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Idaho National Engineering and Environmental Laboratory Offsite Environmental Surveillance Program Report: Fourth Quarter 2000

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EXECUTIVE SUMMARY

This report for the fourth quarter, 2000, 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, 2000. All sample types (media) and the sampling schedule followed during 2000 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including air filters and charcoal cartridges, atmospheric moisture and, 10-micron particulate matter (PM_{10});
- Water sampling, including precipitation, drinking water, and surface water;
- Food stuff sampling, including milk, potatoes, large game, ducks, and doves; and,
- Environmental radiation.

At no time during the fourth quarter were weekly average gross alpha concentrations from INEEL locations significantly higher than corresponding averages for either Boundary or Distant locations. During two weeks the average gross beta concentration for INEEL locations were significantly higher than the corresponding Distant location average. There were no trends over time of INEEL being higher than Boundary being higher than Distant locations, as one would expect if the INEEL was the source of radionuclide contamination. No ^{131}I was detected in any of the weekly charcoal cartridges during the fourth quarter. Selected quarterly composite filter samples were analyzed for gamma emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. No human-made radionuclide was detected in any sample. Details of the low-volume air sampling appear in section 3.1.

Eight atmospheric moisture samples were obtained and analyzed for tritium during the fourth quarter of 2000. Two samples, one each from Idaho Falls and Blackfoot exceeded their 2s uncertainty. These results were both less than the minimum detectable concentration (MDC) and over 300,000 times lower than the Derived Concentration Guide value of 1×10^{-7} µCi/mL (3.7×10^{-3} Bq/mL) for tritium in air. Derived Concentration Guide values are set to ensure dose limits are not exceeded. Details of atmospheric moisture sampling appear in section 3.2.

The ESER Program operates three PM_{10} samplers, one each at Rexburg, Blackfoot, and Atomic City. Sampling of PM_{10} is informational as no analyses are conducted for contaminants. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour concentration was 112 µg/m^3 on December 7, 2000, in Rexburg. Details of PM_{10} sampling appear in section 3.3.

Monthly composite precipitation samples were collected from Idaho Falls and the Central Facilities Area (CFA) on the INEEL. Four weekly samples were collected from the Experimental Field Station (EFS) on the INEEL. All three of the monthly precipitation samples from CFA, the December sample from Idaho Falls, and two weekly samples from EFS had tritium results exceeding their respective 2s uncertainties. There is no DCG for precipitation, but in drinking water it is 80,000 pCi/L (2,960 Bq/L). The Safe Drinking Water Act sets a limit of 20,000 pCi/L (740 Bq/L) for tritium. The levels of tritium measured in fourth quarter precipitation samples were at least 280 times lower than the DCG value and 70 times lower than the Safe Drinking Water Act Limits. Details of precipitation sampling appear in section 4.1.

Drinking water samples were collected from tap water from 13 locations throughout southeast Idaho. All were analyzed for gross alpha, gross beta, and tritium. One drinking water sample (Monteview) had a gross alpha result greater than its 2s value. Sixty-nine percent of the drinking water samples had gross beta results greater than their associated 2s values. The DCG values for gross alpha and gross beta in water are 30 pCi/L and 100pCi/L, respectively. The EPA, has set the limits for gross alpha and gross beta in water at 15 pCi/L and 50 pCi/L, respectively. The gross alpha in the sample from Monteview was about ten times lower than the DCG value and about five times lower than the Safe Drinking Water Act limit. Gross beta concentrations in all fourth quarter drinking water samples were also at least ten times lower than the DCG value and five times lower than the Safe Drinking Water Act limit. Gross alpha and beta concentrations were not higher at locations “down stream” from the INEEL. Tritium analyses showed one drinking water sample, from Shoshone, had a result greater than its 2s value. No other sample had a tritium result greater than its associated 2s value. The Shoshone sample result was less than the minimum detectable concentration and nearly 500 times lower than the DCG value and 124 times lower than the Safe Drinking Water Act Limit. Details of drinking water sampling appear in section 4.2.

Surface water samples were collected from four locations along the Snake River in the area where the Snake River Plain Aquifer discharges and from one upstream location in Idaho Falls. Samples were analyzed for the same constituents as drinking water. Two surface water samples, one each from Bliss and Buhl, exceeded their associated 2s value for gross alpha. Both of these samples also exceeded their 2s value for gross beta as did samples from Hagerman, Twin Falls, and the duplicate sample from Idaho Falls. None of these samples exceeded the MDC of 8 pCi/L. Details of surface water sampling appear in section 4.3.

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 with samples from three locations (Howe, Dietrich, and Roberts) being analyzed for ^{90}Sr. No ^{131}I was detected in any sample. Eight samples had ^{137}Cs concentrations greater than their 2s uncertainty. All three samples analyzed for ^{90}Sr had concentrations greater than their associated 2s uncertainty. There are no established limits for ^{137}Cs or ^{90}Sr in milk but, for comparison, the EPA has set the limit for ^{137}Cs in drinking water at 12 pCi/L and at 8pCi/L for ^{90}Sr. The Safe Drinking Water limit is based on a 4 mrem per year maximum allowable dose and the assumption that two liters per day are consumed. The maximum ^{137}Cs concentration measured in milk during the fourth quarter, 2000 was about eight times lower than the 12 pCi/L limit and the maximum ^{90}Sr concentration was about five times lower than the 8 pCi/L limit. Details of milk sampling appear in section 5.1.

Five large game animals were sampled during the fourth quarter of 2000. All were killed as a result of vehicular collisions. These accidents involved four mule deer (*Odocoileus hemionus*) and one elk (*Cervus elaphus*). Thyroid and muscle tissue were collected from each animal and liver tissue was collected from all except one mule deer. The muscle tissue from the elk had a greater than 2s result (3.6 ± 1.9 pCi/kg wet weight, or 0.13 ± 0.07 Bq/kg wet weight) of ^{137}Cs. No other gamma-emitting radionuclides were detected in any samples. The presence of ^{137}Cs in big game tissue is not an immediate concern in that similar levels are commonly detected in wild game tissues throughout the world. Details of large game animal sampling appear in section 5.2.

Potatoes were collected from various growers in southeast Idaho as well as from locations around the United States. All samples were analyzed for gamma emitting radionuclides and ^{90}Sr. No sample collected during the fourth quarter contained levels of ^{90}Sr above the 2s level. The only human-made gamma emitting radionuclide found above the 2s level was ^{137}Cs in the sample from Arco. The result of a recount of the Arco sample fell short of its 2s value which gives evidence that the initial result was a false positive. Details of potato sampling appear in section 5.3.

Seven ducks were collected from waste ponds on the INEEL and three were collected from Mud Lake. Both ^{137}Cs and ^{60}Co were measured at greater than 2s levels in the muscle tissue of four ducks sampled from the Test Reactor Area (TRA). Duck hunting is not allowed on the INEEL but a maximum potential exposure scenario to humans would be someone collecting a duck directly from the TRA radioactive waste ponds and immediately consuming all muscle, liver, heart, and gizzard tissue. One person would have to eat over 5,000 ducks at these concentrations to approach the dose limit of 100 mrem. Details of duck sampling appear in section 5.4.

Eighteen mourning doves (*Zenaida macroura*) were sampled during 2001; seven from a location adjacent radioactive waste ponds at the TRA, six from a location adjacent contaminated waste ponds at the Idaho Nuclear Technology and Engineering Center (INTEC), and five, for comparison, from a location approximately 2 miles southeast of Idaho Falls. Because of the small size of the birds, two to three birds were composited in each sample. All samples were analyzed for gamma emitting radionuclides with a subset analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. The only human-made radionuclide in the edible tissue (muscle) measured at levels greater than their associated 2s was ^{137}Cs in two samples from INTEC (consisting of muscle tissue from three birds each) and in one sample from TRA (consisting of muscle tissue from three birds). One person would have to eat over 1,295,000 doves at these concentrations to approach the dose limit of 100 mrem. Details of dove sampling appear in section 5.5.

The ESER and its predecessors have placed an array of thermoluminescent dosimeters (TLDs) throughout the Eastern Snake River Plain to measure the amount of radiation in the environment. The results of the November sampling (the period of measurement being May 2000 through November 2000) show the average exposure rate for locations in the Boundary group to range from a low of 0.29 mR/day at Reno Ranch to a high of 0.39 mR/day at Mud Lake. The overall average was 0.35 mR/day. The Distant set had a high of 0.40 mR/day at Rexburg and a low of 0.33 mR/day at Minidoka. The overall average Distant value was 0.37 mR/day. There was no statistical difference between Boundary and Distant locations. Details of environmental radiation measurements appear in section 6.

Overall, the only radionuclides measured that could be attributed to the INEEL were ^{60}Co and ^{137}Cs in some of the ducks and doves collected directly from contaminated waste ponds on the INEEL. No radionuclides in any other samples taken during the fourth quarter, 2000, could be directly linked with INEEL activities. Levels of detected radionuclides were below regulatory limits and not different from values measured at other locations across the United States. Concentrations of ^{60}Co and ^{137}Cs in ducks from TRA and ^{137}Cs in doves from both TRA and INTEC were higher than in samples taken from offsite locations, still, all concentrations were low such that it would take one person eating tens of thousands to over one million birds to approach regulatory dose limits. Concentrations in all of the samples collected and analyzed during the fourth quarter, 2000 were below guidelines set by both the DOE and the U.S. Environmental Protection Agency (EPA) for protection of the public.

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LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
ANL-W	Argonne National Laboratory- West
Bq	becquerel
CFA	Central Facilities Area
CMS	community monitoring station
Ci	curie
DCG	Derived Concentration Guide
DOE – ID	U.S. 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 Program	Environmental Surveillance, Education, and Research Program
g	gram
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISU	Idaho State University
L	liter
MDA	minimum detectable activity
MDC	minimum detectable concentration
mi	mile
mL	milliliter
mR	milliroentgens
mrem	millirem
µCi	microcurie
µSv	microseiverts
PM_{10}	particulate matter less than 10 micrometers in diameter
R	roentgen
rem	unit of dose equivalent (roentgen-equivalent-man)
s	standard deviation
SI	Systeme International d'Unites
Sv	seivert
TRA	Test Reactor Area
y	year

HELPFUL INFORMATION

Elements That Make Up Our World

Atoms make up everything in our world. The basic parts of an atom are protons, neutrons, and electrons (Figure 1). Different atoms may have different numbers of each of these parts. An element is a substance that is made up of only atoms with the same number of protons. Elements with different numbers of neutrons are referred to as isotopes of that element. Elements are sometimes expressed with the one- or two-letter chemical symbol for that element. The atomic weight, shown as a superscript number, is equal to the number of protons and neutrons in its nucleus and is used to identify the isotope of that element. Some isotopes of some elements are radioactive, including many naturally occurring elements. Radioactive isotopes, when taken as a whole for more than one element, are collectively referred to as radionuclides. All human-made radionuclides detected during this quarter are listed in this report. Common human-made radionuclides, along with their chemical symbol, are listed below.

Symbol		Radionuclide
^{3}H	-	Tritium
^{90}Sr	-	Strontium-90
^{131}I	-	Iodine-131
^{137}Cs	-	Cesium-137
^{238}Pu	-	Plutonium-238
$^{239/240}Pu$	-	Plutonium-239/240
^{241}Am	-	Americium-241

Helium Atom

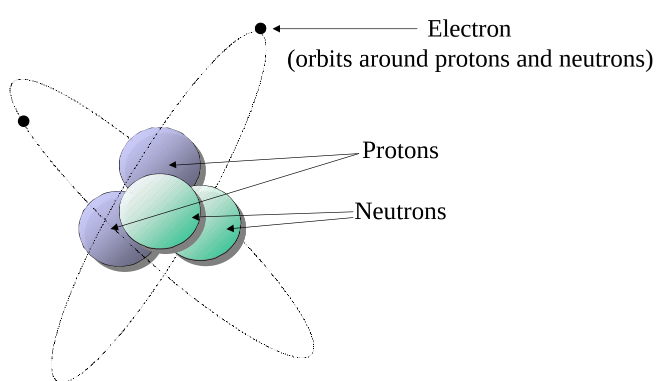


FIGURE 1. An atom of the element Helium. An element is a substance that is made up of only atoms with the same number of protons.

Radiation

Radioactive atoms are unstable and, in an effort to become stable, release energy. This release of energy comes from the release of particles or electromagnetic waves as the radioactive atom "decays," or "disintegrates." The three main types of radiation are alpha, beta, and gamma radiation (Figure 2). Alpha and beta are two types of particles emitted from an atom. Alpha particles consist of two protons and two neutrons (equal to the nucleus of a helium atom). Alpha particles do not travel very far (only centimeters in air) and are easily stopped. They will not penetrate paper or the outer layer of your skin so they are not an external hazard to the body. Internally, however, they are of more concern. Beta particles are electrons emitted from the nucleus of an atom. Beta particles can have enough energy to penetrate paper or skin but not materials like wood or plastic. Gamma rays are short-wavelength electromagnetic waves (photons) emitted from the nucleus of an atom following radioactive decay. Gamma ray radiation has a penetration ability greater than alpha or beta radiation. In fact, X-rays are the same as gamma radiation except they are produced from the orbital electrons of atoms rather than the nucleus. The rate at which a given amount of a particular radioactive isotope decays is measured by its half-life. The half-life is the time required for half of the amount present to decay.

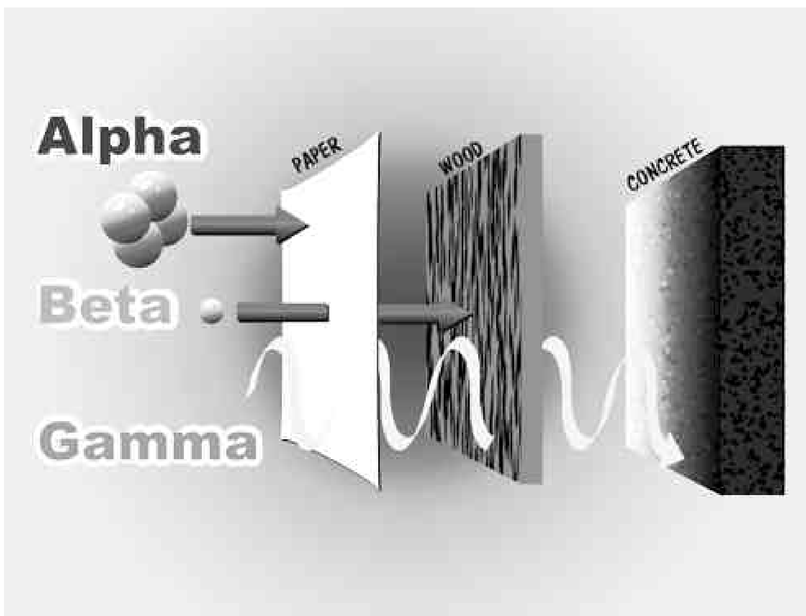


FIGURE 2. Three main types of radiation are alpha, beta, & gamma. Alpha and beta are particles emitted from an atom. Gamma radiation is short-wavelength electromagnetic waves (photons) emitted from atoms.

Units Used to Express the Amount of Radioactivity

Radioactivity is measured by the number of atoms that disintegrate per unit time. The conventional unit for activity is the curie (Ci). A curie is defined as the activity in one gram of naturally occurring Radium-226 and equals 37,000,000,000 disintegrations per second (Figure 3). The Systeme International d'Unites (SI) is the recognized international standard for describing measurable quantities and their units. The standard SI unit for radioactivity is the becquerel (Bq). A becquerel is equal to one disintegration per second (Figure 3).

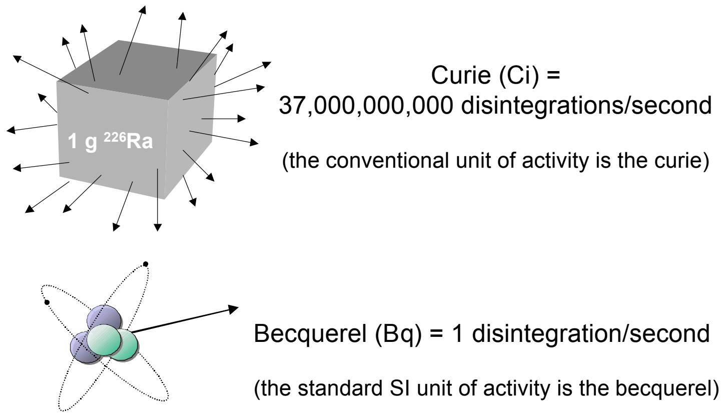


FIGURE 3. Units used to express the amount of radioactivity.

Radiation Exposure and Dose

The primary concern regarding radioactivity is the amount of energy deposited by particles or gamma radiation to the surrounding environment. It is possible that the energy from radiation may damage living tissue. When radiation interacts with the atoms of a given substance, it can alter the number of electrons associated with those atoms (usually removing orbital electrons). This is called ionization.

The term “exposure” is used to express the amount of ionization produced in air by electromagnetic (gamma and X-ray) radiation. The unit of exposure from gamma or X-ray radiation is the roentgen (R). The average exposure rate from natural radioactivity in southeast Idaho is about 0.130 R per year.

Radiation absorbed dose describes the amount of energy from ionizing radiation absorbed by any kind of matter. When absorbed dose is adjusted to account for the amount of biological damage a particular type of radiation causes, it is known as dose equivalent. The unit for dose equivalence is called the rem (“roentgen-equivalent-man”). The SI unit for dose equivalent is called the seivert (Sv). One seivert is equivalent to 100 rem.

Unit Prefixes

The range of numbers experienced in many scientific fields, like that of environmental monitoring for radioactivity, is huge and scientists commonly express units for very small and very large numbers as a prefix that modifies the unit of measure. One example is the prefix *kilo*, abbreviated k, which means 1,000 of a given unit. A kilometer is therefore equal to 1,000 meters. Prefixes used in this report include:

Prefix	Abbreviation	Meaning
Mega	M	1,000,000 (= 1×10^{6})
milli	m	0.001 (= 1×10^{-3})
micro	μ	0.000001 (1×10^{-6})
pico	p	0.000000000001 (= 1×10^{-12})

Scientific Notation

Scientific notation is used to express numbers, which are very small or very large. A very small number will be expressed with a negative exponent, e.g., 1.2×10^{-6}. To convert this number to the more commonly used form, the decimal point must be moved left by the number of places equal to the exponent (in this case, six). Thus the number 1.2×10^{-6} is equal to 0.0000012. A large number will be expressed with a positive exponent, e.g. 1.2×10^{6}. To convert this number, the decimal point must be moved right by the number of places equal to the exponent. For example, the number 1.2×10^{6} is equal to 1,200,000.

Concentrations of Radioactivity

The amount of radioactivity in a substance is described by its concentration. The concentration is the amount of radioactivity per unit volume or weight of that substance. Air, milk, and atmospheric moisture samples are expressed as activity per milliliter (mL). Concentrations in surface water, drinking water, and precipitation samples are expressed as activity per liter (L). Radioactivity in foodstuff and soil are expressed as activity per gram (g). Exposure, as measured by environmental dosimeters, is expressed in units of milliroentgens (mR). This is sometimes expressed in terms of dose as millirem (mrem) or microseiverts (µSv).

Gross versus Specific Analyses

Some analyses are designed to detect specific radionuclides (specific analyses) while other analyses are designed to measure radiation from a large number of sources (gross analyses). Gamma emitting radionuclides are determined by a specific analyses technique called gamma spectroscopy. Analyses for specific alpha and beta emitting radionuclides, on the other hand, require more difficult and expensive radiochemical analyses. Low cost, but very sensitive, gross measurements are often substituted for the more expensive specific analyses as a screening procedure. The gross analyses are generally made first to determine the total amount of radioactivity that is present. The more expensive specific analyses for beta and alpha emitting radionuclides are only made if the gross measurements are above background levels. When gross beta or gross alpha measurements are made, it simply means all beta activity or all alpha activity is measured. There is no distinction between which beta emitting or alpha emitting radionuclides are present, just how much beta or alpha activity is present. Gross measurements are used as a method to screen samples for relative levels of radioactivity.

Detecting Radioactivity

All measurements have uncertainties. Uncertainty arises from variations in detection equipment and analysis procedures, natural background radiation, the random nature of radioactive decay, variances in the distribution of the compound targeted for analysis in the media being analyzed, and other sources. The analysis uncertainty is reported with radioactive analyses. This uncertainty exists because individual radioactive atoms disintegrate in a random way, both in location throughout a substance and direction particles or gamma rays are emitted. That is to say not all of the particles/energy released strike the detector. If the number of radioactive disintegrations from one sample is counted multiple times, each for the same duration, that number will vary around some average value. Background radiation makes this true even for a sample that has no radioactivity. If a sample containing no radioactivity was analyzed multiple times, the net result should vary around an average of zero (Figure 4). Therefore, samples with radioactivity levels very close to zero will have results that are negative values approximately 50% of the time. In order to avoid censoring data, these negative values, rather than “not detectable” or “zero,” are reported for radionuclides of interest. This provides more information than merely truncating to the detection limits for results near background activities and allows for improved statistical analyses and measures of trends in the data.

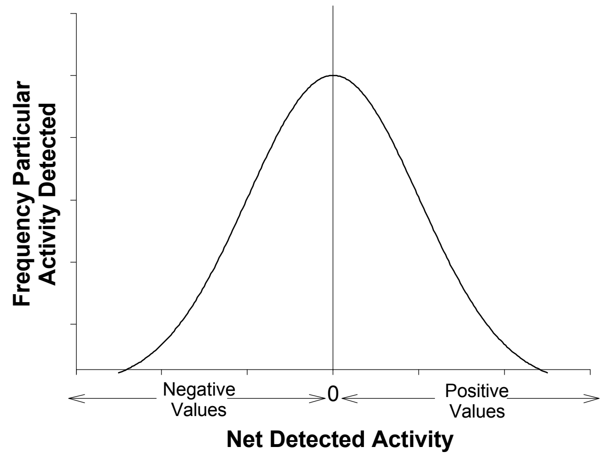


FIGURE 4. **Expected frequency distribution for a sample with no radioactivity. If a sample containing no radioactivity was analyzed multiple times, a distribution of net values with an average of zero would result. Samples with radioactivity levels very close to zero are expected to have net results that are negative values approximately 50% of the time after background is subtracted.**

Confidence in Detections

There are two main types of errors that may be made when reporting levels of contaminants:

- reporting something as not present when it actually is, and;
- reporting something as present when it actually is not.

One goal of the ESER program is to minimize the error of saying something is not present when it actually is. To do this, a two standard deviation (2s) reporting level is used. The standard deviation is a measurement of the variation from the mean. In a distribution of results for one sample, the average result, plus or minus (±) two standard deviations (2s) of that average, approximates the 95% confidence interval for that average. When a net sample result is greater than 2s from zero, we have about 95% confidence[1] the value came from a distribution with an average greater than zero (Figure 5). The uncertainty of measurements in this report are denoted by following the result with a "±" 2s uncertainty term and all results that are greater than 2s from zero are reported in the text (all data are reported in Appendix C).

By using a 2s value as a reporting level (i.e. reporting net results that are greater than two times their uncertainty), we are controlling the error rate for saying something is not there when it is, to less than 5% (we have 95% confidence the value is greater than zero). However, there is a relatively high error rate for false detections (reporting something as present when it actually is not) for results near their 2s uncertainty. This is because there is variability around a net activity of zero for samples with no radioactivity, which may substantially overlap the variability around the sample result (Figure 5). Variability associated with current analysis techniques

[1] 95% confidence interval is equal to 1.96s.

were used to calculate the level at which we are 95% certain the sample result is greater than the distribution of values for a sample with no radioactivity. This level is known as the minimum detectable activity (MDA). When sample net results are greater than the MDA, (Figure 6) we have 95% confidence the results are not false detections. The MDA per sample weight or volume is called the minimum detectable concentration (MDC). All results with measured levels greater than the MDC will be specifically highlighted in this report.

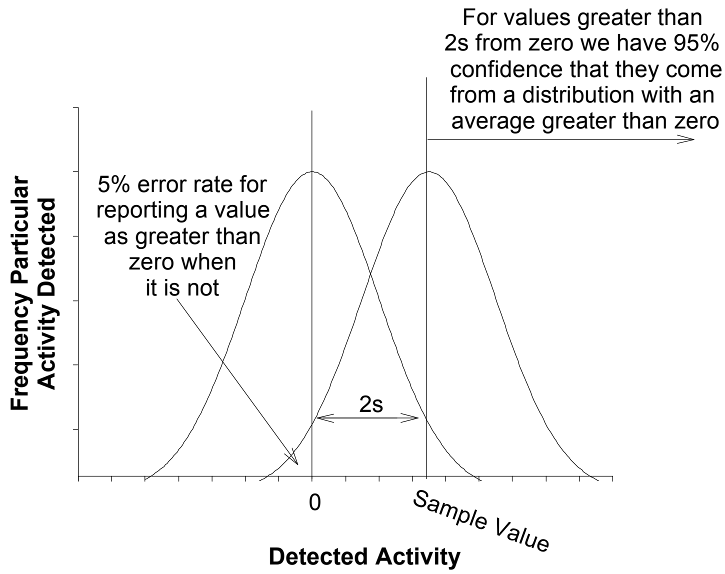


FIGURE 5. Radioactivity is reported when the result is greater than 2s from a net activity of zero. However, because there is variability around a net activity of zero for a sample with no radioactivity and variability around some value for a sample with radioactivity, there is a high rate for false detections for results near 2s.

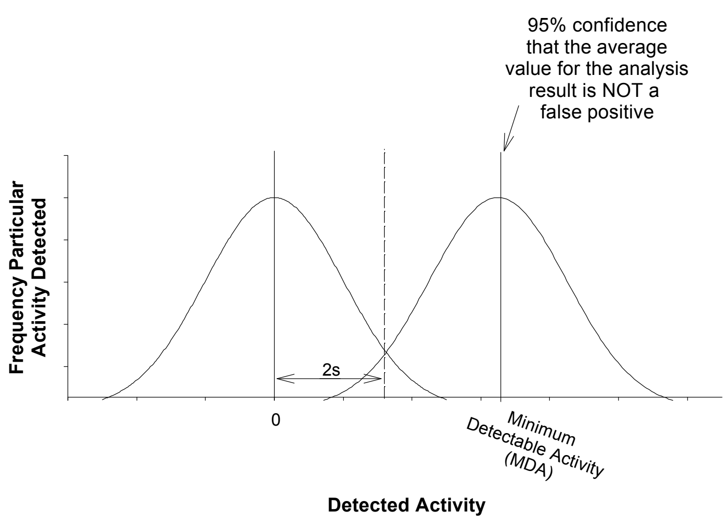


FIGURE 6. 95% confidence level that a sample result is not a false positive (95% confidence the sample result is greater than 2s from zero) is obtained when the sample result is greater than the MDA.

Determining Statistical Differences

When radiological measurements are made, it is often of interest to determine whether concentrations are different between locations or periods of time. For example, if the INEEL were a significant source of offsite contamination, concentrations of contaminants would be higher at INEEL locations compared to Boundary locations, which, in turn, would be higher than Distant locations due to dispersal. To investigate this, statistical tests are used. Specifically, an independent samples t-test is used to determine if there are significant differences between the average gross alpha and gross beta concentrations at INEEL, Boundary, and Distant locations. Groups are considered significantly different if the 95% confidence interval for their averages overlap (t-test with $\alpha = 0.05$).

Radioactivity In Our World

Radiation has always been a part of the natural environment. Sources include cosmic radiation, cosmogenic radionuclides [carbon-14 (^{14}C), Beryllium-7 (^{7}Be), and tritium (^{3}H)], and naturally occurring radionuclides, such as potassium-40 (^{40}K), and the thorium, uranium, and actinium series radionuclides which have very long half lives. Additionally, human-made radionuclides were distributed throughout the world beginning in the early 1940s. Atmospheric testing of nuclear weapons from 1945 through 1980 and nuclear power plant accidents, such as the Chernobyl accident in the former Soviet Union during 1986, have resulted in fallout of detectable radionuclides around the world. This natural and global fallout radioactivity is referred to as background radiation.

The radionuclides present in our environment can give both internal and external doses (Table 1). Internal dose is received as a result of the intake of radionuclides. The major routes of intake of radionuclides for members of the public are ingestion and inhalation. Ingestion includes the intake of radionuclides from the consumption of milk, water, and food products. Radionuclide intake by inhalation consists of breathing dust particles containing radioactive materials.

Air samples are taken at 15 locations on and around the INEEL; surface water at 4 locations on the Snake River; drinking water at 14 locations around the INEEL; foodstuff which includes milk at 9 dairies around the INEEL, potatoes from at least 5 local producers, wheat from 11 local producers, lettuce from 8 home-owned gardens around the INEEL, sheep from 2 operators which graze their sheep on the INEEL, and various numbers of wildlife (game animals) which include big game (pronghorn, mule deer, and elk), waterfowl, and fish sampled on and near the INEEL. Table A-1 in Appendix A lists samples, sampling locations and collection frequency for the ESER Program.

Regulatory Limits

During the last 100 years, research has been conducted in an attempt to understand the effects of radiation on humans and the environment. Much of this research was done using standard epidemiological and toxicological approaches to characterize the response of populations and individuals to high radiation doses. A good understanding of risks associated with high radiation doses was achieved. At low exposures to radiation, however, cells heal, so the risks from these levels are less known. This problem is compounded because scientists are searching for effects from exposure to low levels of radiation in the midst of exposures to much larger amounts of natural radiation. The only measurable increased cancer incidence has occurred following high radiation doses. Mathematical models have been used to predict risks from low radiation doses. Regulatory dose limits are set well below levels where measurable health effects have been observed. The total radiation dose limit for individual members of the public as defined by the Code of Federal Regulations (10 CFR 20.1301) is 1 mSv/y (100 mrem/y), not including the dose contribution from background radiation. Limits on emissions of radionuclides to the air from DOE facilities are set such that they will not result in a dose greater than 0.1 mSv/y (10 mrem/y) to any member of the public (40 CFR 61.92). DOE drinking water criterion have set limits of 0.04 mSv/y (4 mrem/y) for the ingestion of drinking water (DOE Order 5400.5,), and EPA limits on drinking water supplies specify low allowable limits for radioactive constituents (40 CFR Parts 9, 141, and 142). DOE Order 5400.5 lists Derived Concentration Guide (DCG) values which are the concentrations in air and water that a person exposed to continuously (ingested and inhaled given certain assumptions) will result in the dose limit. DCG values are used as a reference to ensure dose limits are not exceeded. ESER Program laboratories analyze for radionuclides at levels ranging from 10 to over one million times lower than those that would result in a dose near the limits (Table B-1, Appendix B).

TABLE 1. Annual estimated average dose received by a member of the population of the United States from natural radiation sources. (data source NCRP 1987)[a].

	Average Annual Effective Dose Equivalent	
SOURCE	**(mSv)[b]**	**(mrem)[c]**
Inhaled (Radon and Decay Products)	2	200
Other Internally Deposited Radionuclides	0.39	39
Terrestrial Radiation	0.28	28
Cosmic Radiation	0.27	27
Cosmogenic Radioactivity	.01	1
Rounded Total From Natural Sources	3	300

[a] Natural radiation doses vary based on local geology and elevation.
[b] milliseiverts
[c] millirem

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, Clean Water Act, and the Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include monitoring the effects of DOE activities onsite and offsite of the INEEL (DOE Order 5400.1). During calendar year 2000, environmental monitoring within the INEEL boundaries was primarily the responsibility of the INEEL Management and Operating (M&O) contractor, while the program for monitoring outside the INEEL boundaries was conducted under the Environmental Surveillance, Education, and Research (ESER) Program by an independent contractor. Samples for the first portion of the year 2000 were collected by the Environmental Science and Research Foundation (Idaho Falls, ID) that formerly held the ESER contract. This report was prepared by the new ESER Team (assuming responsibilities of the ESER program in November, 2000) lead by the S.M. Stoller Corporation. The team includes North Wind Environmental, Montgomery-Watson Harza for technical support, the University of Idaho and Washington State University for research assistance, and Idaho State University (ISU) for analytical services. This report contains the monitoring results from the ESER Program for the fourth quarter of 2000.

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

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

The INEEL ESER Program's primary responsibility is to monitor a number of different pathways by which pollutants from the INEEL could reach members of the public. The Surveillance Program focuses on constituents of primary concern, which are radioactive isotopes. The goal of the surveillance program is to monitor several different media points within these potential pathways, including air, water, foodstuff, and soil, that could potentially contribute to the dose received by the public. A comprehensive list of the annual sample collection schedule is presented in Appendix A.

Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data and preparing quarterly reports on results from the environmental surveillance program. The quarterly reports for each calendar year are combined with environmental monitoring and surveillance data collected by the Management and Operating contractor (Bechtel, BWXT Idaho, LLC) to produce the *INEEL Annual Site*

Environmental Report for each calendar year. Annual reports also include data collected by other INEEL contractors.

The ESER Program used several different laboratories to perform analyses on environmental samples for the quarter reported here. The ISU Environmental Assessment Laboratory (EAL) performed routine gross alpha, gross beta, tritium, and gamma spectrometry analyses. Analyses requiring radiochemistry, including ^{90}Sr , ^{238}Pu, $^{239/240}Pu$, and ^{241}Am are performed under contract with Severn-Trent, Inc. The Operational Dosimetry unit of the INEEL M&O contractor evaluates environmental dosimeters. Samples collected by the ESER Program on behalf of the EPA are sent to the EPA's Eastern Environmental Radiation Facility.

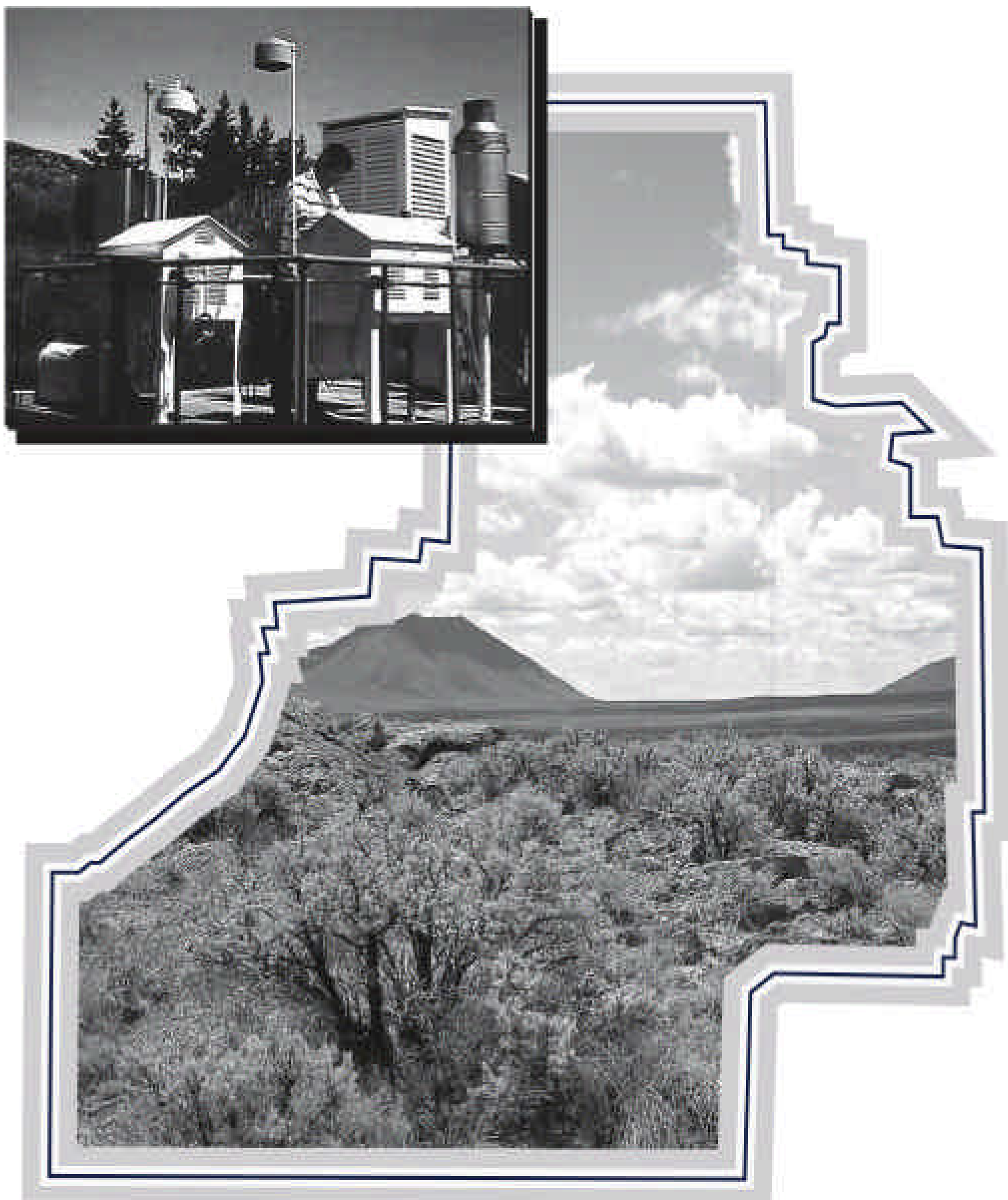
In the event of non-routine occurrences, such as suspected releases of radioactive material, the ESER Program may increase either the frequency of sampling or the number of sampling locations based on the nature of the release and wind distribution patterns. In the event of any suspected worldwide nuclear incidents, like the Chernobyl accident, the EPA may request additional sampling be performed through the Environmental Radiation Ambient Monitoring System (ERAMS) network of which the ESER Program operates air and precipitation sampling equipment in Idaho Falls. 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. Any data found to be outside historical norms in the ESER Program are thoroughly investigated to determine if an INEEL origin is likely. Investigation may include re-sampling and/or re-analysis of prior samples.

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

2. THE INEEL

The Idaho National Engineering and Environmental Laboratory (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 2,300 km^2 (890 mi^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 just two such installations in the U.S., retooled large guns from U.S. Navy ships. The facility tested the retooled guns on the nearby-uninhabited plain, known as the Naval Proving Ground. In the aftermath of the 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 first to produce useful electricity. The facility evolved into an assembly of 52 reactors, associated research centers, and waste handling areas. The NRTS was renamed the Idaho National Engineering Laboratory in 1974 and INEEL in January 1997. Only two reactors are operable today with most activities on the INEEL centered on environmental restoration and waste management activities.



3. AIR SAMPLING

Surface water does not flow from the INEEL so the primary pathway by which radionuclides can move off-site is through the air. Consequently, air is a primary focus of monitoring on and around the INEEL. Particulates and ^{131}I in air are measured at 15 locations, three on the INEEL with the rest at Boundary and Distant locations, using low-volume air samplers. Moisture in the atmosphere is sampled at four locations around the INEEL and analyzed for tritium. All air and atmospheric moisture samples are analyzed by gamma spectrometry for any gamma emitting radionuclides. Because of its prevalence in the environment primarily due to atmospheric nuclear testing and recent nuclear accidents (i.e., Chernobyl) cesium-137 is the most commonly measured human-made radionuclide in samples. Other radionuclides are reported when they are found (measured). Concentrations of particulates in the air are measured using PM_{10} samplers at three locations. Air sampling activities and results for the fourth quarter, 2000 are discussed below.

3.1 Low-Volume Air Sampling

Radioactivity associated with airborne particulates was monitored continuously by 17 ESER Program air samplers at 15 locations during the fourth quarter of 2000 (Figure 7). Three of these samplers were located on the INEEL, seven were located off the INEEL near the boundary, and five were at locations distant to the INEEL. Samplers are divided into INEEL, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INEEL. One replicate sampler was placed at an FAA Tower (Boundary location) and one at Monteview (Boundary location) during 2000. An average of 17,853 ft^3 (506 m^3) of air was sampled at each location, each week, at an average flow rate of 1.8 ft^3/min (0.05 m^3/min). Particulates in air were collected on filters (1.2-μm pore size), while gases were pulled through activated charcoal cartridges.

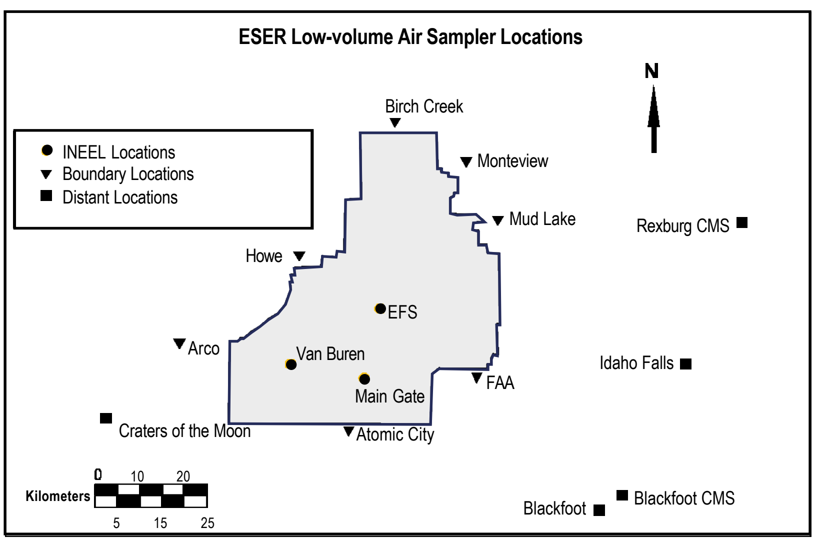


FIGURE 7. Locations of continuously run air samplers.

Filters and charcoal cartridges were changed weekly at each station. Each filter was screened 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. For more information concerning gross alpha and beta radioactivity, see the *Gross versus Specific Analyses* portion of the *Helpful Information* section of this report. Charcoal cartridges were analyzed for gamma-emitting radionuclides, specifically ^{131}I. Iodine-131 is of great interest because it is produced in relatively large quantities by nuclear fission, is readily concentrated in human thyroids, and has a half-life of only eight days. This means any ^{131}I that is detected would be from a recent release of fission products. Finally, a composite of the 13 filters, one for each week of the quarter, for each location was analyzed for gamma emitting radionuclides with a subset analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am.

Weekly average gross alpha concentrations in air for INEEL, Boundary, and Distant locations are shown in Figure 8. At no time during the fourth quarter were INEEL location weekly average gross alpha concentrations significantly higher than corresponding averages for either Boundary or Distant locations (using independent samples T-tests and $\alpha = 0.05$).

Weekly average gross beta concentrations are shown in Figure 9. During two weeks, those ending November 1, 2000 and December 27, 2000, the average gross beta concentration for INEEL locations were significantly higher than the corresponding Distant location average. Overall, there was great variation in whether concentrations were higher at INEEL, Boundary, or Distant locations for both gross alpha and gross beta concentrations (Figure 8 and Figure 9). There were no trends over time of INEEL being higher than Boundary, being higher than Distant locations, as one would expect if the INEEL was the source of radionuclide contamination. A summary of approximate minimum detectable concentrations for radiological analyses is provided in Appendix B, and gross alpha and gross beta results for individual filters are listed in Table C-1 of Appendix C.

Monthly average gross alpha and beta concentrations in air at each sampling location are shown in Figures 10 – 15. No ^{131}I was detected in any of the weekly charcoal cartridges during the fourth quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

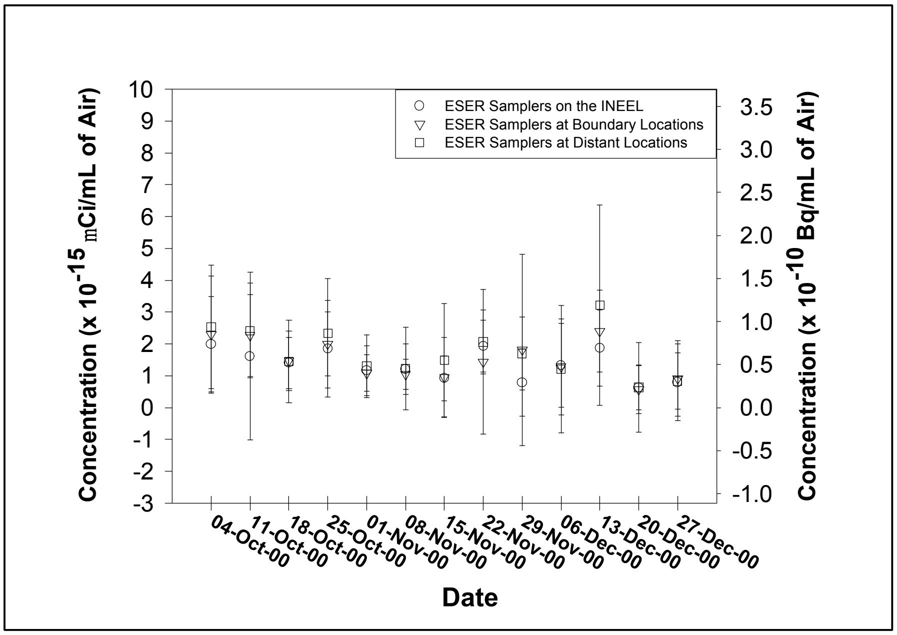


FIGURE 8. Weekly average gross alpha concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Error bars equal ± 2s.

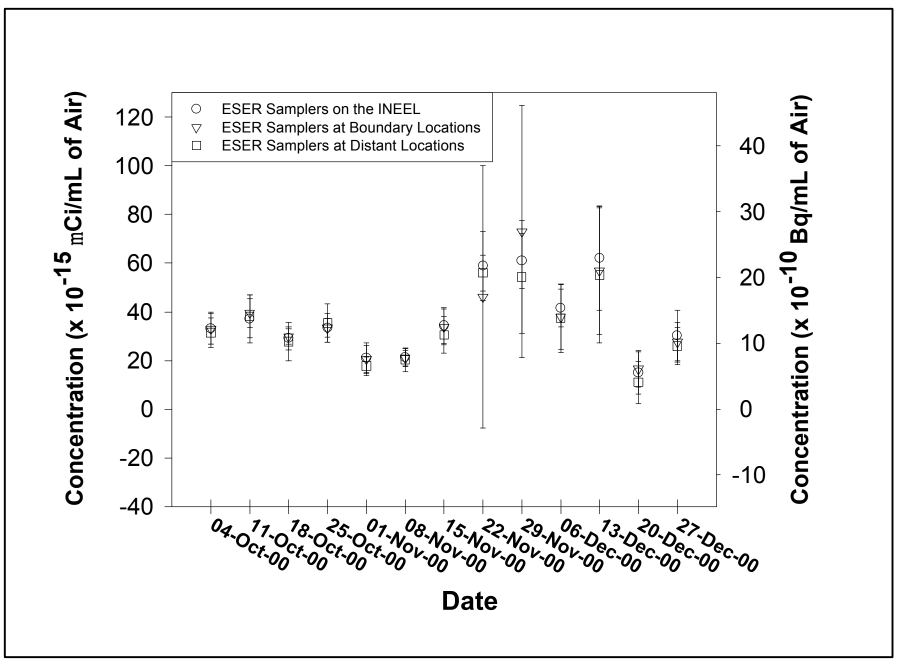


FIGURE 9. Weekly average gross beta concentrations in air at ESER Program INEEL, Boundary, and Distant locations. Error bars equal ± 2s.

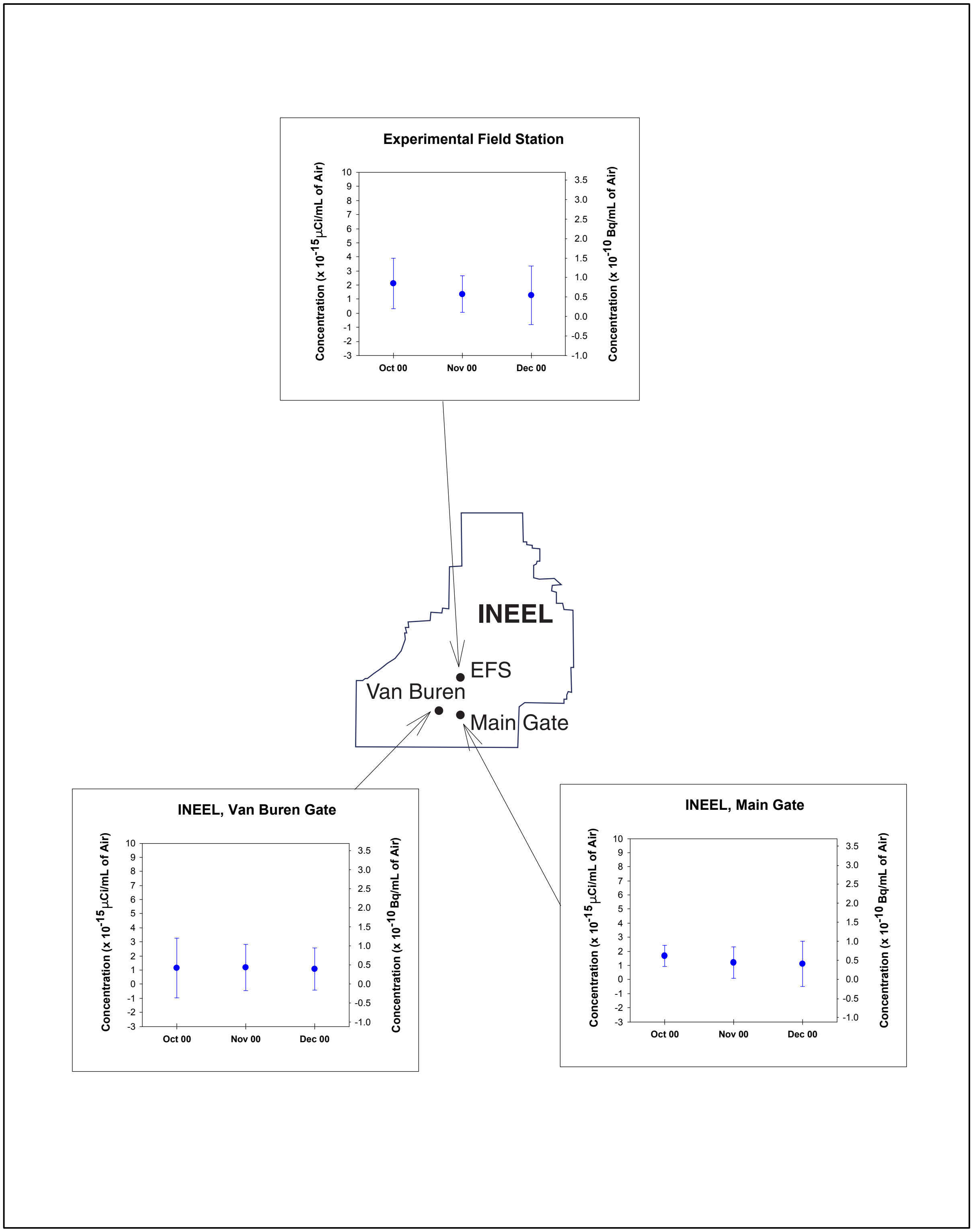


FIGURE 10. Monthly average gross alpha concentrations in air at ESER Program INEEL Locations.

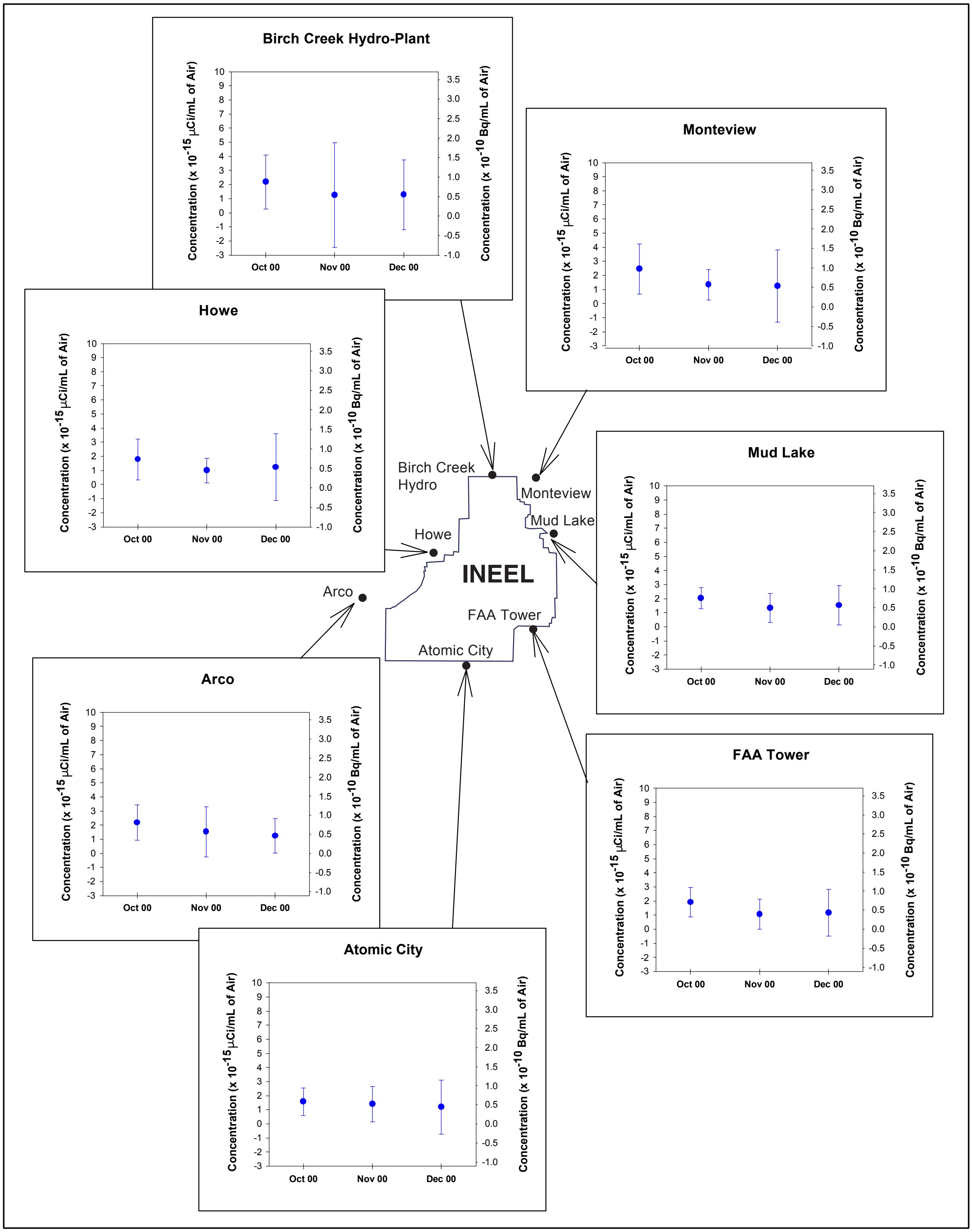


FIGURE 11. Monthly average gross alpha concentrations in air at ESER Program Boundary locations.

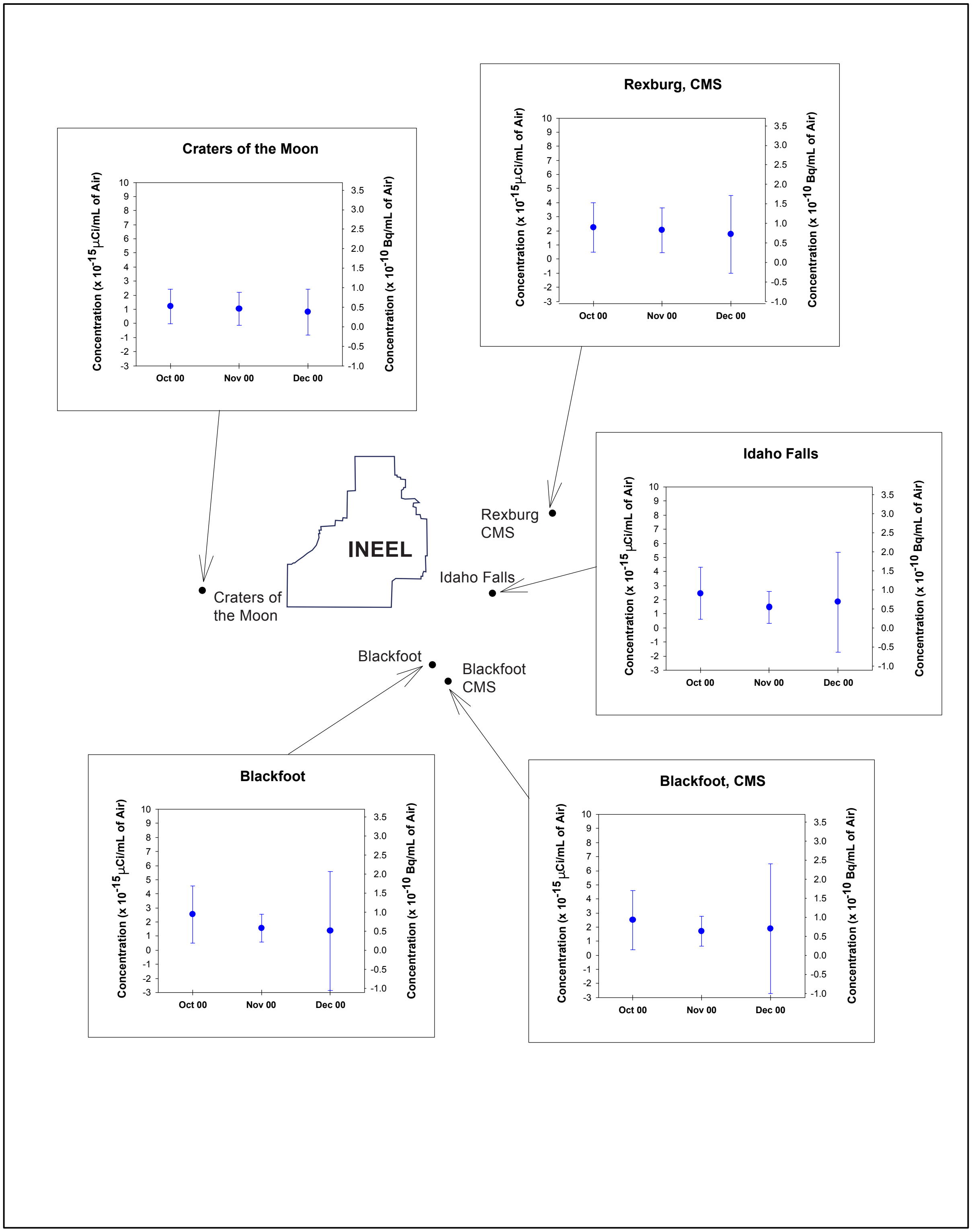


FIGURE 12. Monthly gross alpha concentrations in air at ESER Program Distant locations.

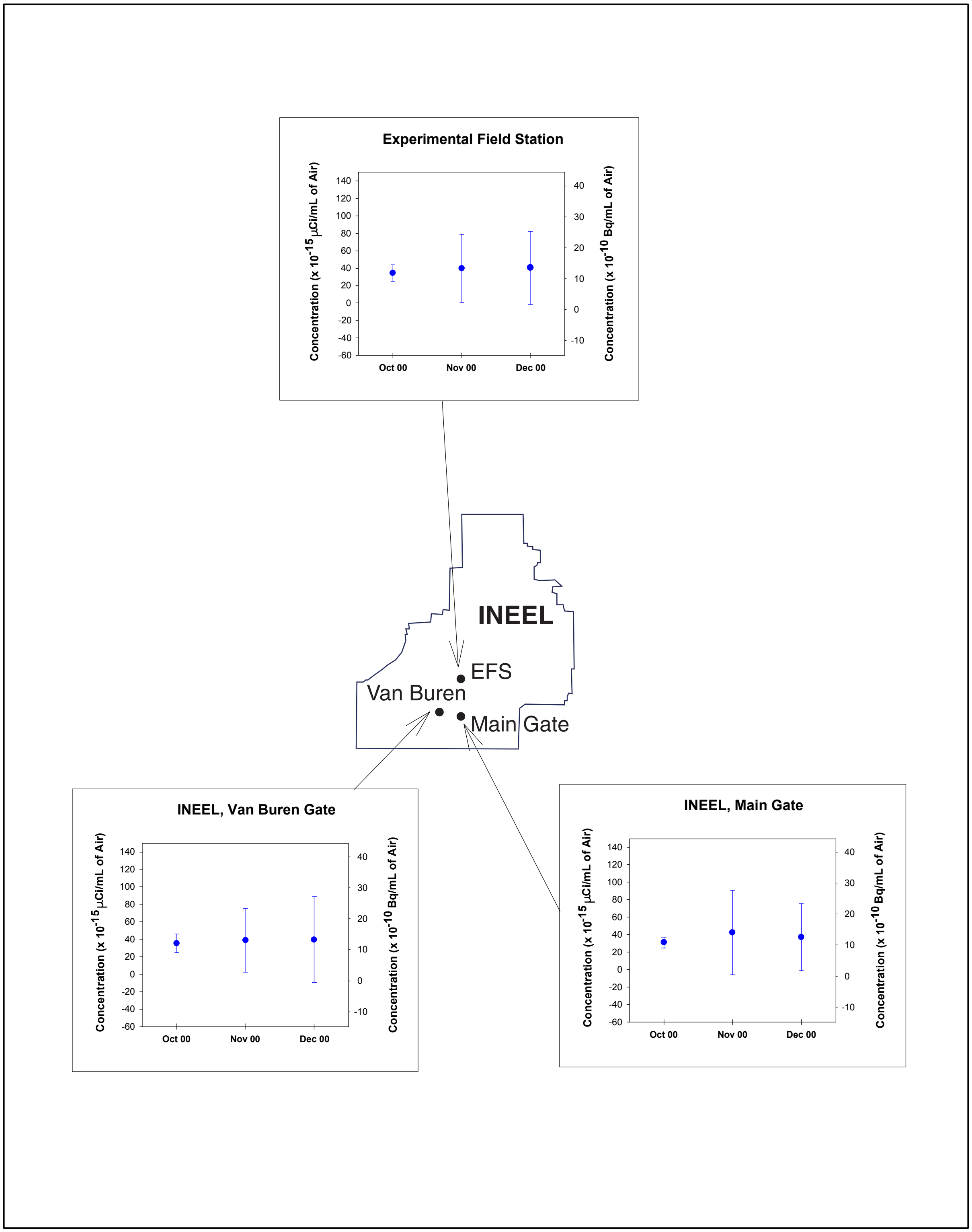


FIGURE 13. Monthly average gross beta concentrations in air at ESER Program INEEL locations.

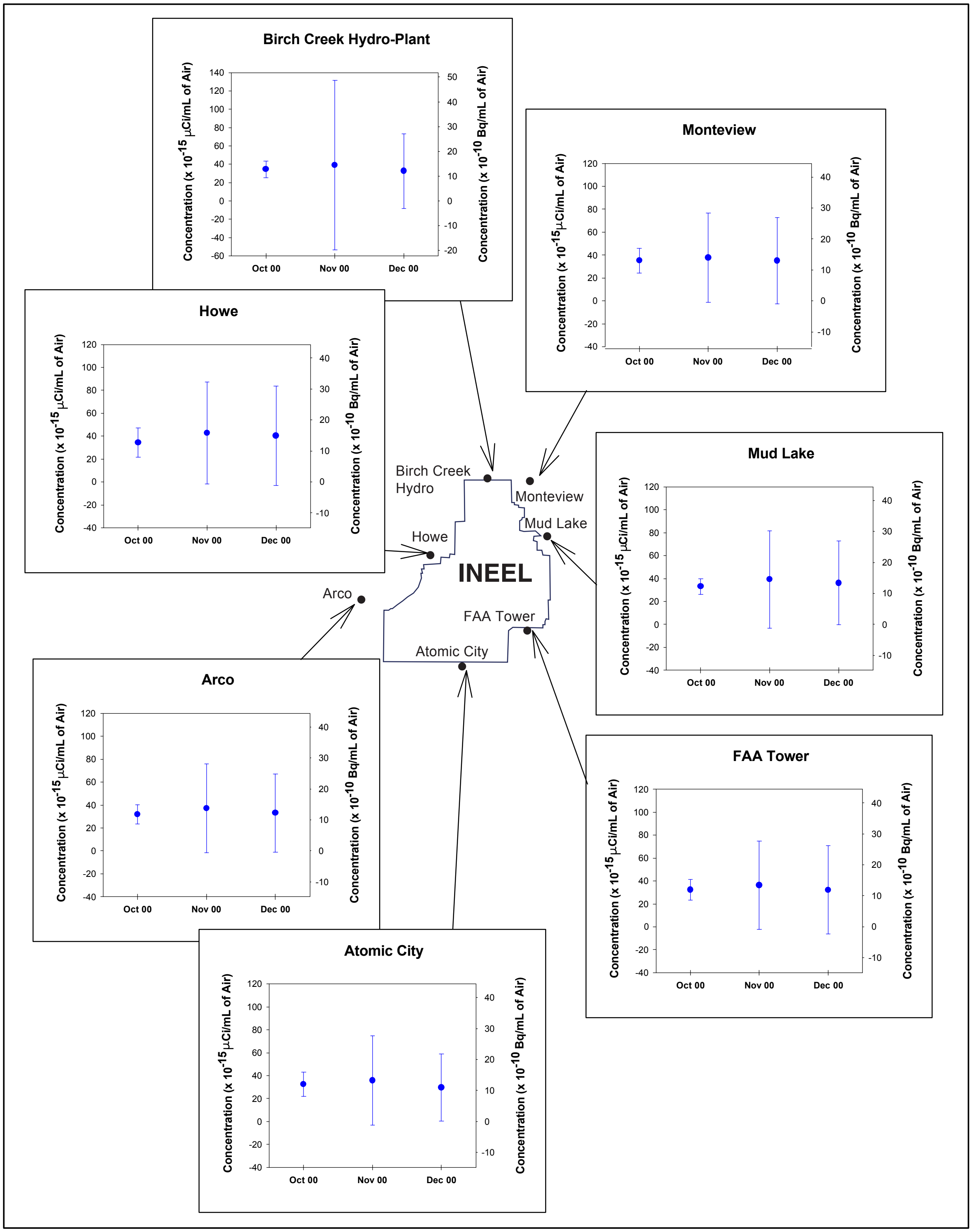


FIGURE 14. Monthly average gross beta concentrations in air at ESER Program Boundary locations.

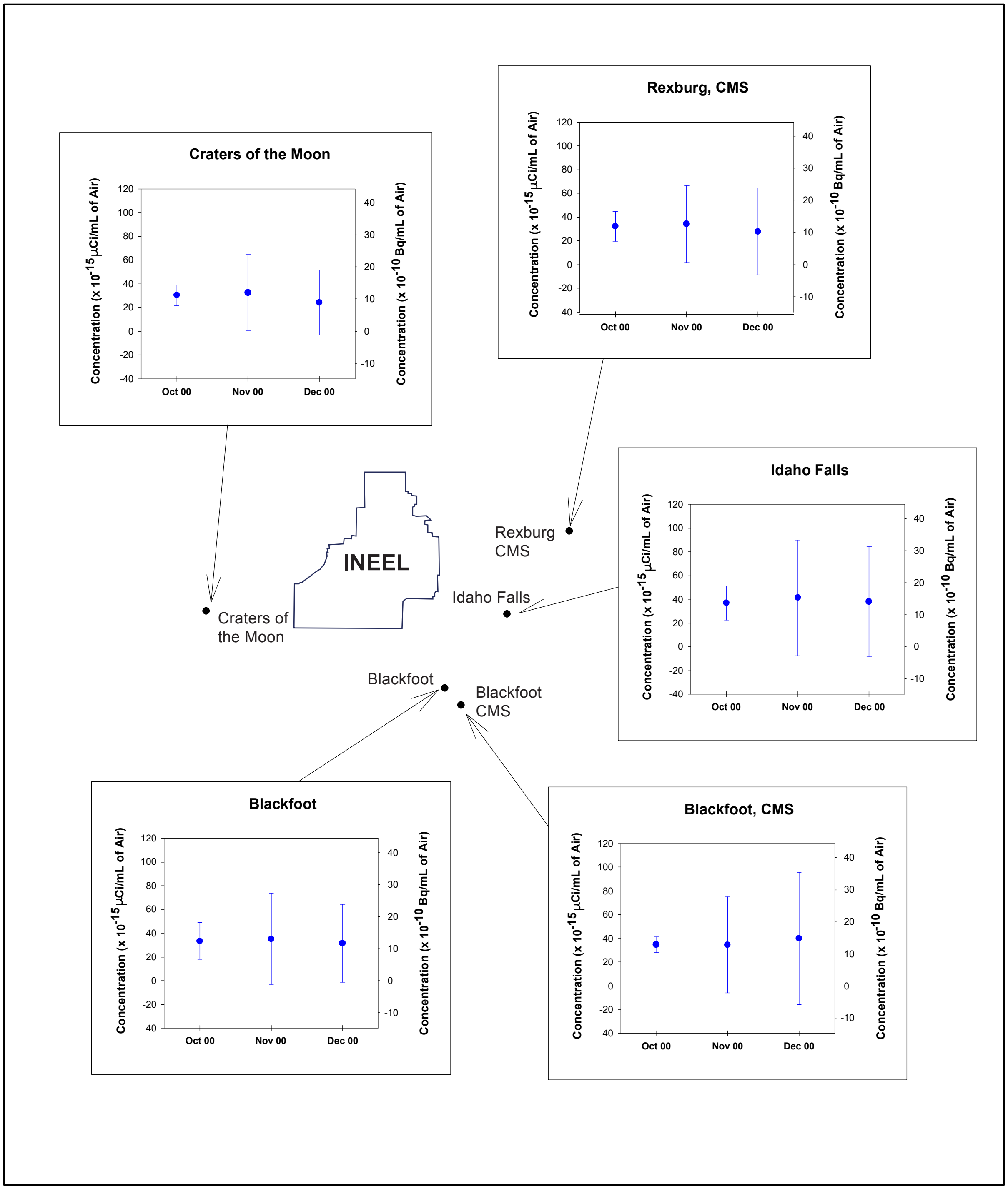


FIGURE 15. Monthly average gross beta concentrations in air at ESER Program Distant locations.

Selected quarterly composite filter samples were analyzed for gamma emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. No human-made radionuclide was detected in any sample. All results for composite filter samples are shown in Table C-3, Appendix C.

3.2 Atmospheric Moisture Sampling

Eight atmospheric moisture samples were obtained during the fourth quarter of 2000; two each from Rexburg, Blackfoot, Idaho Falls, and Atomic City. Atmospheric moisture was collected by pulling air through a column of silica gel to absorb water vapor. The water was then extracted from the silica gel by heat distillation. The resulting atmospheric moisture samples were then analyzed for tritium using liquid scintillation.

Two samples, one each from Idaho Falls and Mountain View Middle School in Blackfoot exceeded their 2s uncertainty. Results were $2.65 \pm 0.92 \times 10^{-13}$ µCi/ml of air ($9.79 \pm 3.39 \times 10^{-9}$ Bq/ml) and $1.69 \pm 1.02 \times 10^{-13}$ µCi/ml of air ($6.24 \pm 3.78 \times 10^{-9}$ Bq/ml), respectively. These results were both less than the MDC (Table B-1, Appendix B) and over 300,000 times lower than the Derived Concentration Guide (DCG) value of 1×10^{-7} µCi/mL (3.7×10^{-3} Bq/mL) for tritium in air. Tritium results for all atmospheric moisture samples are listed in Appendix C, Table C-4.

3.3 PM_{10} Air Sampling

The EPA began using a standard for concentrations of airborne particulate matter (PM) less than 10 micrometers in diameter in 1987 (40 CFR 50.6). Particles of this size can reach deeply 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 fine particulates, generally referred to as PM_{10}, 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 Community Monitoring Stations (CMS) in Rexburg, and Blackfoot, and one in Atomic City. Sampling of PM_{10} is informational as no analyses are conducted for contaminants. Twenty-four hour sampling periods were scheduled to run once every six days. Equipment problems nullified samples for October 20 and 26 in Atomic City, and filter problems nullified the sample for October 20 from Blackfoot and the October 26 sample from Rexburg. A total of 15 samples each were collected from Blackfoot and Rexburg with a total of 14 collected from Atomic City. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour concentration was 112 µg/m^3 on December 7, 2000, in Rexburg. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

4. WATER SAMPLING

Water that is sampled by the ESER program includes precipitation, surface water, and drinking water. Monthly composite precipitation samples are collected from Idaho Falls and the Central Facilities Area (CFA) at 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 18 locations around the INEEL (Figure 16). This occurs during the second and fourth quarters. All water samples are analyzed by gamma spectrometry for any gamma emitting radionuclides. Because of its prevalence in the environment, primarily due to atmospheric nuclear testing and recent nuclear accidents (i.e., Chernobyl) cesium-137 is the most commonly measured radionuclide in samples. Other radionuclides are reported when they are found.

4.1 Precipitation Sampling

Monthly composite precipitation samples were collected from Idaho Falls and the Central Facilities Area (CFA) on the INEEL. There was enough (~10 mL, minimum) precipitation collected during four weeks of the quarter for weekly samples from the Experimental Field Station (EFS).

All three of the monthly precipitation samples from CFA, the December sample from Idaho Falls, and samples from EFS for the weeks ending October 17 and October 31 had tritium results exceeding their respective 2s uncertainties. The December sample from Idaho Falls had a tritium result of 129 ± 64 pCi/L (4.8 ± 2.4 Bq/L). Monthly samples from CFA ranged from 83 ± 82 pCi/L (3.1 ± 3.0 Bq/L) in the November sample to 285 ± 85 pCi/L (10.5 ± 3.2 Bq/L) in the October sample. EFS samples for the weeks ending October 17 and October 31 had tritium results of 84 ± 82 pCi/L (3.1 ± 3.0 Bq/L) and 154 ± 83 pCi/L (5.7 ± 3.1 Bq/L), respectively.

There is no DCG for precipitation, but in drinking water it is 80,000 pCi/L (2,960 Bq/L). The Safe Drinking Water Act sets a limit of 20,000 pCi/L (740 Bq/L) for tritium. The levels of tritium measured in the fourth quarter precipitation samples were at least 280 times lower than the DCG value and 70 times lower than the Safe Drinking Water Act Limits.

Due to cosmic ray reactions in the upper atmosphere, low levels of tritium exist in the environment at all times. Tritium measured in fourth quarter ESER samples were within the range of values measured elsewhere. The EPA's Environmental Radiation Ambient Monitoring System (ERAMS) program collects precipitation samples from across the United States. From October 1996 through September 1997 tritium measured in those samples ranged from -95 to 301 pCi/L (-3.5 to 11 Bq/L) (EPA 1996, EPA 1997a, EPA 1997b, EPA 1997c). Data for all precipitation samples collected by the ESER Program, fourth quarter, 2000, are listed in Table C-6 (Appendix C).

4.2 Drinking Water Sampling

A drinking water sample was collected from tap water at each of thirteen locations throughout southeast Idaho (Figure 16). One duplicate drinking water sample was also collected from the Mud Lake sampling location. All samples were analyzed for gross alpha, gross beta, and tritium (^3H).

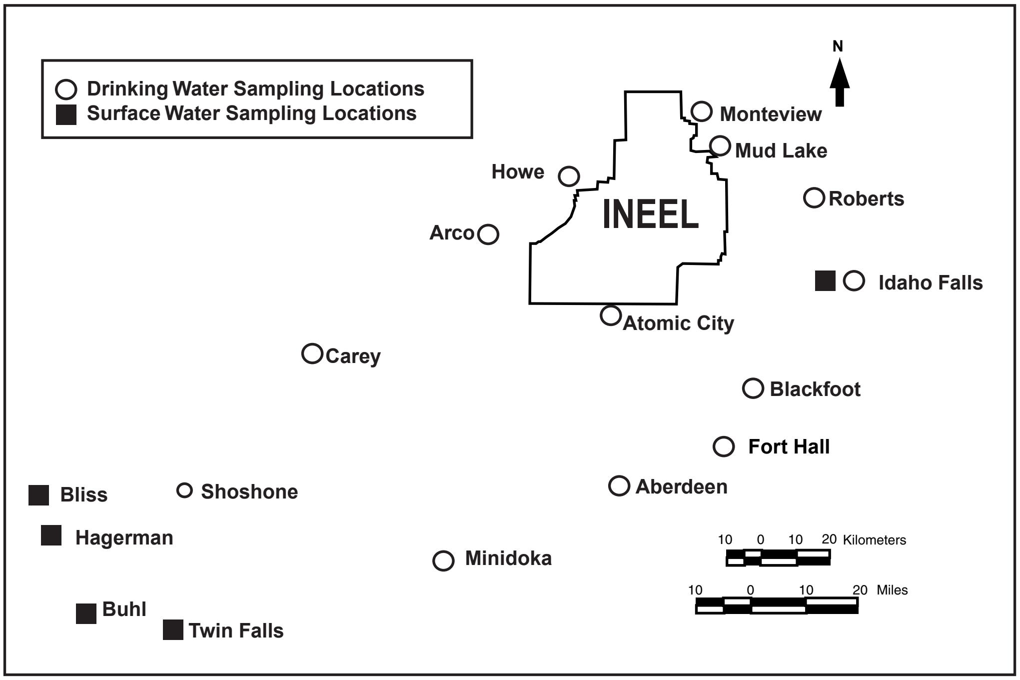


FIGURE 16. Drinking and surface water sample locations.

Only the Monteview drinking water sample had a gross alpha result greater than its 2s value. Of all drinking water samples, 69 % had gross beta results greater than their associated 2s values. The DCG values for gross alpha and gross beta in water are 30 and 100 pCi/L, respectively. The EPA limits for gross alpha and gross beta in water are 15 and 50 pCi/L, respectively (Safe Drinking Water Act, 40 CFR 141). The gross alpha concentration in the drinking water from Monteview (3.1 ± 1.9 pCi/L, or 0.11 ± 0.07 Bq/L) was about ten times lower than the DCG value and about five times lower than the EPA limit. Gross beta concentrations in fourth quarter drinking water samples were also at least ten times lower than the DCG value and five times lower than the Safe Drinking Water Act limit. Gross alpha and beta concentrations measured in fourth quarter drinking water samples were within the range observed in the past. Gross alpha and beta are a measure of the total alpha, and beta emitting radionuclides that are present in the sample. The majority of gross alpha and beta activity in water are primarily from naturally occurring uranium, thorium, radium, and their decay products. Gross alpha and beta concentrations were not higher at locations “down stream” from the INEEL, so there is, no evidence of INEEL contributions to gross alpha or beta concentrations.

Tritium analyses showed one drinking water sample, from Shoshone, had a tritium result greater than its 2s value (161 ± 73 pCi/L, or 6.0 ± 2.7 Bq/L). No other sample had a tritium result greater than its associated 2s value and the Shoshone sample result was less than the minimum detectable concentration (MDC) of 200 pCi/L, or 7.4 Bq/L, for the detector used (see *Confidence in Detections* in the *Helpful Information* section). The DCG value for tritium in drinking water is 80,000 pCi/L (2,960 Bq/L). The Safe Drinking Water Act sets a limit of 20,000 pCi/L (740 Bq/L) for tritium. The level of tritium measured in the sample from Shoshone was nearly 500 times lower than the DCG value and 124 times lower than the Safe Drinking Water Act Limits. The EPA’s Environmental Radiation Ambient Monitoring System (ERAMS) program collects drinking water samples from across the United States. From October 1996 through

September 1997 tritium measured in 304 samples ranged from -83 to 560 pCi/L (-3.1 to 20.7 Bq/L) (EPA 1996, EPA 1997a, EPA 1997b, EPA 1997c). Table C-7 of Appendix C lists all drinking water sample results.

4.3 Surface Water Sampling

Surface water samples were collected from four locations along the Snake River in the area where the Snake River Plain Aquifer discharges. One sample, and a duplicate, were collected from an upstream location at Idaho Falls (Figure 16). Samples were analyzed for the same constituents as drinking water.

Two surface water samples, one each from Bliss and Buhl, exceeded their associated 2s value for gross alpha. Both samples also exceeded their 2s value for gross beta as did samples from Hagerman, Twin Falls, and the duplicate sample from Idaho Falls. None of these samples exceeded the MDC of 8 pCi/L. Levels of gross alpha and gross beta in all samples are in line with results from recent years (1998 and 1999). The presence of gross alpha and gross beta in surface water (particularly the springs) is related to dissolution of naturally occurring radionuclides (i.e., uranium and radium) by groundwater as it flows through the surrounding basalts. Surface water results were similar to drinking water results. Table C-7 of Appendix C lists all data for the surface water samples.

5. FOOD STUFF SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, garden lettuce, sheep, big game, waterfowl, marmots, and fish 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 B-1, Appendix B, for more details on foodstuff sampling. All samples are analyzed by gamma spectrometry for any gamma emitting radionuclides. Because of its prevalence in the environment, primarily due to atmospheric nuclear testing and recent nuclear accidents (i.e., Chernobyl), cesium-137 is the most commonly measured radionuclide in samples. Other radionuclides are reported when they are detected.

5.1 Milk Sampling

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL (Figure 17) during the fourth quarter of 2000. All samples were analyzed for gamma emitting radionuclides. With samples from three locations (Howe, Dietrich, and Roberts – selected on a rotating basis) being analyzed for ^{90}Sr.

No ^{131}I was detected in any sample. Eight samples (Minidoka and Mud Lake in October; Carey, Mud Lake, Idaho Falls, and Roberts in November; and Moreland and Howe in December) had a ^{137}Cs concentration greater than their 2s uncertainty (Figure 18). All three samples analyzed for ^{90}Sr (Roberts, Howe, and Dietrich in November) had concentrations greater than their associated 2s uncertainty. Almost all samples had detectable levels of the naturally occurring radionuclide ^{40}K. Data for ^{131}I and ^{137}Cs in milk samples are listed in Table C-8. Data for ^{90}Sr in milk samples are listed in Table C-9, both in Appendix C.

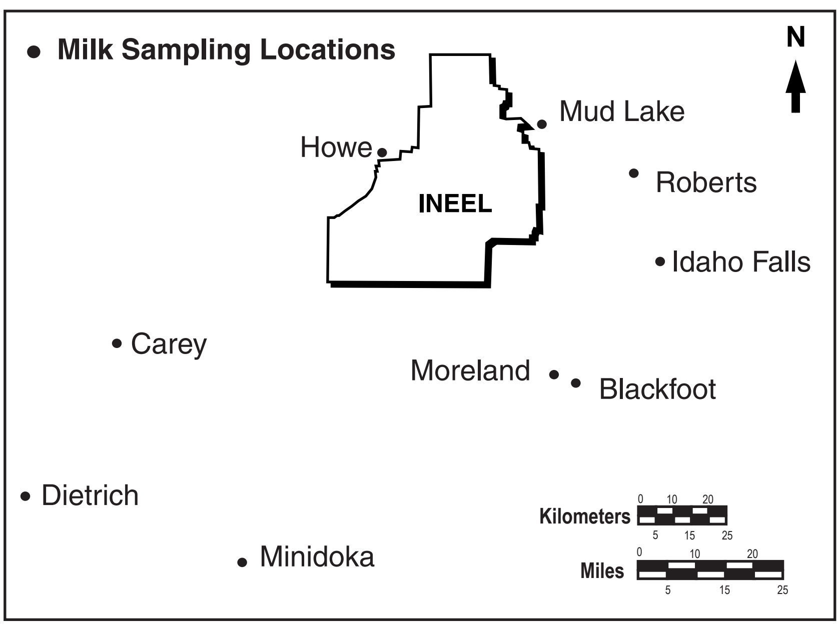


FIGURE 17. ESER Program milk sampling locations.

Results from a reanalysis of the eight samples with initial ^{137}Cs values above their 2s uncertainty, were all less than their associated 2s values. The average of the initial and recount result could support the detection for only the Idaho Falls sample [7.4 ± 3.1 pCi/L (0.27 ± 0.11 Bq/L). The seven unsupported samples are therefore assumed to be false positives. All detections of ^{137}Cs in milk around the INEEL were at very low concentrations and indistinguishable from levels expected from ^{137}Cs released from historical fallout events (e.g. from nuclear weapons tests and Chernobyl) (EPA 1997). There are no established limits for ^{137}Cs in milk but, for comparison, the EPA has set the limit for ^{137}Cs in drinking water at 120 pCi/L. This Safe Drinking Water limit is based on a 4 mrem per year limit and the assumption that two liters per day are consumed. The maximum concentration (15.4 ± 5.9 pCi/L) measured in milk during the fourth quarter, 2000 is about eight times lower than the 120 pCi/L limit. Data for ^{131}I and ^{137}Cs in all ESER milk samples taken during the fourth quarter, 2000, are listed in Table C-8 (Appendix C).

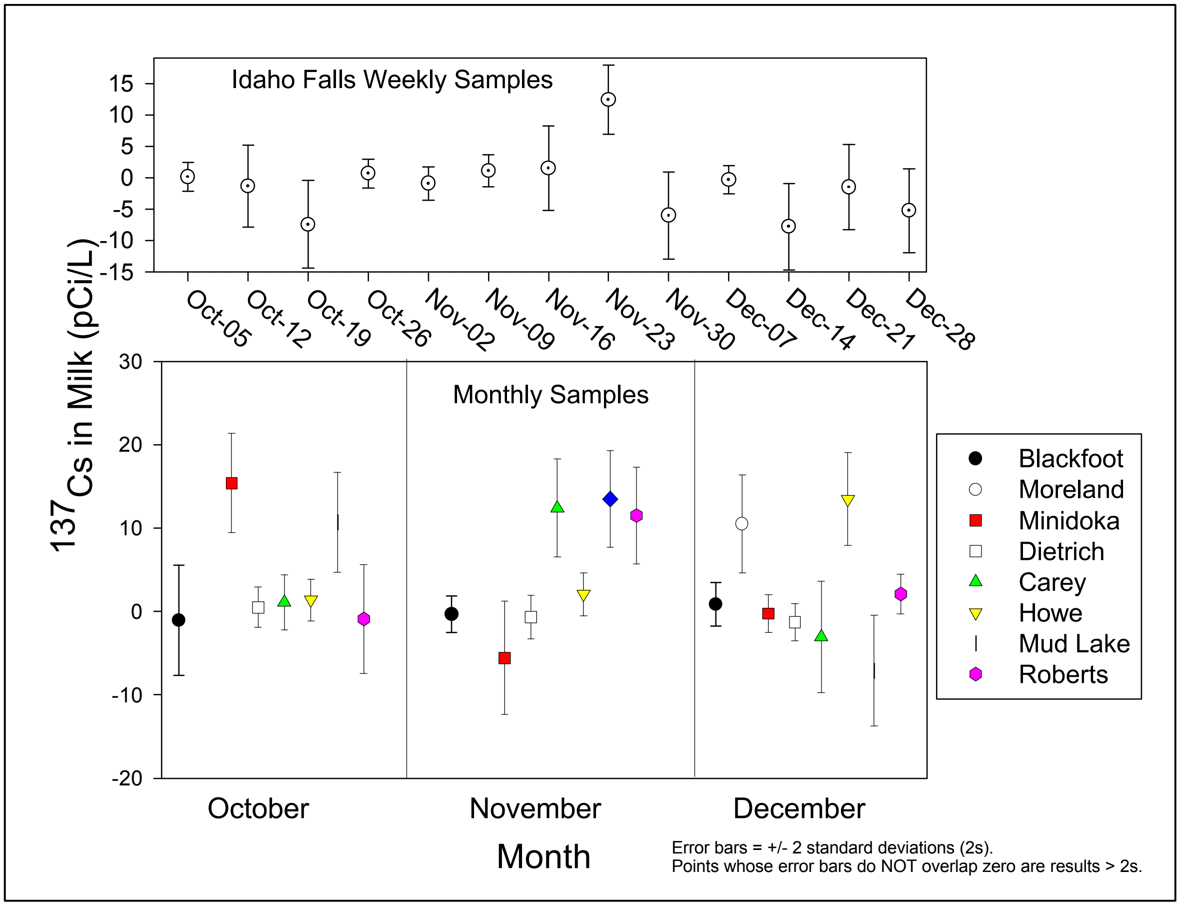


FIGURE 18. Cesium-137 concentrations in milk sampled during the fourth quarter, 2000. There are no regulatory limits on ^{137}Cs in milk but, for comparison, the EPA has set the limit for ^{137}Cs in drinking water at 12 pCi/L (based on a 4 mrem/yr limit and assumed 2 L/d consumption).

Chemically, ^{90}Sr acts similar to calcium. Therefore, it is expected that, if ^{90}Sr is present, it would be found in substances with high calcium content such as milk. Milk is such a substance. The EPA's ERAM program samples milk from approximately 55 sites across the United States. This data showed ^{90}Sr results in milk to be greater than the 2s level in about 63% of samples with a range of –0.15 to 2.12 pCi/L (-0.006 to 0.078 Bq/L) (EPA, 1997). While ^{90}Sr levels in the three samples analyzed for ^{90}Sr were greater than their associated 2s values, all results were within the range measured across the United States. All ^{90}Sr detected in fourth quarter ESER milk samples were at very low concentrations and indistinguishable from levels expected from ^{90}Sr released from historical fallout events (e.g. from nuclear weapons tests and Chernobyl) (EPA 1997). There are no established limits for ^{90}Sr in milk but, for comparison, the EPA has set the limit for ^{90}Sr in drinking water at 8 pCi/L. This Safe Drinking Water limit is based on a 4 mrem per year limit and the assumption that two liters per day are consumed. The maximum concentration (1.7 ± 1.6 pCi/L) measured in milk during the fourth quarter, 2000 is about five times lower than the 8 pCi/L limit. Data for ^{90}Sr in fourth quarter milk samples are listed in Table C-9 (Appendix C).

5.2 Large Game Animal Sampling

Five game animals were sampled during the fourth quarter of 2000 (Figure 19). All were killed as a result of vehicular collisions. These accidents involved four mule deer (*Odocoileus hemionus*) and one elk (*Cervus elaphus*). Thyroid and muscle tissue were collected from each animal and liver tissue was collected from all except one mule deer. No liver was taken from the mule deer killed October 5 because the body cavity was breached during impact thereby potentially contaminating the tissue with surrounding soil. Each sample collected was analyzed for gamma emitting radionuclides. Liver and/or muscle tissue of all animals gave valid (> MDC) results for naturally occurring ^{40}K. The muscle tissue from the elk had a greater than 2s result (3.6 ± 1.9 pCi/kg wet weight, or 0.13 ± 0.07 Bq/kg wet weight) of ^{137}Cs. No other gamma-emitting radionuclides were detected in any samples. Data for all big game samples are listed in Appendix C, Table C-10.

The presence of ^{137}Cs in big game tissue is not an immediate concern in that similar levels are commonly detected in wild game tissues throughout the world. For example, big game animals sampled in Colorado, Idaho (distant to the INEEL), Montana, Oregon, Utah, and Wyoming during 1998 – 1999, had average ^{137}Cs concentrations in muscle tissue of 20 pCi/kg wet weight (range: -10 to 152 pCi/g wet weight). Cesium-137 is an analog of potassium and is readily incorporated in muscle and organ tissues. Cesium-137 is also available throughout the world from the fallout from historic nuclear weapons tests.

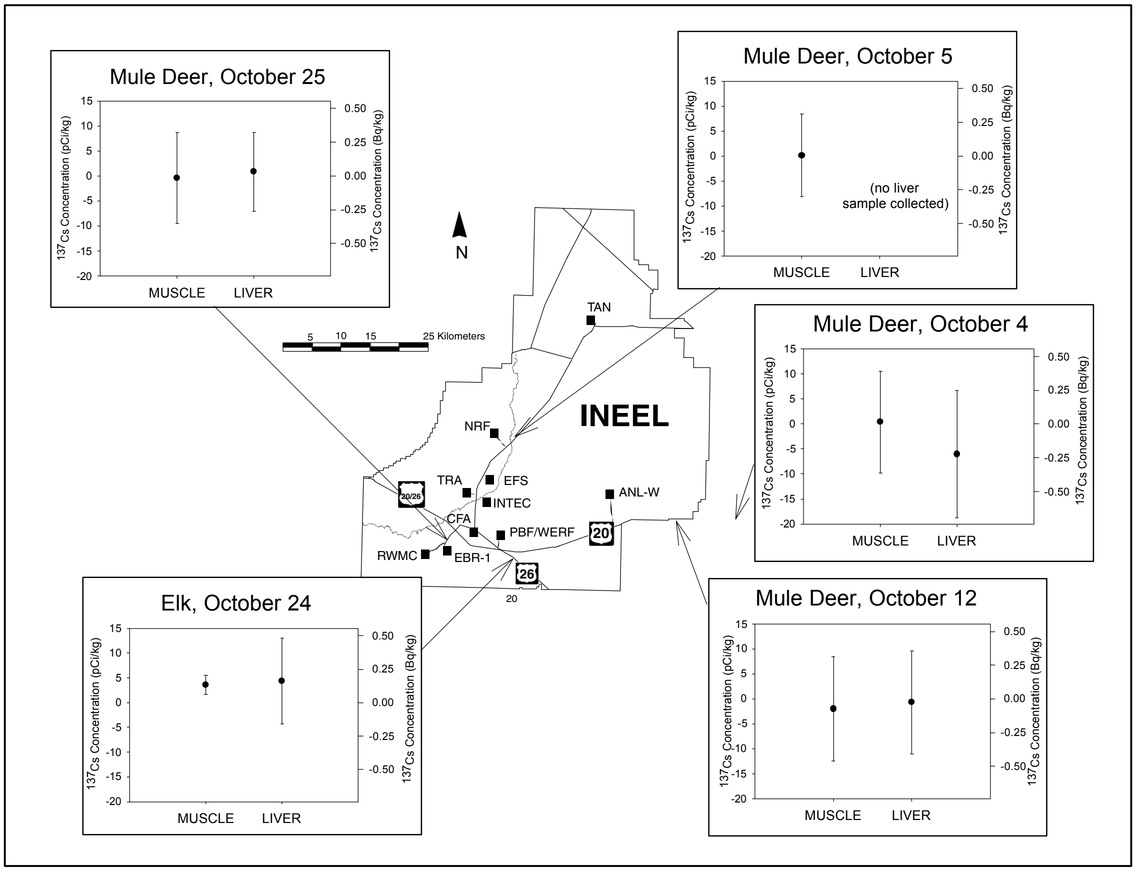


FIGURE 19. Cesium-137 concentrations in muscle and liver of big game animals sampled on the INEEL during the fourth quarter, 2000. Error bars equal ± 2s. For comparison, big game animals sampled in Colorado, Idaho (distant the INEEL), Montana, Oregon, Utah, and Wyoming, 1998 - 1999, had average ^{137}Cs concentrations in muscle tissue of 20 pCi/kg (0.74 Bq/kg) wet weight [range: -10 to 152 pCi/kg (-0.37 to 5.6 Bq/kg) wet weight].

5.3 Potato Sampling

Potatoes were collected from various growers in southeast Idaho as well as from locations around the United States (Figure 20). All samples were analyzed for gamma emitting radionuclides and ^{90}Sr.

No potato sample collected during the fourth quarter contained levels of ^{90}Sr above the 2s level. Except for naturally occurring ^{40}K, which was detected in all samples above the MDC value, the only gamma emitting radionuclide found above the 2s level was ^{137}Cs in the sample from Arco. The result of a recount of the Arco sample fell short of its 2s value which gives evidence that the initial result was a false positive (see the *Confidence in Detections* section in the *Helpful Information* section of this report). All data for ^{137}Cs in potato samples are shown in Table C-11 of Appendix C. All data for ^{90}Sr in potato samples are shown in Table C-12.

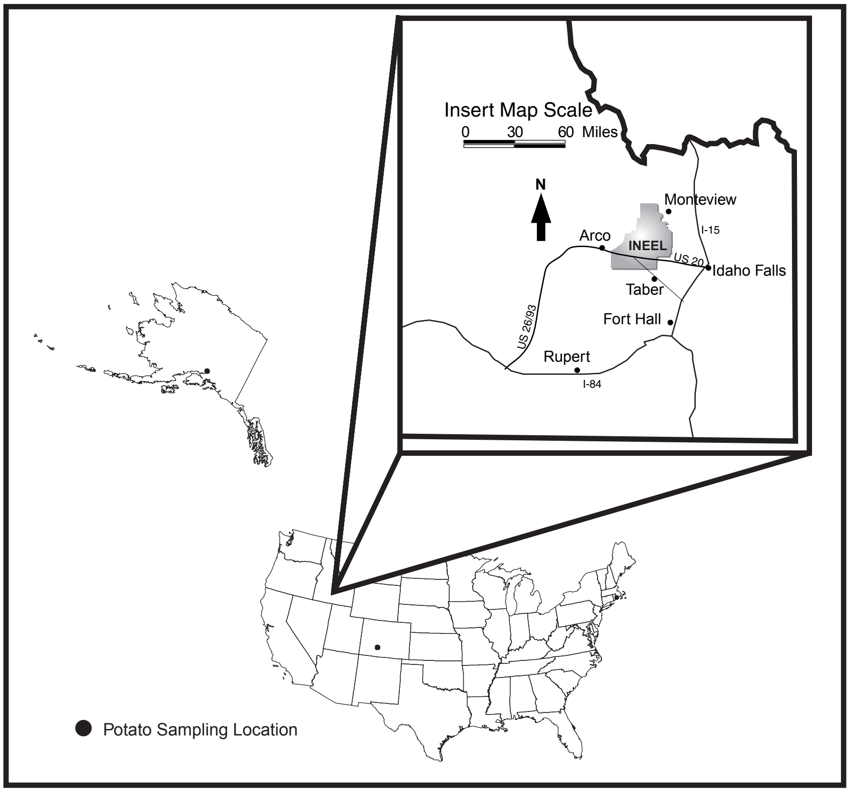


FIGURE 20. Potato sampling locations.

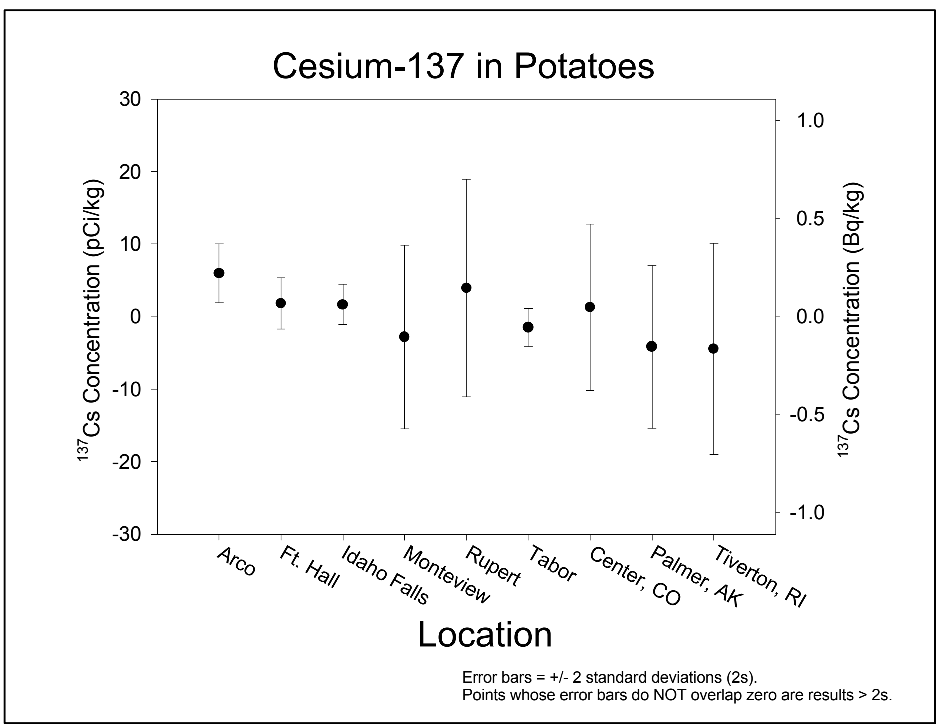


FIGURE 21. Cesium-137 concentrations in potatoes sampled during the fourth quarter, 2000.

5.4 Waterfowl Sampling

Seven ducks were collected from waste ponds on the INEEL and three were collected from an offsite location (Mud Lake). Of the ducks collected from the INEEL, five were collected from radioactive waste ponds at the Test Reactor Area (TRA), one from percolation ponds at the Idaho Nuclear Technology and Engineering Center (INTEC), and one from the industrial waste pond at the Argonne National Laboratory-West (ANL-W) facility. No human-made radionuclides were detected in the samples from Mud Lake, INTEC, or ANL-W. Both ^{137}Cs and ^{60}Co were measured at greater than 2s levels in the muscle tissue of four of the ducks sampled from the TRA ponds (Table 2). Duck hunting is not allowed on the INEEL, but a maximum potential exposure scenario to humans would be someone collecting a duck directly from the TRA radioactive waste ponds and immediately consuming all muscle, liver, heart, and gizzard tissue (average 225 g). The doses from consuming the four ducks from TRA with measurable amounts of ^{137}Cs and ^{60}Co are also listed in Table 2. Compare the total dose values to the 300 mrem we receive each year from natural sources (Table 1) and the 100 mrem per year regulatory dose limit. One person would have to eat over 5,000 ducks at these concentrations to approach the 100 mrem dose limit. Results for all duck samples are listed in Table C-13 of Appendix C.

TABLE 2. Detected radionuclides in edible tissue of duck using TRA ponds and resultant dose[a] from consuming them.

Sample ID	Species	Radionuclide	Concentration ($\pm$ 2s) pCi/g	Concentration ($\pm$ 2s) Bq/g	Dose (mrem)	Total Dose (mrem)
00-WF-TRA1-MUS	Redhead	^{60}Co	4.3 $\pm$ 0.6	0.16 $\pm$ 0.02	0.0122	0.0184
		^{137}Cs	0.6 $\pm$ 0.2	0.02 $\pm$ 0.01	0.0063	
00-WF-TRA3-MUS	Redhead	^{60}Co	2.1 $\pm$ 0.3	0.08 $\pm$ 0.01	0.0059	0.0077
		^{137}Cs	0.2 $\pm$ 0.1	0.01$\pm$0.004	0.0017	
00-WF-TRA4-MUS	Ruddy	^{60}Co	0.3 $\pm$ 0.1	0.01$\pm$0.004	0.0007	0.0095
		^{137}Cs	0.8 $\pm$ 0.2	0.03 $\pm$ 0.01	0.0088	
00-WF-TRA5-MUS	Ruddy	^{60}Co	0.5 $\pm$ 0.1	0.02$\pm$0.004	0.0013	0.0090
		^{137}Cs	0.7 $\pm$ 0.2	0.03 $\pm$ 0.01	0.0077	

[a] Committed (50y) effective dose equivalent from consuming 225 g based on ICRP 68 dose conversion factors.

5.5 Dove Sampling

Mourning doves (*Zenaida macroura*) are a game bird commonly hunted across the United States. A total of 18 mourning doves were sampled during 2000; seven from locations near radioactive waste ponds at the TRA, six from locations near contaminated waste ponds at the INTEC, and five, for comparison, from a location approximately 2 miles southeast of Idaho Falls. Because of the small size of the birds, two to three birds were composited in each sample. All samples were analyzed for gamma emitting radionuclides with a subset analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am. The only human-made radionuclide in the edible tissue (muscle) measured at levels greater than their associated 2s was ^{137}Cs in two samples from INTEC (consisting of muscle tissue from three birds each) and in one sample from TRA (consisting of muscle tissue from three birds) (Table 3). Dove hunting is not allowed on the INEEL but a maximum potential exposure to humans would be someone eating a dove directly from the waste pond areas and immediately consuming the muscle tissue (average 50 g). The doses from consuming the doves with measurable amounts of ^{137}Cs are also listed in Table 2. Compare the dose values to the 300 mrem we receive each year from natural sources (Table 1) and the 100 mrem per year regulatory dose limit. One person would have to eat over 1,295,000 doves at these concentrations to approach the 100 mrem dose limit. Results for all dove samples are listed in Table C-14 of Appendix C.

TABLE 3. ^{137}Cs measured at levels greater than the associated 2s level in edible tissue of doves near INEEL waste ponds and resultant dose[a] from consuming them.

Sample ID[b]	Concentration (± 2s) pCi/g	Concentration (± 2s) Bq/g	Dose (mrem)
00-DV-TRA3-MUS	0.037 ± 0.035	0.001 ± 0.001	0.00009
00-DV-INTEC2-MUS	0.041 ± 0.036	0.002 ± 0.001	0.00010
00-DV-INTEC1-MUS	0.032 ± 0.028	0.001 ± 0.001	0.00008

[a] Committed (50y) effective dose equivalent from consuming 50 g based on ICRP 68 dose conversion factors.
[b] Each sample containing muscle tissue from three doves.

6. ENVIRONMENTAL RADIATION

The ESER and its predecessors have placed an array of thermoluminescent dosimeters (TLDs) distributed throughout the Eastern Snake River Plain (Figure 22) to measure the amount of radiation in the environment. The TLDs are changed in May and again in November. The results of the November sampling (the period May 2000 through November 2000) are discussed below.

Dosimeter locations are divided into Boundary and Distant groupings. Total exposure for the period for each distant group are listed in Table 4. The average exposure rate for locations in the Boundary group ranged from a low of 0.29 mR/day at Reno Ranch to a high of 0.39 mR/day at Mud Lake. The overall average was 0.35 mR/day. The Distant set had a high of 0.40 mR/day at Rexburg and a low of 0.33 mR/day at Minidoka. The overall average Distant value was 0.37 mR/day. There was no statistical difference between Boundary and Distant locations. Furthermore, all values are in line with past readings. Table C-15 shows the results for each location.

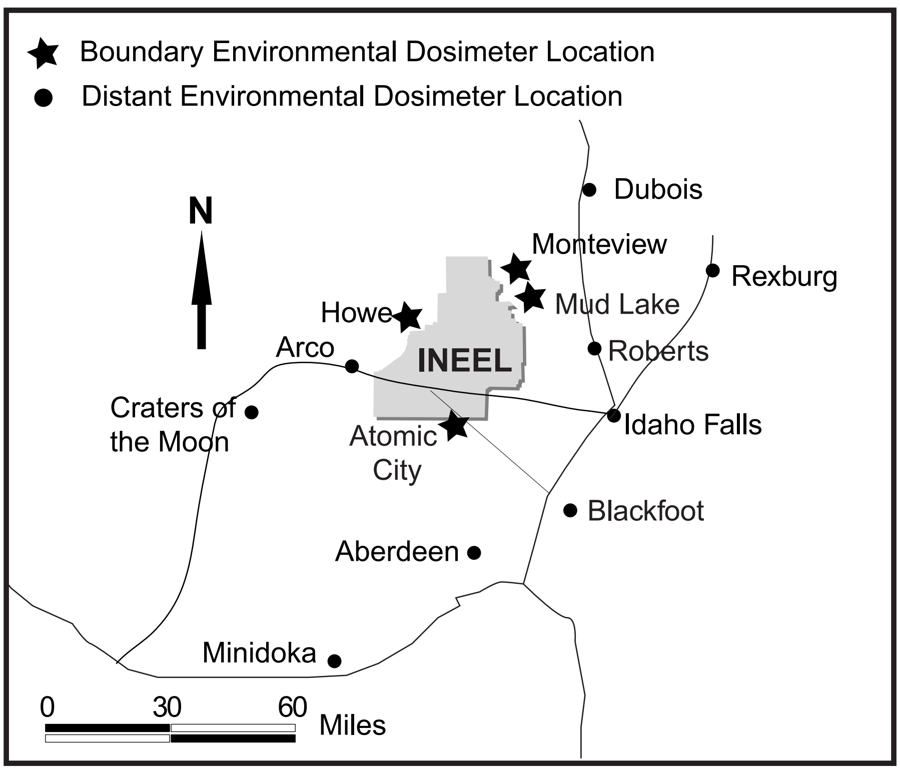


FIGURE 22. TLD locations.

TABLE 4. TLD exposures from May 2000 to November 2000.

	Exposure (mR)	
Location	**Boundary**	**Distant**
Average	65.6	70.7
Maximum	74.1	76.6
Minimum	55.8	55.8

7. SUMMARY AND CONCLUSIONS

The only radionuclides measured that could be attributed to the INEEL were ^{60}Co and ^{137}Cs in some of the ducks and doves collected from locations adjacent to contaminated waste ponds on the INEEL. No radionuclides in any other samples taken during the fourth quarter, 2000, could be directly linked with INEEL activities. There were no observed gradients of gross alpha or beta concentrations in air increasing towards the INEEL from Distant locations. Levels of detected radionuclides were below regulatory limits and, except for ducks and doves, were not different from values measured at other locations across the United States. Concentrations of ^{60}Co and ^{137}Cs in ducks from TRA and ^{137}Cs in doves from both TRA and INTEC were higher than in samples taken from offsite locations but all concentrations would require a person to consume thousands to over one million birds to approach regulatory dose limits. Concentrations in all of the samples collected and analyzed during the fourth quarter, 2000 were below guidelines set by both the DOE and the U.S. Environmental Protection Agency (EPA) for protection of the public.

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8. REFERENCES

EPA. 1996. Environmental Radiation Data. Report 88. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Montgomery, AL.

EPA. 1997a. Environmental Radiation Data. Report 89. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Montgomery, AL.

EPA. 1997b. Environmental Radiation Data. Report 90. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Montgomery, AL.

EPA. 1997c. Environmental Radiation Data. Report 91. United States Environmental Protection Agency, Office of Radiation and Indoor Air, Montgomery, AL.

NCRP. 1987. Exposure of the Population in the United States and Canada from Natural Background. Report 94, National Council on Radiation Protection and Measurements, Bethesda, MD.

NRC. 1999. The Biological Effects of Radiation. Web-page http://www.nrc.gov/NRC/EDUCATE/REACTOR/06-BIO/fig05.html. U.S. Nuclear Regulatory Commission, Washington, D.C.

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Appendix A

ESER PROGRAM SAMPLING MEDIA & SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS Distant	Boundary	INEEL
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha Gross Beta ^{131}I	weekly	Blackfoot, Craters of the Moon, Idaho Falls, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Reno Ranch	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Idaho Falls, Rexburg	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Reno Ranch	Main Gate, EFS, Van Buren
^{90}Sr Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	4 to 13 weeks	Idaho Falls	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				
DRINKING WATER				
Gross Alpha, Gross Beta, ^{3}H	semiannually	Twin Falls, Buhl, Hagerman Idaho Falls, Bliss	None	None
SURFACE WATER				
Gross Alpha Gross Beta, ^{3}H	semiannually	Aberdeen, Blackfoot, Carey, Idaho Falls, Fort Hall, Minidoka, Roberts, Shoshone	Arco, Atomic City, Howe, Monteview, Mud Lake, Reno Ranch	None
ENVIRONMENTAL RADIATION SAMPLING				
TLDs				
Gamma Radiation	semiannually	Aberdeen, Blackfoot, Craters of the Moon, Idaho Falls, Minidoka, Rexburg, Roberts	Arco, Atomic City, Howe, Monteview, Mud Lake, Reno Ranch	None
SOIL SAMPLING				
SOIL				
Gamma Spec ^{90}Sr Transuranics	biennially	Carey, Crystal Ice Caves, Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Reno Ranch	None

TABLE A-1. cont.

Sample Type Analysis	Collection Frequency	LOCATIONS Distant	Boundary	INEEL
FOOD STUFF SAMPLING				
MILK				
^{131}I	weekly	Idaho Falls	None	None
^{131}I	monthly	Blackfoot, Carey, Dietrich, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
Tritium ^{90}Sr	semiannually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
POTATOES				
Gamma Spec ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Mud Lake	None
WHEAT				
Gamma Spec ^{90}Sr	annually	Am. Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Tabor, Terreton	None
LETTUCE				
Gamma Spec ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	None
GAME				
Gamma Spec	varies	Occasional samples across the U.S.	varies	INEEL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois, N. INEEL, S. INEEL	None	INEEL
WATERFOWL				
Gamma Spec ^{90}Sr Transuranics	annually	Fort Hall	None	Waste disposal ponds
FISH				
Gamma Spec	annually	None	None	Big Lost River

Appendix B

MINIMUM DETECTABLE CONCENTRATIONS

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TABLE B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)	Drinking Water Detection Limits[c]
Air (particulate filter)[d]	Gross alpha	1×10^{-15} µCi/ml	2×10^{-14} µCi/ml	--
	Gross beta	3×10^{-15} µCi/ml	3×10^{-12} µCi/ml	--
	Specific gamma (^{137}Cs)	3×10^{-16} µCi/ml	4×10^{-10} µCi/ml	
	^{238}Pu	2×10^{-18} µCi/ml	3×10^{-14} µCi/ml	
	$^{239/240}Pu$	3×10^{-18} µCi/ml	2×10^{-14} µCi/ml	
	^{241}Am	2×10^{-18} µCi/ml	2×10^{-14} µCi/ml	--
	^{90}Sr	3×10^{-17} µCi/ml	9×10^{-12} µCi/ml	--
Air (charcoal cartridge)[d]	^{131}I	4×10^{-15} µCi/ml	4×10^{-10} µCi/ml	--
Air (atmospheric moisture)[e]	^{3}H	4×10^{-12} µCi/ml	1×10^{-7} µCi/ml	--
Air (precipitation)	^{3}H	1×10^{-7} µCi/ml	2×10^{-3} µCi/ml	--
Water (drinking & surface)	Gross alpha	3 pCi/L	30 pCi/L	3 pCi/L
	Gross beta	2 pCi/L	100 pCi/L	4 pCi/L
	^{3}H	100 pCi/L	2×10^{6} pCi/L	1000 pCi/L
Milk	^{131}I	3×10^{-9} µCi/ml	--	--
Wheat	Specific gamma (^{137}Cs)	4×10^{-9} µCi/g	--	--
	^{90}Sr	5×10^{-9} µCi/g	--	--
Lettuce	Specific gamma (^{137}Cs)	1×10^{-7} µCi/g	--	--
	^{90}Sr	2×10^{-7} µCi/g	--	--

[a] The MDC is an estimate of the concentration of radioactivity in a given sample type that can be identified with a 95% level of confidence and precision of plus or minus 100% under a specified set of typical laboratory measurement conditions.

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

[c] These limits are required by the National Primary Drinking Water Regulations (40 CFR 141). The “detection limit” is the terminology used by the EPA and means the same as the MDC defined above.

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

[e] The approximate MDC is expressed for tritium (as tritiated water) in air, and is based on an average filtered air volume of 25 m^3, assuming an average sampling period of eight weeks.

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APPENDIX C

SAMPLE ANALYSIS RESULTS

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

Sample Group & Location	Sampling Date	GROSS ALPHA Concentration +/- 2s [a] 10^{-15} µCi [b]/mL			GROSS ALPHA Concentration +/- 2s 10^{-10} Bq [c]/mL			GROSS BETA Concentration +/- 2s 10^{-15} µCi/mL			GROSS BETA Concentration +/- 2s 10^{-10} Bq/mL		
BOUNDARY													
ARCO													
	10/4/00	2.8	±	0.8	1.0	±	0.3	30.9	±	2.3	11.4	±	0.8
	10/11/00	2.1	±	0.7	0.8	±	0.3	36.8	±	2.4	13.6	±	0.9
	10/18/00	1.9	±	0.9	0.7	±	0.3	28.4	±	2.5	10.5	±	0.9
	10/25/00	2.0	±	0.7	0.7	±	0.2	30.8	±	2.2	11.4	±	0.8
	11/1/00	1.0	±	0.5	0.4	±	0.2	18.2	±	1.8	6.7	±	0.7
	11/8/00	0.8	±	0.5	0.3	±	0.2	19.1	±	1.8	7.1	±	0.7
	11/15/00	1.2	±	0.6	0.4	±	0.2	35.6	±	2.3	13.2	±	0.9
	11/22/00	2.3	±	0.8	0.8	±	0.3	56.6	±	3.0	20.9	±	1.1
	11/29/00	2.4	±	0.9	0.9	±	0.3	56.0	±	3.0	20.7	±	1.1
	12/6/00	1.5	±	0.8	0.6	±	0.3	35.7	±	2.6	13.2	±	0.9
	12/13/00	1.7	±	0.7	0.6	±	0.3	54.4	±	3.0	20.1	±	1.1
	12/20/00	0.9	±	0.6	0.3	±	0.2	15.4	±	1.8	5.7	±	0.7
	12/27/00	0.8	±	0.6	0.3	±	0.2	26.8	±	2.2	9.9	±	0.8
ATOMIC CITY													
	10/4/00	1.3	±	0.8	0.5	±	0.3	29.8	±	2.6	11.0	±	0.9
	10/11/00	1.8	±	0.8	0.6	±	0.3	39.6	±	2.8	14.7	±	1.0
	10/18/00	1.3	±	0.7	0.5	±	0.3	30.5	±	2.4	11.3	±	0.9
	10/25/00	1.9	±	0.7	0.7	±	0.3	30.3	±	2.4	11.2	±	0.9
	11/1/00	1.2	±	0.6	0.4	±	0.2	17.4	±	2.0	6.4	±	0.7
	11/8/00	1.2	±	0.6	0.4	±	0.2	20.3	±	2.0	7.5	±	0.8
	11/15/00	1.2	±	0.7	0.4	±	0.3	29.4	±	2.4	10.9	±	0.9
	11/22/00	2.2	±	1.1	0.8	±	0.4	55.4	±	4.1	20.5	±	1.5
	11/29/00	1.4	±	0.9	0.5	±	0.3	56.0	±	3.2	20.7	±	1.2
	12/6/00	1.7	±	0.9	0.6	±	0.3	44.3	±	3.0	16.4	±	1.1
	12/13/00	2.0	±	0.8	0.7	±	0.3	36.0	±	2.6	13.3	±	1.0
	12/20/00	0.3	±	0.5	0.1	±	0.2	11.5	±	1.7	4.3	±	0.6
	12/27/00	0.7	±	0.6	0.3	±	0.2	26.7	±	2.4	9.9	±	0.9
BIRCH CREEK													
	10/4/00	2.7	±	1.1	1.0	±	0.4	32.3	±	3.0	12.0	±	1.1
	10/11/00	2.9	±	1.0	1.1	±	0.4	39.0	±	3.1	14.4	±	1.2
	10/18/00	1.5	±	0.9	0.6	±	0.3	30.6	±	2.8	11.3	±	1.1
	10/25/00	1.6	±	0.8	0.6	±	0.3	36.4	±	3.1	13.5	±	1.1
	11/1/00	1.1	±	0.7	0.4	±	0.2	22.5	±	2.5	8.3	±	0.9
	11/8/00	1.0	±	0.8	0.4	±	0.3	20.8	±	2.5	7.7	±	0.9
	11/15/00	0.3	±	0.7	0.1	±	0.3	35.9	±	3.0	13.3	±	1.1
	11/22/00	-0.2	±	0.5	-0.1	±	0.2	-0.5	±	1.4	-0.2	±	0.5
	11/29/00	4.1	±	1.4	1.5	±	0.5	117.0	±	5.1	43.3	±	1.9
	12/6/00	0.7	±	0.9	0.3	±	0.3	32.2	±	2.9	11.9	±	1.1
	12/13/00	2.7	±	1.0	1.0	±	0.4	60.1	±	3.7	22.2	±	1.4
	12/20/00	0.3	±	0.7	0.1	±	0.2	15.8	±	2.2	5.8	±	0.8
	12/27/00	1.4	±	0.8	0.5	±	0.3	22.1	±	2.5	8.2	±	0.9
FAA TOWER													
	10/4/00	1.8	±	1.0	0.7	±	0.4	34.6	±	3.1	12.8	±	1.1
	10/11/00	2.4	±	0.9	0.9	±	0.3	35.4	±	2.8	13.1	±	1.0
	10/18/00	1.7	±	0.8	0.6	±	0.3	27.1	±	2.5	10.0	±	0.9
	10/25/00	1.8	±	0.9	0.7	±	0.3	32.4	±	3.1	12.0	±	1.2
	11/1/00	0.8	±	0.6	0.3	±	0.2	17.5	±	2.4	6.5	±	0.9

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

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

Sample Group & Location	Sampling Date	GROSS ALPHA Concentration +/- 2s[a] 10^{-15} µCi[b]/mL			GROSS ALPHA Concentration +/- 2s 10^{-10} Bq[c]/mL			GROSS BETA Concentration +/- 2s 10^{-15} µCi/mL			GROSS BETA Concentration +/- 2s 10^{-10} Bq/mL		
	11/8/00	1.0	±	0.7	0.4	±	0.3	19.7	±	2.2	7.3	±	0.8
	11/15/00	0.9	±	0.8	0.3	±	0.3	32.6	±	3.0	12.1	±	1.1
	11/22/00	1.7	±	0.9	0.6	±	0.3	54.3	±	3.7	20.1	±	1.4
	11/29/00	1.0	±	1.1	0.4	±	0.4	56.6	±	3.9	20.9	±	1.5
	12/6/00	1.0	±	1.0	0.4	±	0.4	44.2	±	3.5	16.4	±	1.3
	12/13/00	2.0	±	1.0	0.8	±	0.4	50.1	±	3.6	18.5	±	1.3
	12/20/00	0.7	±	0.8	0.3	±	0.3	9.7	±	2.1	3.6	±	0.8
	12/27/00	0.9	±	0.8	0.3	±	0.3	24.6	±	2.7	9.1	±	1.0
FAA TOWER (Q/A-1)													
	10/4/00	2.4	±	0.9	0.9	±	0.3	30.3	±	2.6	11.2	±	1.0
	10/11/00	1.1	±	0.8	0.4	±	0.3	43.2	±	3.4	16.0	±	1.3
	10/18/00	0.2	±	0.7	0.1	±	0.3	28.2	±	2.9	10.4	±	1.1
	10/25/00	1.5	±	0.7	0.5	±	0.3	29.5	±	2.5	10.9	±	0.9
	11/1/00	0.6	±	0.5	0.2	±	0.2	16.8	±	2.1	6.2	±	0.8
	11/8/00	1.0	±	0.7	0.4	±	0.3	18.7	±	2.2	6.9	±	0.8
	11/15/00	0.8	±	0.7	0.3	±	0.3	30.2	±	2.5	11.2	±	0.9
	11/22/00	1.1	±	0.7	0.4	±	0.3	51.2	±	3.2	18.9	±	1.2
	11/29/00	1.4	±	0.9	0.5	±	0.3	51.1	±	3.3	18.9	±	1.2
	12/6/00	2.4	±	1.0	0.9	±	0.4	36.8	±	2.8	13.6	±	1.1
	12/13/00	2.3	±	0.9	0.8	±	0.3	39.4	±	2.9	14.6	±	1.1
	12/20/00	0.7	±	0.7	0.3	±	0.2	12.5	±	1.9	4.6	±	0.7
	12/27/00	0.9	±	0.7	0.4	±	0.3	24.8	±	2.4	9.2	±	0.9
HOWE													
	10/4/00	2.0	±	1.0	0.7	±	0.4	33.0	±	3.0	12.2	±	1.1
	10/11/00	2.2	±	0.9	0.8	±	0.4	41.8	±	3.2	15.5	±	1.2
	10/18/00	1.1	±	0.8	0.4	±	0.3	28.3	±	2.8	10.5	±	1.0
	10/25/00	2.0	±	0.8	0.7	±	0.3	33.9	±	2.8	12.5	±	1.1
	11/1/00	0.9	±	0.6	0.3	±	0.2	23.2	±	2.5	8.6	±	0.9
	11/8/00	1.1	±	0.8	0.4	±	0.3	22.7	±	2.5	8.4	±	0.9
	11/15/00	0.6	±	0.8	0.2	±	0.3	37.4	±	3.0	13.8	±	1.1
	11/22/00	1.3	±	0.8	0.5	±	0.3	61.8	±	3.7	22.9	±	1.4
	11/29/00	1.1	±	1.0	0.4	±	0.4	68.6	±	4.0	25.4	±	1.5
	12/6/00	1.0	±	0.9	0.4	±	0.3	40.9	±	3.2	15.1	±	1.2
	12/13/00	2.7	±	1.0	1.0	±	0.4	69.1	±	3.9	25.6	±	1.4
	12/20/00	0.7	±	0.7	0.3	±	0.3	20.1	±	2.3	7.4	±	0.9
	12/27/00	0.5	±	0.7	0.2	±	0.3	31.0	±	2.8	11.5	±	1.0
MONTEVIEW													
	10/4/00	3.2	±	1.0	1.2	±	0.4	36.8	±	2.7	13.6	±	1.0
	10/11/00	2.6	±	1.0	1.0	±	0.4	41.2	±	3.1	15.2	±	1.2
	10/18/00	1.6	±	0.8	0.6	±	0.3	30.7	±	2.5	11.4	±	0.9
	10/25/00	2.5	±	1.0	0.9	±	0.4	32.1	±	2.9	11.9	±	1.1
	11/1/00	1.3	±	0.6	0.5	±	0.2	20.2	±	2.1	7.5	±	0.8
	11/8/00	1.1	±	0.7	0.4	±	0.2	19.9	±	2.1	7.4	±	0.8
	11/15/00	1.2	±	0.7	0.5	±	0.3	33.8	±	2.5	12.5	±	0.9
	11/22/00	2.0	±	0.8	0.7	±	0.3	54.4	±	3.2	20.1	±	1.2
	11/29/00	1.1	±	0.8	0.4	±	0.3	60.4	±	3.3	22.3	±	1.2
	12/6/00	0.9	±	0.8	0.3	±	0.3	30.8	±	2.6	11.4	±	0.9
	12/13/00	2.9	±	0.9	1.1	±	0.3	61.0	±	3.3	22.6	±	1.2
	12/20/00	0.6	±	0.6	0.2	±	0.2	18.5	±	2.1	6.8	±	0.8
	12/27/00	0.5	±	0.6	0.2	±	0.2	30.1	±	2.5	11.1	±	0.9

[a] 2s = 2 Standard Deviations
[b] µCi = Standard Units (see "Helpful Information")
[c] Bq = Systeme International d'Unites (see "Helpful Information")
NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

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

Sample Group & Location	Sampling Date	GROSS ALPHA Concentration +/- 2s[a] 10^{-15} μCi[b]/mL			GROSS ALPHA Concentration +/- 2s 10^{-10} Bq[c]/mL			GROSS BETA Concentration +/- 2s 10^{-15} μCi/mL			GROSS BETA Concentration +/- 2s 10^{-10} Bq/mL		
MONTEVIEW (Q/A-2)													
	10/4/00	2.7	±	0.9	1.0	±	0.3	31.1	±	2.3	11.5	±	0.9
	10/11/00	2.0	±	0.8	0.7	±	0.3	41.0	±	2.9	15.2	±	1.1
	10/18/00	1.4	±	0.7	0.5	±	0.3	26.6	±	2.2	9.8	±	0.8
	10/25/00	3.0	±	0.8	1.1	±	0.3	35.7	±	2.5	13.2	±	0.9
	11/1/00	1.2	±	0.5	0.5	±	0.2	21.3	±	1.9	7.9	±	0.7
	11/8/00	0.7	±	0.5	0.3	±	0.2	19.5	±	1.9	7.2	±	0.7
	11/15/00	0.6	±	0.6	0.2	±	0.2	33.5	±	2.3	12.4	±	0.9
	11/22/00	1.6	±	0.7	0.6	±	0.3	53.6	±	2.9	19.8	±	1.1
	11/29/00	1.6	±	0.8	0.6	±	0.3	51.3	±	2.8	19.0	±	1.0
	12/6/00	0.8	±	0.7	0.3	±	0.2	29.5	±	2.3	10.9	±	0.8
	12/13/00	1.6	±	0.7	0.6	±	0.3	56.2	±	2.9	20.8	±	1.1
	12/20/00	0.8	±	0.6	0.3	±	0.2	21.1	±	2.0	7.8	±	0.7
	12/27/00	0.9	±	0.6	0.3	±	0.2	29.4	±	2.2	10.9	±	0.8
MUD LAKE													
	10/4/00	2.3	±	0.8	0.9	±	0.3	33.1	±	2.3	12.2	±	0.9
	10/11/00	2.0	±	0.7	0.7	±	0.3	35.9	±	2.4	13.3	±	0.9
	10/18/00	1.8	±	0.7	0.7	±	0.3	29.2	±	2.1	10.8	±	0.8
	10/25/00	2.0	±	0.7	0.7	±	0.3	34.3	±	2.3	12.7	±	0.9
	11/1/00	1.0	±	0.5	0.4	±	0.2	19.9	±	1.8	7.4	±	0.7
	11/8/00	1.0	±	0.5	0.4	±	0.2	21.3	±	1.9	7.9	±	0.7
	11/15/00	1.4	±	0.6	0.5	±	0.2	32.5	±	2.2	12.0	±	0.8
	11/22/00	1.9	±	0.7	0.7	±	0.3	59.5	±	2.9	22.0	±	1.1
	11/29/00	1.5	±	0.7	0.5	±	0.3	62.9	±	3.0	23.3	±	1.1
	12/6/00	2.0	±	0.8	0.8	±	0.3	41.1	±	2.6	15.2	±	1.0
	12/13/00	1.9	±	0.7	0.7	±	0.2	58.2	±	2.8	21.5	±	1.0
	12/20/00	0.9	±	0.6	0.3	±	0.2	17.2	±	1.7	6.4	±	0.6
	12/27/00	1.4	±	0.6	0.5	±	0.2	27.9	±	2.1	10.3	±	0.8
DISTANT													
BLACKFOOT													
	10/4/00	3.3	±	1.1	1.2	±	0.4	32.9	±	2.8	12.2	±	1.0
	10/11/00	2.6	±	0.9	1.0	±	0.3	37.5	±	2.9	13.9	±	1.1
	10/18/00	1.4	±	0.8	0.5	±	0.3	23.7	±	2.5	8.8	±	0.9
	10/25/00	2.9	±	1.0	1.1	±	0.4	39.5	±	3.0	14.6	±	1.1
	11/1/00	1.4	±	0.7	0.5	±	0.2	17.5	±	2.1	6.5	±	0.8
	11/8/00	1.8	±	0.8	0.7	±	0.3	21.5	±	2.3	8.0	±	0.9
	11/15/00	1.2	±	0.8	0.5	±	0.3	26.6	±	2.6	9.8	±	1.0
	11/22/00	2.0	±	0.9	0.7	±	0.3	52.5	±	3.4	19.4	±	1.3
	11/29/00	1.5	±	1.0	0.5	±	0.4	57.7	±	3.6	21.3	±	1.3
	12/6/00	0.7	±	0.9	0.2	±	0.3	40.3	±	3.3	14.9	±	1.2
	12/13/00	4.2	±	1.1	1.5	±	0.4	47.7	±	3.3	17.6	±	1.2
	12/20/00	0.0	±	0.6	0.0	±	0.2	12.6	±	2.1	4.7	±	0.8
	12/27/00	0.6	±	0.7	0.2	±	0.3	25.3	±	2.6	9.4	±	1.0
BLACKFOOT, CMS													
	10/4/00	3.0	±	1.1	1.1	±	0.4	32.3	±	2.8	12.0	±	1.0
	10/11/00	2.5	±	1.0	0.9	±	0.4	37.8	±	3.0	14.0	±	1.1
	10/18/00	1.3	±	0.8	0.5	±	0.3	33.0	±	2.8	12.2	±	1.0
	10/25/00	3.1	±	1.0	1.2	±	0.4	35.8	±	2.9	13.2	±	1.1
	11/1/00	1.2	±	0.7	0.4	±	0.2	15.7	±	2.1	5.8	±	0.8

[a] *2s = 2 Standard Deviations*
[b] *μCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

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

Sample Group & Location	Sampling Date	GROSS ALPHA Concentration +/- 2s[a] 10^{-15} µCi[b]/mL			GROSS ALPHA Concentration +/- 2s 10^{-10} Bq[c]/mL			GROSS BETA Concentration +/- 2s 10^{-15} µCi/mL			GROSS BETA Concentration +/- 2s 10^{-10} Bq/mL		
	11/8/00	1.9	±	0.9	0.7	±	0.3	18.6	±	2.3	6.9	±	0.9
	11/15/00	2.0	±	0.9	0.7	±	0.3	28.0	±	2.6	10.4	±	1.0
	11/22/00	2.0	±	0.9	0.7	±	0.3	59.3	±	3.7	21.9	±	1.4
	11/29/00	1.6	±	1.0	0.6	±	0.4	51.4	±	3.5	19.0	±	1.3
	12/6/00	1.1	±	1.0	0.4	±	0.4	44.7	±	3.4	16.5	±	1.3
	12/13/00	5.0	±	1.3	1.8	±	0.5	74.9	±	4.0	27.7	±	1.5
	12/20/00	0.7	±	0.7	0.3	±	0.3	11.4	±	2.0	4.2	±	0.7
	12/27/00	0.8	±	0.7	0.3	±	0.3	28.0	±	2.7	10.4	±	1.0
CRATERS OF THE MOON													
	10/4/00	1.2	±	0.6	0.4	±	0.2	28.7	±	2.1	10.6	±	0.8
	10/11/00	1.8	±	0.7	0.7	±	0.2	34.5	±	2.3	12.8	±	0.8
	10/18/00	0.7	±	0.5	0.2	±	0.2	25.7	±	2.0	9.5	±	0.7
	10/25/00	1.2	±	0.6	0.5	±	0.2	31.9	±	2.2	11.8	±	0.8
	11/1/00	0.8	±	0.4	0.3	±	0.2	16.6	±	1.7	6.1	±	0.6
	11/8/00	0.7	±	0.5	0.2	±	0.2	19.4	±	1.8	7.2	±	0.7
	11/15/00	0.7	±	0.5	0.3	±	0.2	29.9	±	2.1	11.1	±	0.8
	11/22/00	1.7	±	0.7	0.6	±	0.3	53.2	±	2.9	19.7	±	1.1
	11/29/00	1.3	±	0.7	0.5	±	0.3	42.5	±	2.5	15.7	±	0.9
	12/6/00	0.8	±	0.6	0.3	±	0.2	26.8	±	2.2	9.9	±	0.8
	12/13/00	1.7	±	0.7	0.6	±	0.2	40.7	±	2.5	15.1	±	0.9
	12/20/00	0.2	±	0.4	0.1	±	0.2	8.9	±	1.4	3.3	±	0.5
	12/27/00	0.5	±	0.5	0.2	±	0.2	20.1	±	1.8	7.4	±	0.7
IDAHO FALLS													
	10/4/00	2.1	±	1.0	0.8	±	0.4	35.1	±	3.1	13.0	±	1.1
	10/11/00	3.4	±	1.1	1.3	±	0.4	45.5	±	3.4	16.8	±	1.3
	10/18/00	2.1	±	1.0	0.8	±	0.4	30.2	±	3.0	11.2	±	1.1
	10/25/00	2.3	±	1.2	0.8	±	0.4	37.4	±	3.7	13.8	±	1.4
	11/1/00	1.6	±	0.8	0.6	±	0.3	18.8	±	2.6	7.0	±	1.0
	11/8/00	1.0	±	0.9	0.4	±	0.3	23.7	±	2.9	8.8	±	1.1
	11/15/00	1.2	±	1.0	0.5	±	0.4	31.9	±	3.2	11.8	±	1.2
	11/22/00	1.9	±	1.0	0.7	±	0.4	59.4	±	3.9	22.0	±	1.5
	11/29/00	1.7	±	1.2	0.6	±	0.4	72.9	±	4.3	27.0	±	1.6
	12/6/00	0.5	±	0.9	0.2	±	0.3	42.0	±	3.5	15.5	±	1.3
	12/13/00	4.0	±	1.3	1.5	±	0.5	66.7	±	4.1	24.7	±	1.5
	12/20/00	1.6	±	0.9	0.6	±	0.3	13.7	±	2.3	5.1	±	0.8
	12/27/00	1.2	±	0.9	0.5	±	0.3	29.7	±	3.0	11.0	±	1.1
REXBURG, CMS													
	10/4/00	3.0	±	0.9	1.1	±	0.3	28.9	±	2.2	10.7	±	0.8
	10/11/00	2.2	±	0.8	0.8	±	0.3	36.8	±	2.5	13.6	±	0.9
	10/18/00	1.3	±	0.6	0.5	±	0.2	25.7	±	2.1	9.5	±	0.8
	10/25/00	2.5	±	0.8	0.9	±	0.3	37.1	±	2.5	13.7	±	0.9
	11/1/00	1.8	±	0.7	0.7	±	0.2	19.8	±	2.0	7.3	±	0.7
	11/8/00	1.2	±	0.7	0.5	±	0.2	19.6	±	2.0	7.3	±	0.7
	11/15/00	2.7	±	0.9	1.0	±	0.3	31.2	±	2.4	11.5	±	0.9
	11/22/00	2.6	±	0.8	1.0	±	0.3	54.7	±	3.1	20.2	±	1.1
	11/29/00	1.9	±	0.9	0.7	±	0.3	45.5	±	2.9	16.8	±	1.1
	12/6/00	2.7	±	1.1	1.0	±	0.4	34.3	±	3.0	12.7	±	1.1
	12/13/00	2.8	±	0.9	1.0	±	0.3	46.2	±	2.9	17.1	±	1.1
	12/20/00	0.4	±	0.4	0.1	±	0.2	4.3	±	1.1	1.6	±	0.4
	12/27/00	1.1	±	0.7	0.4	±	0.2	26.0	±	2.3	9.6	±	0.8

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

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

Sample Group & Location	Sampling Date	GROSS ALPHA Concentration +/- 2s[a] 10^{-15}µCi[b]/mL			GROSS ALPHA Concentration +/- 2s 10^{-10}Bq[c]/mL			GROSS BETA Concentration +/- 2s 10^{-15} µCi/mL			GROSS BETA Concentration +/- 2s 10^{-10} Bq/mL		
INEEL													
EFS													
	10/4/00	2.7	±	1.0	1.0	±	0.4	33.8	±	2.7	12.5	±	1.0
	10/11/00	2.1	±	0.8	0.8	±	0.3	40.1	±	2.8	14.8	±	1.0
	10/18/00	1.2	±	0.7	0.4	±	0.3	30.8	±	2.5	11.4	±	0.9
	10/25/00	2.5	±	0.8	0.9	±	0.3	32.8	±	2.6	12.1	±	0.9
	11/1/00	1.4	±	0.6	0.5	±	0.2	21.4	±	2.2	7.9	±	0.8
	11/8/00	1.5	±	0.8	0.6	±	0.3	22.5	±	2.2	8.3	±	0.8
	11/15/00	0.9	±	0.7	0.3	±	0.3	36.2	±	2.7	13.4	±	1.0
	11/22/00	2.1	±	0.8	0.8	±	0.3	57.5	±	3.3	21.3	±	1.2
	11/29/00	0.9	±	0.8	0.3	±	0.3	61.3	±	3.4	22.7	±	1.2
	12/6/00	1.6	±	0.9	0.6	±	0.3	44.0	±	3.0	16.3	±	1.1
	12/13/00	2.3	±	0.9	0.9	±	0.3	65.9	±	3.4	24.4	±	1.3
	12/20/00	0.6	±	0.6	0.2	±	0.2	17.3	±	2.0	6.4	±	0.8
	12/27/00	0.6	±	0.8	0.2	±	0.3	34.7	±	3.1	12.8	±	1.2
MAIN GATE													
	10/4/00	1.5	±	0.6	0.6	±	0.2	29.4	±	1.9	10.9	±	0.7
	10/11/00	1.8	±	0.6	0.7	±	0.2	32.7	±	2.0	12.1	±	0.7
	10/18/00	1.4	±	0.6	0.5	±	0.2	28.2	±	1.9	10.4	±	0.7
	10/25/00	1.9	±	0.6	0.7	±	0.2	33.4	±	2.0	12.4	±	0.7
	11/1/00	1.3	±	0.6	0.5	±	0.2	23.8	±	2.2	8.8	±	0.8
	11/8/00	1.2	±	0.5	0.4	±	0.2	20.8	±	1.6	7.7	±	0.6
	11/15/00	0.7	±	0.5	0.3	±	0.2	31.0	±	1.9	11.5	±	0.7
	11/22/00	1.9	±	0.7	0.7	±	0.3	68.0	±	3.1	25.2	±	1.1
	11/29/00	1.0	±	0.7	0.4	±	0.2	67.5	±	3.0	25.0	±	1.1
	12/6/00	1.8	±	0.7	0.7	±	0.3	40.8	±	2.5	15.1	±	0.9
	12/13/00	1.5	±	0.6	0.5	±	0.2	59.3	±	2.8	21.9	±	1.0
	12/20/00	0.8	±	0.5	0.3	±	0.2	14.6	±	1.6	5.4	±	0.6
	12/27/00	0.3	±	0.4	0.1	±	0.2	33.0	±	2.1	12.2	±	0.8
VAN BUREN													
	10/4/00	1.9	±	0.9	0.7	±	0.3	35.2	±	2.9	13.0	±	1.1
	10/11/00	0.2	±	2.7	0.1	±	1.0	40.1	±	9.3	14.8	±	3.4
	10/18/00	1.3	±	0.8	0.5	±	0.3	30.5	±	2.7	11.3	±	1.0
	10/25/00	1.1	±	0.7	0.4	±	0.3	35.1	±	2.8	13.0	±	1.0
	11/1/00	1.1	±	0.6	0.4	±	0.2	21.3	±	2.3	7.9	±	0.9
	11/8/00	1.2	±	0.7	0.4	±	0.3	22.2	±	2.3	8.2	±	0.9
	11/15/00	1.2	±	0.8	0.4	±	0.3	37.5	±	2.8	13.9	±	1.0
	11/22/00	2.1	±	0.9	0.8	±	0.3	55.5	±	3.4	20.5	±	1.3
	11/29/00	0.3	±	0.8	0.1	±	0.3	58.4	±	3.5	21.6	±	1.3
	12/6/00	0.9	±	0.9	0.3	±	0.3	37.6	±	3.1	13.9	±	1.2
	12/13/00	1.7	±	0.9	0.6	±	0.3	73.3	±	3.9	27.1	±	1.4
	12/20/00	0.4	±	0.7	0.1	±	0.2	18.2	±	2.3	6.7	±	0.9
	12/27/00	1.3	±	0.8	0.5	±	0.3	28.9	±	2.7	10.7	±	1.0

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

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

Sample Group & Location	Sampling Date	Concentration +/- 2s[a] 10^{-6} µCi[b]/mL			Concentration +/- 2s 10^{-2} Bq[c]/mL		
BOUNDARY							
ARCO							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
ATOMIC CITY							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
BIRCH CREEK							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
FAA TOWER							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE 1: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location
NOTE 2: Up to 9 charcoal cartridges are screened simultaneously on a gamma spectrometer, hence like results for certain locations by sample date.

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

Sample Group & Location	Sampling Date	Concentration +/- 2s [a] 10^{-6} µCi [b]/mL			Concentration +/- 2s 10^{-2} Bq [c]/mL		
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
FAA TOWER (Q/A-1)							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
HOWE							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
MONTEVIEW							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE 1: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

NOTE 2: Up to 9 charcoal cartridges are screened simultaneously on a gamma spectrometer, hence like results for certain locations by sample date.

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

Sample Group & Location	Sampling Date	Concentration +/- 2s[a] 10^{-6} µCi[b]/mL			Concentration +/- 2s 10^{-2} Bq[c]/mL		
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
MONTEVIEW (Q/A-2)							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
MUD LAKE							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
DISTANT							
BLACKFOOT							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
BLACKFOOT, CMS							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE 1: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location
NOTE 2: Up to 9 charcoal cartridges are screened simultaneously on a gamma spectrometer, hence like results for certain locations by sample date.

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

Sample Group & Location	Sampling Date	Concentration +/- 2s[a] 10 $^{-6}$ µCi[b]/mL			Concentration +/- 2s 10 $^{-2}$ Bq[c]/mL		
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
CRATERS OF THE MOON							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
IDAHO FALLS							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
REXBURG, CMS							
	10/4/00	0.5	±	1.9	1.8	±	7.0
	10/11/00	-0.1	±	2.1	-0.3	±	7.8
	10/18/00	0.3	±	2.2	0.9	±	8.3
	10/25/00	0.1	±	2.1	0.4	±	7.8
	11/1/00	2.7	±	2.0	10.0	±	7.4
	11/8/00	-0.8	±	2.1	-3.0	±	7.6
	11/15/00	0.2	±	1.8	0.9	±	6.8
	11/22/00	-1.9	±	2.2	-7.0	±	8.0
	11/29/00	-0.4	±	1.9	-1.4	±	7.1
	12/6/00	0.9	±	2.6	3.4	±	9.5
	12/13/00	-0.7	±	1.8	-2.6	±	6.5

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE 1: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location
NOTE 2: Up to 9 charcoal cartridges are screened simultaneously on a gamma spectrometer, hence like results for certain locations by sample date.

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

Sample Group & Location	Sampling Date	Concentration +/- 2s [a] 10 $^{-6}$ µCi [b]/mL			Concentration +/- 2s 10 $^{-2}$ Bq [c]/mL		
	12/20/00	-0.2	±	1.9	-0.7	±	7.1
	12/27/00	-1.3	±	1.9	-4.9	±	7.1
INEEL							
EFS							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
MAIN GATE							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6
VAN BUREN							
	10/4/00	-0.8	±	2.6	-2.9	±	9.8
	10/11/00	0.1	±	2.2	0.5	±	8.3
	10/18/00	-0.4	±	2.4	-1.4	±	9.0
	10/25/00	-1.8	±	1.6	-6.8	±	6.0
	11/1/00	1.0	±	2.6	3.6	±	9.8
	11/8/00	-2.2	±	2.5	-8.1	±	9.3
	11/15/00	-0.8	±	2.4	-2.8	±	8.7
	11/22/00	1.5	±	2.7	5.4	±	9.8
	11/29/00	-0.2	±	2.4	-0.9	±	8.7
	12/6/00	-0.6	±	1.8	-2.0	±	6.7
	12/13/00	-1.1	±	2.2	-3.9	±	8.3
	12/20/00	-1.7	±	2.5	-6.3	±	9.1
	12/27/00	1.6	±	2.6	5.7	±	9.6

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*
NOTE 1: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location
NOTE 2: Up to 9 charcoal cartridges are screened simultaneously on a gamma spectrometer, hence like results for certain locations by sample date.

TABLE C-3: Quarterly Cesium-137, Americium-241, Plutonium-238, Plutonium-239/240 & Strontium-90 Concentrations in Composited Air Filters

Sample Group & Location	Sampling Date	Analyte	Concentration +/- 2s[a] 10^{-16} µCi[b]/mL			Concentration +/- 2s 10^{-12} Bq[c]/mL		
BOUNDARY								
ARCO								
	12/27/00	STRONTIUM-90	0.269	±	0.280	0.995	±	1.036
	12/31/00	CESIUM-137	1.780	±	2.100	6.586	±	7.770
ATOMIC CITY								
	12/27/00	AMERICIUM-241	0.005	±	0.010	0.020	±	0.037
	12/27/00	PLUTONIUM-238	-0.002	±	0.003	-0.006	±	0.013
	12/27/00	PLUTONIUM-239/240	0.007	±	0.012	0.025	±	0.044
	12/31/00	CESIUM-137	1.840	±	2.760	6.808	±	10.212
BIRCH CREEK								
	12/31/00	CESIUM-137	1.610	±	8.360	5.957	±	30.932
FAA TOWER								
	12/27/00	AMERICIUM-241	0.007	±	0.012	0.024	±	0.044
	12/27/00	PLUTONIUM-238	-0.008	±	0.009	-0.028	±	0.033
	12/27/00	PLUTONIUM-239/240	-0.001	±	0.015	-0.005	±	0.056
	12/31/00	CESIUM-137	0.762	±	2.980	2.819	±	11.026
FAA TOWER (Q/A-1)								
	12/27/00	AMERICIUM-241	0.007	±	0.010	0.026	±	0.037
	12/27/00	PLUTONIUM-238	-0.002	±	0.004	-0.006	±	0.013
	12/27/00	PLUTONIUM-239/240	-0.003	±	0.005	-0.013	±	0.018
	12/31/00	CESIUM-137	1.580	±	3.000	5.846	±	11.100
HOWE								
	12/31/00	CESIUM-137	1.800	±	3.320	6.660	±	12.284
MONTEVIEW								
	12/27/00	STRONTIUM-90	0.333	±	0.420	1.232	±	1.554
	12/31/00	CESIUM-137	2.200	±	2.500	8.140	±	9.250
MONTEVIEW (Q/A-2)								
	12/27/00	STRONTIUM-90	0.185	±	0.300	0.685	±	1.110
	12/31/00	CESIUM-137	1.590	±	2.140	5.883	±	7.918
MUD LAKE								
	12/27/00	AMERICIUM-241	0.006	±	0.008	0.021	±	0.030
	12/27/00	PLUTONIUM-238	0.005	±	0.012	0.017	±	0.044
	12/27/00	PLUTONIUM-239/240	-0.005	±	0.005	-0.017	±	0.020
	12/31/00	CESIUM-137	2.200	±	5.440	8.140	±	20.128

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

TABLE C-3 (cont.): Quarterly Cesium-137, Americium-241, Plutonium-238, Plutonium-239/240 & Strontium-90 Concentrations in Composited Air Filters

Sample Group & Location	Sampling Date	Analyte	Concentration +/- 2s [a] 10^{-16} µCi [b] /mL			Concentration +/- 2s 10^{-12} Bq [c] /mL		
DISTANT								
BLACKFOOT								
	12/27/00	STRONTIUM-90	0.650	±	0.450	2.405	±	1.665
	12/31/00	CESIUM-137	1.350	±	7.800	4.995	±	28.860
BLACKFOOT, CMS								
	12/27/00	AMERICIUM-241	-0.015	±	0.013	-0.056	±	0.048
	12/27/00	PLUTONIUM-238	0.007	±	0.013	0.025	±	0.048
	12/27/00	PLUTONIUM-239/240	0.011	±	0.020	0.040	±	0.074
	12/31/00	CESIUM-137	-0.182	±	7.940	-0.673	±	29.378
CRATERS OF THE MOON								
	12/27/00	AMERICIUM-241	0.006	±	0.012	0.023	±	0.044
	12/27/00	PLUTONIUM-238	0.000	±	0.012	0.000	±	0.044
	12/27/00	PLUTONIUM-239/240	-0.002	±	0.004	-0.007	±	0.014
	12/31/00	CESIUM-137	-1.900	±	2.100	-7.030	±	7.770
IDAHO FALLS								
	12/27/00	AMERICIUM-241	0.029	±	0.024	0.105	±	0.089
	12/27/00	PLUTONIUM-238	0.000	±	0.017	0.000	±	0.063
	12/27/00	PLUTONIUM-239/240	0.007	±	0.014	0.025	±	0.052
	12/31/00	CESIUM-137	1.250	±	9.540	4.625	±	35.298
REXBURG, CMS								
	12/27/00	STRONTIUM-90	0.328	±	0.320	1.214	±	1.184
	12/31/00	CESIUM-137	1.690	±	2.120	6.253	±	7.844
INEEL								
EFS								
	12/27/00	AMERICIUM-241	0.002	±	0.007	0.008	±	0.027
	12/27/00	PLUTONIUM-238	0.003	±	0.009	0.009	±	0.034
	12/27/00	PLUTONIUM-239/240	0.005	±	0.013	0.019	±	0.048
	12/31/00	CESIUM-137	0.386	±	6.740	1.428	±	24.938
MAIN GATE								
	12/27/00	STRONTIUM-90	0.084	±	0.260	0.311	±	0.962
	12/31/00	CESIUM-137	0.246	±	1.950	0.910	±	7.215
VAN BUREN								
	12/31/00	CESIUM-137	-0.123	±	2.840	-0.455	±	10.508

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE: Q/A-1 and Q/A-2 are replicate samplers placed at the stated location

TABLE C-4: Tritium Concentrations in Atmospheric Moisture

Location	Start Date	End Date	Concentration +/- 2s[a] 10^{-14} µCi /ml Air			Concentration +/- 2s 10^{-9} Bq /ml Air[b]		
ATOMIC CITY								
	9/27/00	*12/13/00*	7.8	±	15.3	2.9	±	5.6
BLACKFOOT, CMS								
	9/27/00	*12/13/00*	26.1	±	15.8	9.7	±	5.8
IDAHO FALLS								
	9/27/00	*12/14/00*	37.5	±	13.0	13.9	±	4.8
REXBURG, CMS								
	9/27/00	*12/13/00*	11.7	±	14.3	4.3	±	5.3

[a] *2s = 2 Standard Deviations*
[b] *pCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

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

Location	Sampling Date	Concentration µg /m³	Comments
ATOMIC CITY			
	10/2/00	9.5	
	10/8/00	27.5	
	10/14/00	4.8	
	10/20/00		Did not run - Equipment problems
	10/26/00		Did not run - Equipment problems
	11/1/00	5.5	
	11/7/00	5.1	
	11/13/00	4.9	
	11/19/00	14.0	
	11/25/00	14.4	
	12/1/00	9.8	
	12/7/00	12.4	
	12/13/00	-0.6	
	12/19/00	7.1	
	12/25/00	108.3	
	12/31/00	46.2	
BLACKFOOT, CMS			
	10/2/00	20.3	
	10/8/00	26.4	
	10/14/00	11.8	
	10/20/00		Filter Problem
	10/26/00	10.6	
	11/1/00	9.1	
	11/7/00	12.6	
	11/13/00	10.0	
	11/19/00	56.0	
	11/25/00	19.2	
	12/1/00	11.1	
	12/7/00	23.3	
	12/13/00	10.1	
	12/19/00	17.7	
	12/25/00	4.5	
	12/31/00	44.0	

TABLE C-5 (cont.): PM 10 Sampler Concentrations at Atomic City, Blackfoot CMS, & Rexburg CMS

Location	Sampling Date	Concentration µg /m^3	Comments
REXBURG, CMS			
	10/2/00	19.6	
	10/8/00	23.4	
	10/14/00	9.9	
	10/20/00	44.3	
	10/26/00		Filter Problem
	11/1/00	10.9	
	11/7/00	16.7	
	11/13/00	61.5	
	11/19/00	41.9	
	11/25/00	17.7	
	12/1/00	35.2	
	12/7/00	112.0	
	12/13/00	13.7	
	12/19/00	12.3	
	12/25/00	-0.3	
	12/27/00	26.2	

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

Location	Sampling Date	Concentration +/- 2s [a] pCi [b]/L			Concentration +/- 2s Bq [c]/L		
CFA							
	11/6/00	284.7	±	85.4	10.54	±	3.16
	12/4/00	83.2	±	81.8	3.08	±	3.03
	12/31/00	171.4	±	64.3	6.34	±	2.38
EFS							
	10/10/00	6.8	±	80.4	0.25	±	2.97
	10/17/00	83.7	±	81.6	3.10	±	3.02
	10/31/00	154.4	±	83.4	5.71	±	3.09
	11/14/00	63.4	±	82.0	2.35	±	3.03
IDAHO FALLS							
	11/4/00	73.2	±	82.2	2.71	±	3.04
	12/4/00	35.8	±	81.2	1.33	±	3.00
	12/31/00	129.1	±	63.7	4.78	±	2.36

a *2s = 2 Standard Deviations*
b *pCi = Standard Units (see "Helpful Information")*
c *Bq = Systeme International d'Unites (see "Helpful Information")*

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

Sample Type & Location	Sampling Date	Analyte	Concentration +/- 2s [a] pCi [b]/L			Concentration +/- 2s Bq [c]/L		
DRINKING WATER								
ABERDEEN								
	10/14/00	GROSS ALPHA	0.70	±	1.11	0.03	±	0.04
	10/14/00	GROSS BETA	2.81	±	1.99	0.10	±	0.07
	10/14/00	TRITIUM	49.40	±	71.40	1.83	±	2.64
ARCO								
	11/8/00	GROSS ALPHA	0.41	±	0.75	0.02	±	0.03
	11/8/00	GROSS BETA	0.16	±	1.67	0.01	±	0.06
	11/8/00	TRITIUM	41.20	±	72.00	1.52	±	2.66
ATOMIC CITY								
	11/8/00	GROSS ALPHA	0.47	±	0.89	0.02	±	0.03
	11/8/00	GROSS BETA	3.55	±	1.92	0.13	±	0.07
	11/8/00	TRITIUM	55.90	±	72.20	2.07	±	2.67
CAREY								
	11/8/00	GROSS ALPHA	-0.18	±	0.69	-0.01	±	0.03
	11/8/00	GROSS BETA	-0.60	±	1.65	-0.02	±	0.06
	11/8/00	TRITIUM	28.50	±	71.00	1.05	±	2.63
FORT HALL								
	11/14/00	GROSS ALPHA	-0.44	±	0.90	-0.02	±	0.03
	11/14/00	GROSS BETA	5.98	±	2.16	0.22	±	0.08
	11/14/00	TRITIUM	43.50	±	71.20	1.61	±	2.63
HOWE								
	11/8/00	GROSS ALPHA	0.75	±	0.98	0.03	±	0.04
	11/8/00	GROSS BETA	1.02	±	1.81	0.04	±	0.07
	11/8/00	TRITIUM	5.80	±	71.60	0.21	±	2.65
IDAHO FALLS								
	11/20/00	GROSS ALPHA	-0.17	±	0.75	-0.01	±	0.03
	11/20/00	GROSS BETA	1.95	±	1.83	0.07	±	0.07
	11/20/00	TRITIUM	55.50	±	72.20	2.05	±	2.67

[a] *2s = 2 Standard Deviations*

[b] *µCi = Standard Units (see "Helpful Information")*

[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

TABLE C-7 (cont): Bi-annual Gross Alpha, Gross Beta & Tritium Concentrations in Drinking & Surface Water

Sample Type & Location	Sampling Date	Analyte	Concentration +/- 2s [a] pCi [b]/L			Concentration +/- 2s Bq [c]/L		
MINIDOKA								
	11/7/00	GROSS ALPHA	0.00	±	0.79	0.00	±	0.03
	11/7/00	GROSS BETA	2.04	±	1.84	0.08	±	0.07
	11/7/00	TRITIUM	57.60	±	71.40	2.13	±	2.64
MONTEVIEW								
	11/8/00	GROSS ALPHA	3.08	±	1.88	0.11	±	0.07
	11/8/00	GROSS BETA	9.54	±	2.68	0.35	±	0.10
	11/8/00	TRITIUM	0.28	±	71.40	0.01	±	2.64
MORELAND								
	12/1/00	GROSS ALPHA	0.52	±	1.10	0.02	±	0.04
	12/1/00	GROSS BETA	9.73	±	2.46	0.36	±	0.09
	12/1/00	TRITIUM	-74.90	±	62.60	-2.77	±	2.32
MUD LAKE								
	11/8/00	GROSS ALPHA	-0.17	±	0.55	-0.01	±	0.02
	11/8/00	GROSS ALPHA	-0.48	±	0.45	-0.02	±	0.02
	11/8/00	GROSS BETA	1.39	±	1.68	0.05	±	0.06
	11/8/00	GROSS BETA	0.62	±	1.65	0.02	±	0.06
	11/8/00	TRITIUM	59.60	±	72.20	2.21	±	2.67
	11/8/00	TRITIUM	-34.70	±	71.00	-1.28	±	2.63
ROBERTS								
	11/6/00	GROSS ALPHA	0.90	±	0.99	0.03	±	0.04
	11/6/00	GROSS BETA	6.32	±	2.08	0.23	±	0.08
	11/6/00	TRITIUM	34.90	±	71.20	1.29	±	2.63
SHOSHONE								
	11/7/00	GROSS ALPHA	0.51	±	0.89	0.02	±	0.03
	11/7/00	GROSS BETA	1.96	±	1.83	0.07	±	0.07
	11/7/00	TRITIUM	161.00	±	73.40	5.96	±	2.72

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

TABLE C-7 (cont): Bi-annual Gross Alpha, Gross Beta & Tritium Concentrations in Drinking & Surface Water

Sample Type & Location	Sampling Date	Analyte	Concentration +/- 2s[a] pCi[b]/L			Concentration +/- 2s Bq[c]/L		
TABOR								
	11/8/00	GROSS ALPHA	-0.22	±	0.85	-0.01	±	0.03
	11/8/00	GROSS BETA	2.77	±	1.94	0.10	±	0.07
	11/8/00	TRITIUM	17.10	±	71.00	0.63	±	2.63
SURFACE WATER								
BLISS								
	11/30/00	GROSS ALPHA	1.00	±	0.89	0.04	±	0.03
	11/30/00	GROSS BETA	5.88	±	1.91	0.22	±	0.07
	11/30/00	TRITIUM	18.70	±	64.00	0.69	±	2.37
BUHL								
	11/7/00	GROSS ALPHA	0.90	±	0.81	0.03	±	0.03
	11/7/00	GROSS BETA	3.72	±	1.75	0.14	±	0.06
	11/7/00	TRITIUM	44.00	±	72.00	1.63	±	2.66
HAGERMAN								
	11/7/00	GROSS ALPHA	0.57	±	0.66	0.02	±	0.02
	11/7/00	GROSS BETA	3.43	±	1.68	0.13	±	0.06
	11/7/00	TRITIUM	-72.60	±	62.80	-2.69	±	2.32
IDAHO FALLS								
	11/20/00	GROSS ALPHA	0.30	±	0.73	0.01	±	0.03
	11/20/00	GROSS ALPHA	0.09	±	0.54	0.00	±	0.02
	11/20/00	GROSS BETA	1.69	±	1.73	0.06	±	0.06
	11/20/00	GROSS BETA	3.46	±	1.68	0.13	±	0.06
	11/20/00	TRITIUM	52.90	±	61.80	1.96	±	2.29
	11/20/00	TRITIUM	1.54	±	63.80	0.06	±	2.36
TWIN FALLS								
	11/7/00	GROSS ALPHA	0.47	±	0.86	0.02	±	0.03
	11/7/00	GROSS BETA	6.66	±	2.02	0.25	±	0.07
	11/7/00	TRITIUM	-47.70	±	63.00	-1.76	±	2.33

[a] 2s = 2 Standard Deviations
[b] µCi = Standard Units (see "Helpful Information")
[c] Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-8: Monthly Iodine-131 & Cesium-137 Concentrations in Milk

Sample Group & Location	Sampling Date	Analyte	Concentration +/- 2s[a] pCi[b]/L			Concentration +/- 2s Bq[c]/L		
BLACKFOOT								
	10/3/00	CESIUM-137	-1.1	±	6.6	-0.04	±	0.25
	10/3/00	IODINE-131	-0.1	±	5.2	0.00	±	0.19
	11/7/00	CESIUM-137	-0.3	±	2.2	-0.01	±	0.08
	11/7/00	IODINE-131	0.8	±	1.9	0.03	±	0.07
	12/4/00	CESIUM-137	0.9	±	2.6	0.03	±	0.10
	12/4/00	IODINE-131	1.8	±	2.7	0.07	±	0.10
CAREY								
	10/3/00	CESIUM-137	1.1	±	3.3	0.04	±	0.12
	10/3/00	IODINE-131	1.6	±	3.0	0.06	±	0.11
	11/7/00	CESIUM-137	12.4	±	5.9	0.46	±	0.22
	11/7/00	IODINE-131	-1.9	±	6.3	-0.07	±	0.23
	12/5/00	CESIUM-137	-3.1	±	6.7	-0.11	±	0.25
	12/5/00	IODINE-131	-0.8	±	4.8	-0.03	±	0.18
DIETRICH								
	10/3/00	CESIUM-137	0.5	±	2.4	0.02	±	0.09
	10/3/00	IODINE-131	-0.4	±	3.0	-0.01	±	0.11
	11/7/00	CESIUM-137	-0.7	±	2.6	-0.03	±	0.10
	11/7/00	IODINE-131	0.9	±	3.3	0.03	±	0.12
	12/5/00	CESIUM-137	-1.3	±	2.2	-0.05	±	0.08
	12/5/00	IODINE-131	-0.1	±	1.6	0.00	±	0.06
HOWE								
	10/2/00	CESIUM-137	1.4	±	2.5	0.05	±	0.09
	10/2/00	IODINE-131	-1.5	±	3.1	-0.05	±	0.12
	11/6/00	CESIUM-137	2.1	±	2.6	0.08	±	0.10
	11/6/00	IODINE-131	3.2	±	3.2	0.12	±	0.12
	12/4/00	CESIUM-137	13.5	±	5.6	0.50	±	0.21
	12/4/00	IODINE-131	-2.2	±	5.5	-0.08	±	0.20
IDAHO FALLS								
	10/2/00	CESIUM-137	0.2	±	2.3	0.01	±	0.08
	10/2/00	IODINE-131	-0.6	±	1.9	-0.02	±	0.07
	10/12/00	CESIUM-137	-1.4	±	6.5	-0.05	±	0.24
	10/12/00	IODINE-131	2.2	±	5.6	0.08	±	0.21
	10/19/00	CESIUM-137	-7.4	±	7.0	-0.27	±	0.26
	10/19/00	IODINE-131	1.2	±	5.6	0.04	±	0.21
	10/26/00	CESIUM-137	0.7	±	2.3	0.03	±	0.08
	10/26/00	IODINE-131	0.5	±	1.6	0.02	±	0.06
	11/2/00	CESIUM-137	-0.9	±	2.6	-0.03	±	0.10
	11/2/00	IODINE-131	1.1	±	2.8	0.04	±	0.10
	11/6/00	CESIUM-137	1.1	±	2.5	0.04	±	0.09
	11/6/00	IODINE-131	0.8	±	3.0	0.03	±	0.11

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE: The same sampling date for a given location is the same sample analysed for both Cesium-137 and Iodine-131.
NOTE: All locations are sampled monthly with the exception of Idaho Falls which is sampled weekly.

TABLE C-8 (cont): Monthly Iodine-131 & Cesium-137 Concentrations in Milk

Location	Sampling Date	Analyte	Concentration +/- 2s [a] pCi [b]/L			Concentration +/- 2s Bq [c]/L		
	11/16/00	CESIUM-137	1.5	±	6.7	0.06	±	0.25
	11/16/00	IODINE-131	0.3	±	4.4	0.01	±	0.16
	11/22/00	CESIUM-137	12.4	±	5.5	0.46	±	0.20
	11/22/00	IODINE-131	-0.3	±	5.1	-0.01	±	0.19
	11/30/00	CESIUM-137	-6.0	±	6.9	-0.22	±	0.26
	11/30/00	IODINE-131	0.0	±	6.2	0.00	±	0.23
	12/4/00	CESIUM-137	-0.3	±	2.2	-0.01	±	0.08
	12/4/00	IODINE-131	1.4	±	1.7	0.05	±	0.06
	12/14/00	CESIUM-137	-7.8	±	6.9	-0.29	±	0.25
	12/14/00	IODINE-131	2.8	±	5.5	0.10	±	0.20
	12/20/00	CESIUM-137	-1.5	±	6.7	-0.06	±	0.25
	12/20/00	IODINE-131	0.7	±	4.4	0.03	±	0.16
	12/27/00	CESIUM-137	-5.2	±	6.7	-0.19	±	0.25
	12/27/00	IODINE-131	-3.3	±	4.6	-0.12	±	0.17
MINIDOKA								
	10/3/00	CESIUM-137	15.4	±	5.9	0.57	±	0.22
	10/3/00	IODINE-131	3.1	±	7.0	0.11	±	0.26
	11/7/00	CESIUM-137	-5.6	±	6.8	-0.21	±	0.25
	11/7/00	IODINE-131	2.5	±	7.1	0.09	±	0.26
	12/5/00	CESIUM-137	-0.3	±	2.2	-0.01	±	0.08
	12/5/00	IODINE-131	-0.5	±	1.7	-0.02	±	0.06
MORELAND								
	12/4/00	CESIUM-137	10.5	±	5.9	0.39	±	0.22
	12/4/00	IODINE-131	0.9	±	5.4	0.03	±	0.20
ROBERTS								
	10/2/00	CESIUM-137	-0.9	±	6.6	-0.03	±	0.24
	10/2/00	IODINE-131	-1.7	±	7.3	-0.06	±	0.27
	11/6/00	CESIUM-137	11.5	±	5.8	0.43	±	0.22
	11/6/00	IODINE-131	-0.5	±	5.7	-0.02	±	0.21
	12/4/00	CESIUM-137	2.1	±	2.4	0.08	±	0.09
	12/4/00	IODINE-131	2.5	±	3.0	0.09	±	0.11
TERRETON								
	10/2/00	CESIUM-137	10.7	±	6.0	0.40	±	0.22
	10/2/00	IODINE-131	-0.8	±	6.2	-0.03	±	0.23
	11/6/00	CESIUM-137	13.5	±	5.8	0.50	±	0.22
	11/6/00	IODINE-131	-3.4	±	6.4	-0.13	±	0.24
	12/4/00	CESIUM-137	-7.1	±	6.7	-0.26	±	0.25
	12/4/00	IODINE-131	2.5	±	4.5	0.09	±	0.17

[a] *2s = 2 Standard Deviations*
[b] *µCi = Standard Units (see "Helpful Information")*
[c] *Bq = Systeme International d'Unites (see "Helpful Information")*

NOTE: The same sampling date for a given location is the same sample analysed for both Cesium-137 and Iodine-131.
NOTE: All locations are sampled monthly with the exception of Idaho Falls which is sampled weekly.

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

Location	Sampling Date	Concentration +/- 2s[a] pCi[b]/L			Concentration +/- 2s Bq[c]/L		
DIETRICH							
	11/7/00	1.1	±	0.5	0.04	±	0.02
HOWE							
	11/7/00	0.5	±	0.4	0.02	±	0.01
ROBERTS							
	11/7/00	1.7	±	1.6	0.06	±	0.06

a ***2s = 2 Standard Deviations***

b ***µCi = Standard Units (see "Helpful Information")***

c ***Bq = Systeme International d'Unites (see "Helpful Information")***

TABLE C-10: Cesium-137 & Iodine-131 Concentrations in Game Animals

Species & Media	Sampling Date	Analyte	Concentration +/- 2s[a] pCi[b]/kg			Concentration +/- 2s Bq[c]/kg		
MULE DEER								
LIVER								
	10/4/00	CESIUM-137	-6.0	±	12.7	-0.2	±	0.5
	10/4/00	IODINE-131	-4.0	±	24.0	-0.1	±	0.9
MUSCLE								
	10/4/00	CESIUM-137	0.4	±	10.2	0.0	±	0.4
	10/4/00	IODINE-131	21.7	±	22.0	0.8	±	0.8
THYROID								
	10/4/00	CESIUM-137	4600.0	±	5300.0	170.2	±	196.1
	10/4/00	IODINE-131	-168.0	±	159.0	-6.2	±	5.9
MULE DEER								
MUSCLE								
	10/5/00	CESIUM-137	0.1	±	8.2	0.0	±	0.3
	10/5/00	IODINE-131	-5.0	±	15.7	-0.2	±	0.6
THYROID								
	10/5/00	CESIUM-137	-613.0	±	980.0	-22.7	±	36.3
	10/5/00	IODINE-131	-337.0	±	580.0	-12.5	±	21.5
MULE DEER								
LIVER								
	10/12/00	CESIUM-137	-0.7	±	10.3	0.0	±	0.4
	10/12/00	IODINE-131	-5.8	±	11.8	-0.2	±	0.4
MUSCLE								
	10/12/00	CESIUM-137	-2.0	±	10.5	-0.1	±	0.4
	10/12/00	IODINE-131	4.1	±	13.3	0.2	±	0.5
THYROID								
	10/12/00	CESIUM-137	-131.0	±	810.0	-4.8	±	30.0
	10/12/00	IODINE-131	193.0	±	436.0	7.1	±	16.1

a 2s = 2 Standard Deviations
b pCi = Standard Units (see "Helpful Information")
c Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-10 (cont): Cesium-137 & Iodine-131 Concentrations in Game Animals

Species & Media	Sampling Date	Analyte	Concentration +/- 2s [a] pCi [b]/kg			Concentration +/- 2s Bq [c]/kg		
ELK								
LIVER								
	10/24/00	CESIUM-137	4.4	±	8.6	0.2	±	0.3
	10/24/00	IODINE-131	2.4	±	4.8	0.1	±	0.2
MUSCLE								
	10/24/00	CESIUM-137	3.6	±	1.9	0.1	±	0.1
	10/24/00	IODINE-131	-0.1	±	1.9	0.0	±	0.1
THYROID								
	10/24/00	CESIUM-137	-8.0	±	47.0	-0.3	±	1.7
	10/24/00	IODINE-131	-33.7	±	42.0	-1.2	±	1.6
MULE DEER								
LIVER								
	10/25/00	CESIUM-137	0.8	±	7.9	0.0	±	0.3
	10/25/00	IODINE-131	-0.2	±	4.9	0.0	±	0.2
MUSCLE								
	10/25/00	CESIUM-137	-0.4	±	9.1	0.0	±	0.3
	10/25/00	IODINE-131	-2.9	±	5.4	-0.1	±	0.2
THYROID								
	10/25/00	CESIUM-137	12.5	±	220.0	0.5	±	8.1
	10/25/00	IODINE-131	46.5	±	116.0	1.7	±	4.3

[a] 2s = 2 Standard Deviations
[b] pCi = Standard Units (see "Helpful Information")
[c] Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-11: Cesium-137 Concentrations in Potatoes

Location	Sampling Date	Lab QC Type	Concentration +/- 2s[a] pCi[b]/kg			Concentration +/- 2s Bq[c]/kg		
POTATOES								
ARCO	10/3/00	N/A	6.0	±	4.1	0.22	±	0.15
ARCO	10/3/00	RECOUNT	5.3	±	8.3	0.20	±	0.31
CENTER, COLORADO	10/17/00	N/A	1.3	±	11.5	0.05	±	0.43
FAIRBANKS, ALASKA	9/28/00	N/A	-4.2	±	11.2	-0.15	±	0.41
FORT HALL	10/10/00	N/A	1.8	±	3.5	0.07	±	0.13
IDAHO FALLS	10/5/00	N/A	1.7	±	2.8	0.06	±	0.10
MONTEVIEW	10/4/00	N/A	-2.8	±	12.7	-0.10	±	0.47
RUPERT	10/3/00	N/A	3.9	±	15.0	0.14	±	0.56
TABOR	10/4/00	N/A	-1.5	±	2.6	-0.06	±	0.10
TIVERTON, RHODE ISLAND	9/21/00	N/A	-4.5	±	14.6	-0.17	±	0.54

[a] 2s = 2 Standard Deviations

[b] pCi = Standard Units (see "Helpful Information")

[c] Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-12: Strontium-90 Concentrations in Potatoes

Location	Sampling Date	Concentration +/- 2s[a] pCi[b]/kg			Concentration +/- 2s Bq[c]/kg		
POTATOES							
ARCO	*10/3/00*	23.8	±	52.0	0.88	±	1.92
CENTER, COLORADO	*10/17/00*	-11.1	±	41.0	-0.41	±	1.52
FAIRBANKS, ALASKA	*9/28/00*	-3.3	±	46.0	-0.12	±	1.70
FORT HALL	*10/10/00*	3.4	±	33.0	0.13	±	1.22
IDAHO FALLS	*10/5/00*	-6.9	±	30.0	-0.25	±	1.11
MONTEVIEW	*10/4/00*	-42.3	±	71.0	-1.57	±	2.63
RUPERT	*10/3/00*	30.1	±	44.0	1.11	±	1.63
TABOR	*10/4/00*	8.0	±	50.0	0.30	±	1.85
TIVERTON, RHODE ISLAND	*9/21/00*	1.4	±	46.0	0.05	±	1.70

[a] ***2s = 2 Standard Deviations***

[b] ***pCi = Standard Units (see "Helpful Information")***

[c] ***Bq = Systeme International d'Unites (see "Helpful Information")***

TABLE C-13: Americium-241, Plutonium-238, Plutonium-239/240, Cesium-137, Cobalt-60 & Strontium-90 Concentrations in Water Fowl

Species & Sample ID	Sampling Date	Analyte	Concentration +/- 2s [a] 10^{-3} pCi [b]/g			Concentration +/- 2s Bq [c]/g		
ANL-W INDUSTRIAL WASTE POND								
00-WF-ANL1-MUS								
	10/21/00	AMERICIUM-241	0.6	±	1.1	0.0	±	0.0
	10/21/00	PLUTONIUM-238	0.4	±	0.8	0.0	±	0.0
	10/21/00	PLUTONIUM-239/240	0.0	±	1.0	0.0	±	0.0
	10/21/00	CESIUM-137	2.6	±	33.0	0.1	±	1.2
	10/21/00	COBALT-60	38.5	±	40.0	1.4	±	1.5
	10/21/00	STRONTIUM-90	62.1	±	140.0	2.3	±	5.2
EVAPORATION PONDS								
00-WF-TRA2-MUS								
	9/23/00	CESIUM-137	0.0	±	300.0	0.0	±	11.1
	9/23/00	COBALT-60	-100.0	±	240.0	-3.7	±	8.9
00-WF-TRA3-MUS								
	9/23/00	AMERICIUM-241	1.0	±	7.4	0.0	±	0.3
	9/23/00	PLUTONIUM-238	2.8	±	11.9	0.1	±	0.4
	9/23/00	PLUTONIUM-239/240	4.4	±	7.5	0.2	±	0.3
	9/23/00	CESIUM-137	160.0	±	120.0	5.9	±	4.4
	9/23/00	COBALT-60	2100.0	±	180.0	77.7	±	6.7
	9/23/00	STRONTIUM-90	24.5	±	183.6	0.9	±	6.8
00-WF-TRA4-MUS								
	9/23/00	AMERICIUM-241	-0.3	±	8.7	0.0	±	0.3
	9/23/00	PLUTONIUM-238	-1.6	±	3.9	-0.1	±	0.1
	9/23/00	PLUTONIUM-239/240	-0.3	±	6.1	0.0	±	0.2
	9/23/00	CESIUM-137	810.0	±	160.0	30.0	±	5.9
	9/23/00	COBALT-60	260.0	±	120.0	9.6	±	4.4
	9/23/00	STRONTIUM-90	76.8	±	248.0	2.8	±	9.2
00-WF-TRA5-MUS								
	9/23/00	CESIUM-137	710.0	±	140.0	26.3	±	5.2
	9/23/00	COBALT-60	450.0	±	100.0	16.7	±	3.7

a 2s = 2 Standard Deviations
b pCi = Standard Units (see "Helpful Information")
c Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-13 (cont.): Americium-241, Plutonium-238, Plutonium-239/240, Cesium-137, Cobalt-60 & Strontium-90 Concentrations in Water Fowl

Species & Sample ID	Sampling Date	Analyte	Concentration +/- 2s [a] 10^{-3} pCi [b]/g			Concentration +/- 2s Bq [c]/g		
EVAPORATION PONDS (EAST)								
00-WF-TRA1-MUS								
	9/23/00	AMERICIUM-241	-1.3	±	7.1	0.0	±	0.3
	9/23/00	PLUTONIUM-238	-2.9	±	6.4	-0.1	±	0.2
	9/23/00	PLUTONIUM-239/240	4.6	±	18.5	0.2	±	0.7
	9/23/00	CESIUM-137	580.0	±	140.0	21.5	±	5.2
	9/23/00	COBALT-60	4300.0	±	260.0	159.1	±	9.6
	9/23/00	STRONTIUM-90	-18.1	±	137.6	-0.7	±	5.1
INTEC PERC PONDS								
00-WF-INT1-MUS								
	9/22/00	AMERICIUM-241	-0.8	±	7.8	0.0	±	0.3
	9/22/00	PLUTONIUM-238	0.0	±	5.4	0.0	±	0.2
	9/22/00	PLUTONIUM-239/240	0.0	±	6.6	0.0	±	0.2
	9/22/00	CESIUM-137	-20.0	±	220.0	-0.7	±	8.1
	9/22/00	COBALT-60	-110.0	±	180.0	-4.1	±	6.7
	9/22/00	STRONTIUM-90	-191.0	±	200.0	-7.1	±	7.4
MUD LAKE								
00-WF-CON1-MUS								
	10/21/00	CESIUM-137	13.9	±	34.0	0.5	±	1.3
	10/21/00	COBALT-60	23.6	±	42.0	0.9	±	1.6
00-WF-CON2-MUS								
	10/21/00	AMERICIUM-241	0.7	±	0.9	0.0	±	0.0
	10/21/00	PLUTONIUM-238	-0.2	±	0.3	0.0	±	0.0
	10/21/00	PLUTONIUM-239/240	0.0	±	1.0	0.0	±	0.0
	10/21/00	CESIUM-137	38.9	±	39.0	1.4	±	1.4
	10/21/00	COBALT-60	-28.9	±	49.0	-1.1	±	1.8
	10/21/00	STRONTIUM-90	57.4	±	110.0	2.1	±	4.1
00-WF-CON3-MUS								
	10/21/00	CESIUM-137	-18.7	±	28.0	-0.7	±	1.0
	10/21/00	COBALT-60	16.4	±	37.0	0.6	±	1.4

a 2s = 2 Standard Deviations
b pCi = Standard Units (see "Helpful Information")
c Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-14: Americium-241, Plutonium-238, Plutonium-239/240, Cesium-137, Cobalt-60 & Strontium-90 Concentrations in Doves

Sample ID	Sampling Date	Analyte	Concentration +/- 2s[a] 10^{-3} pCi[b]/g			Concentration +/- 2s Bq[c]/g		
EVAPORATION PONDS (WEST)								
00-DV-TRA1-MUS								
	8/31/00	AMERICIUM-241	-0.3	±	0.4	0.0	±	0.0
	8/31/00	PLUTONIUM-238	-0.3	±	0.4	0.0	±	0.0
	8/31/00	PLUTONIUM-239/240	0.1	±	0.9	0.0	±	0.0
	8/31/00	CESIUM-137	8.7	±	42.0	0.3	±	1.6
	8/31/00	COBALT-60	-27.3	±	51.0	-1.0	±	1.9
	8/31/00	STRONTIUM-90	37.5	±	120.0	1.4	±	4.4
00-DV-TRA2-MUS								
	8/27/00	CESIUM-137	-9.3	±	31.0	-0.3	±	1.1
	8/27/00	COBALT-60	18.4	±	35.0	0.7	±	1.3
00-DV-TRA3-MUS								
	8/15/00	CESIUM-137	36.7	±	35.0	1.4	±	1.3
	8/15/00	COBALT-60	3.1	±	44.0	0.1	±	1.6
INTEC PERC PONDS								
00-DV-INTEC1-MUS								
	8/21/00	AMERICIUM-241	-0.1	±	0.3	0.0	±	0.0
	8/21/00	PLUTONIUM-238	0.2	±	1.3	0.0	±	0.0
	8/21/00	PLUTONIUM-239/240	0.2	±	0.9	0.0	±	0.0
	8/21/00	CESIUM-137	32.1	±	28.0	1.2	±	1.0
	8/21/00	COBALT-60	-1.0	±	34.0	0.0	±	1.3
	8/21/00	STRONTIUM-90	-64.4	±	98.0	-2.4	±	3.6
00-DV-INTEC2-MUS								
	8/18/00	CESIUM-137	40.8	±	36.0	1.5	±	1.3
	8/18/00	COBALT-60	46.1	±	48.0	1.7	±	1.8
MARKET LAKE								
00-DV-1-MUS								
	9/5/00	AMERICIUM-241	1.0	±	1.4	0.0	±	0.1
	9/5/00	PLUTONIUM-238	-0.2	±	0.4	0.0	±	0.0
	9/5/00	PLUTONIUM-239/240	-0.6	±	0.7	0.0	±	0.0
	9/5/00	CESIUM-137	10.3	±	31.0	0.4	±	1.1
	9/5/00	COBALT-60	-30.1	±	41.0	-1.1	±	1.5
	9/5/00	STRONTIUM-90	37.8	±	130.0	1.4	±	4.8
00-DV-2-MUS								
	9/5/00	CESIUM-137	3.9	±	31.0	0.1	±	1.1
	9/5/00	COBALT-60	27.4	±	42.0	1.0	±	1.6

[a] 2s = 2 Standard Deviations
[b] pCi = Standard Units (see "Helpful Information")
[c] Bq = Systeme International d'Unites (see "Helpful Information")

TABLE C-15: Environmental Radiation Results

Sample Group & Location	*Sampling Date*	*Radiation Measurement (mR)*	*Radiation Measurement +/- 1s [a] (mR)*
BOUNDARY			
MUD LAKE	*11/8/00*	74.1	7.3
MONTEVIEW	*11/8/00*	61.7	6.1
HOWE	*11/8/00*	62.7	6.2
BIRCH CREEK	*11/8/00*	55.8	5.5
ATOMIC CITY	*11/8/00*	70.7	7.0
ARCO	*11/8/00*	68.6	6.7
DISTANT			
MINIDOKA	*11/7/00*	62.6	6.2
ROBERTS	*11/8/00*	76.0	7.5
REXBURG, CMS	*11/8/00*	76.6	7.5
IDAHO FALLS	*11/8/00*	74.4	7.3
CRATERS OF THE MOON	*11/8/00*	68.0	6.7
BLACKFOOT, CMS	*11/8/00*	64.6	6.4
BLACKFOOT	*11/8/00*	69.4	6.8
ABERDEEN	*11/14/00*	74.0	7.3

[a] ***1s = 1 Standard Deviation***