	±	2.20	-0.032	±	0.081
	12/02/2003	0.18	±	0.75	0.007	±	0.028	0.42	±	0.97	0.015	±	0.036
	12/10/2003	-0.54	±	1.21	-0.020	±	0.045	-3.18	±	2.21	-0.118	±	0.082
	12/17/2003	-0.29	±	1.21	-0.011	±	0.045	-3.27	±	385.00	-0.121	±	14.259
	12/23/2003	0.99	±	1.09	0.037	±	0.040	-1.87	±	2.19	-0.069	±	0.081
	12/31/2003	1.74	±	1.28	0.064	±	0.047	-3.54	±	2.20	-0.131	±	0.081

TABLE C-8: Cesium-137 and Iodine-131 Concentrations in Milk (cont.).

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi[†]/L)			Iodine-131 Result ± 1s Uncertainty (Bq[‡]/L)			Cesium-137 Result ± 1s Uncertainty (pCi/L)			Cesium-137 Result ± 1s Uncertainty (Bq/L)		
MORELAND													
	10/07/2003	2.10	±	1.01	0.078	±	0.037	0.13	±	0.78	0.005	±	0.029
	11/04/2003	-0.41	±	0.97	-0.015	±	0.036	0.88	±	0.77	0.033	±	0.029
	12/02/2003	0.12	±	1.54	0.004	±	0.057	0.10	±	1.43	0.004	±	0.053
ROBERTS													
	10/07/2003	1.00	±	1.48	0.037	±	0.055	1.94	±	1.37	0.072	±	0.051
	11/04/2003	-1.34	±	1.62	-0.050	±	0.060	0.17	±	1.55	0.006	±	0.057
	12/02/2003	-0.35	±	0.66	-0.013	±	0.025	-0.18	±	0.98	-0.007	±	0.036
RUPERT													
	10/07/2003	-0.18	±	1.78	-0.007	±	0.066	-0.30	±	2.43	-0.011	±	0.090
	11/04/2003	1.78	±	1.60	0.066	±	0.059	1.95	±	2.41	0.072	±	0.089
	12/02/2003	0.03	±	1.21	0.001	±	0.045	-1.30	±	2.20	-0.048	±	0.081
TERRETON													
	10/07/2003	-0.21	±	2.13	-0.008	±	0.079	0.38	±	2.40	0.014	±	0.089
	11/04/2003	2.88	±	1.74	0.107	±	0.064	1.88	±	1.30	0.070	±	0.048
	12/02/2003	-0.39	±	1.74	-0.014	±	0.064	0.58	±	1.37	0.022	±	0.051

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

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty (pCi[†]/L)			Strontium-90 Result ± 1s Uncertainty (Bq[‡]/L)			Result > 3s
DIETRICH	11/04/2003	1.28	±	0.25	0.047	±	0.009	Y
HOWE	11/04/2003	0.71	±	0.20	0.026	±	0.007	Y
MORELAND	11/04/2003	0.86	±	0.15	0.032	±	0.006	Y
ROBERTS	11/04/2003	0.61	±	0.25	0.023	±	0.009	

		Tritium Concentration ± 1s* (pCi/L)			Tritium Concentration ± 1s* (Bq/L)		
BLACKFOOT	11/04/2003	54.40	±	24.20	2.015	±	0.896
CAREY	11/05/2003	43.90	±	23.70	1.626	±	0.878
IDAHO FALLS	11/04/2003	44.90	±	23.10	1.663	±	0.856
RUPERT	11/04/2003	61.70	±	23.50	2.285	±	0.870
TERRETON	11/04/2003	9.08	±	22.80	0.336	±	0.844

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
10/07/2003	Rupert	-2.85	±	4.94	-0.11	±	0.18	
10/07/2003	Tabor	-0.65	±	3.01	-0.02	±	0.11	
10/07/2003	Tabor	-0.20	±	5.33	-0.01	±	0.20	
10/29/2003	Chmayo N.M.	8.42	±	3.69	0.31	±	0.14	
09/26/2003	Idaho Falls	-4.34	±	4.95	-0.16	±	0.18	
09/30/2003	Monteview	1.43	±	1.51	0.05	±	0.06	
09/26/2003	Blackfoot	-0.44	±	1.36	-0.02	±	0.05	
11/01/2003	Northern New Jersey	-0.13	±	2.25	0.00	±	0.08	
10/01/2003	Arco	2.70	±	2.72	0.10	±	0.10	
09/30/2003	Howe	1.47	±	2.94	0.05	±	0.11	
09/30/2003	Mud Lake	0.29	±	1.50	0.01	±	0.06	

		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			Result ± 1s Uncertainty bq/kg			
								Result > 3s
10/07/2003	Rupert	122.00	±	90.00	4.52	±	3.33	
10/07/2003	Tabor	309.00	±	92.00	11.44	±	3.41	Y
10/07/2003	Tabor	198.00	±	130.00	7.33	±	4.81	
10/29/2003	Chmayo N.M.	252.00	±	110.00	9.33	±	4.07	
09/26/2003	Idaho Falls	322.00	±	79.00	11.93	±	2.93	Y
09/30/2003	Monteview	249.00	±	100.00	9.22	±	3.70	
09/26/2003	Blackfoot	256.00	±	98.00	9.48	±	3.63	
11/01/2003	Northern New Jersey	206.00	±	79.00	7.63	±	2.93	
10/01/2003	Out-of-State	193.00	±	96.00	7.15	±	3.56	
09/30/2003	Arco	331.00	±	110.00	12.26	±	4.07	Y
09/30/2003	Howe	404.00	±	96.00	14.96	±	3.56	Y
	Mud Lake	240.00	±	97.00	8.89	±	3.59	

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

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^5 Bq/kg wet weight)			Result > 3s
MULE DEAR										
	THYROID	CESIUM-137	10/07/2003	0.04	±	86.90	0.00	±	3.22	
		IODINE-131	10/07/2003	76.00	±	98.30	2.81	±	3.64	
MULE DEAR										
	MUSCLE	CESIUM-137	10/08/2003	0.64	±	1.34	0.02	±	0.05	
		IODINE-131	10/08/2003	0.04	±	2.11	0.00	±	0.08	
PRONGHORN										
	LIVER	CESIUM-137	10/09/2003	4.54	±	1.69	0.17	±	0.06	
		IODINE-131	10/09/2003	3.90	±	2.35	0.14	±	0.09	
	MUSCLE	CESIUM-137	10/09/2003	3.05	±	3.43	0.11	±	0.13	
		IODINE-131	10/09/2003	-0.23	±	3.28	-0.01	±	0.12	
	THYROID	CESIUM-137	10/09/2003	-18.20	±	429.00	-0.67	±	15.89	
		IODINE-131	10/09/2003	-544.00	±	346.00	-20.15	±	12.81	
ELK										
	MUSCLE	CESIUM-137	10/16/2003	-1.80	±	4.63	-0.07	±	0.17	
		IODINE-131	10/16/2003	-6.73	±	5.37	-0.25	±	0.20	
MULE DEER										
	THYROID	CESIUM-137	10/18/2003	-104.00	±	142.00	-3.85	±	5.26	
		IODINE-131	10/18/2003	-4790.00	±	2440.00	-177.41	±	90.37	
ELK										
	LIVER	CESIUM-137	10/21/2003	8.17	±	3.75	0.30	±	0.14	
		IODINE-131	10/21/2003	-4.99	±	3.58	-0.18	±	0.13	
	MUSCLE	CESIUM-137	10/21/2003	2.20	±	1.20	0.08	±	0.04	
		IODINE-131	10/21/2003	3.36	±	1.65	0.12	±	0.06	
	THYROID	CESIUM-137	10/21/2003	294.00	±	103.00	10.89	±	3.81	
		IODINE-131	10/21/2003	-146.00	±	110.00	-5.41	±	4.07	
MULE DEER										
	MUSCLE	CESIUM-137	10/22/2003	1.90	±	1.52	0.07	±	0.06	
		IODINE-131	10/22/2003	2.33	±	2.06	0.09	±	0.08	
	THYROID	CESIUM-137	10/22/2003	-57.40	±	181.00	-2.13	±	6.70	
		IODINE-131	10/22/2003	-156.00	±	119.00	-5.78	±	4.41	

TABEL C-11: Cesium-137 and Iodine-131 Concentrations in Game Animals (cont.).

	Tissue	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^5 Bq/kg wet weight)			Result > 3s
MULE DEER										
	LIVER	CESIUM-137	10/28/2003	1.73	±	1.29	0.06	±	0.05	
		IODINE-131	10/28/2003	0.66	±	1.33	0.02	±	0.05	
	MUSCLE	CESIUM-137	10/28/2003	1.89	±	1.30	0.07	±	0.05	
		IODINE-131	10/28/2003	-2.31	±	1.40	-0.09	±	0.05	
	THYROID	CESIUM-137	10/28/2003	821.00	±	926.00	30.41	±	34.30	
		IODINE-131	10/28/2003	-485.00	±	595.00	-17.96	±	22.04	
PRONGHORN										
	LIVER	CESIUM-137	10/30/2003	10.50	±	1.92	0.39	±	0.07	Y
		IODINE-131	10/30/2003	8.37	±	1.89	0.31	±	0.07	Y
	MUSCLE	CESIUM-137	10/30/2003	15.00	±	1.94	0.56	±	0.07	Y
		IODINE-131	10/30/2003	1.64	±	3.52	0.06	±	0.13	
	THYROID	CESIUM-137	10/30/2003	-33.50	±	102.00	-1.24	±	3.78	
		IODINE-131	10/30/2003	-61.70	±	136.00	-2.29	±	5.04	
ELK										
	LIVER	CESIUM-137	11/05/2003	0.97	±	1.70	0.04	±	0.06	
		IODINE-131	11/05/2003	0.41	±	3.16	0.02	±	0.12	
MULE DEER										
	MUSCLE	CESIUM-137	11/13/2003	3.46	±	2.51	0.13	±	0.09	
		IODINE-131	11/13/2003	1.29	±	3.06	0.05	±	0.11	
	THYROID	CESIUM-137	11/13/2003	809.00	±	770.00	29.96	±	28.52	
		IODINE-131	11/13/2003	-311.00	±	483.00	-11.52	±	17.89	
MULE DEER										
	LIVER	CESIUM-137	11/26/2003	3.51	±	1.72	0.13	±	0.06	
		IODINE-131	11/26/2003	0.01	±	5.92	0.00	±	0.22	
	MUSCLE	CESIUM-137	11/26/2003	3.55	±	2.53	0.13	±	0.09	
		IODINE-131	11/26/2003	0.04	±	6.84	0.00	±	0.25	
	THYROID	CESIUM-137	11/26/2003	-157.00	±	238.00	-5.81	±	8.81	
		IODINE-131	11/26/2003	3.00	±	2.16	0.11	±	0.08	
MULE DEER										
	MUSCLE	CESIUM-137	12/18/2003	2.64	±	1.37	0.10	±	0.05	
		IODINE-131	12/18/2003	0.04	±	5.61	0.00	±	0.21	
	THYROID	CESIUM-137	12/18/2003	95.30	±	185.00	3.53	±	6.85	
		IODINE-131	12/18/2003	209.00	±	182.00	7.74	±	6.74	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl.

Location	Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-3}$) Bq/g			Result > 3s
MUD LAKE										
	GADWAL	10/11/2003	AMERICIUM-241	-0.55	±	0.39	-2.05	±	1.44	
		10/11/2003	ANTIMONY-124	-64.50	±	26.00	-238.89	±	96.30	
		10/11/2003	CERIUM-141	65.30	±	57.00	241.85	±	211.11	
		10/11/2003	CERIUM-144	17.20	±	44.00	63.70	±	162.96	
		10/11/2003	CESIUM-134	-2.00	±	12.00	-7.41	±	44.44	
		10/11/2003	CESIUM-137	4.69	±	10.00	17.37	±	37.04	
		10/11/2003	CHROMIUM-51	-84.20	±	560.00	-311.85	±	2074.07	
		10/11/2003	COBALT-58	-42.20	±	22.00	-156.30	±	81.48	
		10/11/2003	COBALT-60	9.77	±	12.00	36.19	±	44.44	
		10/11/2003	EUROPIUM-152	-38.10	±	24.00	-141.11	±	88.89	
		10/11/2003	HAFNIUM-181	7.18	±	37.00	26.59	±	137.04	
		10/11/2003	MANGANESE-54	5.31	±	12.00	19.67	±	44.44	
		10/11/2003	NIOBIUM-95	14.90	±	58.00	55.19	±	214.81	
		10/11/2003	PLUTONIUM-238	0.00	±	0.42	0.00	±	1.56	
		10/11/2003	PLUTONIUM-239/40	0.34	±	0.34	1.26	±	1.26	
		10/11/2003	RUTHENIUM-103	16.00	±	39.00	59.26	±	144.44	
		10/11/2003	SILVER-110m	5.83	±	17.00	21.59	±	62.96	
		10/11/2003	STRONTIUM-90	10.60	±	3.00	39.26	±	11.11	Y
		10/11/2003	ZINC-65	-75.60	±	33.00	-280.00	±	122.22	
		10/11/2003	ZIRCONIUM-95	23.30	±	44.00	86.30	±	162.96	
MUD LAKE										
	Duplicate	10/11/2003	ANTIMONY-124	-5.02	±	20.00	-18.59	±	74.07	
		10/11/2003	CERIUM-141	95.80	±	50.00	354.81	±	185.19	
		10/11/2003	CERIUM-144	9.59	±	33.00	35.52	±	122.22	
		10/11/2003	CESIUM-134	-2.19	±	8.80	-8.11	±	32.59	
		10/11/2003	CESIUM-137	-0.67	±	8.10	-2.47	±	30.00	
		10/11/2003	CHROMIUM-51	-144.00	±	460.00	-533.33	±	1703.70	
		10/11/2003	COBALT-58	-22.90	±	17.00	-84.81	±	62.96	
		10/11/2003	COBALT-60	-6.27	±	7.90	-23.22	±	29.26	
		10/11/2003	EUROPIUM-152	-11.50	±	18.00	-42.59	±	66.67	
		10/11/2003	HAFNIUM-181	43.20	±	29.00	160.00	±	107.41	
		10/11/2003	MANGANESE-54	4.54	±	9.00	16.81	±	33.33	
		10/11/2003	NIOBIUM-95	-103.00	±	45.00	-381.48	±	166.67	
		10/11/2003	RUTHENIUM-103	-46.40	±	31.00	-171.85	±	114.81	
		10/11/2003	SILVER-110m	2.51	±	13.00	9.30	±	48.15	
		10/11/2003	ZINC-65	-47.00	±	22.00	-174.07	±	81.48	
		10/11/2003	ZIRCONIUM-95	-24.60	±	31.00	-91.11	±	114.81	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl (cont.).

Location	Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-5}$) Bq/g			Result > 3s
MUD LAKE		10/11/2003	AMERICIUM-241	1.18	±	0.84	4.37	±	3.11	
	GREEN-WINGED TEAL	10/11/2003	ANTIMONY-124	-90.10	±	34.00	-333.70	±	125.93	
		10/11/2003	CERIUM-141	-24.40	±	68.00	-90.37	±	251.85	
		10/11/2003	CERIUM-144	3.34	±	54.00	12.37	±	200.00	
		10/11/2003	CESIUM-134	15.40	±	14.00	57.04	±	51.85	
		10/11/2003	CESIUM-137	3.41	±	12.00	12.63	±	44.44	
		10/11/2003	CHROMIUM-51	-53.60	±	720.00	-198.52	±	2666.67	
		10/11/2003	COBALT-58	-15.70	±	28.00	-58.15	±	103.70	
		10/11/2003	COBALT-60	34.90	±	14.00	129.26	±	51.85	
		10/11/2003	EUROPIUM-152	-13.10	±	28.00	-48.52	±	103.70	
		10/11/2003	HAFNIUM-181	-19.80	±	47.00	-73.33	±	174.07	
		10/11/2003	MANGANESE-54	-0.42	±	15.00	-1.56	±	55.56	
		10/11/2003	NIOBIUM-95	187.00	±	70.00	692.59	±	259.26	
		10/11/2003	PLUTONIUM-238	0.00	±	0.45	0.00	±	1.67	
		10/11/2003	PLUTONIUM-239/40	0.00	±	0.44	0.00	±	1.63	
		10/11/2003	RUTHENIUM-103	1.53	±	50.00	5.67	±	185.19	
		10/11/2003	SILVER-110m	3.48	±	20.00	12.89	±	74.07	
		10/11/2003	STRONTIUM-90	9.91	±	4.40	36.70	±	16.30	
		10/11/2003	ZINC-65	-62.80	±	37.00	-232.59	±	137.04	
		10/11/2003	ZIRCONIUM-95	41.00	±	51.00	151.85	±	188.89	
MUD LAKE		10/11/2003	AMERICIUM-241	0.45	±	0.45	1.65	±	1.67	
	GREEN-WINGED TEAL	10/11/2003	ANTIMONY-124	-0.04	±	39.00	-0.16	±	144.44	
		10/11/2003	CERIUM-141	2.89	±	86.00	10.70	±	318.52	
		10/11/2003	CERIUM-144	89.40	±	63.00	331.11	±	233.33	
		10/11/2003	CESIUM-134	32.40	±	18.00	120.00	±	66.67	
		10/11/2003	CESIUM-137	-31.00	±	15.00	-114.81	±	55.56	
		10/11/2003	CHROMIUM-51	1540.00	±	920.00	5703.70	±	3407.41	
		10/11/2003	COBALT-58	-46.90	±	34.00	-173.70	±	125.93	
		10/11/2003	COBALT-60	-8.34	±	15.00	-30.89	±	55.56	
		10/11/2003	EUROPIUM-152	-3.85	±	34.00	-14.26	±	125.93	
		10/11/2003	HAFNIUM-181	-3.80	±	59.00	-14.07	±	218.52	
		10/11/2003	MANGANESE-54	-7.18	±	17.00	-26.59	±	62.96	
		10/11/2003	NIOBIUM-95	-127.00	±	85.00	-470.37	±	314.81	
		10/11/2003	PLUTONIUM-238	0.00	±	0.79	0.00	±	2.93	
		10/11/2003	PLUTONIUM-239/40	0.32	±	0.72	1.19	±	2.67	
		10/11/2003	RUTHENIUM-103	-6.03	±	60.00	-22.33	±	222.22	
		10/11/2003	SILVER-110m	-30.40	±	25.00	-112.59	±	92.59	
		10/11/2003	STRONTIUM-90	20.40	±	5.40	75.56	±	20.00	Y
		10/11/2003	ZINC-65	-85.50	±	45.00	-316.67	±	166.67	
		10/11/2003	ZIRCONIUM-95	-172.00	±	68.00	-637.04	±	251.85	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl (cont.).

Location / Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-5}$) Bq/g			Result > 3s
ANL-W SEWAGE LAGOON	10/19/2003	AMERICIUM-241	1.96	±	1.10	7.26	±	4.07	
A. WIGEON	10/19/2003	ANTIMONY-124	-17.50	±	18.00	-64.81	±	66.67	
	10/19/2003	CERIUM-141	79.30	±	36.00	293.70	±	133.33	
	10/19/2003	CERIUM-144	43.90	±	36.00	162.59	±	133.33	
	10/19/2003	CESIUM-134	-1.87	±	9.40	-6.93	±	34.81	
	10/19/2003	CESIUM-137	-18.00	±	8.40	-66.67	±	31.11	
	10/19/2003	CHROMIUM-51	-380.00	±	340.00	-1407.41	±	1259.26	
	10/19/2003	COBALT-58	-8.45	±	17.00	-31.30	±	62.96	
	10/19/2003	COBALT-60	10.90	±	9.30	40.37	±	34.44	
	10/19/2003	EUROPIUM-152	-11.60	±	19.00	-42.96	±	70.37	
	10/19/2003	HAFNIUM-181	-53.20	±	25.00	-197.04	±	92.59	
	10/19/2003	MANGANESE-54	5.98	±	9.60	22.15	±	35.56	
	10/19/2003	NIOBIUM-95	-14.40	±	35.00	-53.33	±	129.63	
	10/19/2003	PLUTONIUM-238	0.00	±	0.68	0.00	±	2.52	
	10/19/2003	PLUTONIUM-239/40	-0.28	±	0.28	-1.03	±	1.04	
	10/19/2003	RUTHENIUM-103	-11.20	±	25.00	-41.48	±	92.59	
	10/19/2003	SILVER-110m	-9.73	±	14.00	-36.04	±	51.85	
	10/19/2003	STRONTIUM-90	-2.55	±	13.00	-9.44	±	48.15	
	10/19/2003	ZINC-65	-21.30	±	23.00	-78.89	±	85.19	
	10/19/2003	ZIRCONIUM-95	-18.70	±	30.00	-69.26	±	111.11	
ANL-W SEWAGE LAGOON	10/18/2003	AMERICIUM-241	0.53	±	0.53	1.96	±	1.96	
N. SHOVELER	10/18/2003	ANTIMONY-124	-54.00	±	27.00	-200.00	±	100.00	
	10/18/2003	CERIUM-141	139.00	±	55.00	514.81	±	203.70	
	10/18/2003	CERIUM-144	-6.00	±	48.00	-22.22	±	177.78	
	10/18/2003	CESIUM-134	11.90	±	13.00	44.07	±	48.15	
	10/18/2003	CESIUM-137	30.00	±	12.00	111.11	±	44.44	
	10/18/2003	CHROMIUM-51	9.22	±	540.00	34.15	±	2000.00	
	10/18/2003	COBALT-58	-27.30	±	22.00	-101.11	±	81.48	
	10/18/2003	COBALT-60	35.40	±	13.00	131.11	±	48.15	
	10/18/2003	EUROPIUM-152	8.56	±	26.00	31.70	±	96.30	
	10/18/2003	HAFNIUM-181	2.07	±	37.00	7.67	±	137.04	
	10/18/2003	MANGANESE-54	-15.10	±	12.00	-55.93	±	44.44	
	10/18/2003	NIOBIUM-95	50.70	±	51.00	187.78	±	188.89	
	10/18/2003	PLUTONIUM-238	0.00	±	0.54	0.00	±	2.00	
	10/18/2003	PLUTONIUM-239/40	1.75	±	0.89	6.48	±	3.30	
	10/18/2003	RUTHENIUM-103	-10.30	±	39.00	-38.15	±	144.44	
	10/18/2003	SILVER-110m	11.10	±	17.00	41.11	±	62.96	
	10/18/2003	STRONTIUM-90	2.98	±	3.40	11.04	±	12.59	
	10/18/2003	ZINC-65	-52.80	±	32.00	-195.56	±	118.52	
	10/18/2003	ZIRCONIUM-95	-2.66	±	42.00	-9.85	±	155.56	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl (cont.).

Location	Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-5}$) Bq/g			Result > 3s
ANL-W SEWAGE LAGOON		10/18/2003	AMERICIUM-241	0.00	±	1.00	0.00	±	3.70	
	MALLARD	10/18/2003	ANTIMONY-124	-0.89	±	13.00	-3.30	±	48.15	
		10/18/2003	CERIUM-141	-9.83	±	33.00	-36.41	±	122.22	
		10/18/2003	CERIUM-144	-4.39	±	26.00	-16.26	±	96.30	
		10/18/2003	CESIUM-134	5.60	±	6.20	20.74	±	22.96	
		10/18/2003	CESIUM-137	-0.55	±	5.20	-2.04	±	19.26	
		10/18/2003	CHROMIUM-51	-120.00	±	320.00	-444.44	±	1185.19	
		10/18/2003	COBALT-58	-28.50	±	12.00	-105.56	±	44.44	
		10/18/2003	COBALT-60	-2.17	±	5.80	-8.04	±	21.48	
		10/18/2003	EUROPIUM-152	-24.90	±	13.00	-92.22	±	48.15	
		10/18/2003	HAFNIUM-181	-1.69	±	20.00	-6.26	±	74.07	
		10/18/2003	MANGANESE-54	-3.13	±	6.20	-11.59	±	22.96	
		10/18/2003	NIOBIUM-95	36.60	±	29.00	135.56	±	107.41	
		10/18/2003	PLUTONIUM-238	0.47	±	0.47	1.73	±	1.74	
		10/18/2003	PLUTONIUM-239/40	0.93	±	0.66	3.45	±	2.44	
		10/18/2003	RUTHENIUM-103	13.00	±	22.00	48.15	±	81.48	
		10/18/2003	SILVER-110m	-6.87	±	9.40	-25.44	±	34.81	
		10/18/2003	STRONTIUM-90	2.28	±	4.50	8.44	±	16.67	
		10/18/2003	ZINC-65	-22.50	±	17.00	-83.33	±	62.96	
		10/18/2003	ZIRCONIUM-95	8.38	±	22.00	31.04	±	81.48	
TRA SEWAGE LAGOON		10/10/2003	AMERICIUM-241	0.70	±	0.50	2.60	±	1.85	
	COOT	10/10/2003	ANTIMONY-124	-27.20	±	33.00	-100.74	±	122.22	
		10/10/2003	CERIUM-141	-141.00	±	65.00	-522.22	±	240.74	
		10/10/2003	CERIUM-144	-32.20	±	64.00	-119.26	±	237.04	
		10/10/2003	CESIUM-134	3.37	±	17.00	12.48	±	62.96	
		10/10/2003	CESIUM-137	6.28	±	15.00	23.26	±	55.56	
		10/10/2003	CHROMIUM-51	-97.70	±	640.00	-361.85	±	2370.37	
		10/10/2003	COBALT-58	25.50	±	29.00	94.44	±	107.41	
		10/10/2003	COBALT-60	-13.20	±	16.00	-48.89	±	59.26	
		10/10/2003	EUROPIUM-152	52.10	±	35.00	192.96	±	129.63	
		10/10/2003	HAFNIUM-181	-45.70	±	46.00	-169.26	±	170.37	
		10/10/2003	MANGANESE-54	17.50	±	18.00	64.81	±	66.67	
		10/10/2003	NIOBIUM-95	60.50	±	65.00	224.07	±	240.74	
		10/10/2003	PLUTONIUM-238	0.00	±	0.70	0.00	±	2.59	
		10/10/2003	PLUTONIUM-239/40	-0.28	±	0.28	-1.05	±	1.04	
		10/10/2003	RUTHENIUM-103	5.46	±	46.00	20.22	±	170.37	
		10/10/2003	SILVER-110m	20.00	±	24.00	74.07	±	88.89	
		10/10/2003	STRONTIUM-90	16.90	±	7.70	62.59	±	28.52	
		10/10/2003	STRONTIUM-90	-0.82	±	9.30	-3.03	±	34.44	
		10/10/2003	ZINC-65	-145.00	±	46.00	-537.04	±	170.37	
		10/10/2003	ZIRCONIUM-95	-19.60	±	57.00	-72.59	±	211.11	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl (cont.).

Location	Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-5}$) Bq/g			Result > 3s
TRA SEWAGE LAGOON		10/10/2003	AMERICIUM-241	0.45	±	0.45	1.66	±	1.67	
	COOT	10/10/2003	ANTIMONY-124	-30.20	±	28.00	-111.85	±	103.70	
		10/10/2003	CERIUM-141	176.00	±	53.00	651.85	±	196.30	Y
		10/10/2003	CERIUM-144	31.90	±	52.00	118.15	±	192.59	
		10/10/2003	CESIUM-134	10.50	±	13.00	38.89	±	48.15	
		10/10/2003	CESIUM-137	-3.98	±	12.00	-14.74	±	44.44	
		10/10/2003	CHROMIUM-51	-8.93	±	510.00	-33.07	±	1888.89	
		10/10/2003	COBALT-58	9.10	±	24.00	33.70	±	88.89	
		10/10/2003	COBALT-60	0.54	±	14.00	2.01	±	51.85	
		10/10/2003	EUROPIUM-152	-30.30	±	27.00	-112.22	±	100.00	
		10/10/2003	HAFNIUM-181	-8.13	±	37.00	-30.11	±	137.04	
		10/10/2003	MANGANESE-54	-25.40	±	14.00	-94.07	±	51.85	
		10/10/2003	NIOBIUM-95	46.40	±	50.00	171.85	±	185.19	
		10/10/2003	PLUTONIUM-238	0.00	±	0.94	0.00	±	3.48	
		10/10/2003	PLUTONIUM-239/40	-0.38	±	0.39	-1.42	±	1.44	
		10/10/2003	RUTHENIUM-103	-14.20	±	38.00	-52.59	±	140.74	
		10/10/2003	SILVER-110m	-7.77	±	19.00	-28.78	±	70.37	
		10/10/2003	STRONTIUM-90	-2.76	±	7.40	-10.22	±	27.41	
		10/10/2003	ZINC-65	4.73	±	34.00	17.52	±	125.93	
		10/10/2003	ZIRCONIUM-95	-31.00	±	45.00	-114.81	±	166.67	
TRA SEWAGE LAGOON		10/10/2003	AMERICIUM-241	1.09	±	0.78	4.04	±	2.89	
	COOT	10/10/2003	ANTIMONY-124	-70.40	±	29.00	-260.74	±	107.41	
		10/10/2003	CERIUM-141	54.40	±	45.00	201.48	±	166.67	
		10/10/2003	CERIUM-144	-34.60	±	41.00	-128.15	±	151.85	
		10/10/2003	CESIUM-134	-11.80	±	11.00	-43.70	±	40.74	
		10/10/2003	CESIUM-137	-9.81	±	9.70	-36.33	±	35.93	
		10/10/2003	CHROMIUM-51	-340.00	±	440.00	-1259.26	±	1629.63	
		10/10/2003	COBALT-58	4.75	±	20.00	17.59	±	74.07	
		10/10/2003	COBALT-60	17.90	±	11.00	66.30	±	40.74	
		10/10/2003	EUROPIUM-152	-16.50	±	22.00	-61.11	±	81.48	
		10/10/2003	HAFNIUM-181	-14.50	±	31.00	-53.70	±	114.81	
		10/10/2003	MANGANESE-54	-3.60	±	11.00	-13.33	±	40.74	
		10/10/2003	NIOBIUM-95	1.09	±	45.00	4.04	±	166.67	
		10/10/2003	PLUTONIUM-238	0.00	±	0.66	0.00	±	2.44	
		10/10/2003	PLUTONIUM-239/40	1.07	±	0.76	3.96	±	2.81	
		10/10/2003	RUTHENIUM-103	2.87	±	32.00	10.63	±	118.52	
		10/10/2003	SILVER-110m	19.20	±	16.00	71.11	±	59.26	
		10/10/2003	STRONTIUM-90	18.70	±	5.50	69.26	±	20.37	Y
		10/10/2003	ZINC-65	-71.00	±	29.00	-262.96	±	107.41	
		10/10/2003	ZIRCONIUM-95	-60.90	±	37.00	-225.56	±	137.04	
TRA SEWAGE LAGOON		10/10/2003	AMERICIUM-241	0.00	±	0.45	0.00	±	1.67	

TABLE C-12: Radionuclides in Edible Portion of Waterfowl (cont.).

Location	Species	Sampling Date	Analyte	Result ± Uncertainty(2s) ($\times 10^{-3}$) pCi/g			Result ± Uncertainty(2s) ($\times 10^{-5}$) Bq/g			Result > 3s
	COOT	10/10/2003	ANTIMONY-124	-69.30	±	30.00	-256.67	±	111.11	
		10/10/2003	CERIUM-141	47.30	±	54.00	175.19	±	200.00	
		10/10/2003	CERIUM-144	22.60	±	49.00	83.70	±	181.48	
		10/10/2003	CESIUM-134	16.30	±	13.00	60.37	±	48.15	
		10/10/2003	CESIUM-137	16.60	±	11.00	61.48	±	40.74	
		10/10/2003	CHROMIUM-51	323.00	±	540.00	1196.30	±	2000.00	
		10/10/2003	COBALT-58	22.50	±	23.00	83.33	±	85.19	
		10/10/2003	COBALT-60	18.20	±	13.00	67.41	±	48.15	
		10/10/2003	EUROPIUM-152	-9.57	±	26.00	-35.44	±	96.30	
		10/10/2003	HAFNIUM-181	13.00	±	37.00	48.15	±	137.04	
		10/10/2003	MANGANESE-54	16.10	±	13.00	59.63	±	48.15	
		10/10/2003	NIOBIUM-95	82.80	±	53.00	306.67	±	196.30	
		10/10/2003	PLUTONIUM-238	0.52	±	0.52	1.91	±	1.93	
		10/10/2003	PLUTONIUM-239/40	0.26	±	0.58	0.95	±	2.15	
		10/10/2003	RUTHENIUM-103	-57.20	±	40.00	-211.85	±	148.15	
		10/10/2003	SILVER-110m	9.57	±	19.00	35.44	±	70.37	
		10/10/2003	STRONTIUM-90	5.52	±	3.50	20.44	±	12.96	
		10/10/2003	ZINC-65	-55.00	±	36.00	-203.70	±	133.33	
		10/10/2003	ZIRCONIUM-95	46.20	±	47.00	171.11	±	174.07	
TRA SEWAGE LAGOON		10/10/2003	AMERICIUM-241	0.00E+00	±	1.00E+00	0.00	±	3.70	
	COOT	10/10/2003	ANTIMONY-124	-1.42E+01	±	2.30E+01	-52.59	±	85.19	
		10/10/2003	CERIUM-141	8.45E+01	±	4.40E+01	312.96	±	162.96	
		10/10/2003	CERIUM-144	-3.45E+01	±	3.80E+01	-127.78	±	140.74	
		10/10/2003	CESIUM-134	-5.99E+00	±	1.10E+01	-22.19	±	40.74	
		10/10/2003	CESIUM-137	1.12E+01	±	9.10E+00	41.48	±	33.70	
		10/10/2003	CHROMIUM-51	-4.47E+01	±	4.40E+02	-165.56	±	1629.63	
		10/10/2003	COBALT-58	2.38E+01	±	1.90E+01	88.15	±	70.37	
		10/10/2003	COBALT-60	1.82E+01	±	1.10E+01	67.41	±	40.74	
		10/10/2003	EUROPIUM-152	-4.36E+01	±	2.00E+01	-161.48	±	74.07	
		10/10/2003	HAFNIUM-181	-3.67E+01	±	3.00E+01	-135.93	±	111.11	
		10/10/2003	MANGANESE-54	9.40E+00	±	1.10E+01	34.81	±	40.74	
		10/10/2003	NIOBIUM-95	2.42E+01	±	4.50E+01	89.63	±	166.67	
		10/10/2003	PLUTONIUM-238	0.00E+00	±	5.60E-01	0.00	±	2.07	
		10/10/2003	PLUTONIUM-239/40	9.14E-01	±	6.50E-01	3.39	±	2.41	
		10/10/2003	RUTHENIUM-103	1.90E+01	±	3.20E+01	70.37	±	118.52	
		10/10/2003	SILVER-110m	1.23E+01	±	1.60E+01	45.56	±	59.26	
		10/10/2003	STRONTIUM-90	1.80E+01	±	4.10E+00	66.67	±	15.19	Y
		10/10/2003	ZINC-65	-6.89E+01	±	2.80E+01	-255.19	±	103.70	
		10/10/2003	ZIRCONIUM-95	2.21E+01	±	3.60E+01	81.85	±	133.33	

TABLE C-13: Environmental Radiation Results.

Sample Group & Location		Start Date	End Date	Radiation Measurement ± 1s Uncertainty (mR)			Exposure mR/day
BOUNDARY							
	BLUE DOME	05/05/2003	11/04/2003	50.30	±	9.90	0.27
	HOWE	05/05/2003	11/04/2003	54.10	±	10.60	0.29
	MONTEVIEW	05/05/2003	11/04/2003	55.40	±	10.90	0.30
	MUD LAKE	05/05/2003	11/04/2003	65.70	±	12.90	0.36
	RENO RANCH	05/05/2003	11/04/2003	51.10	±	10.00	0.28
						Boundary Average	**0.30**
DISTANT							
	ABERDEEN	05/05/2003	11/04/2003	44.90	±	8.80	0.24
	BLACKFOOT CMS	05/05/2003	11/04/2003	49.50	±	9.70	0.27
	CRATERS	05/05/2003	11/04/2003	59.60	±	11.70	0.32
	DUBOIS	05/05/2003	11/04/2003	48.90	±	9.60	0.27
	IDAHO FALLS	05/05/2003	11/04/2003	58.60	±	11.50	0.32
	REXBURG	05/05/2003	11/04/2003	67.60	±	13.20	0.37
	ROBERTS	05/05/2003	11/04/2003	63.60	±	12.50	0.35
						Distant Average	**0.31**
OUT OF STATE							
	JACKSON	05/05/2003	11/04/2003	59.60	±	11.70	0.32

APPENDIX D

STATISTICAL ANALYSIS RESULTS

PAGE INTENTIONALLY LEFT BLANK

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

Parameter	p[b]
Gross Alpha	
Quarter	0.75
October	0.11
November	0.97
December	0.74
Gross Beta	
Quarter	0.07
October	0.98
November	0.99
December	0.61

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

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

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

Mann-Whitney U Test[a]		
Parameter	**Week**	**p[b]**
Gross Alpha		
	October 1st	0.32
	October 8th	1.00
	October 15th	0.47
	October 22nd	0.57
	October 29th	0.78
	November 5th	0.78
	November 12th	0.78
	November 19th	0.39
	November 25th	0.89
	December 3rd	0.03
	December 10th	0.48
	December 17th	0.48
	December 23rd	0.67
	December 31st	0.83
Gross Beta		
	October 1st	0.94
	October 8th	0.78
	October 15th	0.22
	October 22nd	1.00
	October 29th	0.09
	November 5th	0.32
	November 12th	0.02
	November 19th	0.78
	November 25th	0.22
	December 3rd	0.01
	December 10th	0.05
	December 17th	0.06
	December 23rd	0.67
	December 31st	0.29

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

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