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

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EXECUTIVE SUMMARY

This report for the third quarter, 2000, consists of 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, July 1 through September 30, 2001. 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 particulate filters, charcoal cartridges, atmospheric moisture, and precipitation;
- Foodstuff sampling, including milk, wheat, lettuce, large game animal collection; and;
- Soil.

Air monitors were operated continuously at 15 locations, plus 2 replicate samplers, with particulate filters and charcoal cartridges sampled weekly. No ^{131}I was detected in any of the weekly charcoal cartridges during the third quarter. During two of the thirteen weeks, average gross alpha concentrations at INEEL locations were statistically higher than Boundary and/or Distant averages. Average gross beta concentrations at INEEL locations were not statistically higher than Boundary or Distant location averages during any week of the third quarter, 2000.

Three wildfires burned on the INEEL during the third quarter, 2000. Increased particulates in air from dry conditions across southeast Idaho and from fires had the expected effect of elevating gross alpha and beta concentrations in air, however, great variation existed in whether concentrations were higher at INEEL, Boundary, or Distant locations. There were no trends of INEEL sample locations being higher than Boundary being higher than Distant locations, as one would expect if the INEEL was the source of radionuclide contamination.

Selected quarterly composited filters were analyzed for gamma emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. None of these radionuclides were detected in any of the third quarter composite samples.

An atmospheric moisture sample was obtained from each of the Rexburg, Blackfoot (CMS), Idaho Falls, and Atomic City sampling locations during the third quarter. The Blackfoot (CMS) sample (June 22 through September 27), had the only result greater than its 2s value [(29.7 ± 14.7) x 10^{-14} µCi/mL of air, or (11.0 ± 5.4) x 10^{-9} Bq/mL of air]. This result was both less than the minimum detectable concentration (MDC) and over 300,000 times lower than the Derived Concentration Guide (DCG) value of 1 x 10^{-7} µCi/mL (3.7 x 10^{-3} Bq/mL) for tritium in air. The DCG values are concentrations set to ensure dose limits are not exceeded.

The EPA began using a standard for concentrations of airborne particulate matter (PM) less than 10 micrometers in diameter in 1987. 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. Twenty-four hour sampling periods were conducted once every six days for a total of 15 samples collected at each of the three locations. However, filter problems during two weeks at Rexburg invalidated two samples during the third quarter. PM_{10} concentrations were below EPA health standard levels (limit for maximum 24-hour concentration is 150 µg/m^3) for all samples. The maximum 24-hour concentration was 114.3 µg/m^3 on August 9, 2000, in Atomic City.

Precipitation occurred during two weeks at EFS allowing the collection of two weekly samples during the third quarter. There was not enough precipitation (>10 mL) at CFA in September for a monthly sample. No tritium was detected in monthly Idaho Falls precipitation samples. The EFS and CFA samples had tritium results ranging from 87.5 ∀ 81.0 pCi/L (3.2 ± 3.0 Bq/L) at CFA in July to 516.7 ∀ 91.1 pCi/L (19.1 ± 3.4 Bq/L) at EFS the week ending July 18. 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 tritium measured in the EFS and CFA precipitation samples were 38 to 914 times lower than these limits.

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL. A total of 35 milk samples were collected during the third quarter. All samples were analyzed for gamma emitting radionuclides. The only human-made gamma emitting radionuclide detected was ^{137}Cs. A total of five milk samples; one each from Carey, Howe, Idaho Falls, Mud Lake, and Moreland, had ^{137}Cs results greater than their associated 2s values. The ^{137}Cs detected in milk around the INEEL was at very low concentrations and indistinguishable from levels expected from ^{137}Cs released during historical fallout events. 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 120 pCi/L limit is about eight times higher than the maximum concentration measured in milk during the third quarter, 2000.

Three mule deer and two elk killed by vehicle collisions on the INEEL were sampled during the third quarter, 2000. Thyroid, muscle, and liver tissue were collected from each and analyzed for gamma emitting radionuclides. The ^{137}Cs results for the muscle samples from one mule deer, one elk, and the liver sample from another mule deer were greater than the 2s uncertainty level. Cesium-137 is an analog of potassium and is readily incorporated in muscle and organ tissues. The ^{137}Cs detected in big game on the INEEL during the third quarter was at very low levels and indistinguishable from that available from fallout from nuclear weapons tests or Chernobyl.

Eight lettuce samples were collected from private gardens and analyzed for gamma-emitting radionuclides and ^{90}Sr. No human-made gamma-emitting radionuclides were detected in any of the lettuce samples collected during the third quarter, 2000. Seven of the samples had ^{90}Sr concentrations greater than their associated 2s uncertainty. One sample, collected from Carey, had a ^{90}Sr concentration greater than the minimum detectable concentration. All ^{90}Sr results from the third quarter fell within the range of values measured over the past 10 years. They are also at levels impossible to differentiate from that available from global fallout events.

Ten wheat samples were collected from 10 local grain elevators. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr. The only human-made gamma-emitting radionuclide found was ^{137}Cs in the sample from Dietrich. Eight of the ten wheat samples collected during the third quarter had levels of ^{90}Sr greater than their associated 2s values. All ^{90}Sr results for wheat from the third quarter fell within the range of values measured over the past 10 years.

Soil samples are collected every two years to evaluate long-term trends. Samples were collected during the third quarter, 2000. Sample locations include boundary and distant localities. Samples are analyzed for gamma emitting radionuclides, ^{90}Sr, and certain actinides. All soil samples collected during the third quarter 2000 contained ^{137}Cs, ^{90}Sr, $^{239/240}$Pu, and

^{241}Am, with 33% having ^{238}Pu values greater than their respective 2s values. If INEEL inputs had contributed significantly to these concentrations, it would be expected that boundary concentrations would be higher than distant locations. There were no differences (using independent samples T-tests and ± = 0.05) between Boundary and Distant group concentrations for any of these radionuclides and values fell within the range expected from global nuclear fallout events.

There were no radionuclides measured in third quarter, 2000, ESER samples that 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 were not different from values measured at other locations across the United States. Based on these results, it is the conclusion of the ESER Program that the INEEL did not measurably contribute to offsite radionuclide concentrations during the third quarter of 2000 for constituents sampled.

A detailed explanation of the statistical significance of reported values is given on page xiii.

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LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
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
ISU	Idaho State University
L	liter
MDA	minimum detectable activity
MDC	minimum detectable concentration
mi	mile
mL	milliliter
mR	milliroentgens
mrem	millirem
µCi	microcurie
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
µSv	microseiverts
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. A list of 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

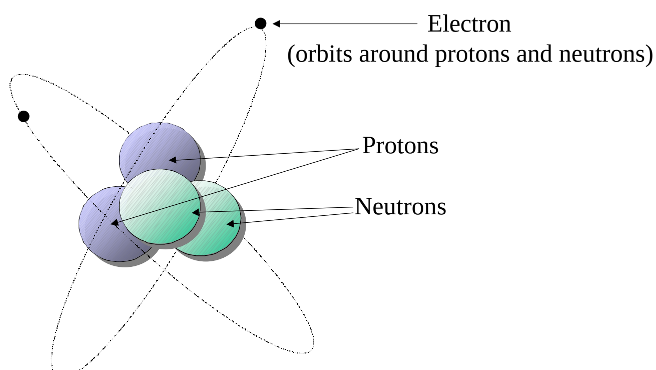


FIGURE 1. An atom of the element Helium. An element is a substance that is made up of only atoms with the same number of protons.

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.

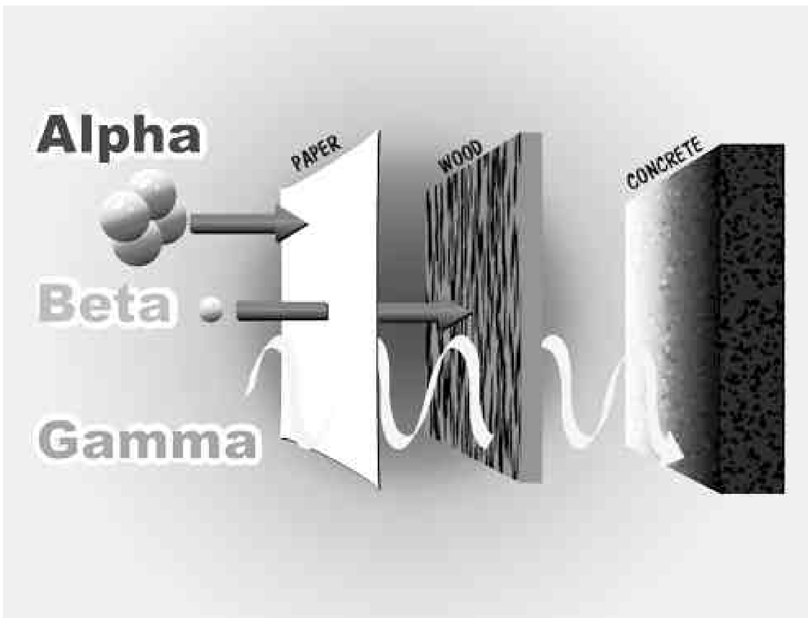
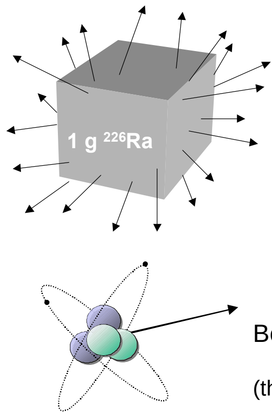


FIGURE 2. Three main types of radiation are alpha, beta, & gamma. Alpha and beta are particles emitted from an atom. Gamma radiation is short-wavelength electromagnetic waves (photons) emitted from atoms.

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).



Curie (Ci) =
37,000,000,000 disintegrations/second

(the conventional unit of activity is the curie)

Becquerel (Bq) = 1 disintegration/second

(the standard SI unit of activity is the becquerel)

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 units for very small and very large numbers are commonly expressed by scientists 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 of interest 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 of 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 are 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.

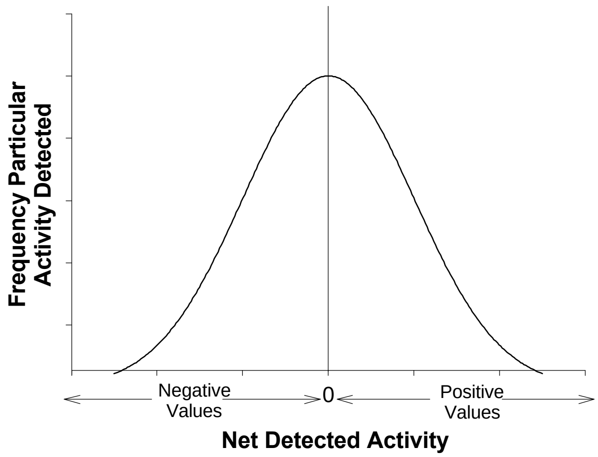


FIGURE 4. Expected frequency distribution for a sample with no radioactivity. If a sample containing no radioactivity was analyzed multiple times, a distribution of net values with an average of zero would result. Samples with radioactivity levels very close to zero are expected to have net results that 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.

It is the goal of the ESER program 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.

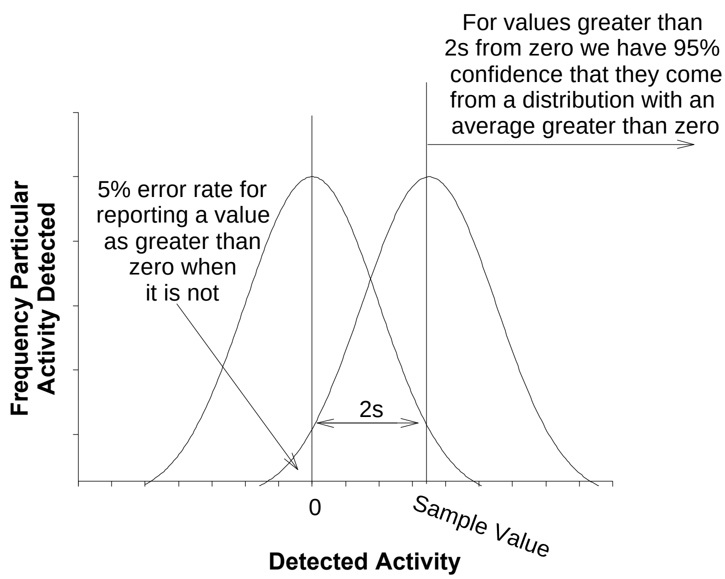


FIGURE 5. Radioactivity is reported when the result is greater than 2s from a net activity of zero. However, because there is variability around a net activity of zero for a sample with no radioactivity and variability around some value for a sample with radioactivity, there is a high rate for false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

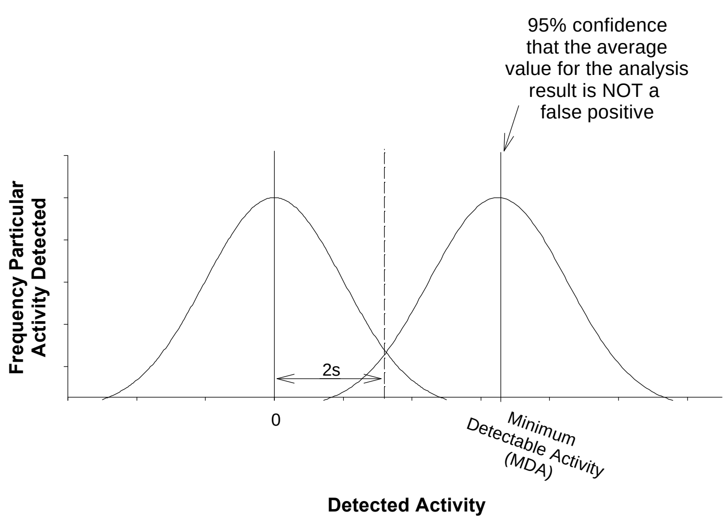


FIGURE 6. 95% confidence level that a sample result is not a false positive (95% confidence the sample result is greater than 2s from zero) is obtained when the sample result is greater than the MDA.

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 and Clean Water Act). The requirements imposed by DOE are specified in the 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 second 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 constituents of primary concern are radioactive isotopes and the surveillance program focuses on these constituents. 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 are then combined into 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 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 off of 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. Concentrations of particulates in the air are measured using PM_{10} samplers at three locations. Air sampling activities and results for the third 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 third 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 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 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.

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. See the *Gross versus Specific Analyses* portion of the *Helpful Information* section of this report for more information concerning gross alpha and beta radioactivity. 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, for each location was analyzed for gamma-emitting radionuclides with a subset analyzed for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am.

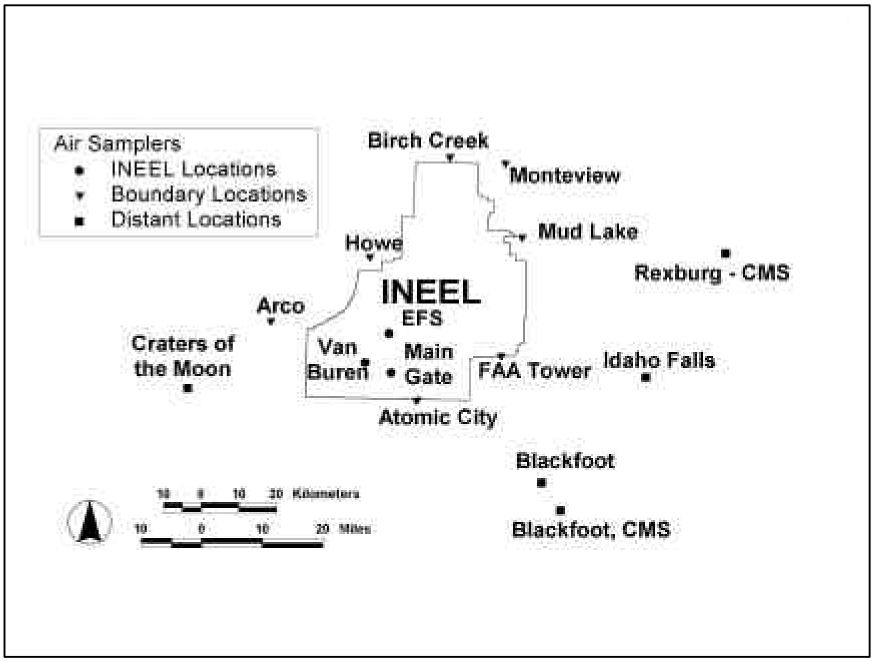


FIGURE 7. Continuous air sampling locations.

Weekly average gross alpha concentrations in air for INEEL, Boundary, and Distant locations are shown in Figure 8. During two of the thirteen weeks, average gross alpha concentrations at INEEL locations were significantly higher than Boundary and/or Distant averages (using independent samples T-tests and ± = 0.05). During the week ending August 30, the average INEEL gross alpha concentration (3.42×10^{-15} µCi/mL or 12.65×10^{-11} Bq/mL) was significantly higher than both the boundary location average (2.55×10^{-15} µCi/mL or 9.44×10^{-11} Bq/mL) and distant location average (2.14×10^{-15} µCi/mL or 7.92×10^{-11} Bq/mL). The INEEL average gross alpha concentration for the week ending September 20 (2.55×10^{-15} µCi/mL or 9.44×10^{-11} Bq/mL) was also significantly higher than the boundary average for that week (1.56×10^{-15} µCi/mL or 5.77×10^{-11} Bq/mL).

Weekly average gross beta concentrations in air for INEEL, Boundary, and Distant locations are shown in Figure 9. Average gross beta concentrations at INEEL locations were not significantly higher than Boundary or Distant location averages during any week of the third quarter, 2000. A summary of approximate minimum detectable concentrations for radiological analyses data is provided in Appendix B, while gross alpha and beta results for individual filters are listed in Table C-1 of Appendix C.

Three wildfires burned on the INEEL during the third quarter, 2000. Increased particulates in air from dry conditions across southeast Idaho and from fires (see Figure 16) had the expected effect of elevating gross alpha and beta concentrations in air. Figures 8 and 9, however, show great variation in whether concentrations were higher at INEEL, Boundary, or Distant locations. There were no trends of INEEL being higher than Boundary being higher than Distant locations, as one would expect if the INEEL was the source of radionuclide contamination.

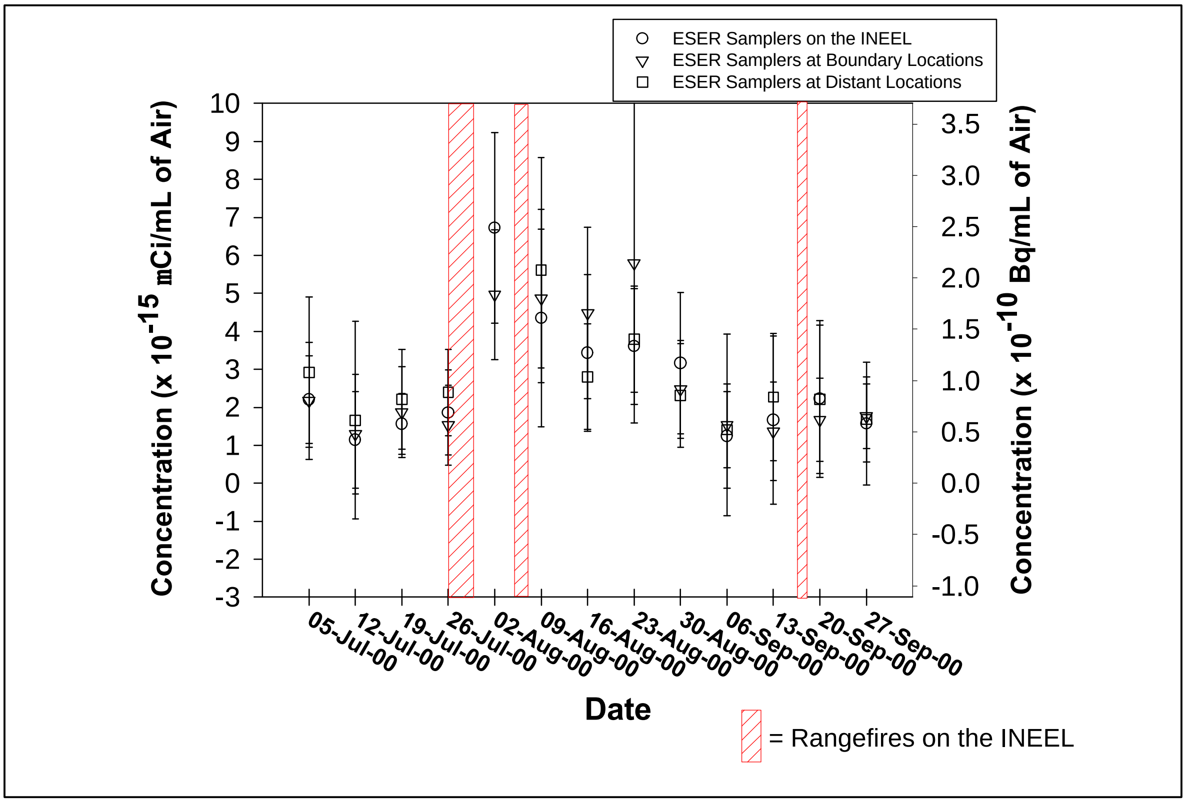


FIGURE 8. Weekly average gross alpha concentrations in air at ESER Program INEEL, boundary, and distant locations (error bars equal ± 2 standard deviations).

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 third quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

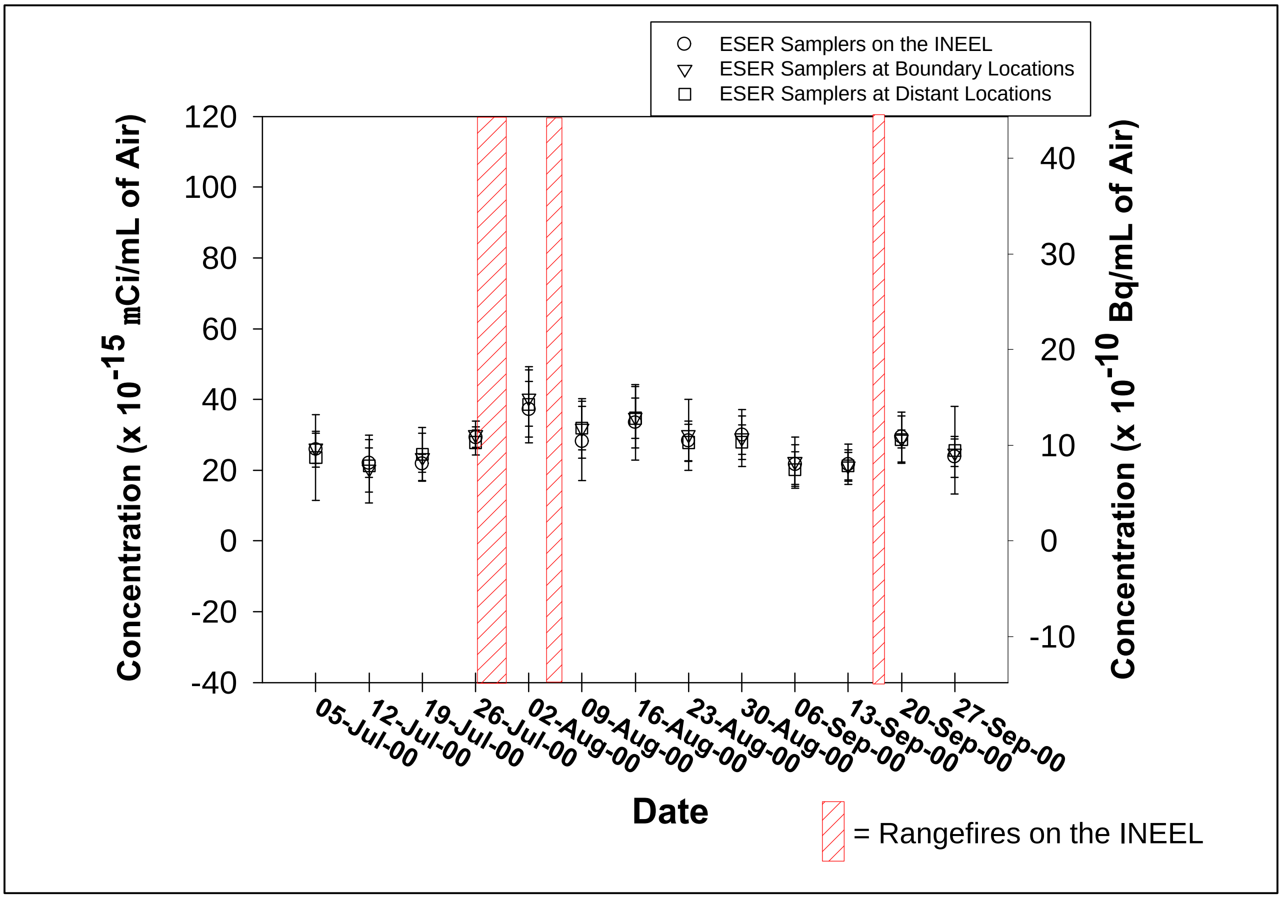


FIGURE 9. Average gross beta concentrations in air at ESER Program INEEL, boundary, and distant locations (error bars equal ± 2 standard deviations).

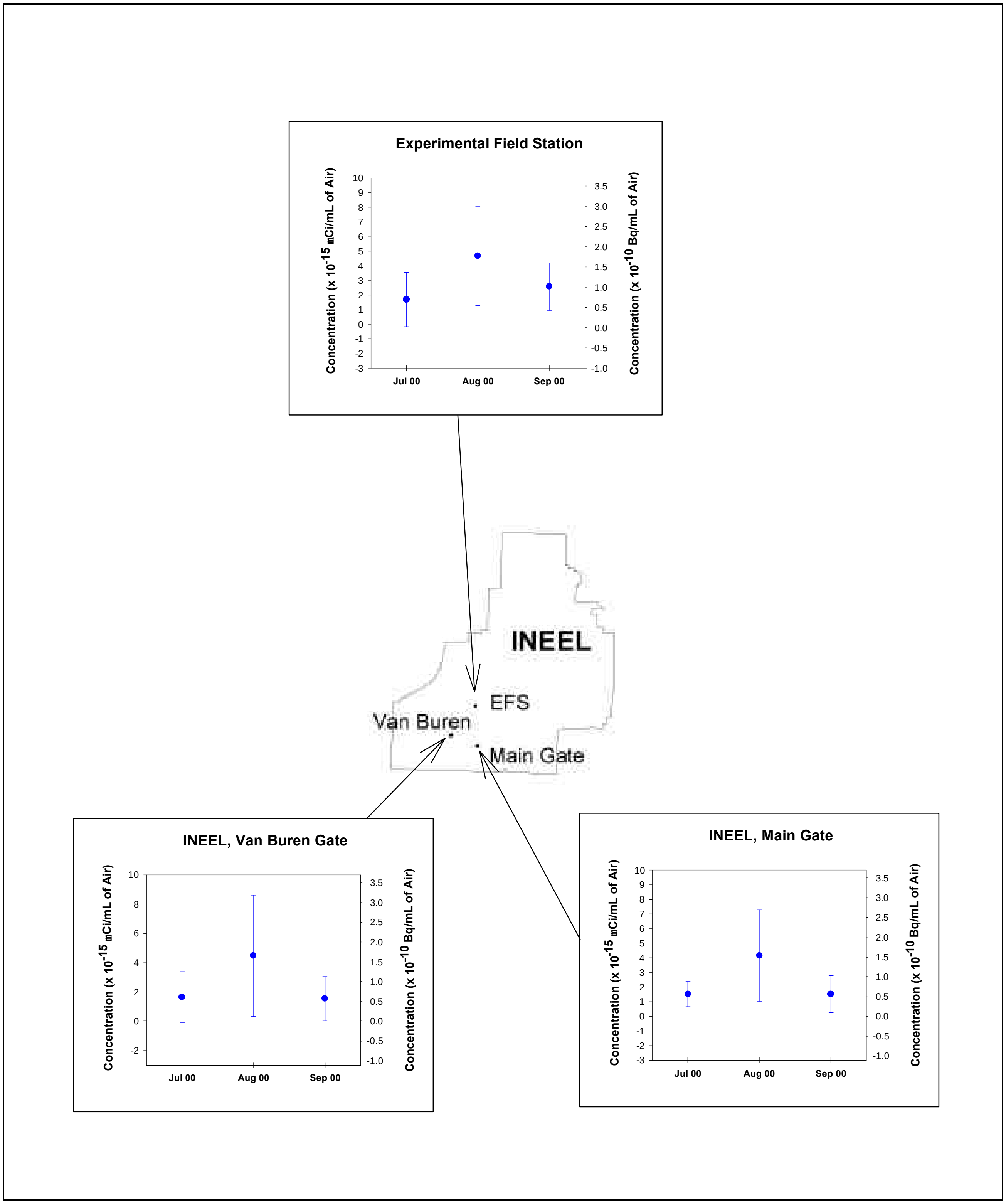


FIGURE 10. Monthly average gross alpha concentrations in air at ESER Program INEEL locations.

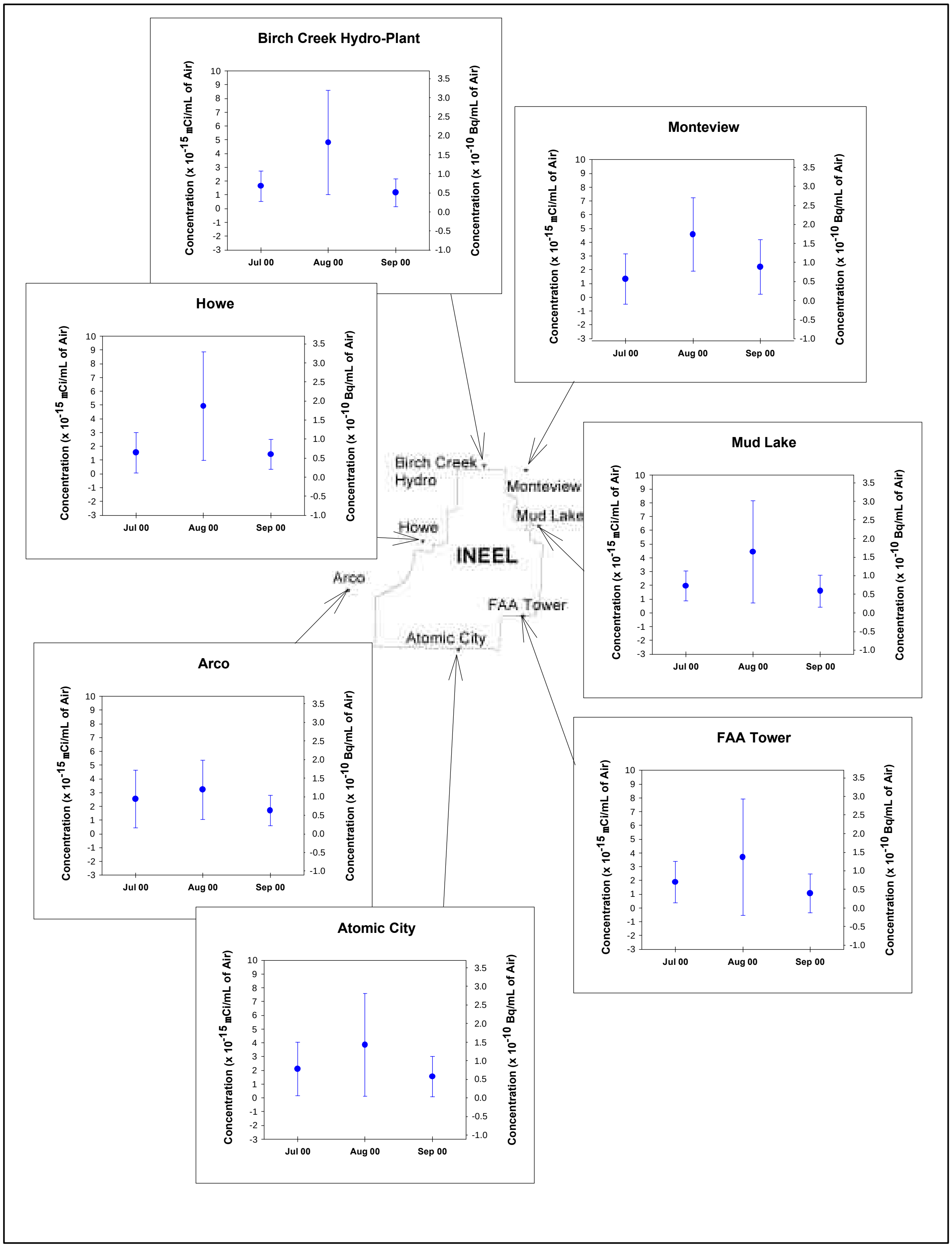


FIGURE 11. Monthly average gross alpha concentrations in air at ESER Program Boundary locations.

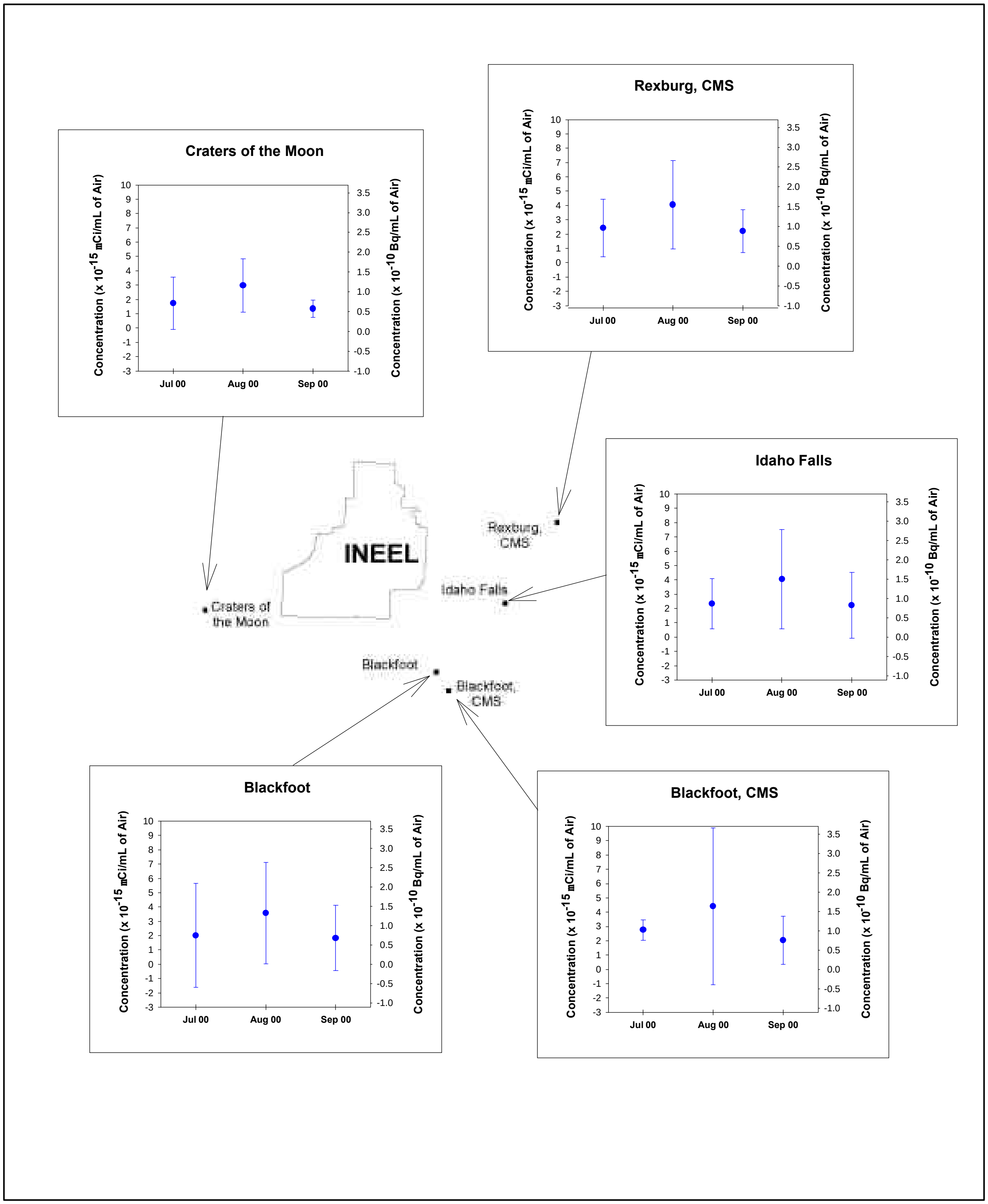


FIGURE 12. Monthly average gross alpha concentrations in air at ESER Program Distant locations.

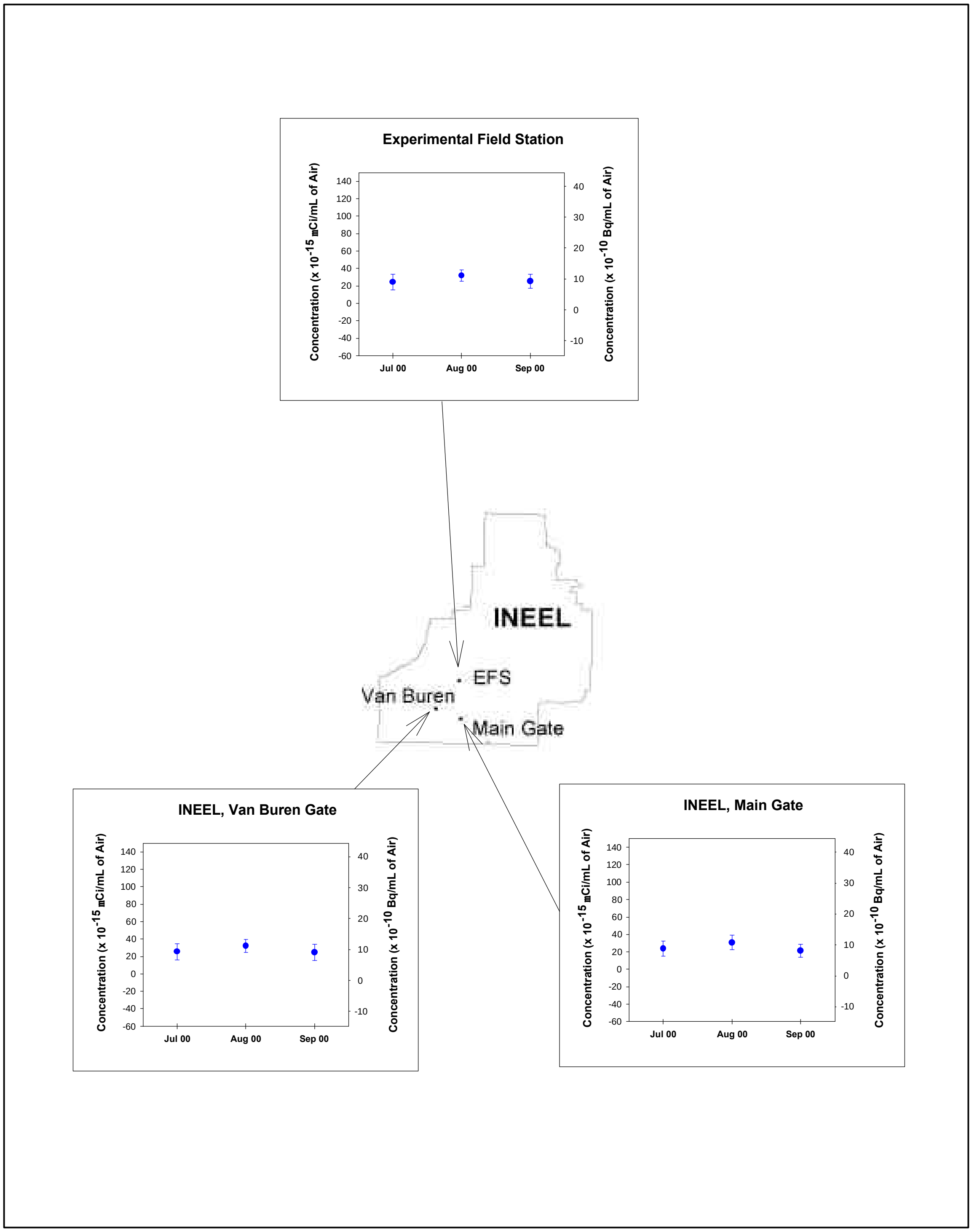


FIGURE 13. Monthly average gross beta concentrations in air at ESER Program INEEL locations.

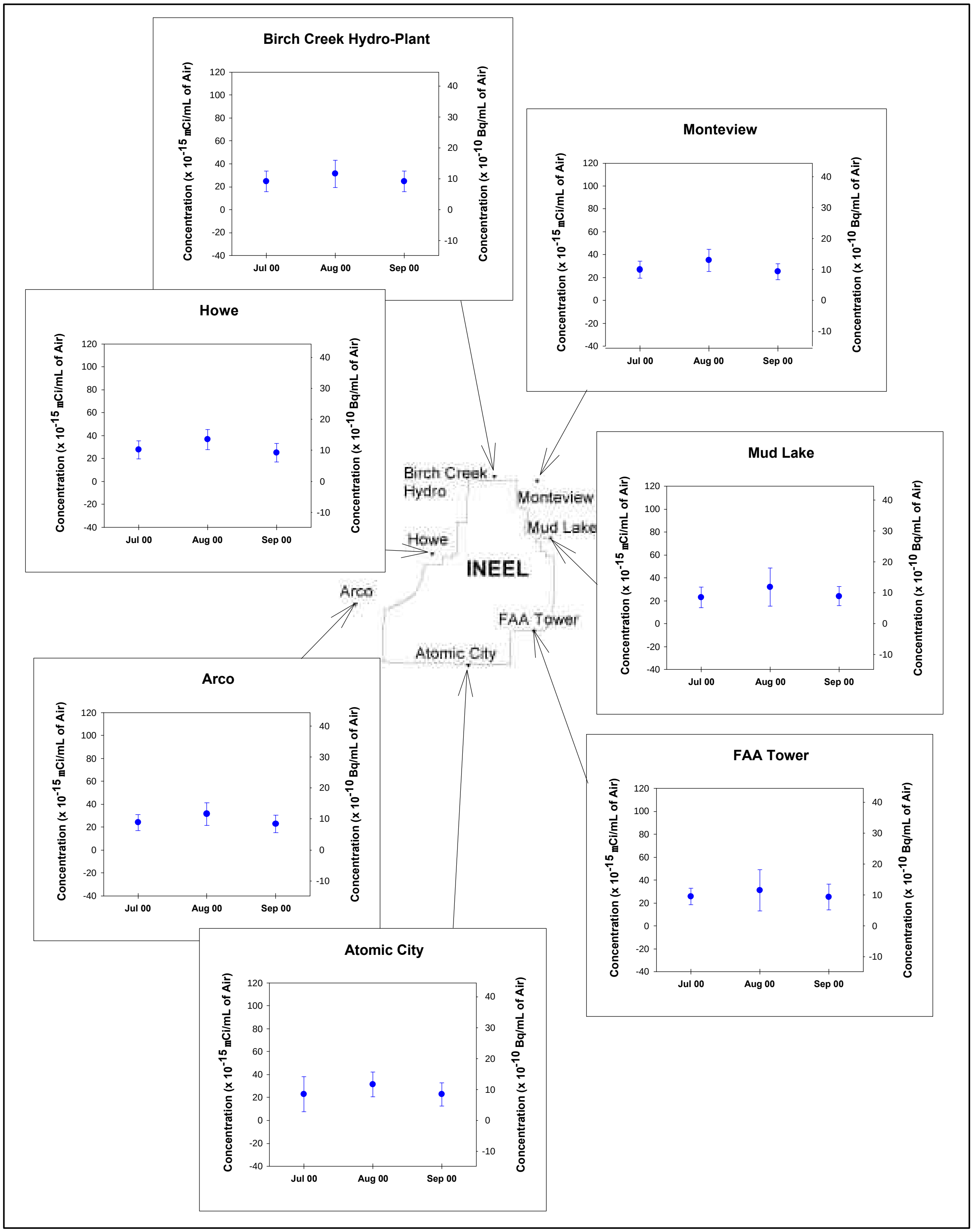


FIGURE 14. Monthly average gross beta concentrations in air at ESER Program Boundary locations.

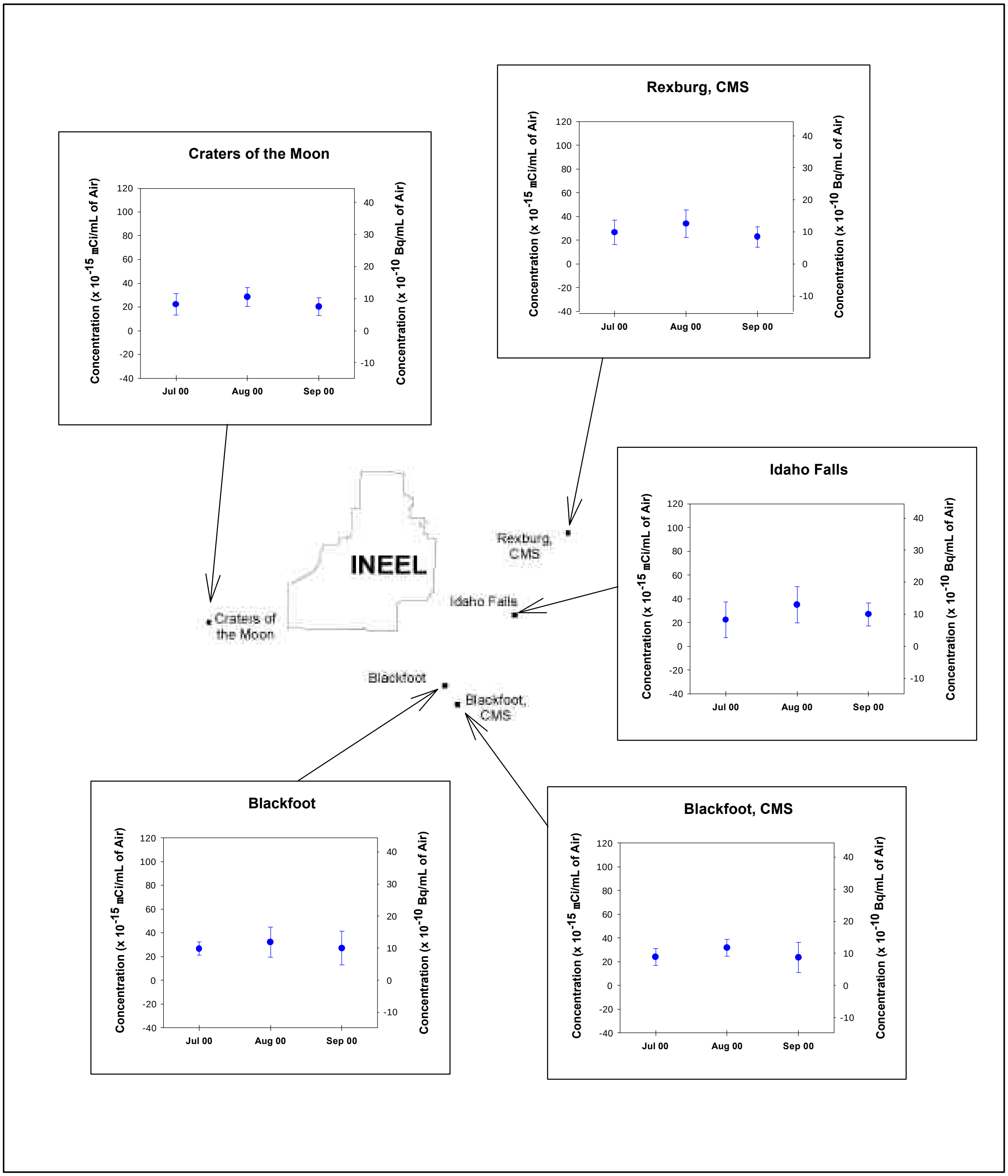


FIGURE 15. Monthly average gross beta concentrations in air at ESER Program Distant locations.

Selected quarterly composited filters were analyzed for the gamma emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. None of these radionuclides were detected in any of the third quarter composite samples. Results for all composite filter samples are shown in Table C-3 of Appendix C.

3.2 Atmospheric Moisture Sampling

An atmospheric moisture sample was obtained from each of Rexburg, Blackfoot (CMS), Idaho Falls, and Atomic City during the third quarter of 2000. Atmospheric moisture was collected by continuously drawing air through a column of silica gel that absorbs water vapor. The water was then extracted from the silica gel by distillation. The resulting atmospheric moisture samples were then analyzed for tritium using liquid scintillation. The Blackfoot (CMS) sample (June 22 through September 27), had the only result greater than its 2s value [(29.7 ± 14.7) x 10^{-14} µCi/mL of air, or (11.0 ± 5.4) x 10^{-9} Bq/mL of air]. This result was both less than the MDC and over 300,000 times lower than the Derived Concentration Guide (DCG) value of 1 x 10^{-7} µCi/mL (3.7 x 10^{-3} Bq/mL) for tritium in air. The DCG values are limits set to ensure dose limits are not exceeded. Tritium results for all atmospheric moisture samples are listed in Table C-4 (Appendix C).

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 the lungs and are considered to be responsible of 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 conducted once every six days for a total of 15 samples collected at each of the three locations. However, filter problems during two weeks at Rexburg invalidated two samples during the third quarter, 2000. PM_{10} concentrations were well below all health standard levels for all samples. The maximum 24-hour concentration was 114.3 µg/m^3 on August 9, 2000, in Atomic City. Results for all PM_{10} samples are listed in Table C-5, Appendix C.

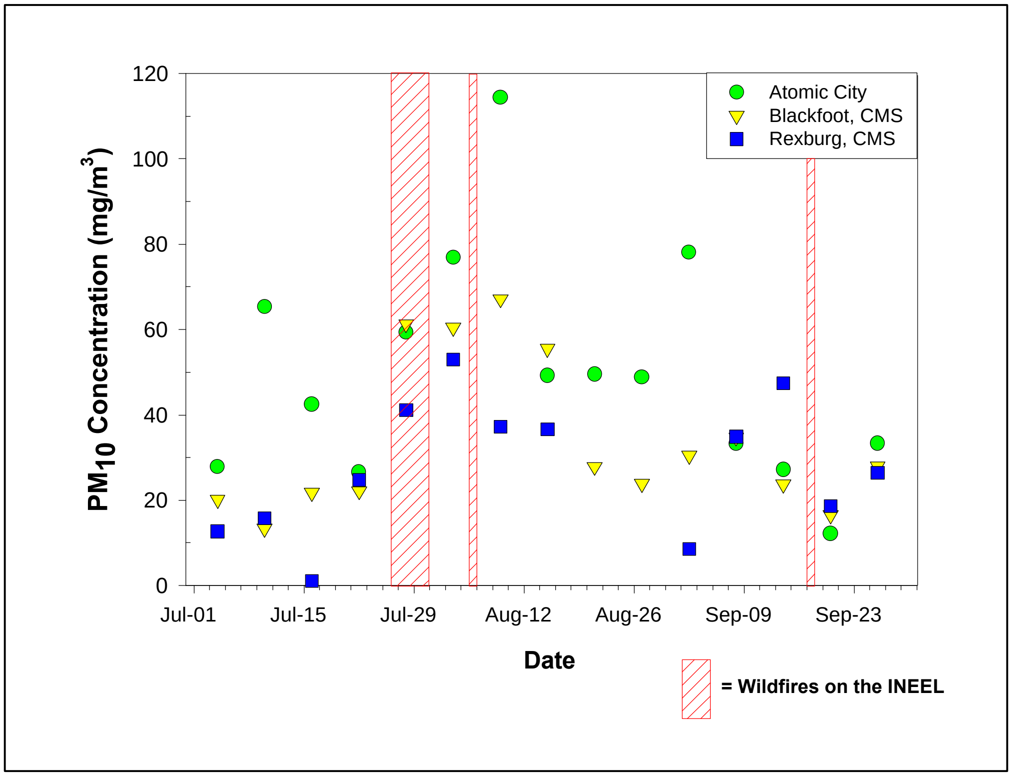


FIGURE 16. Twenty-four hour average PM_{10} concentrations in air during the third quarter, 2000.

4. WATER SAMPLING

Water that is sampled by the ESER program includes surface and drinking water and precipitation. Surface and/or drinking water are sampled twice each year at 18 locations around the INEEL (see Appendix B). This occurs during the second and fourth quarters. Monthly composite precipitation samples are collected from Idaho Falls and the Central Facilities Area (CFA) on the INEEL. Weekly precipitation samples are collected from the Experimental Field Station (EFS) on the INEEL.

4.1 Precipitation Sampling

There was enough (at least 10 mL) precipitation at EFS for the collection of two weekly samples (July 11 through July 18, 2000 and August 29 through September 5, 2000). There was not enough precipitation at CFA in September for the monthly sample. No tritium was detected in Idaho Falls precipitation samples. The EFS and CFA precipitation samples had detected tritium results ranging from 87.5 ± 81.0 pCi/L (3.2 ± 3.0 Bq/L) at CFA in July to 516.7 ± 91.1 pCi/L (19.1 ± 3.4 Bq/L) at EFS the week ending July 18. 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 level of tritium measured in the EFS and CFA precipitation samples were 38 to 914 times lower than health safety limits.

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

5. FOODSTUFF SAMPLING

Another potential pathway for contaminants to reach humans is that through the food chain. The ESER Program samples multiple important agricultural products, game animals, and garden lettuce around the INEEL and Southeast Idaho. Specifically, milk, wheat, potatoes, sheep, garden lettuce, big game, waterfowl 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. Big game and fish are sampled as they come available. See Table B-1, Appendix B, for more details on foodstuff sampling.

5.1 Milk Sampling

Milk samples were collected weekly in Idaho Falls and monthly at eight other locations around the INEEL (Figure 17). A total of 35 milk samples were collected during the third quarter, 2000. All samples were analyzed for gamma emitting radionuclides. Besides the naturally occurring radionuclide Potassium-40 (^{40}K), the only gamma emitting radionuclide detected was ^{137}Cs. A total of five milk samples; one each from Carey (July 4), Howe (August 7), Idaho Falls (August 17), Mud Lake (September 4), and Moreland (September 12), had ^{137}Cs results greater their associated 2s values (Figure 18). The ^{137}Cs detected 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 12 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 measured in milk during the third quarter, 2000 is about eight times lower than the 12 pCi/L limit. Data for all ESER milk samples taken during the third quarter, 2000, are listed in Table C-7 (Appendix C).

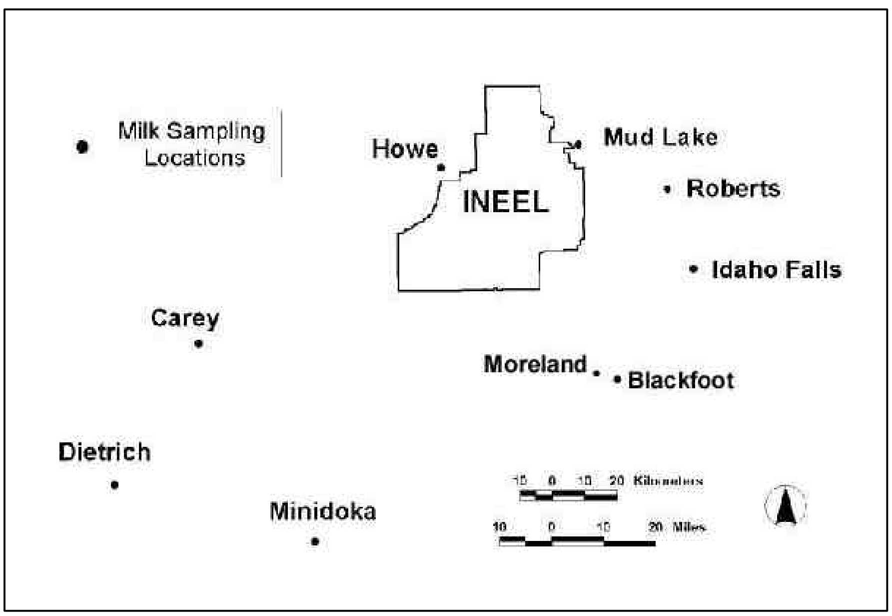


FIGURE 17. ESER Program milk sampling locations.

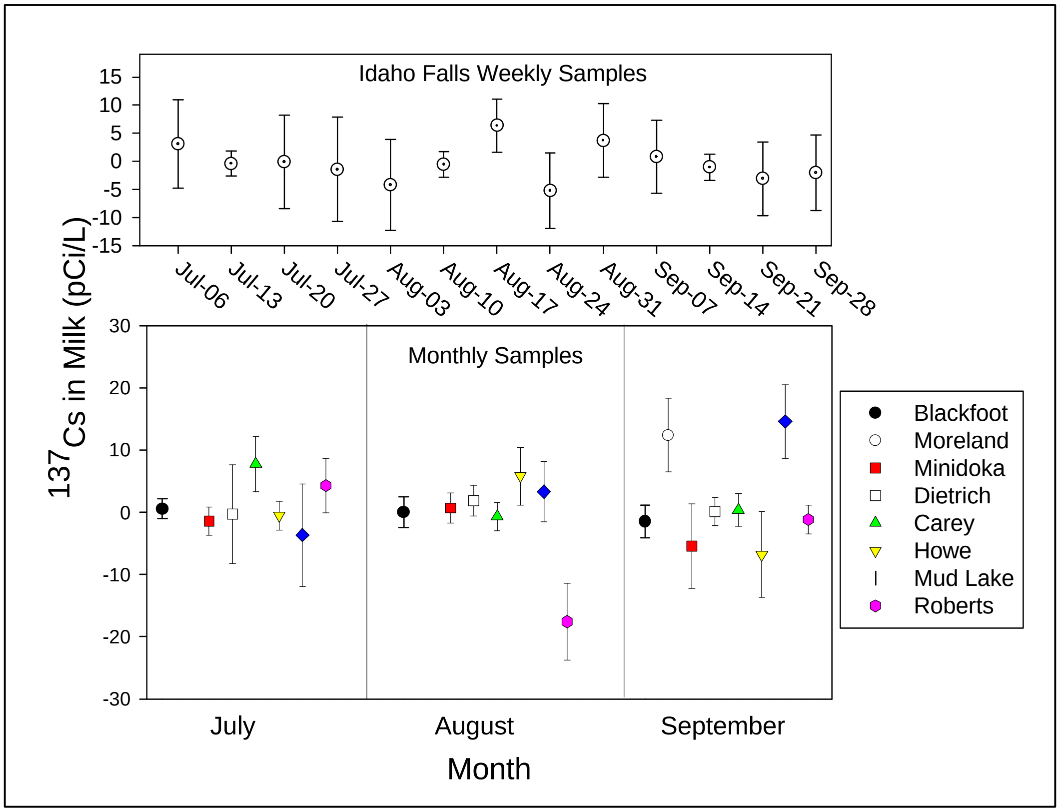


FIGURE 18. Cesium-137 concentrations in milk sampled during the third quarter, 2000. There are no regulatory limits on ^{137}Cs in milk but, for comparison, the EPA has set the limit for ^{137}Cs in drinking water at 12 pCi/L (based on a 4 mrem/yr limit and assumed 2 L/d consumption).

5.2 Large Game Animal Sampling

Three mule deer and two elk killed by vehicle collisions on the INEEL were sampled during the third quarter, 2000. Thyroid, muscle, and liver tissue were collected from each and analyzed for gamma emitting radionuclides. The ^{137}Cs result for the muscle sample from one mule deer (September 18), one elk (August 2), and the liver sample from another mule deer (August 17) was greater than their 2s uncertainty level (Figure 19).

Cesium-137 is an analog of potassium and is readily incorporated in muscle and organ tissues. The ^{137}Cs detected in big game on the INEEL during the third quarter was at very low levels and indistinguishable from that available from fallout from nuclear weapons tests or Chernobyl. 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]. Data for all big game sampled during the third quarter are listed in Table C-8 (Appendix C).

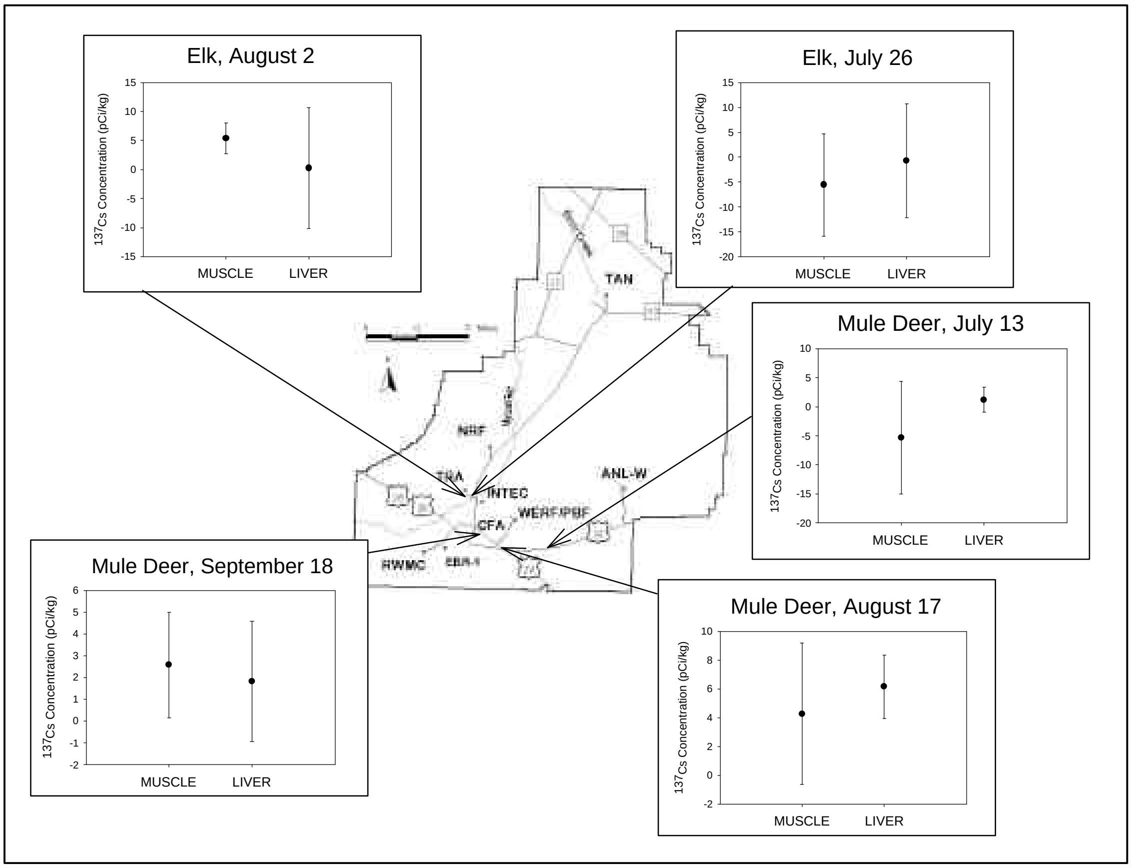


FIGURE 19. Cesium-137 concentrations in muscle and liver of big game animals sampled on the INEEL during the third quarter, 2000. Error bars equal ± 2s. For comparison, big game animals sampled in Colorado, Idaho (distant the INEEL), Montana, Oregon, Utah, and Wyoming, 1998 - 1999, had average ^{137}Cs 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 Lettuce Sampling

Eight lettuce samples were collected from private gardens and analyzed for gamma emitting radionuclides and ^{90}Sr. No human-made gamma emitting radionuclides were detected in any of the lettuce samples collected during the third quarter, 2000. Seven of the samples had ^{90}Sr concentrations greater than their associated 2s uncertainty. One sample, collected from Carey, had a ^{90}Sr concentration [295 ± 140 pCi/kg dry weight (10.92 ± 5.18 Bq/kg dry weight)] which was greater than the minimum detectable concentration [181 pCi/kg dry weight (7 Bq/kg dry weight)]. All ^{90}Sr results from the third quarter, 2000, fell within the range of values measured over the past 10 years. They are also at levels impossible to differentiate from that available from fallout during nuclear weapons tests and Chernobyl. Data for ^{137}Cs in all lettuce samples taken during the third quarter are listed in Table C-9 and ^{90}Sr data for all lettuce samples are listed in Table C-10 (Appendix C).

5.4 Wheat Sampling

Ten wheat samples were collected from ten local elevators. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr. The only human-made gamma-emitting radionuclide found was ^{137}Cs in the sample from Dietrich [3.19 ± 3.11 pCi/kg (0.118 ± 0.115 Bq/kg)]. Eight of the ten wheat samples collected during the third quarter had levels of ^{90}Sr greater than their associated 2s (Figure 20 – error bars that do not overlap zero are for results greater than their 2s). All ^{90}Sr results for wheat from the third quarter, 2000, fell within the range of values measured over the past 10 years. Data for ^{137}Cs in all wheat samples taken during the third quarter are listed in Table C-9 and ^{90}Sr data for all wheat samples are listed in Table C-10 (Appendix C)..

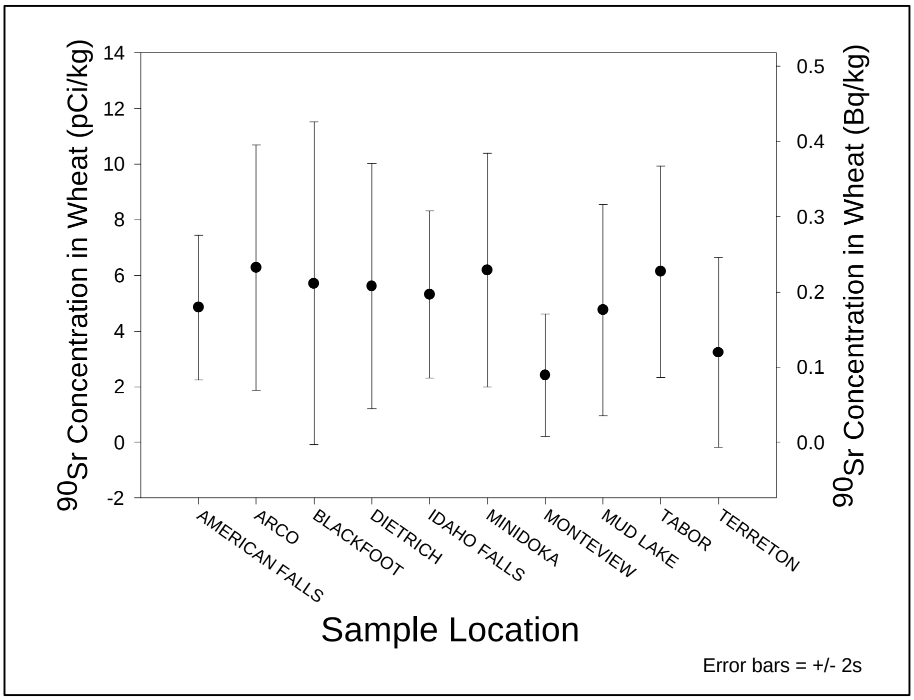


FIGURE 20. Strontium-90 concentrations in wheat sampled during the third quarter, 2000.

6. SOIL SAMPLING

Soil samples are collected every two years to evaluate the long-term trends. Samples were collected during the third quarter, 2000. Sample locations include boundary and distant localities (Figure 21). Five samples are taken at each location from two discrete depths, 0 – 5 cm and 5 – 10 cm. All samples from each depth are combined to make two composite samples, one for the 0-5 cm depth and one for the 5-10 cm depth, for each location. Samples are analyzed for gamma emitting radionuclides, ^{90}Sr, and certain actinides.

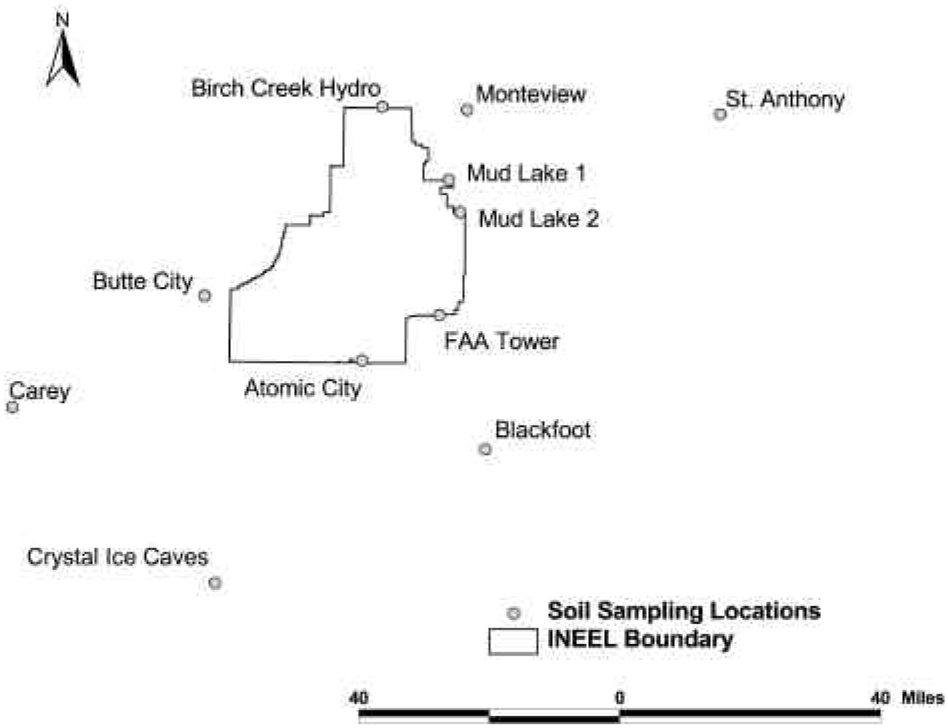


FIGURE 21. Soil sample locations.

One sample, from the 5 – 10 cm depth at the Mud Lake 1 location, had a ^{60}Co result slightly greater than its 2s uncertainty. Because this result was very close to the 2s level and three recounts of this sample had negative results for ^{60}Co, the result in the initial analysis was deemed a false positive. Cobalt-60 has a relatively short half-life (5 yrs) and no ^{60}Co was detected in air or surface soils at that location which reinforces the false positive assessment. Fallout from atmospheric nuclear weapons testing did contain ^{60}Co but no ^{60}Co has been reported in offsite soil samples for more than twenty years.

Atmospheric nuclear weapons testing resulted in many radionuclides being distributed throughout the world. Of these, ^{137}Cs, ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am are of particular interest due to their abundance from nuclear fission events (e.g. ^{137}Cs and ^{90}Sr) or from their persistence in the environment due to long half-lives (e.g. Pu) and could potentially be released from INEEL operations. All soil samples collected during the third quarter 2000 contained ^{137}Cs, ^{90}Sr, $^{239/240}$Pu, and ^{241}Am, with 33% having ^{238}Pu values greater than their respective 2s values (Figure 22). If INEEL inputs had contributed significantly to these concentrations, it would be expected that Boundary concentrations would be higher than Distant locations. There were no differences (using independent samples T-tests and ∀ = 0.05) between Boundary and Distant group concentrations for any of these radionuclides.

Figure 23 displays the geometric mean areal activity of specific radionuclides in offsite soils from 1975 to present. The geometric means were used because the data was log-normally skewed. The shorter-lived radionuclides (^{90}Sr and ^{137}Cs) show overall decreases through time. Data for ^{137}Cs and ^{60}Co in all soil samples taken during the third quarter are listed in Table C-11. Data for ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, and ^{241}Am in soil are listed in Table C-12 (Appendix C).

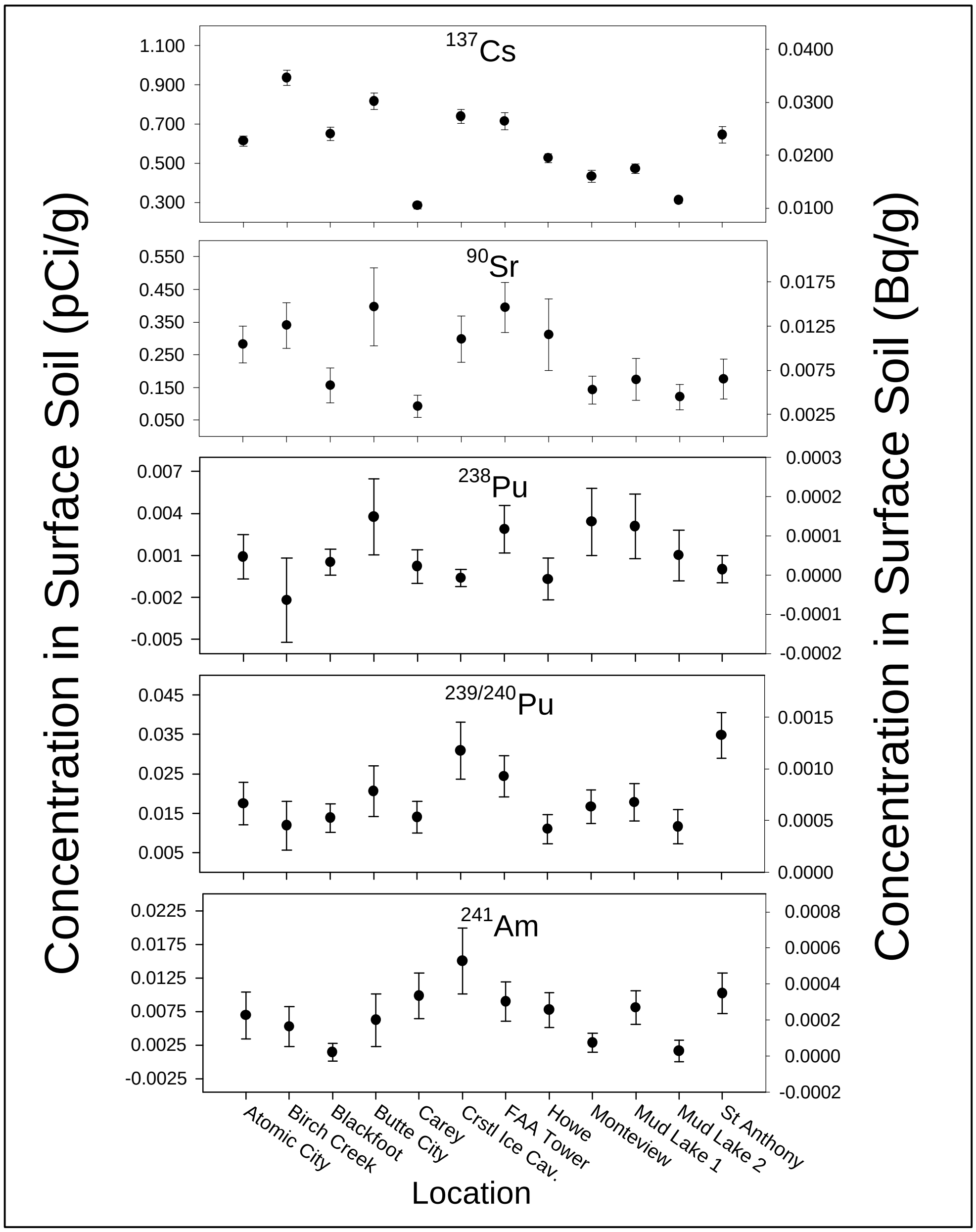


FIGURE 22. Concentrations of selected radionuclides in soil sampled during the third quarter, 2000. Values with error bars (error bars equal 2s) that overlap zero are not considered detected.

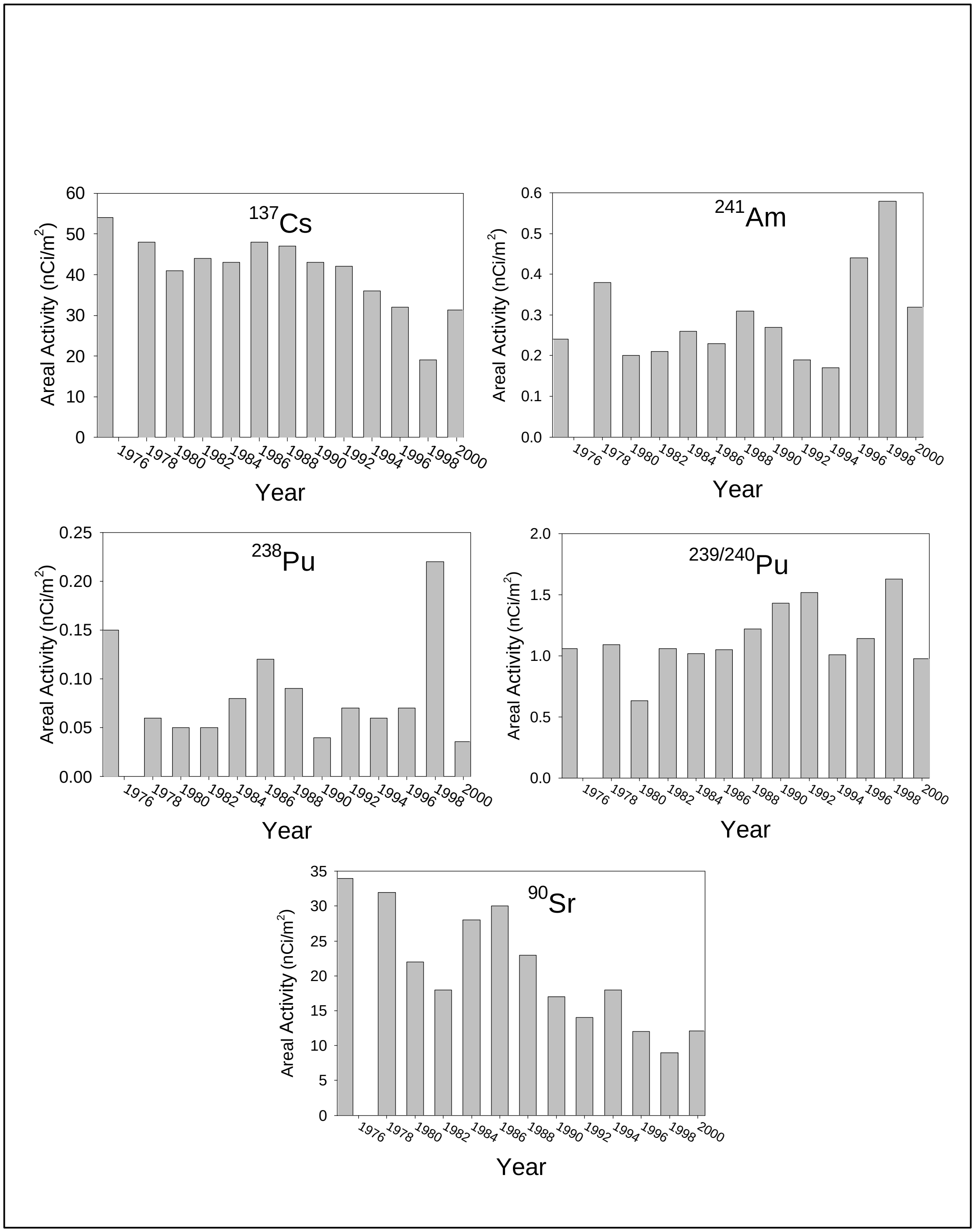


FIGURE 23. Geometric mean areal activity in offsite surface (0 – 5 cm) soils, 1975 through 2000.

7. SUMMARY AND CONCLUSIONS

There were no radionuclides measured in third quarter, 2000, ESER samples that 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 were not different from values measured at other locations across the United States. Based on these results, it is the conclusion of the ESER Program that the INEEL did not measurably contribute to offsite radionuclide concentrations during the third quarter of 2000 for constituents sampled.

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APPENDIX A

SUMMARY OF SAMPLING MEDIA & SCHEDULE

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				
SURFACE WATER				
Gross Alpha, Gross Beta, ^{3}H	semi-annually	Twin Falls, Buhl, Hagerman Idaho Falls, Bliss	None	None
DRINKING WATER				
Gross Alpha Gross Beta, ^{3}H	semi-annually	Aberdeen, 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	semiannual	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
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Carey, Dietrich, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
Tritium ^{90}Sr	Semi-annually	Blackfoot, Carey, Dietrich, Idaho Falls, Minidoka, Roberts, Moreland	Howe, Terreton, Arco	None
POTATOES				
Gamma Spec ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, occasional samples across the U.S.	Arco, Mud Lake	None
WHEAT				
Gamma Spec ^{90}Sr	annually	Am. Falls, Blackfoot, Dietrich, Idaho Falls, Minidoka, Carey	Arco, Monteview, Mud Lake, Tabor, Terreton	None
LETTUCE				
Gamma Spec ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Pocatello	Arco, Atomic City, Howe, Mud Lake	None
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	varies	INEEL roads
SHEEP				
Gamma Spec	annually	Blackfoot or Dubois,	None	INEEL
WATERFOWL				
Gamma Spec ^{90}Sr Transuranics	annually	Fort Hall	None	Waste disposal ponds
FISH				
Gamma Spec	annually or as available	None	None	Big Lost River

APPENDIX B

MINIMUM DETECTABLE CONCENTRATIONS

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	6×10^{-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	3.7×10^{-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 39 m^3, assuming an average sampling period of eight weeks.

APPENDIX C

SUMMARY OF SAMPLE ANALYSIS RESULTS

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													
	7/5/00	3.5	±	1.1	1.3	±	0.4	26.4	±	2.4	9.8	±	0.9
	7/12/00	1.9	±	1.0	0.7	±	0.4	21.8	±	2.4	8.1	±	0.9
	7/19/00	1.8	±	0.9	0.7	±	0.3	21.4	±	2.2	7.9	±	0.8
	7/26/00	2.9	±	0.9	1.1	±	0.3	26.9	±	2.2	10.0	±	0.8
	8/2/00	4.1	±	1.0	1.5	±	0.4	38.9	±	2.7	14.4	±	1.0
	8/9/00	2.9	±	0.9	1.1	±	0.3	29.1	±	2.4	10.8	±	0.9
	8/16/00	2.0	±	0.7	0.7	±	0.3	32.1	±	2.4	11.9	±	0.9
	8/23/00	4.0	±	1.0	1.5	±	0.4	27.8	±	2.5	10.3	±	0.9
	8/30/00	3.2	±	0.9	1.2	±	0.3	29.5	±	2.4	10.9	±	0.9
	9/6/00	1.5	±	0.7	0.6	±	0.3	20.0	±	1.9	7.4	±	0.7
	9/13/00	1.8	±	0.7	0.6	±	0.2	20.3	±	1.9	7.5	±	0.7
	9/20/00	1.3	±	0.6	0.5	±	0.2	26.7	±	2.1	9.9	±	0.8
	9/27/00	2.2	±	0.7	0.8	±	0.3	24.5	±	2.1	9.1	±	0.8
ATOMIC CITY													
	7/5/00	3.0	±	1.1	1.1	±	0.4	26.4	±	2.6	9.8	±	1.0
	7/12/00	2.1	±	1.0	0.8	±	0.4	13.4	±	2.0	5.0	±	0.7
	7/19/00	2.0	±	1.0	0.7	±	0.4	22.1	±	2.5	8.2	±	0.9
	7/26/00	1.3	±	0.8	0.5	±	0.3	29.8	±	2.6	11.0	±	1.0
	8/2/00	5.8	±	1.3	2.1	±	0.5	36.4	±	2.9	13.5	±	1.1
	8/9/00	5.1	±	1.3	1.9	±	0.5	32.2	±	2.9	11.9	±	1.1
	8/16/00	3.6	±	1.0	1.3	±	0.4	35.0	±	2.8	13.0	±	1.0
	8/23/00	2.9	±	1.0	1.1	±	0.4	24.7	±	2.6	9.1	±	1.0
	8/30/00	1.8	±	0.8	0.7	±	0.3	28.7	±	2.5	10.6	±	0.9
	9/6/00	1.1	±	0.7	0.4	±	0.3	17.8	±	2.0	6.6	±	0.8
	9/13/00	1.3	±	0.6	0.5	±	0.2	20.7	±	2.0	7.7	±	0.8
	9/20/00	2.3	±	0.9	0.9	±	0.3	28.2	±	2.5	10.4	±	0.9
	9/27/00	1.6	±	0.7	0.6	±	0.3	24.6	±	2.2	9.1	±	0.8
BIRCH CREEK													
	7/5/00	1.9	±	0.9	0.7	±	0.3	25.2	±	2.4	9.3	±	0.9
	7/12/00	1.1	±	0.8	0.4	±	0.3	21.2	±	2.1	7.8	±	0.8
	7/19/00	1.8	±	0.9	0.7	±	0.4	22.5	±	2.3	8.3	±	0.9
	7/26/00	1.7	±	0.7	0.6	±	0.3	29.9	±	2.3	11.1	±	0.9
	8/2/00	4.7	±	1.1	1.7	±	0.4	37.8	±	2.7	14.0	±	1.0
	8/9/00	5.2	±	1.2	1.9	±	0.4	28.9	±	2.5	10.7	±	0.9
	8/16/00	4.9	±	1.4	1.8	±	0.5	36.1	±	3.3	13.4	±	1.2
	8/23/00	6.9	±	1.6	2.5	±	0.6	26.1	±	3.0	9.7	±	1.1
	8/30/00	2.4	±	1.0	0.9	±	0.4	27.7	±	2.9	10.2	±	1.1
	9/6/00	0.9	±	0.8	0.3	±	0.3	23.4	±	2.7	8.7	±	1.0
	9/13/00	0.9	±	0.7	0.3	±	0.3	19.8	±	2.4	7.3	±	0.9
	9/20/00	1.3	±	0.8	0.5	±	0.3	28.1	±	2.7	10.4	±	1.0
	9/27/00	1.5	±	0.8	0.6	±	0.3	27.2	±	2.7	10.1	±	1.0
FAA TOWER													
	7/5/00	2.5	±	1.3	0.9	±	0.5	27.3	±	3.2	10.1	±	1.2
	7/12/00	1.5	±	1.1	0.6	±	0.4	23.9	±	2.8	8.8	±	1.0
	7/19/00	1.5	±	1.1	0.6	±	0.4	22.5	±	2.7	8.3	±	1.0
	7/26/00	1.9	±	0.9	0.7	±	0.3	28.6	±	2.6	10.6	±	1.0
	8/2/00	6.9	±	1.8	2.6	±	0.6	41.6	±	4.0	15.4	±	1.5

[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 location in parenthesis

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		
	8/9/00	2.8	±	0.9	1.1	±	0.3	21.1	±	2.3	7.8	±	0.8
	8/16/00	3.0	±	1.1	1.1	±	0.4	37.1	±	3.1	13.7	±	1.2
	8/23/00	3.3	±	1.1	1.2	±	0.4	26.7	±	2.8	9.9	±	1.0
	8/30/00	2.4	±	1.0	0.9	±	0.4	28.6	±	2.8	10.6	±	1.0
	9/6/00	0.6	±	0.7	0.2	±	0.3	24.7	±	2.7	9.1	±	1.0
	9/13/00	0.6	±	0.6	0.2	±	0.2	21.2	±	2.5	7.8	±	0.9
	9/20/00	1.2	±	0.8	0.5	±	0.3	32.4	±	3.0	12.0	±	1.1
	9/27/00	1.7	±	0.8	0.6	±	0.3	22.6	±	2.6	8.4	±	0.9
FAA TOWER (Q/A-1)													
	7/5/00	3.4	±	1.2	1.2	±	0.4	24.5	±	2.6	9.1	±	1.0
	7/12/00	0.9	±	0.9	0.3	±	0.3	18.1	±	2.3	6.7	±	0.8
	7/19/00	1.3	±	0.9	0.5	±	0.3	20.7	±	2.4	7.7	±	0.9
	7/26/00	2.5	±	0.9	0.9	±	0.3	28.8	±	2.4	10.7	±	0.9
	8/2/00	5.3	±	1.3	1.9	±	0.5	35.4	±	3.1	13.1	±	1.1
	8/9/00	4.3	±	1.3	1.6	±	0.5	29.7	±	3.1	11.0	±	1.2
	8/16/00	4.5	±	1.2	1.7	±	0.4	32.1	±	2.8	11.9	±	1.0
	8/23/00	3.2	±	1.1	1.2	±	0.4	28.5	±	2.7	10.5	±	1.0
	8/30/00	1.9	±	0.9	0.7	±	0.3	27.5	±	2.6	10.2	±	1.0
	9/6/00	1.1	±	0.7	0.4	±	0.3	19.4	±	2.2	7.2	±	0.8
	9/13/00	1.0	±	0.7	0.4	±	0.2	21.1	±	2.2	7.8	±	0.8
	9/20/00	1.9	±	0.8	0.7	±	0.3	25.0	±	2.4	9.3	±	0.9
	9/27/00	1.7	±	0.8	0.6	±	0.3	24.5	±	2.4	9.1	±	0.9
HOWE													
	7/5/00	1.5	±	0.9	0.6	±	0.3	28.6	±	2.6	10.6	±	1.0
	7/12/00	1.2	±	1.1	0.4	±	0.4	24.0	±	2.8	8.9	±	1.1
	7/19/00	2.2	±	1.2	0.8	±	0.5	26.1	±	3.0	9.7	±	1.1
	7/26/00	1.3	±	0.9	0.5	±	0.3	31.5	±	3.0	11.7	±	1.1
	8/2/00	5.0	±	1.5	1.9	±	0.6	41.3	±	3.8	15.3	±	1.4
	8/9/00	4.0	±	1.5	1.5	±	0.5	37.2	±	3.9	13.8	±	1.4
	8/16/00	5.5	±	1.4	2.0	±	0.5	38.3	±	3.3	14.2	±	1.2
	8/23/00	7.2	±	1.8	2.7	±	0.7	33.2	±	3.7	12.3	±	1.4
	8/30/00	2.9	±	1.2	1.1	±	0.4	32.8	±	3.2	12.1	±	1.2
	9/6/00	1.5	±	0.9	0.5	±	0.3	23.9	±	2.7	8.8	±	1.0
	9/13/00	0.9	±	0.7	0.3	±	0.3	22.1	±	2.5	8.2	±	0.9
	9/20/00	1.6	±	0.9	0.6	±	0.3	29.8	±	2.9	11.0	±	1.1
	9/27/00	1.7	±	0.8	0.6	±	0.3	24.6	±	2.6	9.1	±	1.0
MONTEVIEW													
	7/5/00	2.2	±	1.1	0.8	±	0.4	26.1	±	2.7	9.7	±	1.0
	7/12/00	0.5	±	0.9	0.2	±	0.3	23.5	±	2.5	8.7	±	0.9
	7/19/00	1.3	±	1.0	0.5	±	0.4	27.0	±	2.7	10.0	±	1.0
	7/26/00	1.3	±	0.8	0.5	±	0.3	30.8	±	2.6	11.4	±	1.0
	8/2/00	4.2	±	1.3	1.6	±	0.5	42.0	±	3.5	15.5	±	1.3
	8/9/00	5.6	±	1.3	2.1	±	0.5	32.4	±	2.8	12.0	±	1.0
	8/16/00	4.9	±	1.2	1.8	±	0.4	36.3	±	2.9	13.4	±	1.1
	8/23/00	5.2	±	1.3	1.9	±	0.5	32.6	±	2.9	12.1	±	1.1
	8/30/00	2.9	±	1.0	1.1	±	0.4	31.8	±	2.8	11.8	±	1.0
	9/6/00	3.2	±	1.8	1.2	±	0.7	25.1	±	4.2	9.3	±	1.6
	9/13/00	1.9	±	0.8	0.7	±	0.3	23.3	±	2.3	8.6	±	0.9
	9/20/00	1.6	±	0.8	0.6	±	0.3	29.1	±	2.5	10.8	±	0.9
	9/27/00	2.1	±	0.8	0.8	±	0.3	23.3	±	2.3	8.6	±	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 location in parenthesis

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)													
	7/5/00	2.0	±	0.9	0.8	±	0.3	25.6	±	2.4	9.5	±	0.9
	7/12/00	1.3	±	0.9	0.5	±	0.3	24.1	±	2.3	8.9	±	0.9
	7/19/00	0.7	±	0.8	0.2	±	0.3	21.4	±	2.3	7.9	±	0.9
	7/26/00	1.8	±	0.7	0.7	±	0.3	29.1	±	2.3	10.8	±	0.8
	8/2/00	5.3	±	1.3	2.0	±	0.5	42.8	±	3.3	15.8	±	1.2
	8/9/00	5.2	±	1.2	1.9	±	0.4	27.1	±	2.4	10.0	±	0.9
	8/16/00	3.9	±	1.0	1.4	±	0.4	27.4	±	2.4	10.1	±	0.9
	8/23/00	4.1	±	1.1	1.5	±	0.4	28.1	±	2.5	10.4	±	0.9
	8/30/00	2.0	±	0.8	0.7	±	0.3	29.6	±	2.4	11.0	±	0.9
	9/6/00	3.0	±	1.4	1.1	±	0.5	13.7	±	2.9	5.1	±	1.1
	9/13/00	1.4	±	0.6	0.5	±	0.2	22.9	±	2.0	8.5	±	0.8
	9/20/00	1.4	±	0.7	0.5	±	0.2	28.3	±	2.2	10.5	±	0.8
	9/27/00	1.6	±	0.7	0.6	±	0.2	23.2	±	2.1	8.6	±	0.8
MUD LAKE													
	7/5/00	2.3	±	0.8	0.8	±	0.3	24.5	±	2.1	9.1	±	0.8
	7/12/00	1.5	±	0.8	0.5	±	0.3	19.4	±	2.0	7.2	±	0.7
	7/19/00	2.1	±	0.9	0.8	±	0.3	20.3	±	2.0	7.5	±	0.8
	7/26/00	2.1	±	0.7	0.8	±	0.3	27.8	±	2.1	10.3	±	0.8
	8/2/00	5.0	±	1.2	1.9	±	0.4	44.3	±	3.1	16.4	±	1.1
	8/9/00	4.4	±	1.0	1.6	±	0.4	28.3	±	2.3	10.5	±	0.9
	8/16/00	3.6	±	0.9	1.3	±	0.3	28.6	±	2.2	10.6	±	0.8
	8/23/00	6.7	±	1.5	2.5	±	0.6	33.6	±	3.2	12.4	±	1.2
	8/30/00	2.4	±	0.7	0.9	±	0.3	24.3	±	1.9	9.0	±	0.7
	9/6/00	1.0	±	0.6	0.4	±	0.2	21.9	±	1.9	8.1	±	0.7
	9/13/00	1.9	±	0.7	0.7	±	0.2	20.3	±	1.9	7.5	±	0.7
	9/20/00	1.6	±	0.6	0.6	±	0.2	28.7	±	2.1	10.6	±	0.8
	9/27/00	1.9	±	0.7	0.7	±	0.2	24.8	±	2.0	9.2	±	0.7
DISTANT													
BLACKFOOT													
	7/5/00	3.2	±	1.3	1.2	±	0.5	27.3	±	3.0	10.1	±	1.1
	7/12/00	0.3	±	4.1	0.1	±	1.5	24.6	±	9.0	9.1	±	3.3
	7/19/00	2.7	±	1.0	1.0	±	0.4	26.4	±	2.5	9.8	±	0.9
	7/26/00	1.8	±	0.9	0.7	±	0.3	28.2	±	2.7	10.4	±	1.0
	8/2/00	4.4	±	1.3	1.6	±	0.5	39.5	±	3.5	14.6	±	1.3
	8/9/00	5.8	±	1.3	2.1	±	0.5	33.3	±	2.9	12.3	±	1.1
	8/16/00	2.6	±	0.9	1.0	±	0.3	35.1	±	2.9	13.0	±	1.1
	8/23/00	3.1	±	1.0	1.1	±	0.4	26.3	±	2.6	9.7	±	1.0
	8/30/00	2.0	±	0.9	0.7	±	0.3	26.5	±	2.6	9.8	±	1.0
	9/1/00	4.0	±	1.0	1.5	±	0.4	28.5	±	2.2	10.5	±	0.8
	9/6/00	0.8	±	0.7	0.3	±	0.3	20.5	±	2.3	7.6	±	0.9
	9/13/00	3.1	±	1.0	1.1	±	0.4	23.7	±	2.4	8.8	±	0.9
	9/20/00	1.8	±	0.9	0.7	±	0.3	28.5	±	2.7	10.5	±	1.0
	9/27/00	1.6	±	0.8	0.6	±	0.3	35.4	±	2.9	13.1	±	1.1
BLACKFOOT, CMS													
	7/5/00	2.7	±	0.9	1.0	±	0.3	24.6	±	2.2	9.1	±	0.8
	7/12/00	2.9	±	1.2	1.1	±	0.4	22.7	±	2.6	8.4	±	0.9
	7/19/00	2.7	±	1.2	1.0	±	0.4	21.1	±	2.6	7.8	±	0.9
	7/26/00	2.7	±	1.0	1.0	±	0.4	27.9	±	2.5	10.3	±	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 location in parenthesis

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		
	8/2/00	8.2	±	1.8	3.0	±	0.7	34.2	±	3.5	12.7	±	1.3
	8/9/00	4.9	±	1.2	1.8	±	0.4	32.4	±	2.8	12.0	±	1.0
	8/16/00	2.7	±	0.9	1.0	±	0.3	34.8	±	2.8	12.9	±	1.0
	8/23/00	4.5	±	1.2	1.7	±	0.4	27.7	±	2.7	10.2	±	1.0
	8/30/00	1.8	±	0.9	0.7	±	0.3	30.4	±	2.7	11.2	±	1.0
	9/6/00	1.9	±	0.9	0.7	±	0.3	18.7	±	2.2	6.9	±	0.8
	9/13/00	2.7	±	0.9	1.0	±	0.3	21.4	±	2.2	7.9	±	0.8
	9/20/00	2.4	±	0.9	0.9	±	0.3	31.9	±	2.8	11.8	±	1.0
	9/27/00	1.2	±	0.7	0.5	±	0.3	22.6	±	2.4	8.4	±	0.9
CRATERS OF THE MOON													
	7/5/00	1.5	±	0.8	0.5	±	0.3	22.5	±	2.1	8.3	±	0.8
	7/12/00	0.8	±	0.7	0.3	±	0.2	16.4	±	1.8	6.1	±	0.6
	7/19/00	2.5	±	0.9	0.9	±	0.3	23.4	±	2.2	8.7	±	0.8
	7/26/00	2.2	±	0.7	0.8	±	0.3	25.9	±	2.1	9.6	±	0.8
	8/2/00	3.2	±	0.9	1.2	±	0.3	32.1	±	2.5	11.9	±	0.9
	8/9/00	2.7	±	0.8	1.0	±	0.3	28.5	±	2.3	10.5	±	0.8
	8/16/00	3.1	±	0.9	1.1	±	0.3	31.8	±	2.5	11.8	±	0.9
	8/23/00	3.9	±	1.0	1.4	±	0.4	24.7	±	2.2	9.1	±	0.8
	8/30/00	1.9	±	0.8	0.7	±	0.3	25.1	±	2.2	9.3	±	0.8
	9/6/00	1.3	±	0.6	0.5	±	0.2	17.6	±	1.7	6.5	±	0.6
	9/13/00	1.2	±	0.6	0.4	±	0.2	19.5	±	1.8	7.2	±	0.7
	9/20/00	1.6	±	0.6	0.6	±	0.2	25.0	±	2.0	9.3	±	0.8
	9/27/00	1.4	±	0.6	0.5	±	0.2	19.1	±	1.8	7.1	±	0.7
IDAHO FALLS													
	7/5/00	3.1	±	1.1	1.2	±	0.4	13.0	±	2.1	4.8	±	0.8
	7/12/00	2.0	±	1.1	0.7	±	0.4	22.1	±	2.6	8.2	±	1.0
	7/19/00	1.8	±	1.2	0.7	±	0.4	24.9	±	3.0	9.2	±	1.1
	7/21/00	0.8	±	1.4	0.3	±	0.5	27.8	±	2.9	10.3	±	1.1
	7/26/00	2.4	±	1.1	0.9	±	0.4	29.2	±	3.0	10.8	±	1.1
	8/2/00	6.1	±	1.6	2.3	±	0.6	45.3	±	4.0	16.8	±	1.5
	8/9/00	4.8	±	1.5	1.8	±	0.5	34.7	±	3.5	12.8	±	1.3
	8/16/00	3.0	±	1.0	1.1	±	0.4	37.1	±	3.0	13.7	±	1.1
	8/23/00	3.9	±	1.2	1.5	±	0.5	29.8	±	3.0	11.0	±	1.1
	8/30/00	2.4	±	1.0	0.9	±	0.4	27.8	±	2.8	10.3	±	1.0
	9/6/00	1.5	±	0.9	0.6	±	0.3	23.9	±	2.5	8.8	±	0.9
	9/13/00	2.5	±	0.9	0.9	±	0.3	23.2	±	2.5	8.6	±	0.9
	9/20/00	3.4	±	1.2	1.3	±	0.4	32.1	±	3.0	11.9	±	1.1
	9/27/00	1.5	±	0.8	0.6	±	0.3	28.6	±	2.7	10.6	±	1.0
REXBURG, CMS													
	7/5/00	3.5	±	1.0	1.3	±	0.4	27.8	±	2.3	10.3	±	0.9
	7/12/00	1.9	±	0.9	0.7	±	0.3	19.7	±	2.1	7.3	±	0.8
	7/19/00	1.9	±	0.9	0.7	±	0.3	29.6	±	2.5	11.0	±	0.9
	7/26/00	2.3	±	0.8	0.9	±	0.3	28.9	±	2.3	10.7	±	0.9
	8/2/00	5.8	±	1.3	2.1	±	0.5	40.7	±	3.2	15.1	±	1.2
	8/9/00	5.0	±	1.1	1.9	±	0.4	33.3	±	2.5	12.3	±	0.9
	8/16/00	3.4	±	0.9	1.3	±	0.3	37.2	±	2.6	13.8	±	0.9
	8/23/00	3.5	±	1.0	1.3	±	0.4	30.3	±	2.5	11.2	±	0.9
	8/30/00	2.5	±	0.8	0.9	±	0.3	27.8	±	2.2	10.3	±	0.8
	9/6/00	1.5	±	0.6	0.5	±	0.2	19.9	±	1.8	7.4	±	0.7
	9/13/00	2.4	±	0.7	0.9	±	0.3	19.9	±	1.9	7.4	±	0.7

[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 location in parenthesis

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		
	9/20/00	2.8	±	0.8	1.0	±	0.3	27.9	±	2.2	10.3	±	0.8
	9/27/00	2.2	±	0.7	0.8	±	0.3	23.4	±	2.0	8.7	±	0.8
INEEL													
EFS													
	7/5/00	2.2	±	1.0	0.8	±	0.4	26.1	±	2.5	9.7	±	0.9
	7/12/00	0.7	±	0.8	0.3	±	0.3	20.8	±	2.3	7.7	±	0.9
	7/19/00	1.7	±	1.0	0.6	±	0.4	21.9	±	2.4	8.1	±	0.9
	7/21/00	1.4	±	1.2	0.5	±	0.4	27.1	±	2.4	10.0	±	0.9
	7/26/00	2.1	±	0.8	0.8	±	0.3	28.9	±	2.5	10.7	±	0.9
	8/2/00	7.0	±	1.7	2.6	±	0.6	35.0	±	3.5	13.0	±	1.3
	8/9/00	4.9	±	1.8	1.8	±	0.7	30.7	±	4.2	11.4	±	1.5
	8/16/00	3.7	±	1.0	1.4	±	0.4	32.3	±	2.7	12.0	±	1.0
	8/23/00	4.1	±	1.2	1.5	±	0.4	28.5	±	2.8	10.5	±	1.0
	8/30/00	3.8	±	1.1	1.4	±	0.4	32.6	±	2.8	12.1	±	1.0
	9/6/00	1.9	±	0.8	0.7	±	0.3	21.2	±	2.2	7.8	±	0.8
	9/13/00	2.8	±	0.9	1.1	±	0.3	24.1	±	2.3	8.9	±	0.9
	9/20/00	3.2	±	1.0	1.2	±	0.4	29.5	±	2.5	10.9	±	0.9
	9/27/00	2.4	±	0.8	0.9	±	0.3	26.2	±	2.4	9.7	±	0.9
MAIN GATE													
	7/5/00	1.8	±	0.9	0.7	±	0.3	23.3	±	2.3	8.6	±	0.8
	7/12/00	1.4	±	0.9	0.5	±	0.3	21.1	±	2.2	7.8	±	0.8
	7/19/00	1.5	±	1.1	0.6	±	0.4	21.1	±	2.6	7.8	±	1.0
	7/26/00	1.4	±	0.7	0.5	±	0.3	29.2	±	2.4	10.8	±	0.9
	8/2/00	5.5	±	1.3	2.0	±	0.5	36.7	±	3.0	13.6	±	1.1
	8/9/00	5.4	±	1.3	2.0	±	0.5	29.5	±	2.8	10.9	±	1.0
	8/16/00	2.6	±	0.9	1.0	±	0.3	29.6	±	2.4	11.0	±	0.9
	8/23/00	3.9	±	1.1	1.5	±	0.4	27.7	±	2.5	10.2	±	0.9
	8/30/00	3.3	±	2.0	1.2	±	0.7	29.8	±	4.9	11.0	±	1.8
	9/6/00	1.4	±	0.6	0.5	±	0.2	17.7	±	1.6	6.5	±	0.6
	9/13/00	1.3	±	0.5	0.5	±	0.2	20.2	±	1.6	7.5	±	0.6
	9/20/00	2.2	±	0.7	0.8	±	0.2	25.5	±	1.9	9.4	±	0.7
	9/27/00	1.1	±	0.5	0.4	±	0.2	21.1	±	1.7	7.8	±	0.6
VAN BUREN													
	7/5/00	2.2	±	1.3	0.8	±	0.5	26.9	±	3.2	10.0	±	1.2
	7/12/00	1.0	±	1.2	0.4	±	0.4	22.4	±	3.0	8.3	±	1.1
	7/19/00	1.5	±	1.3	0.5	±	0.5	22.2	±	3.1	8.2	±	1.1
	7/26/00	2.0	±	0.9	0.7	±	0.4	30.4	±	2.8	11.2	±	1.0
	8/2/00	7.4	±	2.0	2.7	±	0.7	35.4	±	4.1	13.1	±	1.5
	8/9/00	4.3	±	1.2	1.6	±	0.5	31.5	±	3.0	11.7	±	1.1
	8/16/00	4.4	±	1.2	1.6	±	0.5	35.0	±	3.1	13.0	±	1.1
	8/23/00	3.1	±	1.2	1.1	±	0.4	30.1	±	3.1	11.1	±	1.2
	8/30/00	3.2	±	1.1	1.2	±	0.4	28.7	±	2.8	10.6	±	1.0
	9/6/00	1.1	±	0.8	0.4	±	0.3	22.6	±	2.4	8.4	±	0.9
	9/13/00	1.8	±	0.8	0.7	±	0.3	21.4	±	2.4	7.9	±	0.9
	9/20/00	2.2	±	0.9	0.8	±	0.3	30.2	±	2.8	11.2	±	1.0
	9/27/00	1.1	±	0.7	0.4	±	0.3	25.1	±	2.5	9.3	±	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 location in parenthesis

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							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
ATOMIC CITY							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
BIRCH CREEK							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
FAA TOWER							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6

[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 location in parenthesis
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		
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
FAA TOWER (Q/A-1)							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
HOWE							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
MONTEVIEW							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3

[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 location in parenthesis
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		
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
MONTEVIEW (Q/A-2)							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
MUD LAKE							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
DISTANT							
BLACKFOOT							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/1/00	-0.2	±	2.3	-0.9	±	8.5
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
BLACKFOOT, CMS							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5

[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 location in parenthesis

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		
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
CRATERS OF THE MOON							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
IDAHO FALLS							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/21/00	4.3	±	2.5	15.8	±	9.4
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
REXBURG, CMS							
	7/5/00	0.3	±	1.7	1.1	±	6.2
	7/12/00	1.6	±	3.2	6.0	±	12.0
	7/19/00	-1.6	±	1.7	-5.9	±	6.2
	7/26/00	0.1	±	1.8	0.4	±	6.5
	8/2/00	0.5	±	1.7	2.0	±	6.4
	8/9/00	0.4	±	1.9	1.3	±	6.9
	8/16/00	-0.4	±	1.7	-1.4	±	6.2
	8/23/00	-0.2	±	1.7	-0.7	±	6.1
	8/30/00	0.2	±	1.7	0.8	±	6.4

[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 location in parenthesis
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		
	9/6/00	-0.6	±	1.7	-2.4	±	6.1
	9/13/00	0.1	±	1.8	0.3	±	6.8
	9/20/00	-0.4	±	1.7	-1.4	±	6.3
	9/27/00	-0.7	±	1.9	-2.7	±	6.9
INEEL							
EFS							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/21/00	4.3	±	2.5	15.8	±	9.4
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
MAIN GATE							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7
VAN BUREN							
	7/5/00	0.5	±	2.2	2.0	±	8.0
	7/12/00	-0.1	±	2.3	-0.5	±	8.4
	7/19/00	-0.4	±	2.0	-1.5	±	7.5
	7/26/00	1.4	±	2.3	5.1	±	8.7
	8/2/00	-1.2	±	2.1	-4.5	±	7.6
	8/9/00	1.6	±	2.3	6.0	±	8.7
	8/16/00	0.1	±	2.1	0.2	±	7.9
	8/23/00	-0.5	±	2.1	-1.9	±	7.8
	8/30/00	0.1	±	2.1	0.4	±	7.8
	9/6/00	0.8	±	2.0	3.1	±	7.4
	9/13/00	2.3	±	2.4	8.5	±	8.9
	9/20/00	-1.0	±	2.0	-3.6	±	7.4
	9/27/00	-1.4	±	2.4	-5.3	±	8.7

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 location in parenthesis
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								
	9/4/00	AMERICIUM-241	0.003	±	0.008	0.012	±	0.031
	9/4/00	PLUTONIUM-238	0.001	±	0.008	0.003	±	0.029
	9/4/00	PLUTONIUM-239/240	0.003	±	0.007	0.013	±	0.025
	9/27/00	CESIUM-137	3.610	±	6.900	13.357	±	25.530
ATOMIC CITY								
	9/4/00	STRONTIUM-90	0.024	±	0.390	0.090	±	1.443
	9/27/00	CESIUM-137	-1.600	±	2.760	-5.920	±	10.212
BIRCH CREEK								
	9/4/00	AMERICIUM-241	0.000	±	0.009	0.000	±	0.031
	9/4/00	PLUTONIUM-238	0.000	±	0.009	0.000	±	0.032
	9/4/00	PLUTONIUM-239/240	0.014	±	0.014	0.051	±	0.052
	9/27/00	CESIUM-137	5.100	±	7.500	18.870	±	27.750
FAA TOWER								
	9/4/00	STRONTIUM-90	-0.077	±	0.440	-0.285	±	1.628
	9/27/00	CESIUM-137	1.880	±	2.820	6.956	±	10.434
FAA TOWER (Q/A-1)								
	9/4/00	STRONTIUM-90	0.156	±	0.370	0.577	±	1.369
	9/27/00	CESIUM-137	1.640	±	2.400	6.068	±	8.880
HOWE								
	9/4/00	STRONTIUM-90	0.313	±	0.540	1.158	±	1.998
	9/27/00	CESIUM-137	3.180	±	3.180	11.766	±	11.766
MONTEVIEW								
	9/4/00	AMERICIUM-241	0.003	±	0.006	0.010	±	0.021
	9/4/00	PLUTONIUM-238	0.001	±	0.011	0.003	±	0.041
	9/4/00	PLUTONIUM-239/240	0.027	±	0.023	0.101	±	0.085
	9/27/00	CESIUM-137	-3.150	±	8.700	-11.655	±	32.190
MONTEVIEW (Q/A-2)								
	9/4/00	AMERICIUM-241	0.018	±	0.016	0.065	±	0.059
	9/4/00	PLUTONIUM-238	0.000	±	0.009	0.000	±	0.034
	9/4/00	PLUTONIUM-239/240	0.004	±	0.008	0.014	±	0.028
	9/27/00	CESIUM-137	-0.844	±	7.460	-3.123	±	27.602
MUD LAKE								
	9/4/00	STRONTIUM-90	0.034	±	0.300	0.125	±	1.110
	9/27/00	CESIUM-137	-0.094	±	2.220	-0.348	±	8.214

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 location in parenthesis

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								
	9/4/00	AMERICIUM-241	0.012	±	0.014	0.046	±	0.052
	9/4/00	PLUTONIUM-238	0.017	±	0.020	0.063	±	0.074
	9/4/00	PLUTONIUM-239/240	0.028	±	0.024	0.105	±	0.089
	9/27/00	CESIUM-137	2.930	±	8.380	10.841	±	31.006
BLACKFOOT, CMS								
	9/4/00	STRONTIUM-90	0.076	±	0.390	0.281	±	1.443
	9/27/00	CESIUM-137	6.560	±	7.580	24.272	±	28.046
CRATERS OF THE MOON								
	9/4/00	AMERICIUM-241	0.006	±	0.010	0.023	±	0.037
	9/4/00	PLUTONIUM-238	0.000	±	0.007	0.000	±	0.027
	9/4/00	PLUTONIUM-239/240	0.011	±	0.012	0.039	±	0.044
	9/27/00	CESIUM-137	0.053	±	1.820	0.197	±	6.734
IDAHO FALLS								
	9/4/00	STRONTIUM-90	0.265	±	0.500	0.981	±	1.850
	9/27/00	CESIUM-137	-0.300	±	3.380	-1.110	±	12.506
REXBURG, CMS								
	9/4/00	STRONTIUM-90	0.321	±	0.360	1.188	±	1.332
	9/27/00	CESIUM-137	1.090	±	6.120	4.033	±	22.644
INEEL								
EFS								
	9/4/00	STRONTIUM-90	0.367	±	0.440	1.358	±	1.628
	9/27/00	CESIUM-137	0.115	±	8.480	0.426	±	31.376
MAIN GATE								
	9/4/00	AMERICIUM-241	0.002	±	0.006	0.007	±	0.024
	9/4/00	PLUTONIUM-238	0.003	±	0.006	0.011	±	0.023
	9/4/00	PLUTONIUM-239/240	0.012	±	0.012	0.046	±	0.044
	9/27/00	CESIUM-137	4.210	±	6.360	15.577	±	23.532
VAN BUREN								
	9/4/00	AMERICIUM-241	0.023	±	0.018	0.086	±	0.067
	9/4/00	PLUTONIUM-238	0.062	±	0.038	0.228	±	0.141
	9/4/00	PLUTONIUM-239/240	0.070	±	0.041	0.259	±	0.152
	9/27/00	CESIUM-137	-2.460	±	10.100	-9.102	±	37.370

[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 location in parenthesis

Table C-4: Tritium Concentrations in Atmospheric Moisture

Location	Start Date	End Date	Concentration +/- 2s[a] 10^{-14} µCi[b] /ml Air			Concentration +/- 2s 10^{-9} Bq[c] /ml Air		
ATOMIC CITY								
	6/27/00	9/27/00	3.0	±	6.4	1.1	±	2.4
BLACKFOOT, CMS								
	6/22/00	9/27/00	29.7	±	14.7	11.0	±	5.4
IDAHO FALLS								
	6/15/00	9/27/00	8.6	±	19.0	3.2	±	7.0
REXBURG, CMS								
	6/28/00	9/27/00	13.6	±	13.8	5.0	±	5.1

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/m^3	Comments
ATOMIC CITY			
	7/4/00	27.8	
	7/10/00	65.4	
	7/16/00	42.4	
	7/22/00	26.6	
	7/28/00	59.3	
	8/3/00	76.9	
	8/9/00	114.3	Weight Difference is large
	8/15/00	49.2	
	8/21/00	49.5	
	8/27/00	48.8	
	9/2/00	78.1	
	9/8/00	33.2	
	9/14/00	27.2	
	9/20/00	12.1	
	9/26/00	33.3	
BLACKFOOT, CMS			
	7/4/00	20.1	
	7/10/00	13.3	
	7/16/00	21.8	
	7/22/00	22.1	
	7/28/00	61.3	
	8/3/00	60.5	
	8/9/00	67.1	
	8/15/00	55.5	
	8/21/00	27.8	
	8/27/00	23.9	
	9/2/00	30.4	
	9/8/00	34.7	
	9/14/00	23.7	
	9/20/00	16.4	
	9/26/00	27.8	

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			
	7/4/00	12.7	
	7/10/00	15.7	
	7/16/00	1.0	
	7/22/00	24.8	
	7/28/00	41.2	
	8/3/00	52.9	
	8/9/00	37.3	
	8/15/00	36.6	
	8/21/00		Invalid Sample - Motor not Running
	8/27/00		Invalid Sample - Motor not Running
	9/2/00	8.5	
	9/8/00	34.9	
	9/14/00	47.4	
	9/20/00	18.6	
	9/26/00	26.4	

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

Location	Sampling Date	Concentration +/- 2s[a] pCi[b]/L			Concentration +/- 2s Bq[c]/L		
CFA							
	6/30/00	60.1	±	80.6	2.23	±	2.98
	8/7/00	87.5	±	81.0	3.24	±	3.00
	9/5/00	96.6	±	82.6	3.58	±	3.06
EFS							
	7/18/00	516.7	±	91.2	19.12	±	3.37
	9/5/00	109.9	±	82.0	4.07	±	3.03
IDAHO FALLS							
	8/7/00	1.6	±	79.8	0.06	±	2.95
	9/5/00	65.8	±	81.2	2.43	±	3.00
	9/30/00	40.9	±	81.8	1.51	±	3.03

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

Table C-7: Weekly 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								
	7/12/00	CESIUM-137	0.6	±	1.6	0.02	±	0.06
	7/12/00	IODINE-131	1.6	±	2.4	0.06	±	0.09
	8/7/00	CESIUM-137	0.0	±	2.5	0.00	±	0.09
	8/7/00	IODINE-131	0.1	±	2.5	0.00	±	0.09
	9/11/00	CESIUM-137	-1.5	±	2.7	-0.05	±	0.10
	9/11/00	IODINE-131	-0.6	±	2.9	-0.02	±	0.11
CAREY								
	7/3/00	CESIUM-137	7.8	±	4.5	0.29	±	0.17
	7/3/00	IODINE-131	3.2	±	5.2	0.12	±	0.19
	8/8/00	CESIUM-137	-0.7	±	2.3	-0.03	±	0.08
	8/8/00	IODINE-131	-0.3	±	1.9	-0.01	±	0.07
	9/12/00	CESIUM-137	0.4	±	2.7	0.01	±	0.10
	9/12/00	IODINE-131	0.0	±	3.1	0.00	±	0.11
DIETRICH								
	7/3/00	CESIUM-137	-0.3	±	7.9	-0.01	±	0.29
	7/3/00	IODINE-131	-4.1	±	7.3	-0.15	±	0.27
	8/8/00	CESIUM-137	1.9	±	2.5	0.07	±	0.09
	8/8/00	IODINE-131	-0.3	±	2.6	-0.01	±	0.10
	9/12/00	CESIUM-137	0.2	±	2.2	0.01	±	0.08
	9/12/00	IODINE-131	-1.0	±	1.8	-0.04	±	0.07
HOWE								
	7/6/00	CESIUM-137	-0.5	±	2.3	-0.02	±	0.09
	7/6/00	IODINE-131	0.2	±	1.9	0.01	±	0.07
	8/7/00	CESIUM-137	5.8	±	4.6	0.22	±	0.17
	8/7/00	IODINE-131	2.0	±	4.7	0.07	±	0.17
	9/11/00	CESIUM-137	-6.8	±	6.9	-0.25	±	0.26
	9/11/00	IODINE-131	-3.0	±	5.4	-0.11	±	0.20
IDAHO FALLS								
	7/6/00	CESIUM-137	3.1	±	7.9	0.11	±	0.29
	7/6/00	IODINE-131	2.1	±	5.8	0.08	±	0.22
	7/13/00	CESIUM-137	-0.4	±	2.2	-0.01	±	0.08
	7/13/00	IODINE-131	1.1	±	1.6	0.04	±	0.06
	7/20/00	CESIUM-137	-0.1	±	8.3	0.00	±	0.31
	7/20/00	IODINE-131	-1.0	±	5.3	-0.04	±	0.20
	7/27/00	CESIUM-137	-1.4	±	9.3	-0.05	±	0.34
	7/27/00	IODINE-131	2.6	±	5.1	0.10	±	0.19
	8/3/00	CESIUM-137	-4.2	±	8.1	-0.15	±	0.30
	8/3/00	IODINE-131	0.0	±	5.4	0.00	±	0.20
	8/7/00	CESIUM-137	-0.5	±	2.3	-0.02	±	0.08
	8/7/00	IODINE-131	1.4	±	1.7	0.05	±	0.06
	8/17/00	CESIUM-137	6.4	±	4.8	0.23	±	0.18
	8/17/00	IODINE-131	2.8	±	4.2	0.10	±	0.15
	8/24/00	CESIUM-137	-5.2	±	6.8	-0.19	±	0.25

[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

Table C-7(cont): Weekly Iodine-131 & Cesium-137 Concentrations in Milk

Location	Sampling Date	Analyte	Concentration +/- 2s[a] pCi[b]/L			Concentration +/- 2s Bq[c]/L		
	8/24/00	IODINE-131	2.1	±	5.4	0.08	±	0.20
	8/31/00	CESIUM-137	3.7	±	6.5	0.14	±	0.24
	8/31/00	IODINE-131	2.9	±	4.0	0.11	±	0.15
	9/7/00	CESIUM-137	0.8	±	6.5	0.03	±	0.24
	9/7/00	IODINE-131	4.8	±	5.5	0.18	±	0.20
	9/11/00	CESIUM-137	-1.1	±	2.3	-0.04	±	0.09
	9/11/00	IODINE-131	-3.0	±	1.9	-0.11	±	0.07
	9/21/00	CESIUM-137	-3.1	±	6.5	-0.11	±	0.24
	9/21/00	IODINE-131	2.6	±	5.6	0.10	±	0.21
	9/28/00	CESIUM-137	-2.0	±	6.7	-0.07	±	0.25
	9/28/00	IODINE-131	2.8	±	4.0	0.10	±	0.15
MINIDOKA								
	7/3/00	CESIUM-137	-1.5	±	2.3	-0.05	±	0.08
	7/3/00	IODINE-131	0.5	±	2.2	0.02	±	0.08
	8/8/00	CESIUM-137	0.7	±	2.4	0.03	±	0.09
	8/8/00	IODINE-131	0.2	±	2.8	0.01	±	0.10
	9/12/00	CESIUM-137	-5.4	±	6.8	-0.20	±	0.25
	9/12/00	IODINE-131	0.6	±	5.3	0.02	±	0.20
MORELAND								
	9/11/00	CESIUM-137	12.4	±	5.9	0.46	±	0.22
	9/11/00	IODINE-131	0.3	±	6.9	0.01	±	0.26
ROBERTS								
	7/6/00	CESIUM-137	4.3	±	4.4	0.16	±	0.16
	7/6/00	IODINE-131	-5.2	±	4.6	-0.19	±	0.17
	8/7/00	CESIUM-137	-17.6	±	6.2	-0.65	±	0.23
	8/7/00	IODINE-131	-1.0	±	3.6	-0.04	±	0.13
	9/18/00	CESIUM-137	-1.2	±	2.3	-0.04	±	0.09
	9/18/00	IODINE-131	-1.2	±	1.7	-0.04	±	0.06
TERRETON								
	7/6/00	CESIUM-137	-3.7	±	8.2	-0.14	±	0.30
	7/6/00	IODINE-131	4.7	±	6.5	0.17	±	0.24
	8/7/00	CESIUM-137	3.3	±	4.9	0.12	±	0.18
	8/7/00	IODINE-131	3.1	±	4.5	0.11	±	0.17
	9/11/00	CESIUM-137	14.6	±	5.9	0.54	±	0.22
	9/11/00	IODINE-131	-2.2	±	6.4	-0.08	±	0.24

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

Table C-8: 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								
THYROID								
	7/12/00	CESIUM-137	-10400.0	±	7940.0	-384.8	±	293.8
	7/12/00	IODINE-131	-34.0	±	226.0	-1.3	±	8.4
MULE DEER								
LIVER								
	7/13/00	CESIUM-137	1.2	±	2.2	0.0	±	0.1
	7/13/00	IODINE-131	-2.0	±	0.8	-0.1	±	0.0
MUSCLE								
	7/13/00	CESIUM-137	-5.4	±	9.7	-0.2	±	0.4
	7/13/00	IODINE-131	4.1	±	5.7	0.2	±	0.2
THYROID								
	7/13/00	CESIUM-137	-486.0	±	688.0	-18.0	±	25.5
	7/13/00	IODINE-131	-18.3	±	294.0	-0.7	±	10.9
ELK								
LIVER								
	7/26/00	CESIUM-137	-0.7	±	11.4	0.0	±	0.4
	7/26/00	IODINE-131	-3.6	±	15.3	-0.1	±	0.6
MUSCLE								
	7/26/00	CESIUM-137	-5.6	±	10.3	-0.2	±	0.4
	7/26/00	IODINE-131	-2.0	±	11.3	-0.1	±	0.4
THYROID								
	7/26/00	CESIUM-137	-228.0	±	464.0	-8.4	±	17.2
	7/26/00	IODINE-131	17.9	±	190.0	0.7	±	7.0
ELK								
LIVER								
	8/2/00	CESIUM-137	0.2	±	10.4	0.0	±	0.4
	8/2/00	IODINE-131	0.1	±	6.7	0.0	±	0.2
MUSCLE								
	8/2/00	CESIUM-137	5.4	±	2.7	0.2	±	0.1
	8/2/00	IODINE-131	-2.7	±	3.2	-0.1	±	0.1
ELK								
THYROID								
	8/8/00	CESIUM-137	-227.0	±	358.0	-8.4	±	13.2
	8/8/00	IODINE-131	-4.2	±	156.0	-0.2	±	5.8

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

Table C-8(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		
MULE DEER								
LIVER								
	8/17/00	CESIUM-137	6.2	±	2.2	0.2	±	0.1
	8/17/00	IODINE-131	-1.0	±	3.8	0.0	±	0.1
MUSCLE								
	8/17/00	CESIUM-137	4.3	±	4.9	0.2	±	0.2
	8/17/00	IODINE-131	1.1	±	8.5	0.0	±	0.3
THYROID								
	8/17/00	CESIUM-137	423.0	±	3780.0	15.7	±	139.9
	8/17/00	IODINE-131	-260.0	±	3200.0	-9.6	±	118.4
MULE DEER								
LIVER								
	9/18/00	CESIUM-137	1.8	±	2.8	0.1	±	0.1
	9/18/00	IODINE-131	-3.0	±	3.2	-0.1	±	0.1
MUSCLE								
	9/18/00	CESIUM-137	2.6	±	2.4	0.1	±	0.1
	9/18/00	IODINE-131	-0.5	±	2.9	0.0	±	0.1
THYROID								
	9/18/00	CESIUM-137	31.6	±	410.0	1.2	±	15.2
	9/18/00	IODINE-131	-26.1	±	410.0	-1.0	±	15.2

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

Table C-9: Cesium-137 Concentrations in Lettuce

Location	Sampling Date	Lab QC Type	Concentration +/- 2s[a] pCi[b]/kg			Concentration +/- 2s Bq[c]/kg		
LETTUCE								
MONTEVIEW	7/4/00	N/A	-150.0	±	508.0	-5.55	±	18.80
CAREY	7/12/00	N/A	-611.0	±	850.0	-22.61	±	31.45
BLACKFOOT	7/19/00	N/A	64.0	±	440.0	2.37	±	16.28
ARCO	8/9/00	N/A	113.0	±	212.0	4.18	±	7.84
MUD LAKE	8/9/00	N/A	-553.0	±	1110.0	-20.46	±	41.07
HOWE	8/16/00	N/A	15.6	±	268.0	0.58	±	9.92

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

Table C-9(cont): Strontium-90 Concentrations in Lettuce

Location	Sampling Date	Concentration +/- 2s[a] pCi[b] /kg			Concentration +/- 2s Bq[c]/kg		
LETTUCE							
ARCO	8/9/00	81.2	±	41.0	3.00	±	1.52
BLACKFOOT	7/19/00	80.0	±	30.0	2.96	±	1.11
CAREY	7/12/00	295.0	±	140.0	10.92	±	5.18
HOWE	8/16/00	88.3	±	48.0	3.27	±	1.78
MONTEVIEW	7/4/00	60.6	±	50.0	2.24	±	1.85
MUD LAKE	8/9/00	50.6	±	51.0	1.87	±	1.89
POCATELLO	8/2/00	88.9	±	60.0	3.29	±	2.22

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

Table C-10: Cesium-137 Concentrations in Wheat

Location	Sampling Date	Lab QC Type	Concentration +/- 2s[a] pCi[b] /kg			Concentration +/- 2s Bq[c]/kg		
WHEAT								
MONTEVIEW	8/16/00	N/A	5.8	±	11.0	0.21	±	0.41
MUD LAKE	8/30/00	N/A	-3.5	±	12.8	-0.13	±	0.47
TERRETON	8/30/00	N/A	6.6	±	10.7	0.24	±	0.40
ARCO	9/6/00	N/A	0.5	±	2.9	0.02	±	0.11
BLACKFOOT	9/6/00	N/A	-0.6	±	2.9	-0.02	±	0.11
TABOR	9/6/00	N/A	-4.0	±	13.1	-0.15	±	0.48
AMERICAN FALLS	9/12/00	N/A	0.1	±	3.0	0.00	±	0.11
DIETRICH	9/12/00	N/A	3.2	±	3.1	0.12	±	0.12
MINIDOKA	9/12/00	N/A	0.2	±	2.7	0.01	±	0.10
IDAHO FALLS	9/14/00	N/A	5.8	±	13.0	0.21	±	0.48

[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): Strontium-90 Concentrations in Wheat

Location	Sampling Date	Concentration +/- 2s[a] pCi[b]/kg			Concentration +/- 2s Bq[c]/kg		
WHEAT							
AMERICAN FALLS	9/12/00	4.9	±	2.6	0.18	±	0.10
ARCO	9/6/00	6.3	±	4.4	0.23	±	0.16
BLACKFOOT	9/6/00	5.7	±	5.8	0.21	±	0.21
DIETRICH	9/12/00	5.6	±	4.4	0.21	±	0.16
IDAHO FALLS	9/14/00	5.3	±	3.0	0.20	±	0.11
MINIDOKA	9/12/00	6.2	±	4.2	0.23	±	0.16
MONTEVIEW	8/16/00	2.4	±	2.2	0.09	±	0.08
MUD LAKE	8/30/00	4.8	±	3.8	0.18	±	0.14
TABOR	9/6/00	6.1	±	3.8	0.23	±	0.14
TERRETON	8/30/00	3.2	±	3.4	0.12	±	0.13

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

Table C11: Annual Cesium-137 & Cobalt-60 in Soil

Depth & Location	Sampling Date	Analyte	Concentration +/- 2s[a] 10-2 pCi[b] /g			Concentration +/- 2s 10-2 Bq[c] /g		
0-5 inches								
ABERDEEN								
	8/17/00	*CESIUM-137*	73.80	±	3.72	2.73	±	0.14
	8/17/00	*COBALT-60*	0.05	±	0.39	0.00	±	0.01
ATOMIC CITY								
	8/8/00	*CESIUM-137*	61.30	±	2.62	2.27	±	0.10
	8/8/00	*COBALT-60*	0.46	±	0.53	0.02	±	0.02
BIRCH CREEK								
	8/14/00	*CESIUM-137*	93.50	±	3.88	3.46	±	0.14
	8/14/00	*COBALT-60*	0.01	±	0.50	0.00	±	0.02
BLACKFOOT								
	8/11/00	*CESIUM-137*	64.90	±	3.48	2.40	±	0.13
	8/11/00	*COBALT-60*	-0.24	±	0.37	-0.01	±	0.01
BUTTE CITY								
	8/9/00	*CESIUM-137*	81.50	±	4.26	3.02	±	0.16
	8/9/00	*COBALT-60*	0.29	±	0.39	0.01	±	0.01
CAREY								
	8/15/00	*CESIUM-137*	28.30	±	1.72	1.05	±	0.06
	8/15/00	*COBALT-60*	0.46	±	0.68	0.02	±	0.03
FAA TOWER								
	8/8/00	*CESIUM-137*	71.40	±	4.40	2.64	±	0.16
	8/8/00	*COBALT-60*	0.56	±	1.22	0.02	±	0.05
HOWE								
	8/14/00	*CESIUM-137*	52.50	±	2.40	1.94	±	0.09
	8/14/00	*COBALT-60*	0.16	±	0.31	0.01	±	0.01
MONTEVIEW								
	8/15/00	*CESIUM-137*	43.20	±	3.00	1.60	±	0.11
	8/15/00	*COBALT-60*	0.17	±	1.06	0.01	±	0.04
MUD LAKE #1								
	8/14/00	*CESIUM-137*	47.10	±	2.40	1.74	±	0.09
	8/14/00	*COBALT-60*	0.00	±	0.35	0.00	±	0.01
MUD LAKE #2								
	8/14/00	*CESIUM-137*	31.10	±	1.47	1.15	±	0.05
	8/14/00	*COBALT-60*	-0.81	±	0.83	-0.03	±	0.03
ST. ANTHONY								
	8/14/00	*CESIUM-137*	64.40	±	4.20	2.38	±	0.16
	8/14/00	*COBALT-60*	0.60	±	0.85	0.02	±	0.03

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

Table C-11(cont): Annual Cesium-137 & Cobalt-60 in Soil

Depth & Location	Sampling Date	Analyte	Concentration +/- 2s[a] 10-2 pCi[b] /g			Concentration +/- 2s 10-2 Bq[c] /g		
5-10 inches								
ABERDEEN								
	8/17/00	CESIUM-137	29.70	±	1.38	1.10	±	0.05
	8/17/00	COBALT-60	0.12	±	0.37	0.00	±	0.01
ATOMIC CITY								
	8/8/00	CESIUM-137	34.50	±	1.70	1.28	±	0.06
	8/8/00	COBALT-60	-0.10	±	0.35	0.00	±	0.01
BIRCH CREEK								
	8/14/00	CESIUM-137	21.10	±	1.98	0.78	±	0.07
	8/14/00	COBALT-60	0.63	±	1.16	0.02	±	0.04
BLACKFOOT								
	8/11/00	CESIUM-137	30.90	±	2.26	1.14	±	0.08
	8/11/00	COBALT-60	0.17	±	0.62	0.01	±	0.02
BUTTE CITY								
	8/9/00	CESIUM-137	16.20	±	1.63	0.60	±	0.06
	8/9/00	COBALT-60	0.64	±	0.87	0.02	±	0.03
CAREY								
	8/15/00	CESIUM-137	41.60	±	2.62	1.54	±	0.10
	8/15/00	COBALT-60	-1.57	±	1.02	-0.06	±	0.04
FAA TOWER								
	8/8/00	CESIUM-137	32.60	±	1.67	1.21	±	0.06
	8/8/00	COBALT-60	0.23	±	0.50	0.01	±	0.02
HOWE								
	8/14/00	CESIUM-137	24.80	±	1.19	0.92	±	0.04
	8/14/00	COBALT-60	0.16	±	0.26	0.01	±	0.01
MONTEVIEW								
	8/15/00	CESIUM-137	37.30	±	2.08	1.38	±	0.08
	8/15/00	COBALT-60	0.15	±	0.47	0.01	±	0.02
MUD LAKE #1								
	8/14/00	CESIUM-137	19.60	±	1.77	0.73	±	0.07
	8/14/00	COBALT-60	0.63	±	0.61	0.02	±	0.02
MUD LAKE #2								
	8/14/00	CESIUM-137	40.20	±	2.76	1.49	±	0.10
	8/14/00	COBALT-60	0.07	±	0.84	0.00	±	0.03
ST. ANTHONY								
	8/14/00	CESIUM-137	71.30	±	3.16	2.64	±	0.12
	8/14/00	COBALT-60	0.25	±	0.40	0.01	±	0.01

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

Table C-12: Annual Americium-241, Plutonium-238, Plutonium-239/240 & Strontium-90 Concentrations in Soil

Depth & Location	Sampling Date	Analyte	Concentration +/- 2s[a] 10^{-2} pCi[b]/g			Concentration +/- 2s 10^{-2} Bq[c]/g		
0-5 inches								
ABERDEEN								
	8/17/00	AMERICIUM-241	1.500	±	0.980	0.056	±	0.036
	8/17/00	PLUTONIUM-238	-0.062	±	0.124	-0.002	±	0.005
	8/17/00	PLUTONIUM-239/240	3.090	±	1.440	0.114	±	0.053
	8/17/00	STRONTIUM-90	29.800	±	14.000	1.103	±	0.518
ATOMIC CITY								
	8/8/00	AMERICIUM-241	0.692	±	0.700	0.026	±	0.026
	8/8/00	PLUTONIUM-238	0.090	±	0.320	0.003	±	0.012
	8/8/00	PLUTONIUM-239/240	1.740	±	1.080	0.064	±	0.040
	8/8/00	STRONTIUM-90	28.200	±	11.200	1.043	±	0.414
BIRCH CREEK								
	8/14/00	AMERICIUM-241	0.525	±	0.600	0.019	±	0.022
	8/14/00	PLUTONIUM-238	-0.221	±	0.600	-0.008	±	0.022
	8/14/00	PLUTONIUM-239/240	1.190	±	1.240	0.044	±	0.046
	8/14/00	STRONTIUM-90	34.000	±	14.000	1.258	±	0.518
BLACKFOOT								
	8/11/00	AMERICIUM-241	0.141	±	0.260	0.005	±	0.010
	8/11/00	PLUTONIUM-238	0.052	±	0.186	0.002	±	0.007
	8/11/00	PLUTONIUM-239/240	1.380	±	0.720	0.051	±	0.027
	8/11/00	STRONTIUM-90	15.600	±	10.600	0.577	±	0.392
BUTTE CITY								
	8/9/00	AMERICIUM-241	0.621	±	0.780	0.023	±	0.029
	8/9/00	PLUTONIUM-238	0.375	±	0.540	0.014	±	0.020
	8/9/00	PLUTONIUM-239/240	2.060	±	1.280	0.076	±	0.047
	8/9/00	STRONTIUM-90	39.700	±	24.000	1.469	±	0.888
CAREY								
	8/15/00	AMERICIUM-241	0.981	±	0.680	0.036	±	0.025
	8/15/00	PLUTONIUM-238	0.022	±	0.240	0.001	±	0.009
	8/15/00	PLUTONIUM-239/240	1.400	±	0.800	0.052	±	0.030
	8/15/00	STRONTIUM-90	9.280	±	6.800	0.343	±	0.252
FAA TOWER								
	8/8/00	AMERICIUM-241	0.896	±	0.580	0.033	±	0.021
	8/8/00	PLUTONIUM-238	0.287	±	0.340	0.011	±	0.013
	8/8/00	PLUTONIUM-239/240	2.440	±	1.040	0.090	±	0.038
	8/8/00	STRONTIUM-90	39.500	±	15.400	1.462	±	0.570

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

Table C-12(cont.): Annual Americium-241, Plutonium-238, Plutonium-239/240 & Strontium-90 Concentrations in Soil

Depth & Location	Sampling Date	Analyte	Concentration +/- 2s[a] 10^{-2} pCi[b]/g			Concentration +/- 2s 10^{-2} Bq[c]/g		
HOWE								
	8/14/00	AMERICIUM-241	0.774	±	0.520	0.029	±	0.019
	8/14/00	PLUTONIUM-238	-0.069	±	0.300	-0.003	±	0.011
	8/14/00	PLUTONIUM-239/240	1.100	±	0.740	0.041	±	0.027
	8/14/00	STRONTIUM-90	31.200	±	22.000	1.154	±	0.814
MONTEVIEW								
	8/15/00	AMERICIUM-241	0.283	±	0.280	0.010	±	0.010
	8/15/00	PLUTONIUM-238	0.341	±	0.480	0.013	±	0.018
	8/15/00	PLUTONIUM-239/240	1.660	±	0.860	0.061	±	0.032
	8/15/00	STRONTIUM-90	14.200	±	8.400	0.525	±	0.311
MUD LAKE #1								
	8/14/00	AMERICIUM-241	0.807	±	0.500	0.030	±	0.019
	8/14/00	PLUTONIUM-238	0.307	±	0.460	0.011	±	0.017
	8/14/00	PLUTONIUM-239/240	1.780	±	0.940	0.066	±	0.035
	8/14/00	STRONTIUM-90	17.400	±	12.800	0.644	±	0.474
MUD LAKE #2								
	8/14/00	AMERICIUM-241	0.161	±	0.320	0.006	±	0.012
	8/14/00	PLUTONIUM-238	0.099	±	0.360	0.004	±	0.013
	8/14/00	PLUTONIUM-239/240	1.160	±	0.880	0.043	±	0.033
	8/14/00	STRONTIUM-90	12.100	±	7.800	0.448	±	0.289
ST. ANTHONY								
	8/14/00	AMERICIUM-241	1.020	±	0.600	0.038	±	0.022
	8/14/00	PLUTONIUM-238	0.000	±	0.194	0.000	±	0.007
	8/14/00	PLUTONIUM-239/240	3.480	±	1.160	0.129	±	0.043
	8/14/00	STRONTIUM-90	17.600	±	12.200	0.651	±	0.451

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