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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: First Quarter 2015

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Contributors:
Russ Mitchell, Marilyn Case

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By Gonzales Stoller Surveillance, LLC
Environmental Surveillance, Education, and Research Program
Douglas K. Halford, Program Manager
120 Technology Dr., Idaho Falls, Idaho 83401
www.gsseser.com

EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the first quarter of 2015 could be directly linked with INL Site activities. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below standards set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the first quarter of 2015 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, January 1 through March 31, 2015. All sample types (media) and the sampling schedule followed during 2015 are listed in Appendix A. This report contains results for the following sample types:

- Air, including particulate air filters, charcoal cartridges, and atmospheric moisture
- Precipitation
- Milk

Table E-1 Summary of results for the First Quarter of 2015.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha concentrations were statistically the same for Distant, Boundary, and INL Site sample groups for the quarter and for each month of the quarter. Gross beta concentrations were statistically higher at Boundary locations than Distant locations during the quarter and during January. No consistent pattern was detected in the gross beta results to indicate an INL Site impact. No result exceeded the DCS for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting radionuclides or actinides were detected. One result for ^{90}Sr was just above the detection limit.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 24 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Six of the eight valid sample results showed tritium concentrations greater than the 3s uncertainty during the quarter. No sample result exceeded the DCS for tritium in air.
Precipitation	Liquid	Tritium	Nine samples were collected. Six of the results were greater than the 3s uncertainty. The concentrations were consistent with those reported across the region by the Environmental Protection Agency and with previous results.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	No Iodine-131 or other human-made gamma emitting radionuclides were detected.

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
CFA	Central Facilities Area
DCS	Derived Concentration Standard
DOE	Department of Energy
DOE – ID	Department of Energy Idaho Operations Office
EAL	Environmental Assessment Laboratory
EFS	Experimental Field Station
EPA	Environmental Protection Agency
ERAMS	Environmental Radiation Ambient Monitoring System
ESER	Environmental Surveillance, Education, and Research
GSS	Gonzales Stoller Surveillance, LLC
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
ISU	Idaho State University
MDC	minimum detectable concentration
NRTS	National Reactor Testing Station

LIST OF UNITS

Bq	becquerel
Ci	curie
g	gram
L	liter
µCi	microcurie
mL	milliliter
pCi	picocurie

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Laboratory (INL) Site are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2011, DOE 2014). During calendar year 2015, environmental monitoring within the INL Site boundaries was primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors, while monitoring outside the INL Site boundaries was conducted under the Environmental Surveillance, Education, and Research (ESER) Program. At the beginning of the first quarter of 2011, the ESER Program became led by a new partnership between S.M. Stoller and Jerome Gonzales Management Systems, Inc. with the support of the previous team members. This partnership is named Gonzales Stoller Surveillance, LLC (GSS).The ESER Program was led by GSS in cooperation with its team members, including the University of Idaho, Idaho State University (ISU), and ALS Environmental.

This report contains monitoring results from the ESER Program for samples collected during the first quarter of 2015 (January 1-March 31, 2015).

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

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

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

Environmental samples collected include:

- air at 16 locations on and around the INL Site
- moisture in air at four locations around the INL Site
- precipitation from three locations on and around the INL Site
- drinking water from eight locations and surface water from three locations around the INL Site
- agricultural products, including milk at seven dairies around the INL Site, potatoes from at least six local producers, alfalfa from a local producer, grain (wheat and barley) from approximately 10 local producers, and lettuce from approximately nine home-owned and portable gardens on and around the INL
- soil from 13 locations around the INL Site biennially
- environmental dosimeters from 17 locations semi-annually
- various numbers of wildlife including big game (pronghorn, mule deer, and elk) and waterfowl sampled on and near the INL Site.

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

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

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

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident or the 2011 Fukushima accident, the EPA may request additional sampling be performed through RadNet (EPA 2015). RadNet is comprised of a nationwide network of sampling stations that provide air, precipitation, drinking water, and milk samples. RadNet has more than 130 radiation air monitors in 50 states. RadNet runs 24 hours a day, 7 days a week collecting near-real-time measurements of gamma radiation in air. Over time, RadNet sample testing and monitoring results reveal the normal background levels of environmental radiation. The ESER Program currently operates a near-real-time air sampler and collects precipitation and drinking water in Idaho Falls for this national program and routinely sends samples to EPA's Eastern Environmental Radiation Facility for analyses. The RadNet data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA RadNet website (http://www2.epa.gov/radnet/radnet-databases-and-reports).

Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data and for preparing quarterly reports on results from the environmental surveillance program. The quarterly reports are then consolidated into the INL Site Environmental Report (DOE/ID 2015) for each calendar year. These annual reports also include data collected by other INL Site contractors.

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

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

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

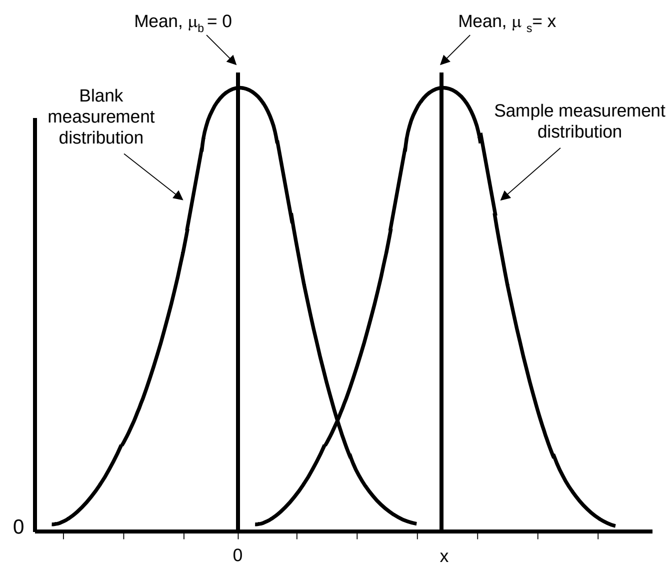

Figure 1. Example of overlap of blank and sample measurement distributions.

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

Once the critical level has been defined, the minimum detectable concentration may be determined. Concentrations that equal 3s represent a measurement at the detection level or minimum detectable concentration. For true concentrations of 3s or greater, there is a greater than 99-percent probability that the radionuclide was detected in the target sample. In a large number of samples, the conclusion—not detected—will be made in less than one percent of the samples with true concentrations at the minimum detectable concentration of 3s. These measurements are known as false negatives. The ESER reports measured radionuclide concentrations greater than or equal to their respective 3s uncertainties as being “detected with confidence.”

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

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

For more information concerning the ESER Program, contact GSS at (208) 525-8250, or visit the Program’s web page (http://www.gsseser.com).

2. THE INL SITE

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

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

The cleanup operation, the ICP, is now a separately managed effort. The ICP is charged with safely and cost-effectively completing the majority of cleanup work from past laboratory missions in an ongoing process.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the first quarter of 2015 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Standard (DCS) (DOE 2011) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the first quarter of 2015 (Figure 2). Four of these samplers are located on the INL Site, seven are situated off the INL Site near the boundary, and seven have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. At the start of 2014, one replicate sampler was moved to Idaho Falls (a Distant location) and one was moved to Main Gate (an INL Site location). An average of 20,832 ft^3 (590 m^3) of air was sampled at each location, each week, at an average flow rate of 2.07 ft^3/min (0.06 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

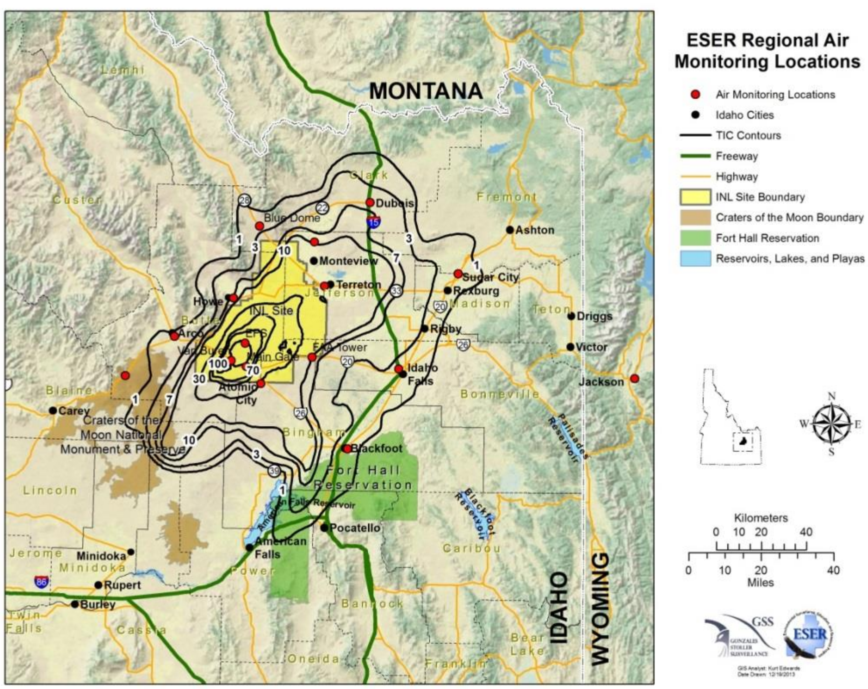

Figure 2. Low-volume air sampler locations.

Filters and charcoal cartridges were changed weekly at each station during the quarter. Each particulate filter was analyzed for gross alpha and gross beta radioactivity using thin-window gas flow proportional counting systems after waiting about four days for naturally-occurring daughter products of radon and thorium to decay.

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

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

Gross alpha results are reported in Table C-1 and shown in Figures 3 through 6. Gross alpha data are tested for normality prior to statistical analyses, and generally show no consistent discernible distribution. Because there is no discernible distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INL Site, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outlier and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. For the quarter, there was no statistical difference noted in the data, as the p-value was above 0.05.

Comparisons of gross alpha concentrations were made for each month of the quarter. Again the Kruskal-Wallis test of multiple independent groups was use d to determine if statistical differences exist between INL Site, Boundary, and Distant data groups. No statistical differences in gross alpha concentrations between groups were noted during any month (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL Site sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL Site and would not aid in determining offsite impacts. In the first quarter, there was one week where a statistical difference existed between the two sample groups (Table D-2). This was during the week of January 14, when the Boundary stations were statistically higher than the Distant locations. The overall average of concentrations for this week were about in the middle of typical concentrations for this time of year, and the statistical difference appears to be random variability in the data with lower concentrations at Craters of the Moon and Dubois.

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10. The data are tested quarterly and generally are found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. A statistical difference was noted in the quarterly data and during the month of January using the Kruskal-Wallace test (Table D-1). This is discussed further below.

Comparison of weekly Boundary and Distant gross beta data sets, using the Mann Whitney U test, showed a statistical difference between Boundary and Distant measurements during three weeks during the quarter (Table D-1).

The gross beta data were further analyzed on a weekly basis using scatter plots to determine if there was a particular trend that resulted in the statistical differences noted. During the week of January 7, gross beta concentrations were above normal at nearly all of the sampling locations. In the winter, strong and persistent inversion conditions sometimes develop on the Snake River Plain that result in an increase in gross beta activity, and this was true during this week. The outlier was Craters of the Moon on the low side, where the higher elevation sometimes allows the station to remain above the inversion. The other two weeks seem to be random variations in the data. The week of February 11, all locations had gross beta activities well below average. During the week ending March 18 the Distant locations were actually statistically higher than the Boundary locations, which does not indicate an INL Site impact. From Figures 7 through 10 it can be seen that variations in gross beta concentrations, while statistically significant, are relatively small between individual locations.

Iodine-131 was not detected in any of the 24 sets of charcoal cartridges measured during the first quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly composites. Specific actinides (plutonium and americium) were not detected either. Strontium-90 was reported in the composite from Howe. The result was just above the detection limit and within measurements made historically. All quarterly composite results are found in Appendix C, Table C-3.

ATMOSPHERIC MOISTURE SAMPLING

Atmospheric moisture is collected by pulling air through a column of absorbent material (molecular sieve material) to absorb water vapor. The water is then extracted from the absorbent material by heat distillation. The resulting water samples are then analyzed for tritium using liquid scintillation.

Results were available for eight atmospheric moisture samples collected during the first quarter of 2015. One sample result was invalidated after it was found that the sample recount results were inconsistent with the original analysis result. A review indicated instrument fluctuations resulted in an increased count rate (and increased activity).

Six of the eight valid results exceeded the 3s uncertainty level for tritium, with similar results to those reported previously. Results also remain similar between the four sampling locations. All samples were significantly below the DOE DCS for tritium in air of 1.4×10^{-8} $\mu Ci/mL_{air}$ with a maximum reported value of 9.9×10^{-13} $\mu Ci/mL_{air}$ at Blackfoot. Results are shown in Table C-4, Appendix C.

Tritium in atmospheric moisture is most likely due to tritium in the atmosphere produced from from natural and man-made sources (such as fallout from past atmospheric weapons testing) which can be washed out of the atmosphere. For this reason, precipitation samples are also collected and analyzed for tritium. A comparison of tritium concentrations measured in atmospheric moisture with tritium concentrations measured in precipitation samples indicate that they share a common source, which is not the INL Site (see Section 4).

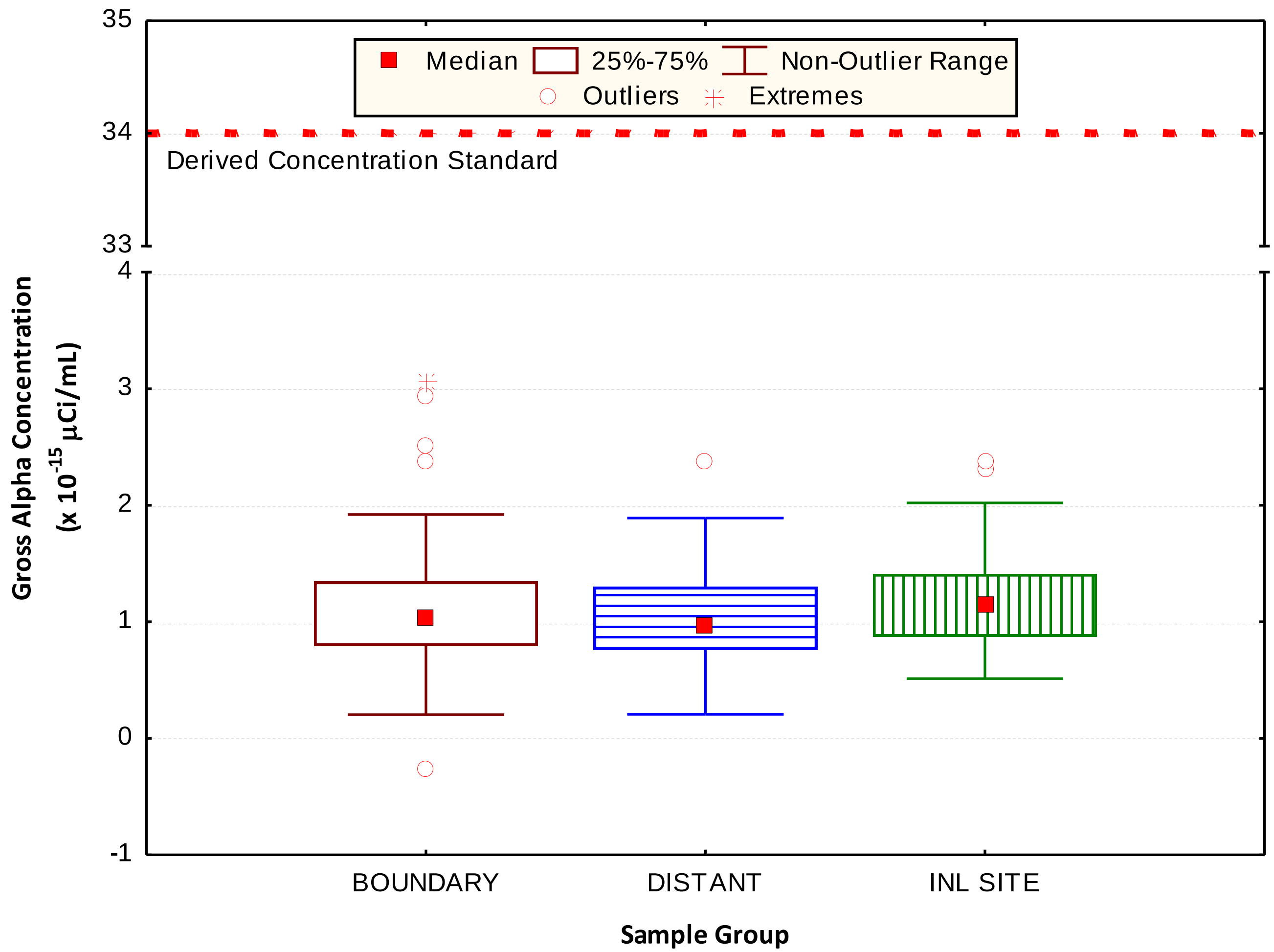

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the first quarter of 2015.

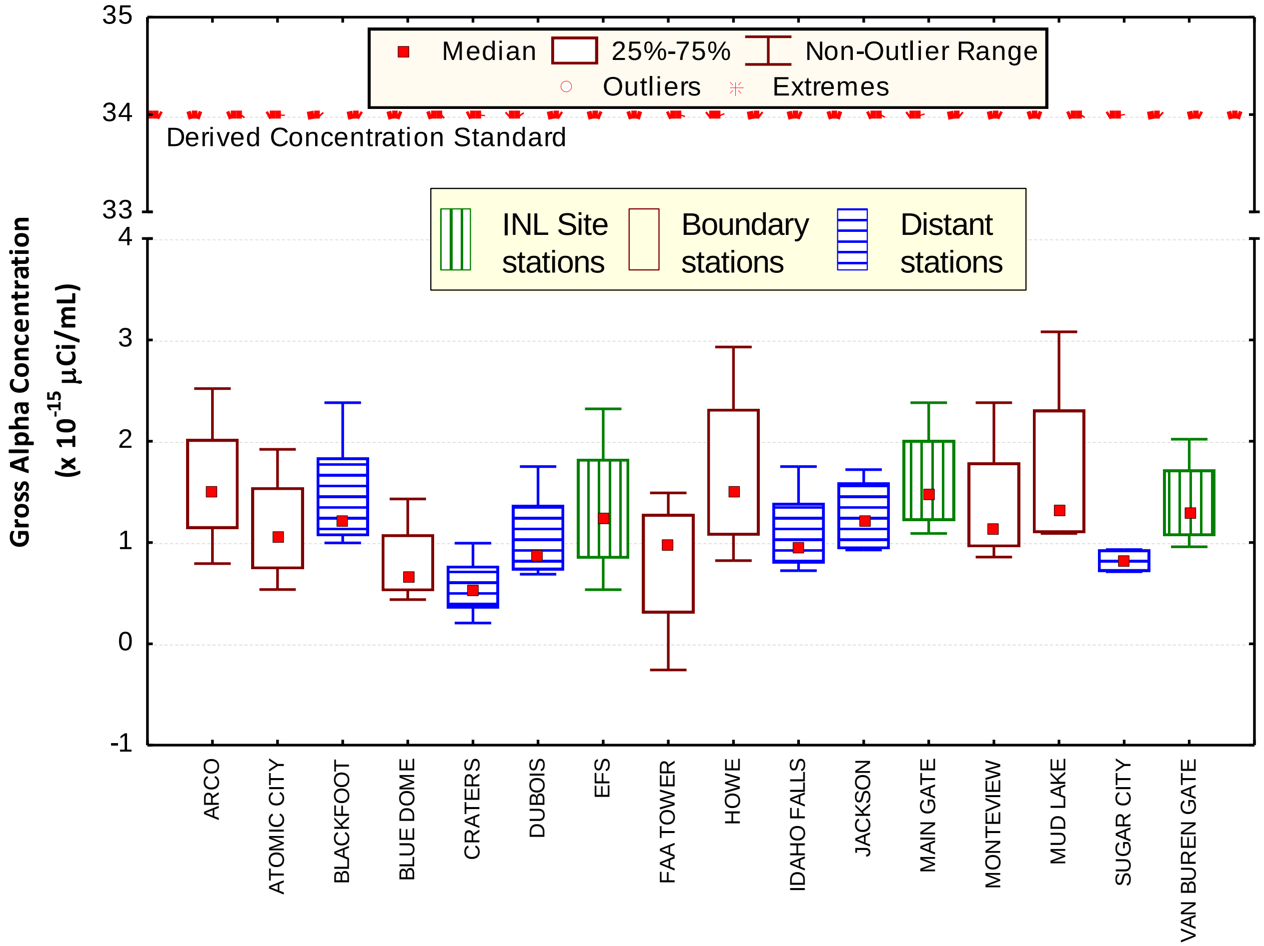

Figure 4. January gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location except Sugar City (N = 3).

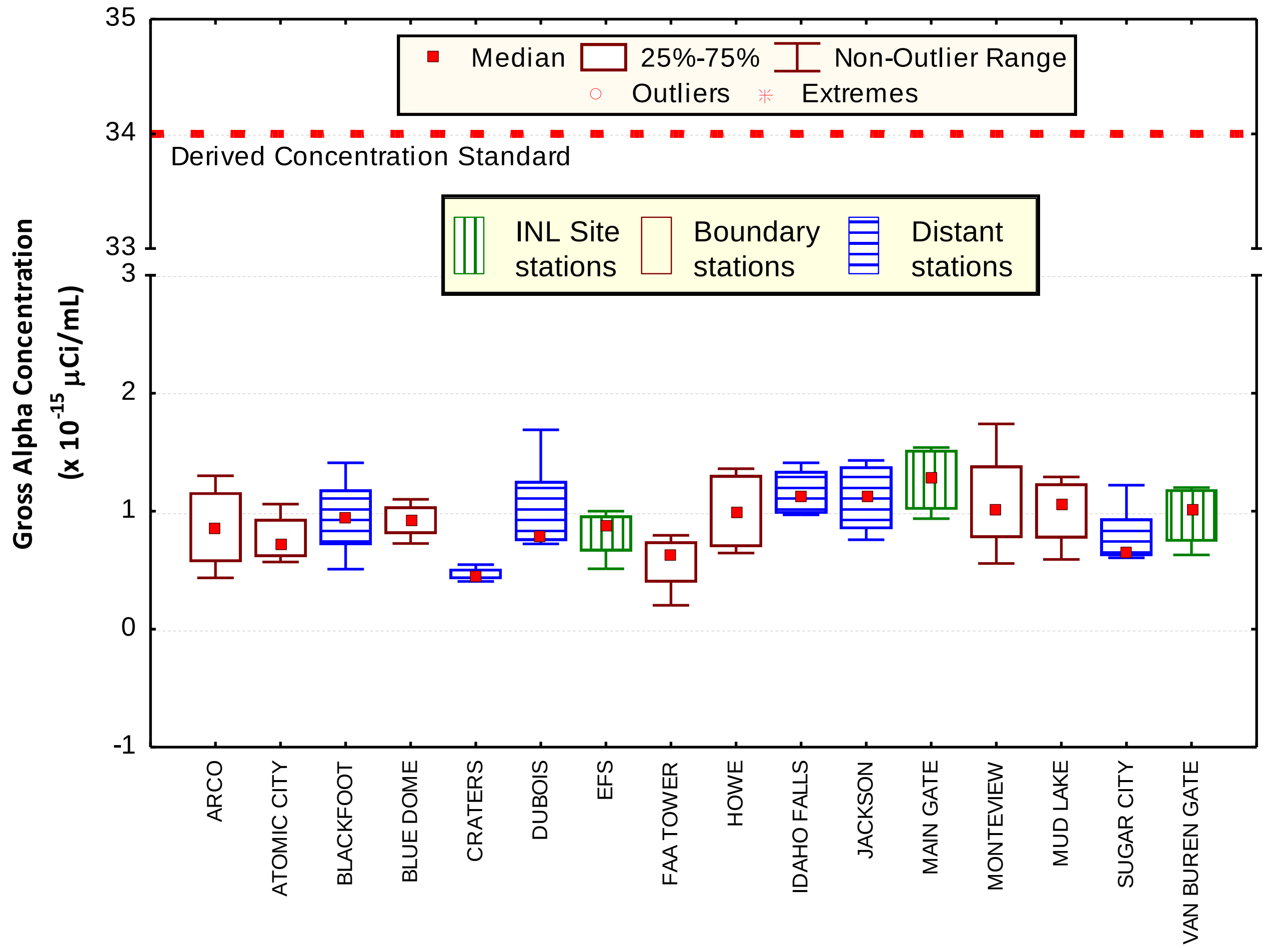

Figure 5. February gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

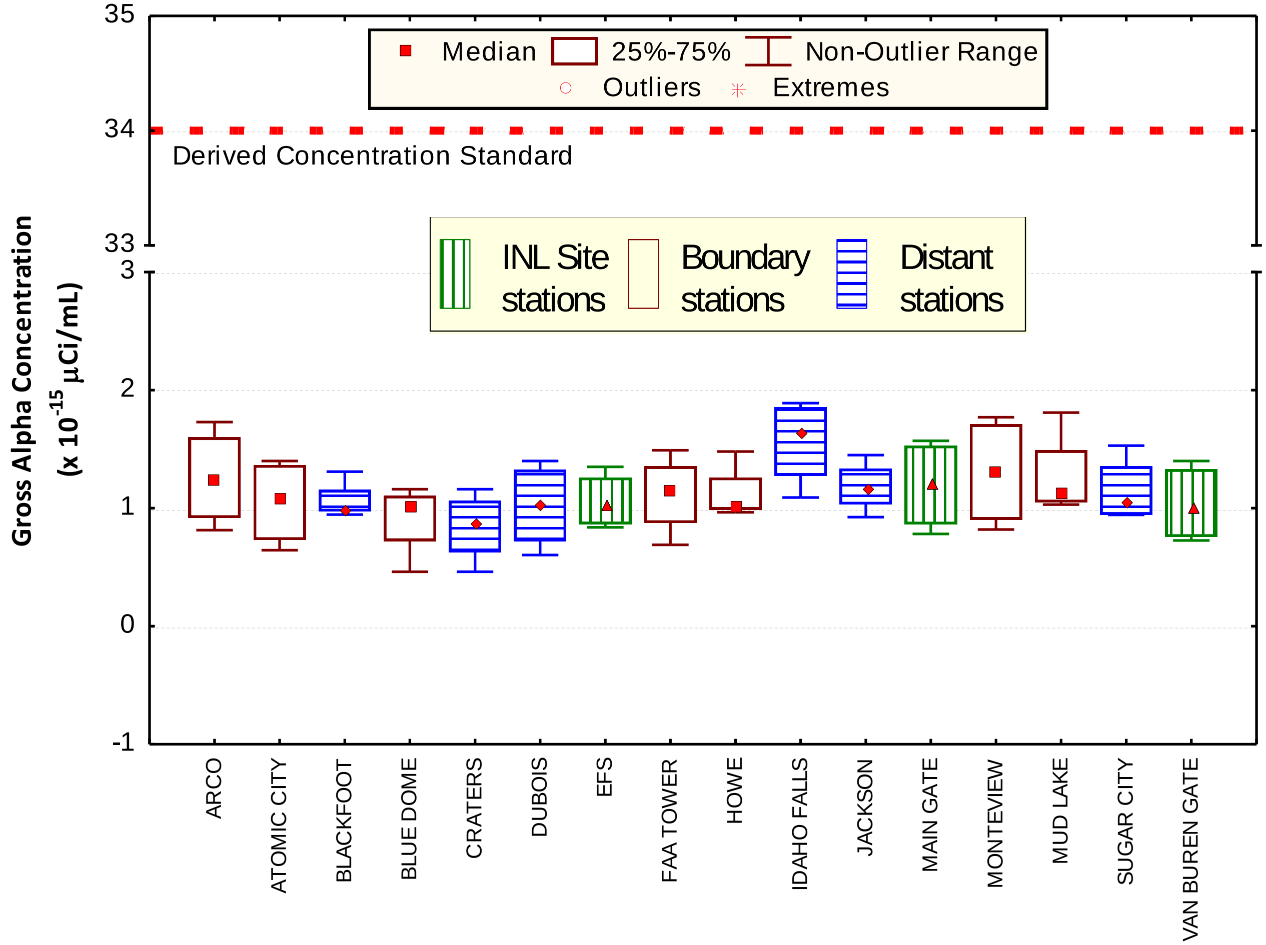

Figure 6. March gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

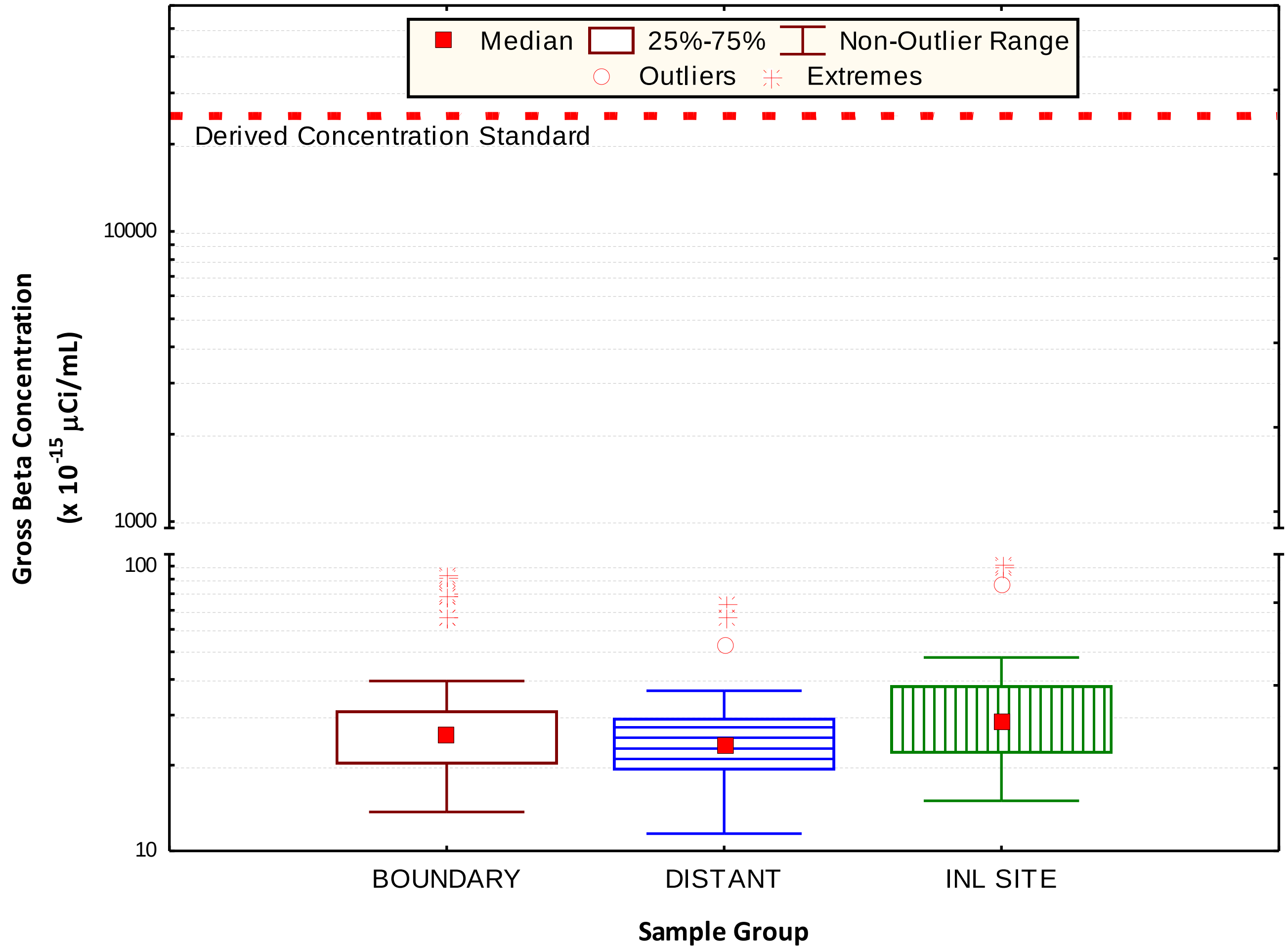

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the first quarter of 2015.

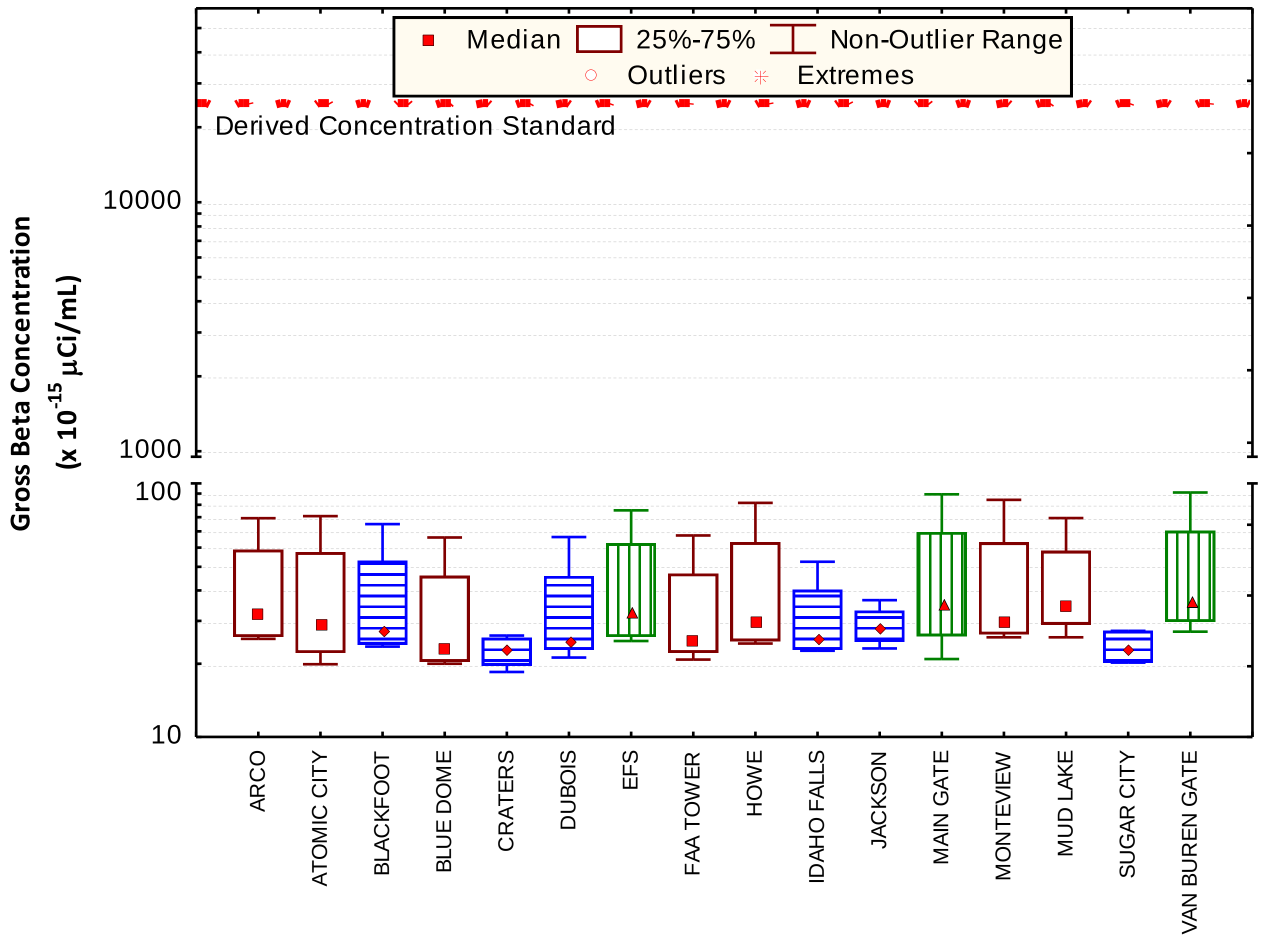

Figure 8. January gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location except Sugar City (N = 3).

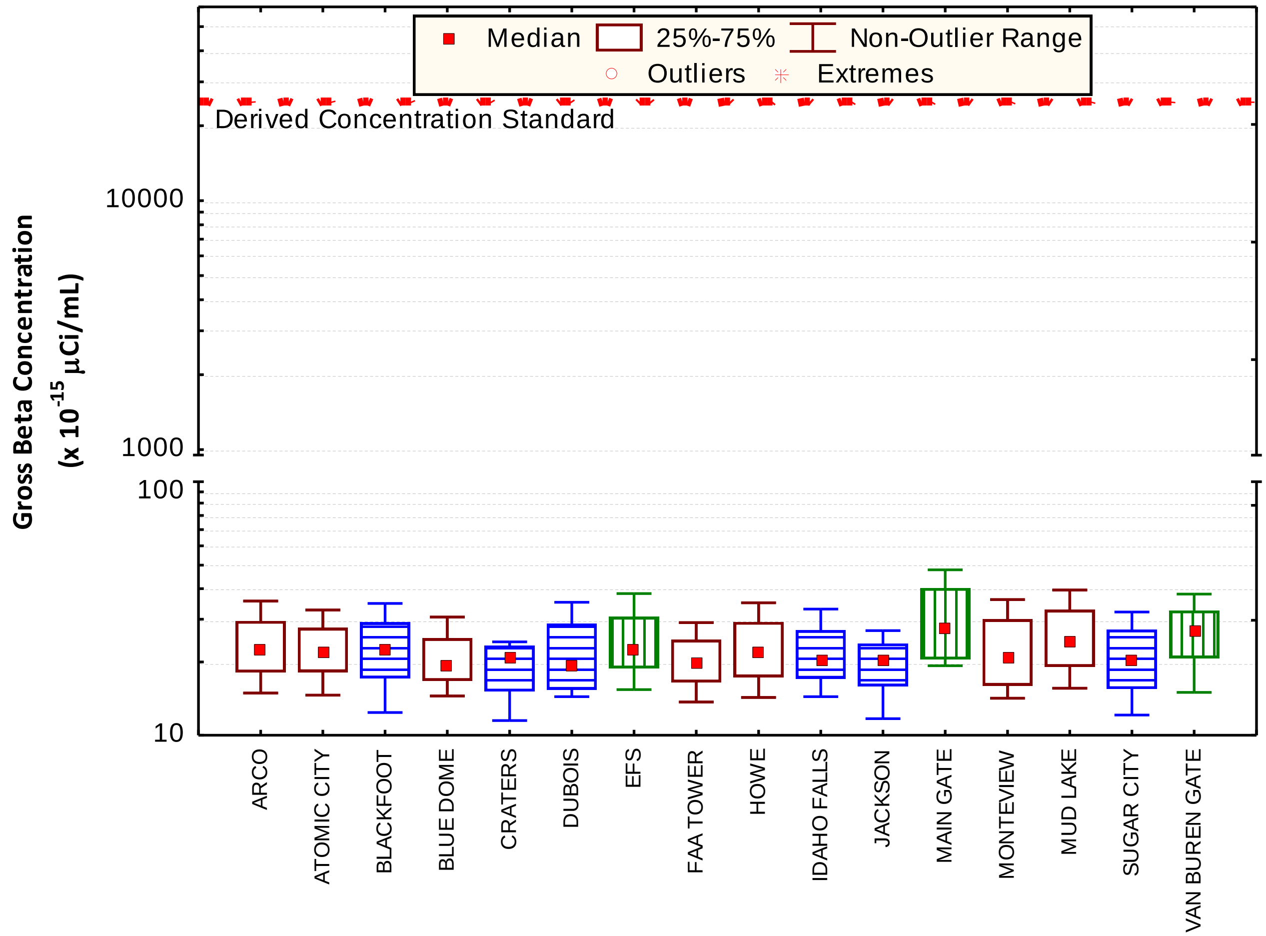

Figure 9. February gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

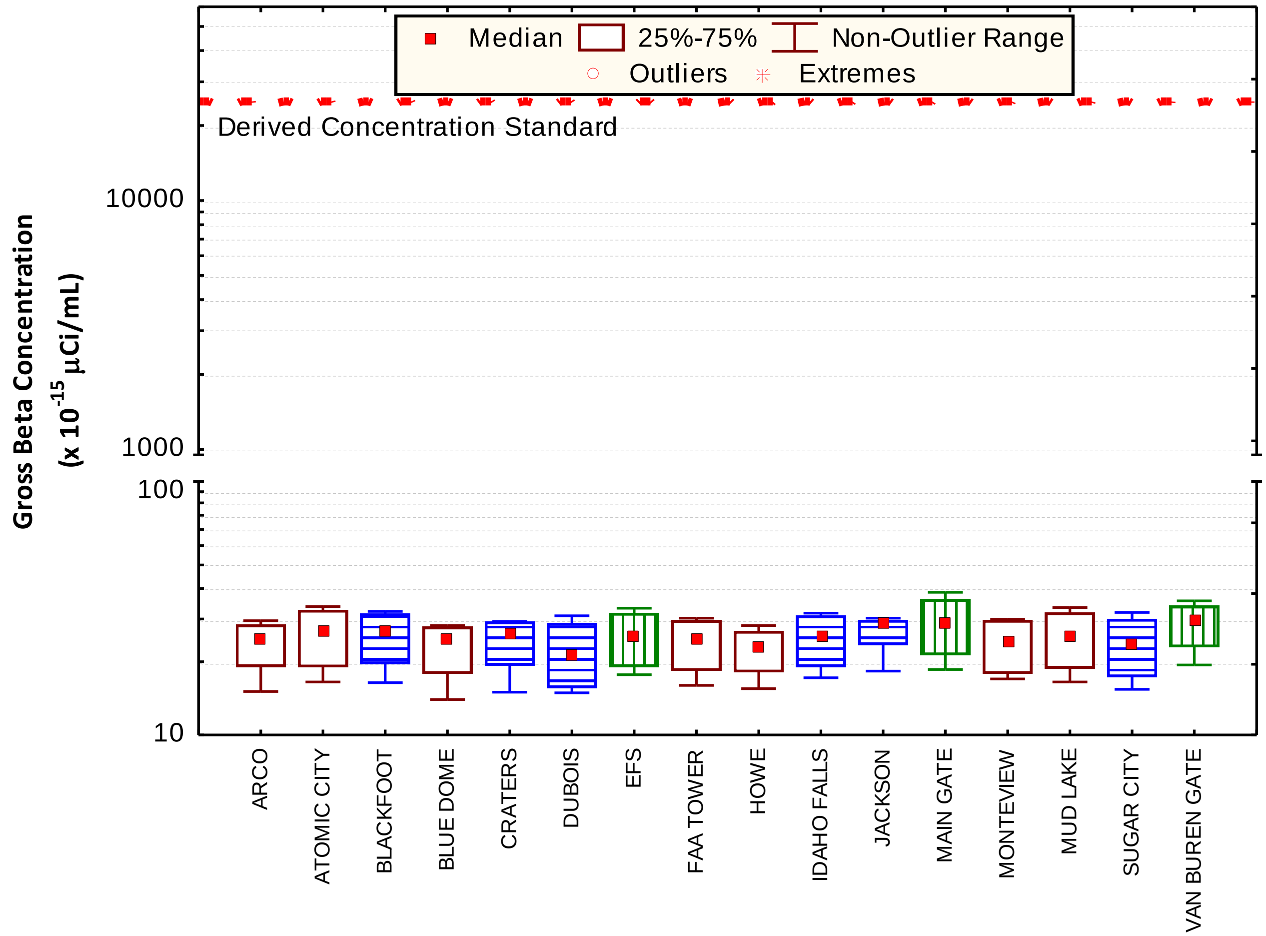

Figure 10. March gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

The "DOE Handbook Environmental Radiological Effluent Monitoring and Environmental Surveillance" (DOE 2015) recommends that rainwater surveillance should be included in the evaluation of the airborne pathway. This is especially important for the tritium pathway because tritium in the atmosphere, resulting from natural and man-made sources other than the INL Site, can be washed out of the atmosphere and detected in atmospheric moisture samples.

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the first quarter of 2015 produced sufficient precipitation to yield nine samples.

Tritium was measured above the 3s values in six of the nine samples. These results are listed in Table C-5 (Appendix C). Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere and the remnants of fallout from nuclear weapons testing. When detected, tritium values have remained well within the historical range and the range measured across the country by the EPA Radnet program (EPA 2013). Most samples have values up to about 150 pCi/L, with occasional values ranging up to about 300-400 pCi/L. The maximum value in the first quarter was at the higher end of this range, measuring 393 pCi/L in a February Idaho Falls sample.

A qualitative comparison of tritium concentrations in precipitation and atmospheric moisture indicates that they are similar and that the tritium water collected in moisture samples is most likely the same as that in background atmosphere. Concentrations of tritium in precipitation samples ranged from 27 to 393 pCi/L, while concentrations of tritium in atmospheric moisture (water) ranged from 27 to 417 pCi/L.

5. AGRICULTURAL PRODUCT, WILDLIFE, AND SOIL SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL Site and Southeast Idaho. Specifically, milk, alfalfa, grain, potatoes, lettuce, large game animals, and waterfowl are sampled. Milk is sampled throughout the year and large game animals are sampled whenever large game animals are killed onsite from vehicle collisions. No large game animals were sampled in the first quarter. Alfalfa is collected during the second quarter, lettuce and grain are sampled during the third quarter, while potatoes are collected during the fourth quarter. Waterfowl are collected in either the third or fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk samples available during the first quarter of 2015.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at six other locations around the INL Site (Figure 11) during the first quarter of 2015. In addition, commercially-available organic milk was purchased as a control sample each month. All samples were analyzed for gamma emitting radionuclides, with particular emphasis on Iodine-131.

Iodine-131 was not detected in any weekly or monthly samples during the first quarter. No other human-made gamma-emitting radionuclides were found either. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-6.

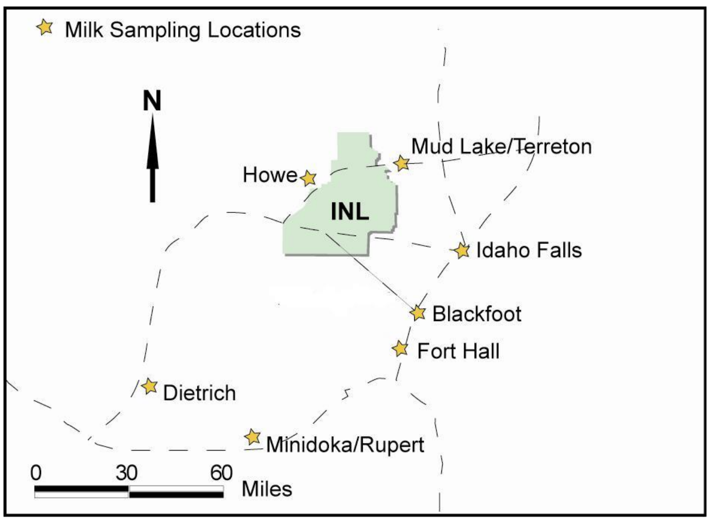

Figure 11. ESER milk sampling locations

6. QUALITY ASSURANCE

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

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

Sample results are compared to criteria described in the Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program (GSS 2012). Criteria established by DOE for Quality Assurance activities include:

- Quality assurance program
- Personnel training and qualification
- Quality improvement process
- Documents and records
- Established work processes
- Established standards for design and verification
- Established procurement requirements
- Inspection and acceptance testing
- Management assessment
- Independent assessment

Assessments of ESER data quality are achieved through analysis of spike, performance evaluation, and duplicate samples; through sample recounts; through analysis of blank samples; and through comparison of sample results to established method quality objectives. These assessments are documented in the ESER Quality Assurance for the First Quarter of 2015 (GSS 2015).

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
^{90}Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	2 to 13 weeks	Blackfoot, Idaho Falls, Sugar City	Atomic City	None
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	CFA
Tritium	weekly	None	None	EFS
DRINKING WATER				
Gross Alpha, Gross Beta, Tritium	Semiannually	Craters of the Moon, Idaho Falls, Minidoka, Shoshone	Atomic City, Howe, Mud Lake, Rest Area	None
SURFACE WATER				
Gross Alpha, Gross Beta, Tritium	Semiannually	Buhl, Hagerman, Twin Falls	None	Big Lost River (when flowing)
ENVIRONMENTAL RADIATION SAMPLING				
TLDs/OSLDs				
Gamma Radiation	semiannual	Aberdeen, Blackfoot (2), Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Minidoka, Sugar City, Roberts	Arco, Atomic City, Birch Creek, Blue Dome, Howe, Monteview, Mud Lake	None
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek, Frenchman's Cabin	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Idaho Falls, Rupert, Shelley, Hamer, occasional samples across the U.S.	Arco, Monteview, Mud Lake, Terreton	None
ALFALFA				
Gamma Spec, ^{90}Sr	annually	None	Mud Lake	None
GRAIN				
Gamma Spec, ^{90}Sr	annually	American Falls, Blackfoot, Carey, Idaho Falls, Minidoka, Roberts	Arco, Monteview, Mud Lake, Taber, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL Site roads
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Heise, Firth, Fort Hall, Mud Lake, Market Lake, and American Falls	None	INL Site wastewater disposal ponds

APPENDIX B

SUMMARY OF MDCs AND DCSs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed during First Quarter 2015

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	3.68×10^{-16} µCi/mL	3.4×10^{-14} µCi/mL
	Gross beta[d]	9.58×10^{-16} µCi/mL	2.5×10^{-11} µCi/mL
	^{137}Cs	6.82×10^{-17} µCi/mL	3.9×10^{-10} µCi/mL
	^{90}Sr	1.83×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
	^{238}Pu	5.92×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}Pu$	6.07×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
	^{241}Am	5.00×10^{-18} µCi/mL	1.8×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	8.48×10^{-16} µCi/mL	2.3×10^{-19} µCi/mL
Air (atmospheric moisture)	^{3}H	89.9 pCi/L_{water}	2.1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	89.2 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.47 pCi/L	--
	^{137}Cs	0.99 pCi/L	--

a The MDC is an estimate of the concentration of radioactivity in a given sample type that can be identified with a 95 percent level of confidence. MDCs are calculated and reported by the laboratories based on actual ESER sample results following analysis. Each MDC shown in this table is an average for the quarter.

b DCSs, 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 Based on the most restrictive human-made alpha emitter (^{239}Pu).

d Based on the most restrictive human-made beta emitter (^{90}Sr).

e The approximate MDC is based on an average filtered air volume (pressure corrected) of 445 m^3/week.

APPENDIX C

SAMPLE ANALYSIS RESULTS

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY															
ARCO	1/7/2015	2.52	±	0.24	9.32	±	0.89	Yes	79.20	±	1.05	293.04	±	3.89	Yes
	1/14/2015	1.48	±	0.23	5.48	±	0.84	Yes	25.30	±	0.63	93.61	±	2.34	Yes
	1/21/2015	0.79	±	0.14	2.93	±	0.53	Yes	26.30	±	0.63	97.31	±	2.32	Yes
	1/28/2015	1.52	±	0.19	5.62	±	0.71	Yes	38.40	±	0.76	142.08	±	2.80	Yes
	2/4/2015	1.30	±	0.18	4.81	±	0.66	Yes	35.60	±	0.74	131.72	±	2.72	Yes
	2/11/2015	0.44	±	0.13	1.61	±	0.49	Yes	14.90	±	0.51	55.13	±	1.87	Yes
	2/18/2015	0.71	±	0.16	2.61	±	0.59	Yes	23.30	±	0.62	86.21	±	2.30	Yes
	2/25/2015	1.02	±	0.16	3.77	±	0.59	Yes	21.40	±	0.58	79.18	±	2.13	Yes
	3/4/2015	1.02	±	0.16	3.77	±	0.59	Yes	23.00	±	0.59	85.10	±	2.18	Yes
	3/11/2015	1.73	±	0.20	6.40	±	0.73	Yes	29.50	±	0.65	109.15	±	2.41	Yes
	3/18/2015	1.47	±	0.19	5.44	±	0.70	Yes	27.30	±	0.65	101.01	±	2.42	Yes
	3/25/2015	0.81	±	0.15	3.01	±	0.56	Yes	15.10	±	0.51	55.87	±	1.89	Yes
ATOMIC CITY	1/7/2015	1.92	±	0.21	7.10	±	0.79	Yes	80.80	±	1.03	298.96	±	3.81	Yes
	1/14/2015	0.94	±	0.20	3.47	±	0.72	Yes	19.90	±	0.56	73.63	±	2.06	Yes
	1/21/2015	0.54	±	0.12	1.98	±	0.45	Yes	24.40	±	0.58	90.28	±	2.14	Yes
	1/28/2015	1.17	±	0.16	4.33	±	0.60	Yes	34.00	±	0.67	125.80	±	2.46	Yes
	2/4/2015	0.57	±	0.13	2.11	±	0.48	Yes	32.70	±	0.66	120.99	±	2.46	Yes
	2/11/2015	0.65	±	0.14	2.42	±	0.52	Yes	14.60	±	0.49	54.02	±	1.82	Yes
	2/18/2015	0.81	±	0.16	2.99	±	0.58	Yes	22.50	±	0.59	83.25	±	2.19	Yes
	2/25/2015	1.06	±	0.16	3.92	±	0.59	Yes	21.80	±	0.57	80.66	±	2.12	Yes
	3/4/2015	0.82	±	0.15	3.03	±	0.54	Yes	21.50	±	0.56	79.55	±	2.08	Yes
	3/11/2015	1.33	±	0.18	4.92	±	0.67	Yes	33.70	±	0.69	124.69	±	2.54	Yes
	3/18/2015	1.40	±	0.19	5.18	±	0.68	Yes	31.60	±	0.69	116.92	±	2.54	Yes
	3/25/2015	0.64	±	0.15	2.38	±	0.54	Yes	16.50	±	0.53	61.05	±	1.96	Yes
BLUE DOME	1/7/2015	1.43	±	0.20	5.29	±	0.73	Yes	66.00	±	0.96	244.20	±	3.56	Yes
	1/14/2015	0.73	±	0.20	2.70	±	0.73	Yes	20.00	±	0.58	74.00	±	2.15	Yes
	1/21/2015	0.44	±	0.12	1.62	±	0.44	Yes	20.80	±	0.57	76.96	±	2.09	Yes
	1/28/2015	0.60	±	0.14	2.23	±	0.51	Yes	25.80	±	0.62	95.46	±	2.29	Yes
	2/4/2015	0.89	±	0.15	3.29	±	0.57	Yes	30.60	±	0.67	113.22	±	2.49	Yes
	2/11/2015	0.98	±	0.17	3.63	±	0.61	Yes	14.50	±	0.52	53.65	±	1.92	Yes
	2/18/2015	0.73	±	0.17	2.69	±	0.62	Yes	19.00	±	0.60	70.30	±	2.23	Yes
	2/25/2015	1.10	±	0.17	4.07	±	0.62	Yes	19.50	±	0.57	72.15	±	2.11	Yes
	3/4/2015	0.98	±	0.16	3.64	±	0.60	Yes	21.70	±	0.59	80.29	±	2.18	Yes
	3/11/2015	1.16	±	0.18	4.29	±	0.68	Yes	28.20	±	0.67	104.34	±	2.49	Yes
	3/18/2015	1.05	±	0.18	3.89	±	0.65	Yes	27.50	±	0.67	101.75	±	2.49	Yes
	3/25/2015	0.46	±	0.14	1.71	±	0.50	Yes	14.00	±	0.51	51.80	±	1.88	Yes
FAA TOWER	1/7/2015	1.07	±	0.18	3.96	±	0.65	Yes	67.30	±	0.93	249.01	±	3.46	Yes
	1/14/2015	1.49	±	0.22	5.51	±	0.80	Yes	20.80	±	0.56	76.96	±	2.08	Yes
	1/21/2015	-0.26	±	0.06	-0.95	±	0.23	No	23.60	±	0.58	87.32	±	2.13	Yes
	1/28/2015	0.86	±	0.15	3.18	±	0.54	Yes	26.50	±	0.60	98.05	±	2.23	Yes
	2/4/2015	0.80	±	0.14	2.95	±	0.53	Yes	29.00	±	0.64	107.30	±	2.36	Yes
	2/11/2015	0.59	±	0.14	2.18	±	0.51	Yes	13.70	±	0.48	50.69	±	1.78	Yes
	2/18/2015	0.20	±	0.13	0.75	±	0.46	No	19.30	±	0.56	71.41	±	2.06	Yes
	2/25/2015	0.69	±	0.14	2.56	±	0.53	Yes	20.30	±	0.57	75.11	±	2.09	Yes
	3/4/2015	0.69	±	0.14	2.55	±	0.52	Yes	20.70	±	0.56	76.59	±	2.06	Yes
	3/11/2015	1.49	±	0.19	5.51	±	0.70	Yes	30.20	±	0.66	111.74	±	2.44	Yes
	3/18/2015	1.22	±	0.17	4.51	±	0.64	Yes	29.10	±	0.65	107.67	±	2.40	Yes
	3/25/2015	1.06	±	0.16	3.92	±	0.60	Yes	16.00	±	0.52	59.20	±	1.91	Yes
HOWE	1/7/2015	2.93	±	0.25	10.84	±	0.94	Yes	91.60	±	1.11	338.92	±	4.11	Yes
	1/14/2015	1.71	±	0.24	6.33	±	0.89	Yes	25.30	±	0.65	93.61	±	2.39	Yes
	1/21/2015	0.82	±	0.15	3.04	±	0.54	Yes	24.20	±	0.62	89.54	±	2.28	Yes
	1/28/2015	1.32	±	0.20	4.88	±	0.73	Yes	34.60	±	0.77	128.02	±	2.86	Yes
	2/4/2015	1.25	±	0.17	4.63	±	0.63	Yes	35.00	±	0.71	129.50	±	2.62	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			GROSS ALPHA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			GROSS BETA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			GROSS BETA Result > 3s
	2/11/2015	0.65	±	0.15	2.39	±	0.56	Yes	14.30	±	0.52	52.91	±	1.93	Yes
	2/18/2015	0.75	±	0.16	2.78	±	0.60	Yes	20.40	±	0.60	75.48	±	2.22	Yes
	2/25/2015	1.36	±	0.19	5.03	±	0.69	Yes	23.40	±	0.63	86.58	±	2.32	Yes
	3/4/2015	1.01	±	0.16	3.74	±	0.60	Yes	20.70	±	0.58	76.59	±	2.15	Yes
	3/11/2015	1.48	±	0.20	5.48	±	0.73	Yes	28.20	±	0.68	104.34	±	2.50	Yes
	3/18/2015	1.04	±	0.17	3.85	±	0.61	Yes	25.30	±	0.62	93.61	±	2.30	Yes
	3/25/2015	0.97	±	0.16	3.57	±	0.60	Yes	15.50	±	0.53	57.35	±	1.95	Yes
MONTEVIEW	1/7/2015	2.38	±	0.23	8.81	±	0.87	Yes	94.20	±	1.11	348.54	±	4.11	Yes
	1/14/2015	1.20	±	0.22	4.44	±	0.80	Yes	27.10	±	0.65	100.27	±	2.40	Yes
	1/21/2015	0.86	±	0.15	3.17	±	0.54	Yes	25.70	±	0.61	95.09	±	2.26	Yes
	1/28/2015	1.05	±	0.17	3.89	±	0.62	Yes	31.80	±	0.69	117.66	±	2.55	Yes
	2/4/2015	1.03	±	0.16	3.81	±	0.61	Yes	36.10	±	0.73	133.57	±	2.70	Yes
	2/11/2015	0.99	±	0.17	3.67	±	0.63	Yes	14.20	±	0.52	52.54	±	1.94	Yes
	2/18/2015	0.56	±	0.15	2.06	±	0.56	Yes	17.80	±	0.57	65.86	±	2.09	Yes
	2/25/2015	1.74	±	0.20	6.44	±	0.74	Yes	23.80	±	0.62	88.06	±	2.31	Yes
	3/4/2015	0.82	±	0.15	3.03	±	0.56	Yes	18.70	±	0.55	69.19	±	2.05	Yes
	3/11/2015	1.77	±	0.21	6.55	±	0.76	Yes	29.90	±	0.68	110.63	±	2.50	Yes
	3/18/2015	1.65	±	0.20	6.11	±	0.73	Yes	29.50	±	0.68	109.15	±	2.50	Yes
	3/25/2015	0.99	±	0.17	3.65	±	0.61	Yes	17.00	±	0.55	62.90	±	2.04	Yes
MUD LAKE	1/7/2015	3.08	±	0.24	11.40	±	0.90	Yes	79.30	±	0.99	293.41	±	3.66	Yes
	1/14/2015	1.09	±	0.20	4.03	±	0.72	Yes	25.70	±	0.59	95.09	±	2.19	Yes
	1/21/2015	1.54	±	0.17	5.70	±	0.64	Yes	36.90	±	0.68	136.53	±	2.53	Yes
	1/28/2015	1.10	±	0.18	4.07	±	0.68	Yes	32.20	±	0.75	119.14	±	2.76	Yes
	2/4/2015	1.29	±	0.17	4.77	±	0.64	Yes	39.50	±	0.74	146.15	±	2.74	Yes
	2/11/2015	0.59	±	0.15	2.19	±	0.54	Yes	15.60	±	0.53	57.72	±	1.95	Yes
	2/18/2015	0.95	±	0.17	3.52	±	0.63	Yes	22.60	±	0.61	83.62	±	2.26	Yes
	2/25/2015	1.18	±	0.17	4.37	±	0.63	Yes	26.00	±	0.63	96.20	±	2.32	Yes
	3/4/2015	1.17	±	0.17	4.33	±	0.63	Yes	21.00	±	0.58	77.70	±	2.14	Yes
	3/11/2015	1.81	±	0.21	6.70	±	0.76	Yes	33.40	±	0.70	123.58	±	2.59	Yes
	3/18/2015	1.03	±	0.17	3.81	±	0.64	Yes	30.40	±	0.69	112.48	±	2.54	Yes
	3/25/2015	1.07	±	0.17	3.96	±	0.62	Yes	16.50	±	0.54	61.05	±	1.99	Yes
DISTANT															
BLACKFOOT	1/7/2015	2.38	±	0.32	8.81	±	1.17	Yes	74.90	±	1.35	277.13	±	5.00	Yes
	1/14/2015	1.00	±	0.20	3.69	±	0.74	Yes	23.50	±	0.59	86.95	±	2.19	Yes
	1/21/2015	1.30	±	0.17	4.81	±	0.62	Yes	24.50	±	0.61	90.65	±	2.25	Yes
	1/28/2015	1.13	±	0.16	4.18	±	0.58	Yes	31.10	±	0.64	115.07	±	2.36	Yes
	2/4/2015	1.41	±	0.17	5.22	±	0.63	Yes	34.80	±	0.68	128.76	±	2.50	Yes
	2/11/2015	0.51	±	0.13	1.88	±	0.48	Yes	12.40	±	0.46	45.88	±	1.71	Yes
	2/18/2015	0.91	±	0.17	3.38	±	0.63	Yes	23.40	±	0.62	86.58	±	2.30	Yes
	2/25/2015	0.96	±	0.16	3.54	±	0.58	Yes	21.90	±	0.58	81.03	±	2.15	Yes
	3/4/2015	0.95	±	0.16	3.50	±	0.58	Yes	22.80	±	0.59	84.36	±	2.18	Yes
	3/11/2015	1.31	±	0.18	4.85	±	0.67	Yes	30.80	±	0.66	113.96	±	2.44	Yes
	3/18/2015	1.00	±	0.17	3.70	±	0.62	Yes	32.20	±	0.69	119.14	±	2.56	Yes
	3/25/2015	1.00	±	0.16	3.70	±	0.59	Yes	16.40	±	0.52	60.68	±	1.94	Yes
CRATERS OF	1/7/2015	0.55	±	0.13	2.03	±	0.48	Yes	25.00	±	0.59	92.50	±	2.16	Yes
THE MOON	1/14/2015	0.50	±	0.17	1.84	±	0.61	No	18.50	±	0.52	68.45	±	1.93	Yes
	1/21/2015	0.21	±	0.11	0.76	±	0.41	No	20.80	±	0.59	76.96	±	2.17	Yes
	1/28/2015	0.99	±	0.16	3.68	±	0.61	Yes	26.10	±	0.64	96.57	±	2.38	Yes
	2/4/2015	0.55	±	0.14	2.02	±	0.51	Yes	24.20	±	0.64	89.54	±	2.37	Yes
	2/11/2015	0.41	±	0.13	1.50	±	0.49	Yes	11.50	±	0.47	42.55	±	1.75	Yes
	2/18/2015	0.44	±	0.15	1.64	±	0.54	Yes	22.40	±	0.61	82.88	±	2.26	Yes
	2/25/2015	0.48	±	0.13	1.76	±	0.49	Yes	18.80	±	0.55	69.56	±	2.05	Yes
	3/4/2015	0.79	±	0.15	2.93	±	0.57	Yes	23.60	±	0.61	87.32	±	2.26	Yes
	3/11/2015	1.16	±	0.18	4.29	±	0.65	Yes	29.30	±	0.66	108.41	±	2.42	Yes
	3/18/2015	0.97	±	0.17	3.58	±	0.62	Yes	29.20	±	0.67	108.04	±	2.49	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			GROSS ALPHA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			GROSS BETA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			GROSS BETA Result > 3s
	3/25/2015	0.46	±	0.13	1.71	±	0.49	Yes	15.00	±	0.51	55.50	±	1.87	Yes
DUBOIS	1/7/2015	1.75	±	0.21	6.48	±	0.78	Yes	66.30	±	0.97	245.31	±	3.57	Yes
	1/14/2015	0.69	±	0.20	2.54	±	0.72	Yes	21.20	±	0.59	78.44	±	2.20	Yes
	1/21/2015	0.99	±	0.16	3.67	±	0.58	Yes	25.40	±	0.63	93.98	±	2.33	Yes
	1/28/2015	0.77	±	0.15	2.83	±	0.55	Yes	24.50	±	0.61	90.65	±	2.26	Yes
	2/4/2015	0.72	±	0.15	2.68	±	0.57	Yes	35.20	±	0.74	130.24	±	2.75	Yes
	2/11/2015	0.78	±	0.16	2.87	±	0.58	Yes	14.40	±	0.52	53.28	±	1.94	Yes
	2/18/2015	0.82	±	0.17	3.04	±	0.61	Yes	16.40	±	0.56	60.68	±	2.06	Yes
	2/25/2015	1.69	±	0.20	6.25	±	0.73	Yes	22.30	±	0.61	82.51	±	2.25	Yes
	3/4/2015	0.60	±	0.15	2.23	±	0.54	Yes	16.30	±	0.55	60.31	±	2.02	Yes
	3/11/2015	1.25	±	0.19	4.63	±	0.68	Yes	26.80	±	0.65	99.16	±	2.41	Yes
	3/18/2015	1.40	±	0.20	5.18	±	0.73	Yes	30.90	±	0.72	114.33	±	2.65	Yes
	3/25/2015	0.84	±	0.15	3.11	±	0.56	Yes	14.90	±	0.50	55.13	±	1.85	Yes
IDAHO FALLS	1/7/2015	1.75	±	0.20	6.48	±	0.75	Yes	52.50	±	0.86	194.25	±	3.19	Yes
	1/14/2015	0.86	±	0.19	3.20	±	0.68	Yes	22.60	±	0.57	83.62	±	2.09	Yes
	1/21/2015	0.72	±	0.13	2.68	±	0.48	Yes	23.10	±	0.56	85.47	±	2.06	Yes
	1/28/2015	1.03	±	0.15	3.81	±	0.57	Yes	28.00	±	0.61	103.60	±	2.26	Yes
	2/4/2015	1.27	±	0.17	4.70	±	0.61	Yes	33.00	±	0.67	122.10	±	2.48	Yes
	2/11/2015	0.97	±	0.16	3.59	±	0.58	Yes	14.40	±	0.50	53.28	±	1.84	Yes
	2/18/2015	0.99	±	0.16	3.66	±	0.60	Yes	19.80	±	0.56	73.26	±	2.05	Yes
	2/25/2015	1.41	±	0.17	5.22	±	0.64	Yes	21.00	±	0.56	77.70	±	2.09	Yes
	3/4/2015	1.09	±	0.16	4.03	±	0.58	Yes	20.90	±	0.55	77.33	±	2.05	Yes
	3/11/2015	1.89	±	0.20	6.99	±	0.75	Yes	30.30	±	0.66	112.11	±	2.45	Yes
	3/18/2015	1.82	±	0.20	6.73	±	0.73	Yes	31.70	±	0.67	117.29	±	2.49	Yes
	3/25/2015	1.46	±	0.18	5.40	±	0.67	Yes	17.20	±	0.54	63.64	±	1.98	Yes
QA-2	1/7/2015	1.86	±	0.22	6.88	±	0.80	Yes	66.90	±	0.98	247.53	±	3.62	Yes
(IDAHO FALLS)	1/14/2015	1.01	±	0.20	3.74	±	0.73	Yes	21.70	±	0.57	80.29	±	2.11	Yes
	1/21/2015	0.71	±	0.13	2.63	±	0.49	Yes	25.40	±	0.59	93.98	±	2.18	Yes
	1/28/2015	1.06	±	0.16	3.92	±	0.58	Yes	29.50	±	0.63	109.15	±	2.33	Yes
	2/4/2015	1.10	±	0.16	4.07	±	0.60	Yes	36.60	±	0.71	135.42	±	2.64	Yes
	2/11/2015	0.44	±	0.13	1.61	±	0.49	Yes	14.20	±	0.50	52.54	±	1.86	Yes
	2/18/2015	0.71	±	0.15	2.64	±	0.56	Yes	20.00	±	0.56	74.00	±	2.08	Yes
	2/25/2015	1.08	±	0.16	4.00	±	0.58	Yes	19.10	±	0.54	70.67	±	2.00	Yes
	3/4/2015	0.85	±	0.15	3.13	±	0.55	Yes	21.10	±	0.56	78.07	±	2.08	Yes
	3/11/2015	1.24	±	0.18	4.59	±	0.65	Yes	30.80	±	0.66	113.96	±	2.45	Yes
	3/18/2015	1.12	±	0.17	4.14	±	0.63	Yes	32.40	±	0.68	119.88	±	2.51	Yes
	3/25/2015	1.24	±	0.17	4.59	±	0.63	Yes	16.10	±	0.51	59.57	±	1.89	Yes
JACKSON	1/7/2015	1.72	±	0.24	6.36	±	0.88	Yes	36.50	±	0.88	135.05	±	3.25	Yes
	1/14/2015	0.93	±	0.19	3.43	±	0.71	Yes	26.20	±	0.60	96.94	±	2.23	Yes
	1/21/2015	0.95	±	0.14	3.50	±	0.53	Yes	23.10	±	0.56	85.47	±	2.08	Yes
	1/28/2015	1.47	±	0.18	5.44	±	0.67	Yes	29.60	±	0.66	109.52	±	2.43	Yes
	2/4/2015	1.43	±	0.17	5.29	±	0.63	Yes	26.90	±	0.62	99.53	±	2.29	Yes
	2/11/2015	0.76	±	0.15	2.80	±	0.54	Yes	11.70	±	0.46	43.29	±	1.70	Yes
	2/18/2015	0.94	±	0.16	3.48	±	0.60	Yes	20.10	±	0.56	74.37	±	2.07	Yes
	2/25/2015	1.33	±	0.18	4.92	±	0.65	Yes	20.70	±	0.58	76.59	±	2.13	Yes
	3/4/2015	0.92	±	0.16	3.42	±	0.60	Yes	29.20	±	0.67	108.04	±	2.48	Yes
	3/11/2015	1.22	±	0.18	4.51	±	0.65	Yes	28.60	±	0.65	105.82	±	2.39	Yes
	3/18/2015	1.45	±	0.19	5.37	±	0.70	Yes	30.20	±	0.68	111.74	±	2.50	Yes
	3/25/2015	1.14	±	0.18	4.22	±	0.65	Yes	18.30	±	0.57	67.71	±	2.11	Yes
SUGAR CITY a	1/7/2015		±			±		No		±			±		No
	1/14/2015	0.82	±	0.19	3.03	±	0.71	Yes	20.20	±	0.57	74.74	±	2.09	Yes
	1/21/2015	0.93	±	0.14	3.44	±	0.53	Yes	22.80	±	0.57	84.36	±	2.11	Yes
	1/28/2015	0.71	±	0.15	2.63	±	0.54	Yes	27.30	±	0.63	101.01	±	2.34	Yes
	2/4/2015	0.64	±	0.14	2.37	±	0.51	Yes	32.10	±	0.68	118.77	±	2.52	Yes
	2/11/2015	0.65	±	0.15	2.42	±	0.56	Yes	12.10	±	0.50	44.77	±	1.84	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty (x 10^{-15} µCi/mL)	GROSS BETA Result ± 1s Uncertainty (x 10^{-11} Bq/mL)	GROSS BETA Result > 3s
	2/18/2015	0.61 ± 0.16	2.24 ± 0.58	Yes	18.90 ± 0.59	69.93 ± 2.19	Yes
	2/25/2015	1.22 ± 0.17	4.51 ± 0.64	Yes	22.20 ± 0.60	82.14 ± 2.22	Yes
	3/4/2015	0.94 ± 0.16	3.49 ± 0.60	Yes	19.20 ± 0.57	71.04 ± 2.11	Yes
	3/11/2015	1.18 ± 0.18	4.37 ± 0.68	Yes	28.10 ± 0.67	103.97 ± 2.46	Yes
	3/18/2015	1.53 ± 0.19	5.66 ± 0.69	Yes	31.90 ± 0.67	118.03 ± 2.49	Yes
	3/25/2015	0.95 ± 0.15	3.50 ± 0.57	Yes	15.40 ± 0.50	56.98 ± 1.84	Yes
INL SITE							
EFS	1/7/2015	2.32 ± 0.23	8.58 ± 0.85	Yes	85.30 ± 1.06	315.61 ± 3.92	Yes
	1/14/2015	1.33 ± 0.21	4.92 ± 0.78	Yes	24.80 ± 0.60	91.76 ± 2.23	Yes
	1/21/2015	0.53 ± 0.12	1.98 ± 0.46	Yes	26.80 ± 0.60	99.16 ± 2.22	Yes
	1/28/2015	1.15 ± 0.17	4.26 ± 0.62	Yes	39.60 ± 0.73	146.52 ± 2.70	Yes
	2/4/2015	0.81 ± 0.15	3.00 ± 0.55	Yes	38.20 ± 0.72	141.34 ± 2.67	Yes
	2/11/2015	0.93 ± 0.16	3.43 ± 0.58	Yes	15.40 ± 0.51	56.98 ± 1.88	Yes
	2/18/2015	0.51 ± 0.15	1.89 ± 0.54	Yes	23.10 ± 0.61	85.47 ± 2.25	Yes
	2/25/2015	1.00 ± 0.16	3.70 ± 0.59	Yes	22.30 ± 0.58	82.51 ± 2.16	Yes
	3/4/2015	0.84 ± 0.15	3.10 ± 0.55	Yes	20.40 ± 0.55	75.48 ± 2.05	Yes
	3/11/2015	1.17 ± 0.18	4.33 ± 0.65	Yes	33.20 ± 0.68	122.84 ± 2.52	Yes
	3/18/2015	1.35 ± 0.18	5.00 ± 0.68	Yes	30.30 ± 0.68	112.11 ± 2.51	Yes
	3/25/2015	0.89 ± 0.16	3.30 ± 0.59	Yes	17.70 ± 0.55	65.49 ± 2.03	Yes
MAIN GATE	1/7/2015	2.38 ± 0.26	8.81 ± 0.96	Yes	99.20 ± 1.25	367.04 ± 4.63	Yes
	1/14/2015	1.34 ± 0.22	4.96 ± 0.80	Yes	20.90 ± 0.58	77.33 ± 2.13	Yes
	1/21/2015	1.09 ± 0.16	4.03 ± 0.61	Yes	31.00 ± 0.69	114.70 ± 2.54	Yes
	1/28/2015	1.64 ± 0.19	6.07 ± 0.69	Yes	39.70 ± 0.73	146.89 ± 2.71	Yes
	2/4/2015	1.50 ± 0.19	5.55 ± 0.69	Yes	47.80 ± 0.82	176.86 ± 3.03	Yes
	2/11/2015	1.09 ± 0.19	4.03 ± 0.71	Yes	19.30 ± 0.63	71.41 ± 2.33	Yes
	2/18/2015	1.54 ± 0.21	5.70 ± 0.78	Yes	32.70 ± 0.75	120.99 ± 2.78	Yes
	2/25/2015	0.94 ± 0.15	3.47 ± 0.54	Yes	21.70 ± 0.54	80.29 ± 2.00	Yes
	3/4/2015	0.78 ± 0.14	2.89 ± 0.52	Yes	24.00 ± 0.57	88.80 ± 2.12	Yes
	3/11/2015	1.57 ± 0.22	5.81 ± 0.80	Yes	38.60 ± 0.81	142.82 ± 2.99	Yes
	3/18/2015	1.49 ± 0.18	5.51 ± 0.67	Yes	33.70 ± 0.68	124.69 ± 2.52	Yes
	3/25/2015	0.95 ± 0.16	3.50 ± 0.61	Yes	18.60 ± 0.56	68.82 ± 2.09	Yes
QA-1	1/7/2015	2.03 ± 0.22	7.51 ± 0.81	Yes	71.80 ± 0.99	265.66 ± 3.68	Yes
(MAIN GATE)	1/14/2015	1.20 ± 0.20	4.44 ± 0.75	Yes	24.80 ± 0.60	91.76 ± 2.20	Yes
	1/21/2015	0.66 ± 0.13	2.46 ± 0.48	Yes	26.20 ± 0.60	96.94 ± 2.22	Yes
	1/28/2015	1.22 ± 0.17	4.51 ± 0.61	Yes	34.20 ± 0.68	126.54 ± 2.51	Yes
	2/4/2015	1.37 ± 0.18	5.07 ± 0.65	Yes	39.40 ± 0.74	145.78 ± 2.74	Yes
	2/11/2015	0.39 ± 0.13	1.43 ± 0.47	Yes	14.50 ± 0.50	53.65 ± 1.84	Yes
	2/18/2015	0.76 ± 0.16	2.81 ± 0.57	Yes	22.90 ± 0.60	84.73 ± 2.20	Yes
	2/25/2015	0.99 ± 0.16	3.65 ± 0.58	Yes	21.10 ± 0.56	78.07 ± 2.08	Yes
	3/4/2015	0.73 ± 0.14	2.69 ± 0.53	Yes	21.20 ± 0.57	78.44 ± 2.09	Yes
	3/11/2015	1.48 ± 0.19	5.48 ± 0.68	Yes	32.90 ± 0.67	121.73 ± 2.49	Yes
	3/18/2015	1.02 ± 0.16	3.77 ± 0.58	Yes	26.80 ± 0.60	99.16 ± 2.23	Yes
	3/25/2015	0.50 ± 0.13	1.84 ± 0.49	Yes	15.70 ± 0.51	58.09 ± 1.87	Yes
VAN BUREN GATE	1/7/2015	2.02 ± 0.24	7.47 ± 0.87	Yes	101.00 ± 1.20	373.70 ± 4.44	Yes
	1/14/2015	1.42 ± 0.22	5.25 ± 0.82	Yes	27.10 ± 0.64	100.27 ± 2.36	Yes
	1/21/2015	1.17 ± 0.21	4.33 ± 0.78	Yes	39.70 ± 0.92	146.89 ± 3.41	Yes
	1/28/2015	0.96 ± 0.15	3.54 ± 0.54	Yes	32.40 ± 0.63	119.88 ± 2.32	Yes
	2/4/2015	1.20 ± 0.17	4.44 ± 0.62	Yes	38.00 ± 0.73	140.60 ± 2.68	Yes
	2/11/2015	0.63 ± 0.15	2.33 ± 0.54	Yes	15.00 ± 0.51	55.50 ± 1.90	Yes
	2/18/2015	0.86 ± 0.17	3.16 ± 0.63	Yes	27.00 ± 0.67	99.90 ± 2.47	Yes
	2/25/2015	1.17 ± 0.18	4.33 ± 0.65	Yes	26.50 ± 0.65	98.05 ± 2.41	Yes
	3/4/2015	0.79 ± 0.15	2.92 ± 0.55	Yes	26.50 ± 0.62	98.05 ± 2.30	Yes
	3/11/2015	1.26 ± 0.17	4.66 ± 0.63	Yes	32.30 ± 0.65	119.51 ± 2.41	Yes
	3/18/2015	1.40 ± 0.20	5.18 ± 0.73	Yes	35.60 ± 0.76	131.72 ± 2.83	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)			Result > 3s	GROSS BETA Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)			Result > 3s
	3/25/2015	0.73	±	0.15	2.69	±	0.55	Yes	19.40	±	0.56	71.78	±	2.07	Yes

a. Invalid sample result shown in red

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY								
ARCO	01/07/2015	0.42	±	1.22	1.54	±	4.52	No
	01/14/2015	0.16	±	1.22	0.58	±	4.52	No
	01/21/2015	1.81	±	1.27	6.68	±	4.70	No
	01/28/2015	1.24	±	1.25	4.60	±	4.61	No
	02/04/2015	1.40	±	1.27	5.17	±	4.71	No
	02/11/2015	-2.80	±	1.21	-10.37	±	4.46	No
	02/18/2015	1.55	±	1.27	5.74	±	4.69	No
	02/25/2015	1.98	±	1.25	7.34	±	4.63	No
	03/04/2015	1.21	±	1.90	4.47	±	7.05	No
	03/11/2015	-1.93	±	1.93	-7.15	±	7.15	No
	03/18/2015	-0.21	±	1.95	-0.79	±	7.21	No
	03/25/2015	-0.99	±	1.88	-3.67	±	6.96	No
ATOMIC CITY	01/07/2015	0.39	±	1.16	1.46	±	4.29	No
	01/14/2015	0.15	±	1.16	0.55	±	4.29	No
	01/21/2015	1.67	±	1.18	6.18	±	4.35	No
	01/28/2015	1.09	±	1.09	4.04	±	4.04	No
	02/04/2015	1.25	±	1.14	4.61	±	4.20	No
	02/11/2015	-2.72	±	1.17	-10.06	±	4.32	No
	02/18/2015	1.46	±	1.19	5.41	±	4.42	No
	02/25/2015	1.94	±	1.23	7.19	±	4.54	No
	03/04/2015	1.17	±	1.85	4.34	±	6.84	No
	03/11/2015	-1.92	±	1.92	-7.11	±	7.11	No
	03/18/2015	-0.21	±	1.92	-0.77	±	7.09	No
	03/25/2015	-1.00	±	1.90	-3.71	±	7.03	No
BLUE DOME	01/07/2015	1.70	±	1.24	6.30	±	4.59	No
	01/14/2015	-0.20	±	1.11	-0.73	±	4.11	No
	01/21/2015	-0.92	±	1.14	-3.41	±	4.22	No
	01/28/2015	-1.59	±	1.11	-5.89	±	4.11	No
	02/04/2015	-0.79	±	1.11	-2.93	±	4.09	No
	02/11/2015	1.88	±	1.18	6.96	±	4.37	No
	02/18/2015	-0.49	±	1.24	-1.80	±	4.58	No
	02/25/2015	0.87	±	1.14	3.23	±	4.20	No
	03/04/2015	1.40	±	1.85	5.18	±	6.83	No
	03/11/2015	2.48	±	1.98	9.18	±	7.32	No
	03/18/2015	1.16	±	1.92	4.28	±	7.09	No
	03/25/2015	1.53	±	1.82	5.65	±	6.73	No
FAA TOWER	01/07/2015	1.59	±	1.16	5.87	±	4.28	No
	01/14/2015	-0.18	±	1.03	-0.67	±	3.79	No
	01/21/2015	-0.88	±	1.09	-3.24	±	4.02	No
	01/28/2015	-1.50	±	1.05	-5.55	±	3.87	No
	02/04/2015	-0.75	±	1.05	-2.77	±	3.87	No
	02/11/2015	1.73	±	1.09	6.40	±	4.02	No
	02/18/2015	-0.43	±	1.08	-1.57	±	4.00	No
	02/25/2015	0.84	±	1.09	3.10	±	4.03	No
	03/04/2015	1.32	±	1.74	4.87	±	6.42	No
	03/11/2015	2.28	±	1.82	8.44	±	6.73	No
	03/18/2015	1.04	±	1.73	3.86	±	6.39	No
	03/25/2015	1.46	±	1.73	5.39	±	6.41	No
HOWE	01/07/2015	1.66	±	1.21	6.15	±	4.48	No
	01/14/2015	-0.20	±	1.13	-0.74	±	4.19	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY								
	01/21/2015	-0.95	±	1.18	-3.53	±	4.38	No
	01/28/2015	-1.89	±	1.32	-7.00	±	4.88	No
	02/04/2015	-0.78	±	1.09	-2.88	±	4.03	No
	02/11/2015	1.92	±	1.20	7.09	±	4.46	No
	02/18/2015	-0.46	±	1.17	-1.71	±	4.34	No
	02/25/2015	0.91	±	1.18	3.36	±	4.37	No
	03/04/2015	1.41	±	1.85	5.20	±	6.86	No
	03/11/2015	2.50	±	1.99	9.25	±	7.37	No
	03/18/2015	1.07	±	1.77	3.96	±	6.56	No
	03/25/2015	1.53	±	1.82	5.65	±	6.72	No
MONTEVIEW	01/07/2015	1.63	±	1.19	6.04	±	4.40	No
	01/14/2015	-0.19	±	1.10	-0.72	±	4.05	No
	01/21/2015	-0.90	±	1.12	-3.35	±	4.15	No
	01/28/2015	-1.65	±	1.15	-6.11	±	4.26	No
	02/04/2015	-0.80	±	1.12	-2.97	±	4.15	No
	02/11/2015	1.92	±	1.21	7.12	±	4.47	No
	02/18/2015	-0.46	±	1.16	-1.69	±	4.30	No
	02/25/2015	0.89	±	1.15	3.28	±	4.26	No
	03/04/2015	1.39	±	1.84	5.15	±	6.80	No
	03/11/2015	2.40	±	1.92	8.89	±	7.09	No
	03/18/2015	1.11	±	1.84	4.11	±	6.81	No
	03/25/2015	1.55	±	1.85	5.74	±	6.83	No
MUD LAKE	01/07/2015	1.52	±	1.11	5.64	±	4.11	No
	01/14/2015	-0.17	±	0.98	-0.64	±	3.63	No
	01/21/2015	-0.84	±	1.04	-3.10	±	3.84	No
	01/28/2015	-1.88	±	1.31	-6.95	±	4.84	No
	02/04/2015	-0.76	±	1.07	-2.83	±	3.96	No
	02/11/2015	1.85	±	1.16	6.83	±	4.29	No
	02/18/2015	-0.45	±	1.14	-1.66	±	4.21	No
	02/25/2015	0.85	±	1.10	3.13	±	4.07	No
	03/04/2015	1.38	±	1.82	5.11	±	6.74	No
	03/11/2015	2.35	±	1.88	8.70	±	6.94	No
	03/18/2015	1.12	±	1.85	4.13	±	6.84	No
	03/25/2015	1.53	±	1.82	5.65	±	6.72	No
DISTANT								
BLACKFOOT	01/07/2015	0.69	±	2.02	2.55	±	7.49	No
	01/14/2015	0.15	±	1.15	0.54	±	4.27	No
	01/21/2015	1.80	±	1.27	6.66	±	4.69	No
	01/28/2015	1.08	±	1.08	4.01	±	4.01	No
	02/04/2015	1.22	±	1.11	4.50	±	4.10	No
	02/11/2015	-2.71	±	1.16	-10.01	±	4.31	No
	02/18/2015	1.54	±	1.26	5.70	±	4.66	No
	02/25/2015	1.99	±	1.25	7.35	±	4.64	No
	03/04/2015	1.21	±	1.91	4.49	±	7.07	No
	03/11/2015	-1.92	±	1.92	-7.09	±	7.09	No
	03/18/2015	-0.21	±	1.92	-0.78	±	7.12	No
	03/25/2015	-0.98	±	1.86	-3.62	±	6.88	No
CRATERS	01/07/2015	0.37	±	1.07	1.35	±	3.97	No
	01/14/2015	0.14	±	1.09	0.51	±	4.02	No
	01/21/2015	1.90	±	1.34	7.05	±	4.96	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY								
	01/28/2015	1.24	±	1.25	4.61	±	4.61	No
	02/04/2015	1.46	±	1.33	5.40	±	4.93	No
	02/11/2015	-2.91	±	1.25	-10.76	±	4.62	No
	02/18/2015	1.54	±	1.26	5.71	±	4.66	No
	02/25/2015	2.02	±	1.27	7.47	±	4.71	No
	03/04/2015	1.27	±	2.00	4.71	±	7.41	No
	03/11/2015	-1.96	±	1.96	-7.27	±	7.27	No
	03/18/2015	-0.21	±	1.96	-0.79	±	7.25	No
	03/25/2015	-0.98	±	1.87	-3.64	±	6.90	No
DUBOIS	01/07/2015	1.70	±	1.24	6.30	±	4.59	No
	01/14/2015	-0.20	±	1.11	-0.73	±	4.11	No
	01/21/2015	-0.96	±	1.19	-3.56	±	4.41	No
	01/28/2015	-1.62	±	1.13	-5.99	±	4.18	No
	02/04/2015	-0.84	±	1.18	-3.11	±	4.35	No
	02/11/2015	1.92	±	1.21	7.10	±	4.46	No
	02/18/2015	-0.46	±	1.18	-1.72	±	4.37	No
	02/25/2015	0.89	±	1.15	3.28	±	4.26	No
	03/04/2015	1.48	±	1.95	5.48	±	7.22	No
	03/11/2015	2.44	±	1.95	9.04	±	7.21	No
	03/18/2015	1.19	±	1.97	4.39	±	7.27	No
	03/25/2015	1.45	±	1.73	5.36	±	6.38	No
IDAHO FALLS	01/07/2015	1.68	±	1.23	6.23	±	4.54	No
	01/14/2015	-0.17	±	0.98	-0.65	±	3.64	No
	01/21/2015	-0.83	±	1.03	-3.07	±	3.81	No
	01/28/2015	-1.46	±	1.02	-5.41	±	3.77	No
	02/04/2015	-0.73	±	1.03	-2.72	±	3.80	No
	02/11/2015	1.76	±	1.11	6.51	±	4.09	No
	02/18/2015	-0.41	±	1.05	-1.53	±	3.90	No
	02/25/2015	0.81	±	1.06	3.01	±	3.91	No
	03/04/2015	1.29	±	1.71	4.78	±	6.31	No
	03/11/2015	2.30	±	1.83	8.50	±	6.78	No
	03/18/2015	1.04	±	1.72	3.85	±	6.38	No
	03/25/2015	1.47	±	1.75	5.45	±	6.49	No
QA-2	01/07/2015	1.74	±	1.26	6.42	±	4.68	No
(IDAHO FALLS)	01/14/2015	-0.18	±	1.02	-0.67	±	3.79	No
	01/21/2015	-0.86	±	1.07	-3.18	±	3.95	No
	01/28/2015	-1.49	±	1.04	-5.53	±	3.85	No
	02/04/2015	-0.76	±	1.07	-2.82	±	3.94	No
	02/11/2015	1.81	±	1.14	6.69	±	4.21	No
	02/18/2015	-0.42	±	1.07	-1.55	±	3.95	No
	02/25/2015	0.81	±	1.05	2.98	±	3.87	No
	03/04/2015	1.32	±	1.74	4.87	±	6.42	No
	03/11/2015	2.27	±	1.81	8.40	±	6.69	No
	03/18/2015	1.04	±	1.72	3.85	±	6.37	No
	03/25/2015	1.43	±	1.70	5.28	±	6.29	No
JACKSON	01/07/2015	0.56	±	1.64	2.06	±	6.06	No
	01/14/2015	0.14	±	1.11	0.52	±	4.11	No
	01/21/2015	1.64	±	1.15	6.07	±	4.27	No
	01/28/2015	1.18	±	1.18	4.36	±	4.37	No
	02/04/2015	1.27	±	1.16	4.69	±	4.28	No

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

Sampling Group and Location		Sampling Date	Result ± 1s Uncertainty (x 10^{-15} µCi/mL)			Result ± 1s Uncertainty (x 10^{-11} Bq/mL)			Result > 3s
BOUNDARY									
		02/11/2015	-2.74	±	1.18	-10.14	±	4.36	No
		02/18/2015	1.44	±	1.17	5.32	±	4.34	No
		02/25/2015	2.02	±	1.28	7.47	±	4.72	No
		03/04/2015	1.28	±	2.01	4.73	±	7.45	No
		03/11/2015	-1.95	±	1.95	-7.21	±	7.21	No
		03/18/2015	-0.21	±	1.93	-0.78	±	7.13	No
		03/25/2015	-1.05	±	2.00	-3.90	±	7.40	No
SUGAR CITY	a	01/07/2015		±			±		No
		01/14/2015	-0.19	±	1.06	-0.69	±	3.91	No
		01/21/2015	-0.87	±	1.08	-3.24	±	4.01	No
		01/28/2015	-1.59	±	1.11	-5.90	±	4.11	No
		02/04/2015	-0.78	±	1.09	-2.87	±	4.02	No
		02/11/2015	1.93	±	1.21	7.15	±	4.49	No
		02/18/2015	-0.47	±	1.20	-1.75	±	4.45	No
		02/25/2015	0.87	±	1.13	3.23	±	4.20	No
		03/04/2015	1.44	±	1.90	5.33	±	7.04	No
		03/11/2015	2.45	±	1.96	9.08	±	7.24	No
		03/18/2015	1.04	±	1.72	3.85	±	6.38	No
		03/25/2015	1.40	±	1.66	5.17	±	6.15	No
INL SITE									
EFS		01/07/2015	0.40	±	1.16	1.47	±	4.31	No
		01/14/2015	0.15	±	1.14	0.54	±	4.23	No
		01/21/2015	1.65	±	1.16	6.10	±	4.30	No
		01/28/2015	1.14	±	1.14	4.21	±	4.21	No
		02/04/2015	1.27	±	1.16	4.71	±	4.30	No
		02/11/2015	-2.76	±	1.19	-10.21	±	4.39	No
		02/18/2015	1.50	±	1.23	5.55	±	4.54	No
		02/25/2015	1.97	±	1.25	7.30	±	4.61	No
		03/04/2015	1.18	±	1.86	4.38	±	6.90	No
		03/11/2015	-1.91	±	1.91	-7.06	±	7.06	No
		03/18/2015	-0.21	±	1.93	-0.78	±	7.15	No
		03/25/2015	-1.01	±	1.92	-3.75	±	7.11	No
MAIN GATE		01/07/2015	0.47	±	1.39	1.74	±	5.13	No
		01/14/2015	0.15	±	1.19	0.56	±	4.39	No
		01/21/2015	1.87	±	1.32	6.93	±	4.88	No
		01/28/2015	1.14	±	1.14	4.23	±	4.23	No
		02/04/2015	1.33	±	1.22	4.94	±	4.50	No
		02/11/2015	-3.42	±	1.47	-12.64	±	5.43	No
		02/18/2015	1.69	±	1.38	6.27	±	5.12	No
		02/25/2015	1.77	±	1.12	6.54	±	4.13	No
		03/04/2015	1.12	±	1.77	4.15	±	6.53	No
		03/11/2015	-2.29	±	2.29	-8.49	±	8.49	No
		03/18/2015	-0.20	±	1.80	-0.73	±	6.66	No
		03/25/2015	-1.03	±	1.95	-3.80	±	7.21	No
QA-1		01/07/2015	0.41	±	1.20	1.51	±	4.43	No
(MAIN GATE)		01/14/2015	0.14	±	1.12	0.53	±	4.14	No
		01/21/2015	1.68	±	1.18	6.20	±	4.36	No
		01/28/2015	1.12	±	1.12	4.15	±	4.15	No
		02/04/2015	1.30	±	1.19	4.81	±	4.39	No
		02/11/2015	-2.76	±	1.19	-10.22	±	4.40	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($x 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	02/18/2015	1.46	±	1.19	5.40	±	4.41	No
	02/25/2015	1.93	±	1.22	7.13	±	4.50	No
	03/04/2015	1.20	±	1.89	4.44	±	6.99	No
	03/11/2015	-1.89	±	1.89	-6.97	±	6.97	No
	03/18/2015	-0.19	±	1.72	-0.69	±	6.37	No
	03/25/2015	-0.96	±	1.81	-3.53	±	6.71	No
VAN BUREN GATE	01/07/2015	0.43	±	1.27	1.60	±	4.70	No
	01/14/2015	0.15	±	1.19	0.56	±	4.40	No
	01/21/2015	2.61	±	1.84	9.65	±	6.79	No
	01/28/2015	1.02	±	1.02	3.78	±	3.78	No
	02/04/2015	1.29	±	1.17	4.77	±	4.35	No
	02/11/2015	-2.86	±	1.23	-10.57	±	4.55	No
	02/18/2015	1.59	±	1.30	5.87	±	4.80	No
	02/25/2015	2.12	±	1.34	7.84	±	4.95	No
	03/04/2015	1.20	±	1.89	4.45	±	7.01	No
	03/11/2015	-1.80	±	1.80	-6.66	±	6.66	No
	03/18/2015	-0.23	±	2.11	-0.85	±	7.80	No
	03/25/2015	-0.98	±	1.87	-3.64	±	6.91	No

a. Invalid sample result shown in red

TABLE C-3. Quarterly Cesium-137, Strontium-90, and Actinide Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($x 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($x 10^{-14}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	3/25/2015	CESIUM-137	-187.00	±	138.00	-691.90	±	510.60	No
ATOMIC CITY	3/25/2015	AMERICIUM-241	-0.20	±	1.25	-0.73	±	4.63	No
		CESIUM-137	10.20	±	88.00	37.74	±	325.60	No
		PLUTONIUM-238	1.52	±	1.25	5.62	±	4.63	No
		PLUTONIUM-239/240	5.57	±	2.02	20.61	±	7.47	No
BLUE DOME	3/25/2015	CESIUM-137	-86.10	±	101.00	-318.57	±	373.70	No
FAA TOWER	3/25/2015	AMERICIUM-241	-0.41	±	1.16	-1.50	±	4.29	No
		CESIUM-137	25.50	±	88.80	94.35	±	328.56	No
		PLUTONIUM-238	2.84	±	2.52	10.51	±	9.32	No
		PLUTONIUM-239/240	1.89	±	2.67	6.99	±	9.88	No
HOWE	3/25/2015	CESIUM-137	10.30	±	94.90	38.11	±	351.13	No
		STRONTIUM-90	22.10	±	6.49	81.77	±	24.01	**Yes**
MONTEVIEW	3/25/2015	CESIUM-137	102.00	±	81.80	377.40	±	302.66	No
		STRONTIUM-90	-10.30	±	5.31	-38.11	±	19.65	No
MUD LAKE	3/25/2015	CESIUM-137	-141.00	±	139.00	-521.70	±	514.30	No
		STRONTIUM-90	-7.86	±	5.39	-29.08	±	19.94	No
DISTANT									
BLACKFOOT	3/25/2015	CESIUM-137	224.00	±	138.00	828.80	±	510.60	No
CRATERS	3/25/2015	CESIUM-137	-36.50	±	90.90	-135.05	±	336.33	No
DUBOIS	3/25/2015	CESIUM-137	135.00	±	141.00	499.50	±	521.70	No
		STRONTIUM-90	1.47	±	5.65	5.44	±	20.91	No
IDAHO FALLS	3/25/2015	AMERICIUM-241	-0.85	±	1.20	-3.13	±	4.44	No
		CESIUM-137	-108.00	±	93.70	-399.60	±	346.69	No
		PLUTONIUM-238	-0.44	±	1.32	-1.62	±	4.88	No
		PLUTONIUM-239/240	-0.44	±	1.70	-1.62	±	6.29	No
QA-2 (IDAHO FALLS)	3/25/2015	AMERICIUM-241	-0.10	±	1.34	-0.36	±	4.96	No
		CESIUM-137	71.20	±	87.30	263.44	±	323.01	No
		PLUTONIUM-238	-1.51	±	1.86	-5.59	±	6.88	No
		PLUTONIUM-239/240	1.51	±	1.85	5.59	±	6.85	No

TABLE C-3. Quarterly Cesium-137, Strontium-90, and Actinide Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty (x 10^{-18} μCi/mL)			Result ± 1s Uncertainty (x 10^{-14} Bq/mL)			Result > 3s
JACKSON	3/25/2015	CESIUM-137	66.40	±	117.00	245.68	±	432.90	No
		STRONTIUM-90	-0.19	±	5.55	-0.69	±	20.54	No
SUGAR CITY	3/25/2015	CESIUM-137	-10.20	±	99.40	-37.74	±	367.78	No
INL SITE									
EFS	3/25/2015	CESIUM-137	-223.00	±	144.00	-825.10	±	532.80	No
		STRONTIUM-90	3.54	±	5.10	13.10	±	18.87	No
MAIN GATE	3/25/2015	AMERICIUM-241	0.05	±	1.40	0.19	±	5.18	No
		CESIUM-137	9.15	±	95.40	33.86	±	352.98	No
		PLUTONIUM-238	0.00	±	1.09	0.00	±	4.03	No
		PLUTONIUM-239/240	3.11	±	1.36	11.51	±	5.03	No
QA-1 (MAIN GATE)	3/25/2015	AMERICIUM-241	0.77	±	1.11	2.86	±	4.11	No
		CESIUM-137	-291.00	±	98.50	-1076.70	±	364.45	No
		PLUTONIUM-238	-1.04	±	1.28	-3.85	±	4.74	No
		PLUTONIUM-239/240	1.04	±	1.47	3.85	±	5.44	No
VAN BUREN GATE	3/25/2015	CESIUM-137	-19.50	±	95.50	-72.15	±	353.35	No
		STRONTIUM-90	3.18	±	5.42	11.77	±	20.05	No

TABLE C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location		Start Date	Sampling Date	Result ± 1s Uncertainty ($x 10^{-13}$ µCi/mL_{air})			Result ± 1s Uncertainty ($x 10^{-9}$ Bq/mL_{air})			Result > 3s
BOUNDARY										
ATOMIC CITY		12/10/14	01/14/15	4.45	±	0.69	16.46	±	2.55	**Yes**
ATOMIC CITY		01/14/15	02/18/15	2.15	±	0.48	7.94	±	1.78	**Yes**
DISTANT										
BLACKFOOT		12/10/14	01/07/15	9.88	±	1.48	36.54	±	5.47	**Yes**
BLACKFOOT	a	01/07/15	02/11/15		±		0.00	±	0.00	No
BLACKFOOT		02/11/15	03/18/15	2.68	±	0.68	9.92	±	2.51	**Yes**
IDAHO FALLS		12/17/14	01/28/15	2.26	±	0.66	8.35	±	2.45	**Yes**
IDAHO FALLS		01/28/15	02/25/15	0.98	±	0.82	3.61	±	3.03	No
SUGAR CITY		12/10/14	01/21/15	1.23	±	0.61	4.54	±	2.24	No
SUGAR CITY		01/21/15	02/18/15	2.00	±	0.66	7.41	±	2.44	**Yes**

a. Invalid sample result shown in red

TABLE C-5. Monthly and Weekly Tritium Concentrations in Precipitation

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
IDAHO FALLS	12/31/14	01/30/15	185.00	±	24.80	6.85	±	0.92	**Yes**
	01/30/15	02/27/15	393.00	±	27.10	14.54	±	1.00	**Yes**
	02/27/15	03/31/15	99.40	±	22.80	3.68	±	0.84	**Yes**
CFA	12/01/14	01/02/15	56.10	±	24.10	2.08	±	0.89	No
	01/02/15	02/02/15	67.40	±	23.40	2.49	±	0.87	No
EFS	01/07/15	01/14/15	250.00	±	25.50	9.25	±	0.94	**Yes**
	01/14/15	01/21/15	27.00	±	22.60	1.00	±	0.84	No
	01/21/15	01/28/15	139.00	±	24.00	5.14	±	0.89	**Yes**
	02/04/15	02/11/15	107.00	±	23.30	3.96	±	0.86	**Yes**

Table C-6. Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi[†]/L)			Iodine-131 Result ± 1s Uncertainty (Bq[‡]/L)			Iodine-131 Result > 3s	Cesium-137 Result ± 1s Uncertainty (pCi/L)			Cesium-137 Result ± 1s Uncertainty (Bq/L)			Cesium-137 Result > 3s
BLACKFOOT	03/01/15	0.43	±	1.25	0.016	±	0.046	No	0.38	±	0.68	0.014	±	0.025	No
CONTROL	01/06/15	0.42	±	1.28	0.016	±	0.047	No	-0.88	±	0.94	-0.032	±	0.035	No
	02/03/15	-1.35	±	1.36	-0.050	±	0.050	No	-0.98	±	0.92	-0.036	±	0.034	No
	03/03/15	-0.74	±	1.35	-0.028	±	0.050	No	0.09	±	0.89	0.003	±	0.033	No
DIETRICH	01/06/15	-0.79	±	1.18	-0.029	±	0.044	No	-0.19	±	0.65	-0.007	±	0.024	No
	02/03/15	1.34	±	2.41	0.050	±	0.089	No	-0.52	±	1.88	-0.019	±	0.070	No
	03/03/15	-1.81	±	2.45	-0.067	±	0.091	No	-1.04	±	1.91	-0.039	±	0.071	No
FORT HALL	01/04/15	0.12	±	1.32	0.004	±	0.049	No	0.08	±	0.91	0.003	±	0.034	No
	02/01/15	-0.52	±	1.33	-0.019	±	0.049	No	0.08	±	0.88	0.003	±	0.033	No
	03/02/15	2.18	±	2.55	0.081	±	0.094	No	0.77	±	1.88	0.029	±	0.070	No
HOWE	01/06/15	-1.64	±	1.83	-0.061	±	0.068	No	-1.93	±	1.46	-0.071	±	0.054	No
	02/03/15	-0.44	±	2.59	-0.016	±	0.096	No	-3.50	±	1.96	-0.130	±	0.073	No
	03/03/15	-2.41	±	2.67	-0.089	±	0.099	No	0.47	±	1.89	0.018	±	0.070	No
IDAHO FALLS	01/06/15	-1.87	±	1.16	-0.069	±	0.043	No	0.33	±	0.63	0.012	±	0.023	No
	01/13/15	0.79	±	1.11	0.029	±	0.041	No	0.79	±	0.64	0.029	±	0.024	No
	01/20/15	1.09	±	1.13	0.040	±	0.042	No	1.09	±	0.68	0.040	±	0.025	No
	01/27/15	-0.31	±	1.08	-0.011	±	0.040	No	1.23	±	0.69	0.046	±	0.026	No
	02/03/15	-0.78	±	1.10	-0.029	±	0.041	No	1.44	±	0.67	0.053	±	0.025	No
Duplicate	02/03/15	-0.09	±	2.21	-0.003	±	0.082	No	-2.80	±	2.06	-0.104	±	0.076	No
	02/10/15	1.33	±	1.13	0.049	±	0.042	No	0.74	±	0.67	0.027	±	0.025	No
	02/17/15	-0.33	±	1.12	-0.012	±	0.041	No	0.94	±	0.67	0.035	±	0.025	No
	02/24/15	0.00	±	1.11	0.000	±	0.041	No	0.72	±	0.69	0.027	±	0.025	No
	03/03/15	-0.16	±	1.10	-0.006	±	0.041	No	1.46	±	0.92	0.054	±	0.034	No
	03/10/15	-0.91	±	1.10	-0.034	±	0.041	No	1.32	±	0.69	0.049	±	0.026	No
	03/17/15	1.80	±	1.14	0.067	±	0.042	No	0.59	±	0.65	0.022	±	0.024	No
	03/24/15	-1.42	±	1.14	-0.053	±	0.042	No	-0.95	±	0.88	-0.035	±	0.033	No
	03/31/15	-0.38	±	1.07	-0.014	±	0.040	No	0.63	±	0.65	0.023	±	0.024	No
RUPERT	01/06/15	0.10	±	1.48	0.004	±	0.055	No	0.35	±	1.53	0.013	±	0.057	No
Duplicate	01/06/15	-1.13	±	1.24	-0.042	±	0.046	No	-0.76	±	0.96	-0.028	±	0.035	No
	02/03/15	-3.42	±	2.52	-0.127	±	0.093	No	1.78	±	1.93	0.066	±	0.071	No
	03/03/15	1.11	±	1.23	0.041	±	0.046	No	0.23	±	0.87	0.009	±	0.032	No
TERRETON	01/06/15	-0.48	±	1.30	-0.018	±	0.048	No	0.15	±	0.61	0.006	±	0.023	No
	02/03/15	0.59	±	1.31	0.022	±	0.049	No	0.54	±	0.68	0.020	±	0.025	No
	03/03/15	-0.79	±	1.32	-0.029	±	0.049	No	0.71	±	0.68	0.026	±	0.025	No

APPENDIX D

STATISTICAL ANALYSIS RESULTS

Table D-1. Results of the Kruskal-Wallace statistical test between INL Site, Boundary, and Distant sample groups by month.

Parameter	P[a]
Gross Alpha	
Quarter	0.23
January	0.08
February	0.54
March	0.86
Gross Beta	
Quarter	0.02
January	0.02
February	0.16
March	0.24

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups. Values below 0.05 are indicated in red.

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

	Mann-Whitney U test	
Parameter	**Week**	**P[a]**
Gross Alpha		
	January 7	0.22
	January 14	0.02
	January 21	0.32
	January 28	0.48
	February 4	1.00
	February 11	0.89
	February 18	0.32
	February 25	0.78
	March 4	0.48
	March 11	0.17
	March 18	0.83
	March 25	0.52
Gross Beta		
	January 7	0.04
	January 14	0.57
	January 21	0.17
	January 28	0.09
	February 4	0.20
	February 11	0.03
	February 18	0.67
	February 25	0.48
	March 4	0.67
	March 11	0.32
	March 18	0.03
	March 25	0.89

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups. Values below 0.05 are indicated in red.