Department of Environmental Quality
INL Oversight Program

ENVIRONMENTAL SURVEILLANCE PROGRAM QUARTERLY DATA REPORT

January - March, 2013

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aCi/L	-	attocuries per liter
ATR	-	Advanced Test Reactor
BEA		Battelle Energy Alliance, LLC
BLR		Big Lost River
CERCLA	-	Comprehensive Environmental Response, Compensation and Liability Act
CFA	-	Central Facilities Area
CITRC	-	Critical Infrastructure Test Range Complex
CWI	-	CH2M-WG Idaho, LLC
DEQ-INL OP	-	The State of Idaho, Department of Environmental Quality, Idaho National Laboratory Oversight Program
DOE	-	U.S. Department of Energy
EBR I & II	-	Experimental Breeder Reactors I & II
EFS	-	Experimental Field Station
EIC	-	electret ionization chamber
EML	-	Environmental Monitoring Laboratory
EPA		Environmental Protection Agency
ESER	-	Environmental Surveillance, Education and Research Program
ESP	-	Environmental Surveillance Program
ESRPA	-	Eastern Snake River Plain Aquifer
GSS	-	Gonzales-Stoller Surveillance, LLC
HPIC	-	high-pressure ion chamber
LLD	-	lower limit of detection
IBL	-	Idaho Bureau of Laboratories
ICPP	-	Idaho Chemical Processing Plant
INL	-	Idaho National Laboratory
INTEC	-	Idaho Nuclear Technology and Engineering Center
LSC	-	liquid scintillation counting
MFC	-	Materials and Fuels Complex
µg/L	-	micrograms per liter
mg/L	-	milligrams per liter
mrem	-	millirem or 1/1000th of a rem
mR	-	milliRoentgen
mR/hr	-	milliRoentgen per hour
µR/hr	-	microRoentgen per hour
MCL	-	maximum contaminant level
MDA	-	minimum detectable activity
MDC	-	minimum detectable concentration
NIST	-	National Institute of Standards and Technology
nCi/L	-	nanocuries per liter
NOAA	-	National Oceanic and Atmospheric Administration
pCi/g	-	picocuries per gram
pCi/L	-	picocuries per liter
pCi/m^3	-	picocuries per cubic meter
QAPP	-	Quality Assurance Program Plan
QA/QC	-	Quality Assurance/Quality Control
RCRA	-	Resource Conservation and Recovery Act
RPD	-	relative percent difference
RWMC	-	Radioactive Waste Management Complex
RTC	-	Reactor Technology Complex
SD	-	standard deviation
SMCL	-	secondary maximum contaminant level
TAN	-	Test Area North
TDS	-	total dissolved solids
TMI	-	Three Mile Island
TRA	-	Test Reactor Area
TSP	-	total suspended particulate
TSS		total suspended solids
USGS	-	U.S. Geological Survey
VOC	-	volatile organic compound
WLAP	-	Wastewater Land Application Permit

Introduction

The State of Idaho, Department of Environmental Quality, Idaho National Laboratory Oversight Program (DEQ-INL OP) conducts an Environmental Surveillance Program (ESP) at locations on the INL, near the boundaries of the INL, and at distant locations to the INL in accordance with accepted monitoring procedures and management practices. This program is designed to provide the people of the state of Idaho with independently evaluated information about the impacts of the Department of Energy's (DOE) activities in Idaho.

The primary objective for DEQ-INL OP's ESP is to maintain an independent environmental monitoring and verification program designed to verify and supplement DOE's environmental data and programs. This program also provides the citizens of Idaho with information on current and proposed DOE programs that has been independently evaluated to enable them to reach informed conclusions about DOE activities in Idaho and potential impacts to public health and the environment.

Results of the ESP are published using two distinct reporting formats: quarterly data reports and an annual ESP report. The annual ESP report is designed for a broad audience and summarizes the results of the ESP for the previous four quarters. The annual report's primary emphasis is to focus on trends, ascertain the impacts of DOE operations on the environment, and confirm the validity of DOE monitoring programs. This quarterly report is designed to document the results of the ESP on a quarterly basis and provide detailed data to those who wish to "see the numbers." It is organized according to the media sampled and also provides a quality assurance assessment.

Air and Precipitation Monitoring Results

The ESP operated eight air monitoring stations on and near the INL as well as two monitoring stations distant from the INL during the first quarter, 2013 (**Figure 1**). These stations employed instrumentation for collecting airborne particulate matter, gaseous radioiodine, precipitation, and water vapor for tritium analysis (Error! Reference source not found.). The Shoshone-Bannock Tribes operated an air monitoring station located at Fort Hall. The Fort Hall station uses identical instrumentation and sampling protocol as the ten stations operated by the ESP. The DEQ-INL OP reports the Fort Hall station data as an additional distant site.

Airborne particulate matter was sampled using high-volume total suspended particulate (TSP) air samplers. Starting in the first quarter of 2013 a new sampler (HVP 4304) is operating side by side at Idaho Falls air station with the current sampler (HVP 3804). The new sampler (HVP 4304) is being operated to test dependability and durability under field conditions. Weekly gross alpha and gross beta particulate radioactivity results for filters from the TSP samplers are presented in **Appendix A** and summarized as a range of results in **Table 2**.

Composites of filters collected using TSP samplers during the course of a calendar quarter are analyzed using gamma spectroscopy. Typically, gamma spectroscopy results are only reported when exceeding a minimum detectable activity (MDA) or minimum detectable concentration (MDC). Gamma spectroscopy results for the first quarter of 2013 for TSP filters are presented in **Table 3**. The only reported gamma-emitting radionuclide was beryllium-7, a naturally occurring, cosmogenic radionuclide.

Annual composites of filters collected using TSP samplers are also analyzed using radiochemical separation techniques. Results from the annual composite analyses are typically presented in the

following year's first quarter report. The samples are analyzed for Strontium-90, Plutonium-238, Plutonium-239/240, and Americium-241 (**Table 6**). Measurable quantities of these radionuclides are expected in the environment due to historic above ground testing of nuclear weapons. DEQ-INL OP's action levels of 190 for Americium-241, 1900 for Strontium-90, 210 for Plutonium-238, and 200 for Plutonium-239/240 (in 1×10^{-6} pCi/m^3) are 10 percent of the compliance values listed for the specific radionuclides in 40 CFR 61, Appendix E, Table 2. Field sample concentrations which exceed these amounts require further investigation. For the 2012 annual composites, three samples exceeded the MDC for $^{239/240}$Pu and one sample exceeded the MDC for ^{241}Am. Though minimally exceeding the MDC, the results are well under the specified regulatory limits and DEQ-INL OP's action levels.

Radioactive iodine samples are collected weekly. Samples are collected by drawing air through a canister filled with activated charcoal using a low-volume air pump. The activated charcoal contained in the canister traps the radioiodine by adsorption onto its porous surface. Each week, canisters are collected from all eleven air monitoring stations and analyzed together as a composite. If Iodine-131 is detected in this grouping, the canisters are individually analyzed. No radioactive isotopes of iodine, specifically Iodine-131, were detected on the weekly charcoal cartridges used to collect this nuclide during the first quarter.

Atmospheric moisture was collected by drawing air through hygroscopic media at each of the 11 monitoring stations. This moisture was stripped from the hygroscopic media and analyzed to calculate the atmospheric tritium concentration. Reported values are the result of either a single sample or a weighted mean based upon the volume of air sampled when more than one atmospheric moisture sample was collected during the calendar quarter. Atmospheric tritium was not measured above the minimum detectable concentration during the first quarter of 2013. Average atmospheric tritium concentrations are presented in **Table 4**.

Precipitation samples were collected at six monitoring locations during the first quarter of 2013. Precipitation samples were analyzed for tritium and gamma-emitting radionuclides. Tritium and gamma-emitting radionuclides were below minimum detectable concentration in precipitation collected during the first quarter of 2013. Tritium and Cesium-137 analysis results are presented in **Table 5**. Reported values were either the result of a single sample or a weighted mean when more than one precipitation sample was collected during the calendar quarter.

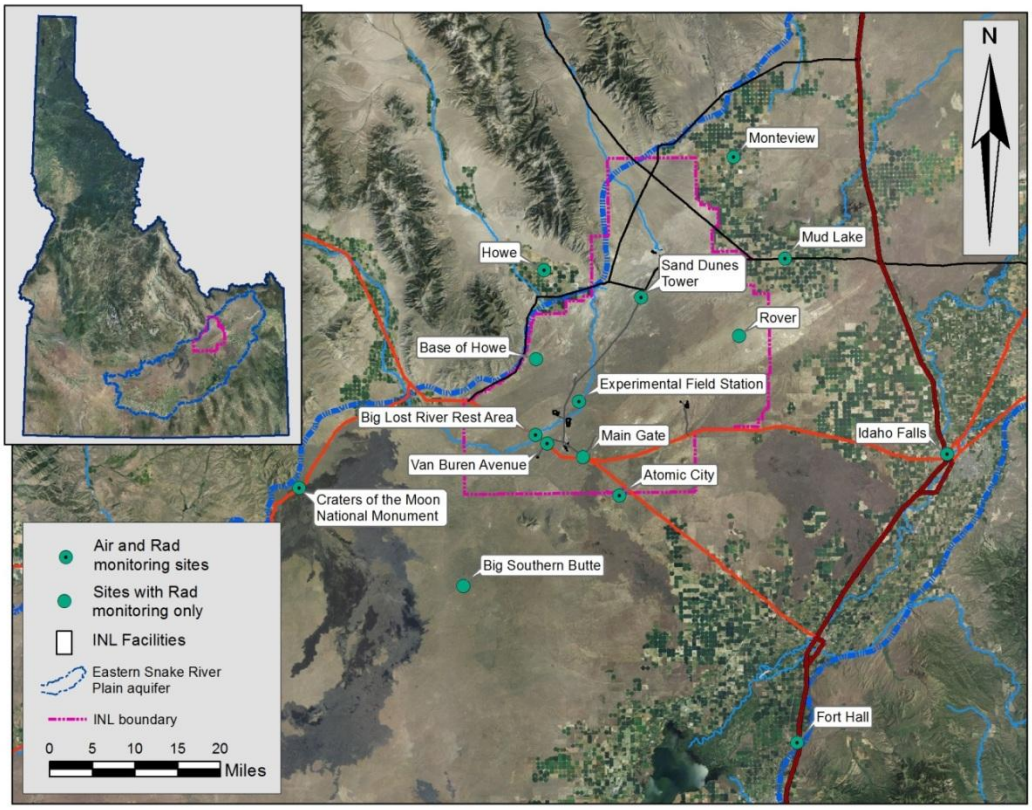

Figure 1. Air and radiation monitoring sites.

Table 1. Sampling locations and sample type.

Station Locations	Sample type[1]			
	TSP	Radioiodine	Water Vapor	Precipitation
On-site Locations				
Big Lost River Rest Area	□	□	■	■
Experimental Field Station	□	□	■	
Sand Dunes Tower	□	□	■	
Van Buren Avenue	□	□	■	
Boundary Locations				
Atomic City	□	□	■	■
Howe	□	□	■	■
Monteview	□	□	■	■
Mud Lake	□	□	■	■
Distant Locations				
Craters of the Moon	□	□	■	
Fort Hall[2]	□	□	■	
Idaho Falls	□	□	■	■

[1] □ Samples collected weekly; ■ Samples collected quarterly.
[2] TSP and radioiodine samples collected by Shoshone-Bannock Tribes.

Table 2. Range of gross alpha and gross beta concentrations for TSP filters, first quarter, 2013.

Station Location	Concentration					
	Gross Alpha			Gross Beta		
On-Site Locations						
Big Lost River Rest Area	0.3	-	1.3	15.2	-	77.5
Experimental Field Station	0.2	-	1.0	11.9	-	63.4
Sand Dunes Tower	0.1	-	1.3	12.1	-	73.9
Van Buren Avenue	0.3	-	0.9	10.3	-	58.9
Boundary Locations						
Atomic City	0.2	-	1.1	10.4	-	65.9
Howe	0.2	-	1.0	12.0	-	63.3
Monteview	0.2	-	1.5	13.7	-	88.0
Mud Lake	0.4	-	2.0	21.4	-	116.6
Distant Locations						
Craters of the Moon	0.0	-	0.7	8.7	-	44.6
Fort Hall[1]	0.2	-	1.0	8.3	-	50.6
Idaho Falls – HVP 3804	0.4	-	1.7	12.6	-	79.6
Idaho Falls – HVP 4304	0.3	-	1.9	14.4	-	97.6

[1]Operated by Shoshone-Bannock Tribes.
Note: Concentrations are expressed in 1 x 10^{-3} pCi/m^3.

Table 3. Gamma spectroscopy analysis data for TSP filters, composite samples, first quarter, 2013.

Station Location	Naturally Occurring Radionuclide Beryllium-7		Man-Made Gamma Emitting Radionuclides
	Concentration	± 2 SD	
On-site Locations			
Big Lost River Rest Area	54.6	2.9	<MDC[2]
Experimental Field Station	38.1	2.2	<MDC
Sand Dunes Tower	37.3	2.1	<MDC
Van Buren Avenue	36.0	2.1	<MDC
Boundary Locations			
Atomic City	39.9	2.2	<MDC
Howe	40.0	2.3	<MDC
Monteview	40.3	2.3	<MDC
Mud Lake	57.0	3.1	<MDC
Distant Locations			
Craters of the Moon	37.9	2.1	<MDC
Fort Hall[1]	31.9	1.9	<MDC
Idaho Falls – HVP 3804	53.3	2.9	<MDC
Idaho Falls – HVP 4304	54.4	2.9	<MDC

[1]Operated by Shoshone-Bannock Tribes.
[2]MDC for Cs-137 typically (5-10)x10^{-5} pCi/m^3.
Note: Concentrations are reported in 1 x 10^{-3} pCi/m^3 with associated uncertainty (± 2 SD), and minimum detectable concentration (MDC).

Table 4. Tritium concentrations in air from atmospheric moisture, first quarter, 2013

Station Location	Tritium		
	Concentration	± 2 SD	MDC
On-site Locations			
Big Lost River Rest Area	0.24	0.19	0.31
Experimental Field Station	0.16	0.13	0.22
Sand Dunes Tower	0.07	0.13	0.23
Van Buren Avenue	0.07	0.16	0.26
Boundary Locations			
Atomic City	0.18	0.14	0.23
Howe	0.00	0.13	0.22
Mud Lake	0.16	0.15	0.26
Monteview	0.00	0.11	0.22
Distant Locations			
Craters of the Moon	0.13	0.18	0.29
Fort Hall[1]	0.05	0.16	0.28
Idaho Falls	0.18	0.17	0.28

[1]Operated by Shoshone-Bannock Tribes.
Note: Concentrations are reported in pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Table 5. Tritium and Cesium-137 concentrations from precipitation, first quarter, 2013.

Station Location	Tritium			Cesium-137		
	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
On-site Locations						
Big Lost River Rest Area	0.0	70	130	0.0	1.8	3.2
Boundary Locations						
Atomic City	0.0	70	130	0.3	1.7	2.9
Howe	0.0	80	130	0.3	1.3	2.3
Monteview	0.0	70	130	0.0	1.5	2.7
Mud Lake	0.0	70	130	0.0	1.6	2.8
Distant Locations						
Idaho Falls	0.0	70	130	0.0	1.3	2.2

Note: Concentrations are reported in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Table 6. Annual radiochemical separation analysis data for TSP particulate filters collected during 2012.

Station Location	Sr^{90}			Pu^{238}			$Pu^{239/240}$			Am^{241}		
	Value[1]	± 2SD	MDC	Value[1]	±2SD	MDC	Value[1]	± 2SD	MDC	Value[1]	±2SD	MDC
On-Site Locations												
Rest Area	0.0	7.3	12.6	0.9	1.6	2.9	0.7	0.9	1.5	3.1	2.2	3.0
EFS[3]	0.0	9.6	16.9	1.7	1.6	2.5	1.3	0.9	0.4	1.5	2.0	3.1
Sand Dunes	0.0	5.1	9.1	2.4	1.7	2.4	0.0	0.7	1.5	2.6	2.3	3.3
Van Buren	0.0	6.1	10.8	1.3	1.8	3.0	1.4	0.9	0.4	2.2	1.9	2.7
Boundary Locations												
Atomic City	4.1	7.2	12.1	0.3	1.7	3.2	0.8	1.3	2.2	3.0	2.8	4.2
Howe	0.0	7.8	13.5	1.4	1.8	3.0	0.3	1.1	2.2	1.0	2.5	4.2
Monteview	4.5	9.8	16.7	1.2	2.4	4.1	0.4	1.1	2.2	3.4	2.6	3.5
Mud Lake	0.0	17.7	31.1	0.9	2.6	4.6	0.0	1.1	2.5	2.3	2.4	3.5
Distant Locations												
Craters of Moon	0.1	7.2	12.4	1.6	2.3	3.9	0.7	1.5	2.6	1.8	2.5	3.8
Fort Hall[2]	0.0	8.7	15.2	6.3	5.2	7.2	1.5	1.9	1.0	0.0	2.0	3.4
Idaho Falls	0.0	9.9	17.3	2.5	2.0	3.1	1.2	1.4	2.2	2.1	2.2	3.3

Note: Concentrations are reported in 1 x 10^{-6} pCi/m^3 with associated uncertainty (± 2 SD), minimum detectable concentration (MDC), and correspond to filter composites collected during the calendar year.
[1] Measurable quantities of these radionuclides are expected in the environment due to historic above-ground testing of nuclear weapons. DEQ-INL OP's action levels of 190 for americium-241, 1900 for strontium-90, 210 for plutonium-238, and 200 for plutonium-239/240 (in 1 x 10^{-6} pCi/m^3) are 10 percent of the compliance values listed for the specific radionuclide in 40 CFR 61, Appendix E, Table 2.
[2] Operated by Shoshone-Bannock Tribes.
[3] Experimental Field Station

Environmental Radiation Monitoring Results

The ESP operated 14 environmental radiation stations during the first quarter of 2013 (**Figure 1**). To detect gamma radiation, each station is instrumented with an electret ionization chamber (EIC), and 11 of the stations also have high-pressure ion chambers (HPIC) (**Table 7**).

The Shoshone-Bannock Tribes operate an additional environmental radiation station at Fort Hall equipped with an EIC and HPIC, both of which belong to the DEQ-INL OP. The DEQ-INL OP reports these results.

HPICs are instruments capable of real-time measurements, and are sensitive enough to detect small changes in gamma radiation levels. The real-time gamma radiation measurements collected by the HPICs at each location are radioed to DEQ-INL OP and presented graphically via the worldwide web at http://www.deq.idaho.gov/inl-oversight/monitoring/gamma-radiation-measurements.aspx

EICs are a passive-integrating system that provides a cumulative measure of environmental gamma radiation exposure in the field. EICs are deployed, collected, and analyzed quarterly. EICs offer an inexpensive methodology to measure gamma radiation over a wide area, particularly in regions which do not have a power source. EICs can also provide valuable gamma radiation data in the event of an emergency. For this reason EICs are deployed at an additional 40 locations by DEQ-INL OP in a widespread network around the INL measuring external radiation. This information is tabulated in **Appendix B.**

These two systems are used by DEQ-INL OP to measure external gamma radiation for various radiological monitoring objectives. **Table 8** lists the average radiation exposure rates measured by the

HPICs for first quarter 2013. **Table 9** lists the EIC monitoring results for first quarter 2013. Overall exposure rates were within the expected historical range of values observed by DEQ-INL OP for background radiation.

Table 7. Summary of instrumentation at radiation monitoring stations.

Station Location	Instrument Type	
	HPIC	EIC
On-site Locations		
Base of Howe	■	■
Big Lost River Rest Area	■	■
Experimental Field Station		■
Main Gate	■	■
Rover	■	■
Sand Dunes Tower	■	■
Van Buren Avenue		■
Boundary Locations		
Atomic City	■	■
Big Southern Butte	■	■
Howe Met Tower	■	■
Monteview	■	■
Mud Lake/Terreton	■	■
Distant Locations		
Craters of the Moon		■
Fort Hall[1]	■	■
Idaho Falls	■	■

[1] HPIC operated by Shoshone-Bannock Tribes with the EIC maintained by DEQ-INL OP.

Table 8. Average gamma exposure rates, first quarter, 2013, from HPIC network.

Station Location	Exposure Rate (µR/hr)	
	Quarterly Average	± 2 SD
On-site Locations		
Base of Howe	14.0	2.9
Big Lost River Rest Area	13.8	1.8
Main Gate	15.0	1.2
Rover	13.6	1.2
Sand Dunes Tower	12.6	1.3
Boundary Locations		
Atomic City	11.3	4.1
Big Southern Butte	12.9	3.6
Howe Met Tower	12.4	2.1
Monteview	12.3	1.3
Mud Lake/Terreton	14.1	1.5
Distant Locations		
Fort Hall[1]	13.6	1.5
Idaho Falls	10.5	1.4

[1] Operated by Shoshone-Bannock Tribes.

Table 9. Electret ionization chamber (EIC) cumulative average exposure rates, first quarter, 2013.

Station Location	Exposure Rate (µR/hr)	
	Quarterly Average	± 2 SD
On-site Locations		
Base of Howe	12.0	2.8
Big Lost River Rest Area	13.5	3.5
Experimental Field Station	18.7	0.4
Main Gate	13.9	3.1
Rover	16.0	3.5
Sand Dunes Tower	16.8	3.0
Van Buren Avenue	13.6	1.2
Boundary Locations		
Atomic City	11.9	0.4
Big Southern Butte	14.1	2.2
Howe Met Tower	12.2	3.1
Monteview	13.0	2.7
Mud Lake / Terreton	16.0	1.8
Distant Locations		
Craters of the Moon	13.4	3.4
Fort Hall[1]	9.5	0.0
Idaho Falls	9.2	2.6

[1] Station operated by Shoshone-Bannock Tribes.

Water Monitoring

Water monitoring sites are sampled for the purposes of examining trends of INL contaminants and other general ground water quality indicators and for verifying DOE monitoring results. Sites sampled include ground water locations (wells and springs), surface water locations (streams), and selected wastewater sites. Sample sites have been selected to aid in identifying INL impacts on the Eastern Snake River Plain Aquifer (ESRPA), and are categorized as up-gradient, facility, boundary, distant, surface water, and waste water. Up-gradient locations are not impacted by INL operations and are considered representative of background ground water quality conditions. Facility sites are sample locations on the INL near facilities, in areas of known contamination, or wells selected to illustrate trends for specific INL contaminants or indicators of ground water quality. Boundary locations are on or near the perimeter of the INL and are down-gradient of potential sources of INL contamination. Distant locations are monitored to provide trends in water quality down-gradient of the INL and include wells and springs used for irrigation, public water supply, livestock, domestic, and industrial purposes. During the first quarter of 2013 six facility locations were sampled. Results are reported in this section, along with backlogged enriched tritium analyses from the second quarter of 2012.

Most sites sampled by DEQ-INL are sampled with another agency or organization. Samples are collected at about the same time using the same collection equipment as the other agency or organization (co-sampled). DEQ-INL verifies work by these agencies monitoring on behalf of DOE by comparing results from co-sampled sites.

Gross alpha and gross beta analyses are conducted as a screening tool for alpha and beta emitting radionuclides potentially released from INL operations. Quantitative gamma analyses are conducted to

identify and determine concentrations of gamma emitting radionuclides. Selected sites are sampled for the man-made, alpha emitting isotopes of plutonium, uranium, americium, and neptunium; and beta emitting radionuclides, technetium-99 and strontium-90, based on historic INL contamination. In the event of suspect or unexpected levels of gross radioactivity, additional samples may also be analyzed for other specific radionuclides.

All but one of the facility locations sampled this quarter showed detectable concentrations of gross alpha radioactivity. These detections are below the EPA maximum contaminant level (MCL) for alpha particles (15 pCi/L) and are located in an area of known contamination. Gross beta radioactivity was detected at each of the facility locations sampled, and are located in an area of known contamination. The derived MCL for beta radioactivity is 8 pCi/L if the source of the radioactivity is strontium-90; 900 pCi/L if technetium-99; or 20,000 pCi/L if tritium. Man-made, gamma emitting cesium-137 was not detected at any of the sample locations. Results for gross alpha, gross beta, and man-made, gamma emitting radioactivity are shown in **Table 10**.

Each facility site was sampled for plutonium isotopes (**Table 11**). There were no detectable results for plutonium isotopes this quarter.

Isotopes of uranium were also sampled at each facility site. There were detectable results for uranium-234 and uranium-238, however, the results for uranium-235 were non-detectable (**Table 12**). The ratio of results observed cannot be distinguished from background concentrations, which means the uranium found in the samples is likely to be naturally occurring. There were no detectable results for americium-241 (**Table 13**).

Each facility location sampled was analyzed for strontium-90 and all but one showed detectable results, but were within the expected range of concentrations for each location (**Table 14**). All locations were sampled for technetium-99 and all had detectable results, but were within the expected range of concentrations (**Table 15**) for each location.

Using the standard analytical method, tritium was detected in each facility sample **(Table 16)**. Selected water samples with tritium concentrations not measurable using the standard method (typically a MDC of 130 pCi/L) were analyzed using an electrolytic enrichment method with a much lower MDC of 10 to 14 pCi/L **(Table 17)**. Twenty-six samples were analyzed this quarter for enriched tritium, all of which were from the second quarter of 2012. The enriched tritium result for the boundary well analyzed this quarter was collected from a Westbay™ packer sampling system, which allows water samples to be collected from discrete levels within the well. The associated sample depth is listed along with the result in **Table 17**. All sample results for up-gradient and distant wells were within the expected range of concentrations due to natural sources and levels remaining after the atomic bomb testing era. Sample results for one facility location and the lone boundary location, however, show concentrations consistent with historic INL waste disposal practices. The sample concentrations for these locations are presented in bold in **Table 17**.

The facility samples were also analyzed for metals, common ions, and nutrients. Results for metals, common ions, and nutrients are displayed in **Tables 18, 19, and 20** respectively. All results were consistent with historical values found at the facility locations. One facility location (USGS-123) was sampled for VOCs, with results indicating no detectable concentrations. A complete list of VOC analyses is shown in **Appendix C**.

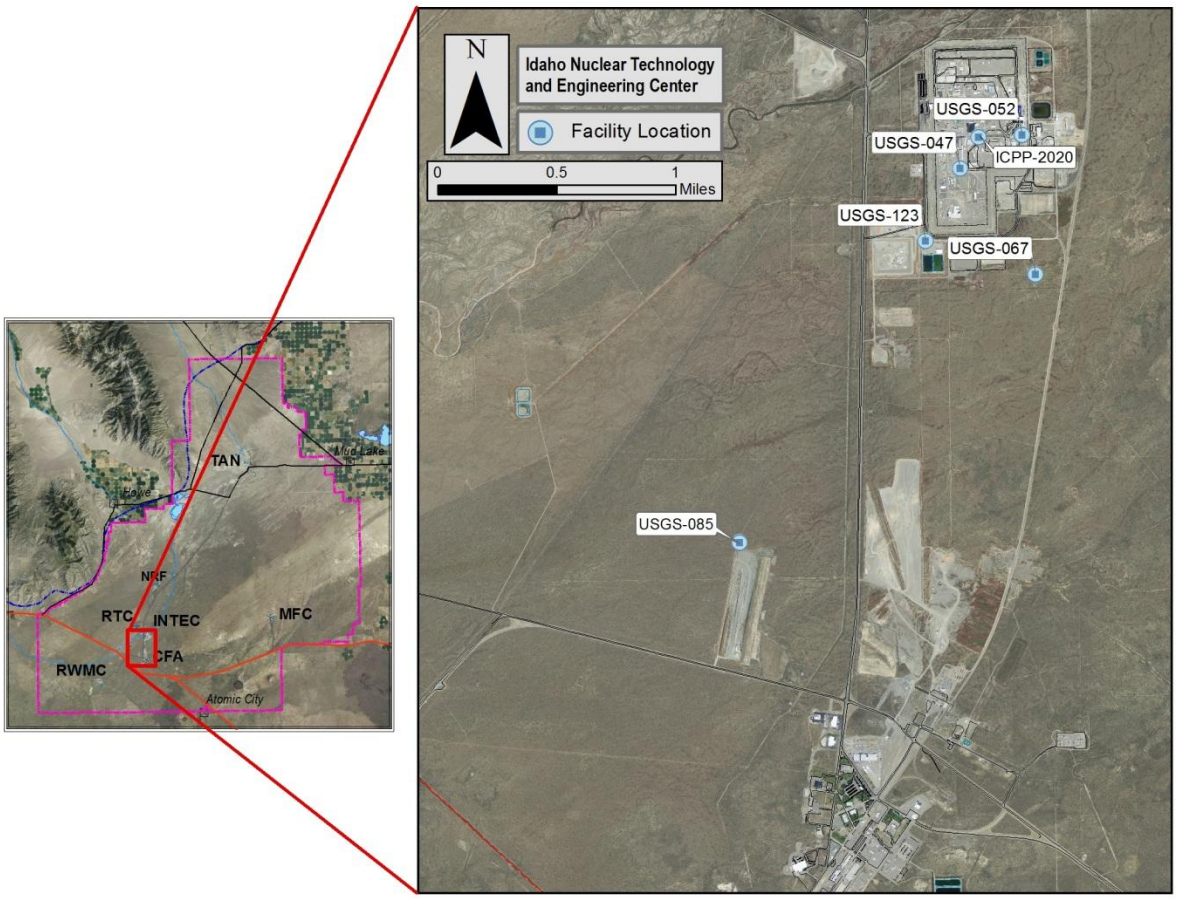

Figure 2. INTEC facility monitoring locations, first quarter, 2013.

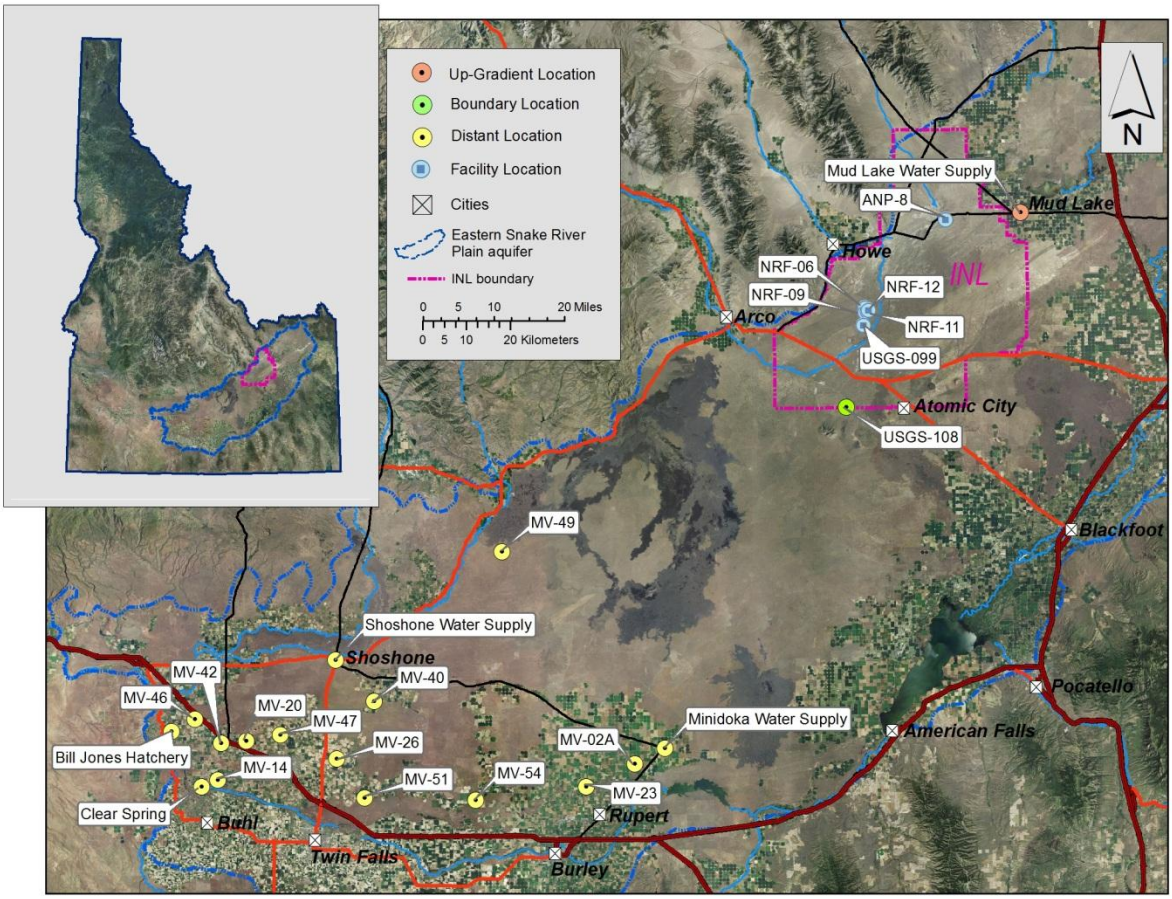

Figure 3. Upgradient, boundary, distant, and facility locations, first quarter 2013.

Table 10. Alpha, beta, and gamma concentrations for water samples, first quarter, 2013.

Sample Location	Sample Date	Gross Alpha			Gross Beta			Man-made gamma-emitting radionuclide Cesium-137		
		Concentration[1,2]		± 2 SD	Concentration		± 2 SD	Concentration		± 2 SD
Facility										
ICPP-2020	3/18/2013	9.1		1.9	120.2		2.8	0.2	U	1.3
USGS-047	3/18/2013	1.6		1.0	52.3		1.9	1.7	U	2.1
USGS-052	3/25/2013	12.5		1.9	212.4		3.5	0.1	U	1.8
USGS-067	3/25/2013	6.0		1.7	104.7		2.6	-0.1	U	1.5
USGS-085	3/25/2013	0.9	U	1.2	9.2		1.1	1.4	U	2.4
USGS-123	3/5/2013	1.5		1.0	4.6		1.0	-0.2	U	1.8

[1] Data qualifiers: U= non-detection, J= estimate, R= rejected.

[2] Concentrations expressed in pCi/L.

Table 11. Reported concentrations of plutonium isotopes in water samples, first quarter, 2013.

Sample Location	Sample Date	Plutonium-238			Plutonium-239/240		
		Concentration[1,2]		± 2SD	Concentration		± 2SD
Facility							
ICPP-2020	3/18/2013	0.005	U	0.011	**0.009**	**U**	**0.011**
USGS-047	3/18/2013	0.011	U	0.016	-0.005	U	0.013
USGS-052	3/25/2013	-0.004	U	0.021	-0.006	U	0.021
USGS-067	3/25/2013	-0.002	U	0.02	-0.002	U	0.02
USGS-123	3/5/2013	0.004	U	0.016	-0.002	U	0.016

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

[2] Concentrations expressed in pCi/L.

Concentrations presented in **Bold** are greater than the MDC, but less than 3-sigma (3σ) and are still considered non-detections.

Table 12. Reported concentrations of uranium isotopes in water samples, first quarter, 2013.

Sample Location	Sample Date	Uranium-234			Uranium-235			Uranium-238		
		Concentration[1,2]		± 2SD	Concentration		± 2SD	Concentration		± 2SD
Facility										
ICPP-2020	3/18/2013	1.63		0.36	**0.063**	**U**	**0.056**	1		0.25
USGS-047	3/18/2013	1.59		0.36	0.028	U	0.056	0.79		0.22
USGS-067	3/25/2013	1.49		0.35	0.039	U	0.048	0.8		0.23
USGS-123	3/5/2013	1.48		0.35	**0.038**	**U**	**0.046**	0.6		0.19

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

[2] Concentrations expressed in pCi/L.

Concentrations presented in **Bold** are greater than the MDC, but less than 3-sigma (3σ) and are still considered non-detections.

Table 13. Reported concentrations of americium-241 in water samples, first quarter, 2013.

Sample Location	Sample Date	Americium-241		
		Concentration[1,2]		± 2SD
Facility				
ICPP-2020	3/18/2013	-0.007	U	0.018
USGS-047	3/18/2013	-0.015	U	0.014
USGS-052	3/25/2013	-0.011	U	0.025
USGS-067	3/25/2013	-0.009	U	0.018
USGS-123	3/5/2013	-0.009	U	0.018

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

[2] Concentrations expressed in pCi/L.

Table 14. Reported concentrations of strontium-90 in water samples, first quarter, 2013.

Sample Location	Sample Date	Strontium-90		
		Concentration[1,2]		± 2SD
Facility				
ICPP-2020	3/18/2013	10.1		2.5
USGS-047	3/18/2013	19.6		4.7
USGS-052	3/25/2013	2.16		0.67
USGS-067	3/25/2013	13.8		3.4
USGS-085	3/25/2013	3.08		0.88
USGS-123	3/5/2013	0.25	U	0.26

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

[2] Concentrations expressed in pCi/L.

Table 15. Reported concentrations of technetium-99 in water samples, first quarter, 2013.

Sample Location	Sample Date	Technetium-99		
		Concentration[1,2]		± 2SD
Facility				
ICPP-2020	3/18/2013	287.4		1.7
USGS-047	3/18/2013	1.5		0.2
USGS-052	3/25/2013	491.8		2.1
USGS-067	3/25/2013	182.5		1.3
USGS-085	3/25/2013	1.7		0.2
USGS-123	3/5/2013	3.5		0.2

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected.

[2] Concentrations expressed in pCi/L.

Table 16. Tritium concentrations for water samples, first quarter, 2013.

Sample Location	Sample Date	Tritium		
		Concentration[1,2]		± 2 SD
Facility				
ICPP-2020	3/18/2013	1900		140
USGS-047	3/18/2013	370		110
USGS-052	3/25/2013	1040		120
USGS-067	3/25/2013	2940		160
USGS-085	3/25/2013	1470		130
USGS-123	3/5/2013	2770		150

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected

[2] Concentrations expressed in pCi/L.

Table 17. Enriched Tritium concentrations for water samples, first quarter, 2013.

Sample Location	Sample Date	Enriched Tritium		
		Concentration[1,2]		± 2 SD
Upgradient				
Mud Lake Water Supply	5/9/2012	3	U	6
Mud Lake Water Supply	6/27/2012	-1	U	7
Facility				
ANP-8	5/15/2012	**79**		8
NRF-06	5/16/2012	26		7
NRF-09	5/17/2012	42		8
NRF-11	5/16/2012	33		7
NRF-12	5/16/2012	27		6
USGS-099	5/17/2012	15		6
Boundary*				
USGS-108 (Zone 7)	6/26/2012	**76**		7
Distant				
Bill Jones Hatchery	6/26/2012	15		7
Clear Spring	5/7/2012	4	U	7
Minidoka Water Supply	5/7/2012	8	U	7
Minidoka Water Supply	6/25/2012	8	U	8
MV-02A	6/25/2012	14		8
MV-14	6/26/2012	3	U	7
MV-20	6/26/2012	9	U	8
MV-23	6/25/2012	16		8
MV-26	6/25/2012	5	U	7
MV-40	6/25/2012	-8	U	8
MV-42	6/26/2012	12		6
MV-46	6/26/2012	4	U	5
MV-47	6/26/2012	6	U	5
MV-49	6/25/2012	18		6
MV-51	6/26/2012	21		8
MV-54	6/25/2012	18		8
Shoshone Water Supply	5/7/2012	13		6

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected

[2] Concentrations expressed in pCi/L.

* USGS-108 (Zone 7) = 887.7 ft below land surface (bls).

Concentrations presented in **Bold** are consistent with historic INL waste disposal practices.

Table 18. Reported metals concentrations in water samples, first quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]																					
		Arsenic		Barium		Beryllium		Cadmium		Chromium		Iron		Lead		Manganese		Mercury		Selenium		Zinc	
Facility																							
ICPP-2020	3/18/2013	<5	U	110		-	NR	-	NR	74		400		<5	U	13		-	NR	<10	U	<5	U
USGS-047	3/18/2013	<5	U	68		-	NR	-	NR	9.4		130		<5	U	6.6		-	NR	<10	U	<5	U
USGS-052	3/25/2013	<5	U	86		-	NR	-	NR	6.9		<10	U	<5	U	<2	U	-	NR	<10	U	<5	U
USGS-067	3/25/2013	<5	U	110		-	NR	-	NR	7.2		15		<5	U	<2	U	-	NR	<10	U	<5	U
USGS-085 (dissolved)	3/25/2013	<5	U	86		-	NR	-	NR	20		<10	U	<5	U	<2	U	-	NR	<10	U	<5	U
USGS-123	3/5/2013	<5	U	50		-	NR	-	NR	14		750		<5	U	11		-	NR	<10	U	<5	U

[1] Data qualifiers: U = non-detection , J = estimate, R = rejected,. A "<" indicates a result below the Minimum Detectable Concentration. NR= analysis not requested.

[2] Concentrations are expressed in µg/L. Samples are not filtered unless otherwise indicated.

Table 19. Reported common ion concentrations in water samples, first quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]																					
		Calcium		Magnesium		Sodium		Potassium		Fluoride		Chloride		Sulfate		Silica		Alkalinity[3]		TDS[4]		TSS[5]	
Facility																							
ICPP-2020	3/18/2013	58		17		19		3.0		0.218		50.1		36.1		-	NR	139		-	NR	-	NR
USGS-047	3/18/2013	49		14		9.3		2.0		0.222		15.1		22.9		-	NR	154		-	NR	-	NR
USGS-052	3/25/2013	48		14		13		2.7		0.235		22.4		25.5		-	NR	147		250		<5	U
USGS-067	3/25/2013	53		15		24		3.5		0.270		47.7		28.8		-	NR	137		-	NR	-	NR
USGS-085* (dissolved)	3/25/2013	54*		15*		10*		2.5*		0.210		14.2		40.7		-	NR	158		-	NR	-	NR
USGS-123	3/5/2013	43		16		12		3.3		0.214		24.8		22.3		-	NR	128		-	NR	-	NR

[1] Data qualifiers: U = non-detection, J = estimate, R = rejected. A "<" indicates a result below the Minimum Detectable Concentration. NR= analysis not requested.

[2] Concentrations expressed in mg/L. A "*" indicates the analyte was filtered.

[3] As $CaCO_3$.

[4] Total Dissolved Solids.

[5] Total Suspended Solids.

Table 20. Reported nutrient concentrations in water samples, first quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]							
		Nitrite + Nitrate		Phosphorus		Total Kjeldahl Nitrogen		Ammonia as N	
Facility									
ICPP-2020	3/18/2013	3.9		0.034		-	NR	<0.01	U
USGS-047	3/18/2013	1.3		0.037		-	NR	0.012	
USGS-052	3/25/2013	2.8		0.028		-	NR	<0.01	U
USGS-067	3/25/2013	5.6		0.030		-	NR	<0.01	U
USGS-085	3/25/2013	1.1		0.028		-	NR	-	NR
USGS-123	3/5/2013	1.2		0.038		-	NR	<0.01	U

[1] Data qualifiers: U = non-detection , J = estimate, R = rejected, NR = analysis not requested,

[2] Concentrations expressed in mg/L.

Terrestrial Monitoring Results

The ESP conducts terrestrial (soil and milk) monitoring and verification to provide an indication as to the long-term deposition and migration of contaminants in the environment, and to provide independent verification of DOE's analytical measurement of terrestrial variables.

Soil

DEQ-INL OP monitors long-term radiological conditions via soil sampling as well as field instrumentation capable of identifying and measuring quantities of gamma-emitting radionuclides in soil. Monitoring concentrations of gamma-emitting radionuclides in surface soil provides some insight to transport, deposition, and accumulation of radioactive material in the environment as a result of INL operations as well as historical above ground testing of nuclear weapons. No in-situ gamma spectroscopic measurements were performed, nor were any soil samples physically collected during the first calendar quarter of 2013.

Milk

DEQ-INL OP monitors milk for naturally occurring potassium-40 and man-made iodine-131. DEQ-INL OP collects milk samples on a monthly basis. Riverside is a small operation that was able to resume milk sampling in March. Ft. Hall is also a small operation that resumed sampling in February. Results for analyses of milk samples are presented in **Table 21**. Naturally occurring potassium-40 was detected in all samples within the expected range. Iodine-131 was not detected in any sample.

Table 21. Gamma spectroscopy analysis data for milk samples, first quarter, 2013.

Sample Location/Dairy	Sample Date	Naturally occurring gamma-emitting radionuclide Potassium-40		Man-made gamma-emitting radionuclide Iodine-131[1]
		Concentration[3]	± 2 SD	
Monitoring Samples				
Fort Hall	02/04/2013	1491	116	<MDC
	03/04/2013	1501	108	<MDC
Gooding/Glanbia	01/03/2013	1446	115	<MDC
	02/07/2013	1421	111	<MDC
	03/06/2013	1415	112	<MDC
Riverside	03/03/2013	1512	115	<MDC
Verification Samples[2]				
Rupert	01/08/2013	1597	112	<MDC
Howe	01/08/2013	1482	114	<MDC
Terreton	02/05/2013	1402	110	<MDC
Dietrich	02/05/2013	1526	108	<MDC
Rupert	03/05/2013	1579	122	<MDC
Idaho Falls	03/05/2013	1583	109	<MDC

[1] <MDC – Less than Minimum Detectable Concentration (approximately 4 pCi/L for Iodine-131).
[2] DEQ-INL OP samples collected by the off-site INL environmental surveillance contractor.
[3] Concentrations are expressed in pCi/L.

Quality Assurance

The measurement of any physical quantity is subject to inaccuracy from errors that may be introduced during sample collection, measurement, calibration, and the reading and reporting of results. While all of these inaccuracies cannot be quantified with certainty for each analytical result, a quality assurance program can evaluate the overall quality of a data set to ensure precise, accurate, representative, and reliable results, and to maximize data usability.

This section summarizes the results of the quality assurance (QA) assessment of the data collected for the first quarter of 2013 for the DEQ-INL OP's ESP. It also summarizes the quality control (QC) samples (spikes, blanks, and duplicates) submitted to the Idaho Bureau of Laboratories-Boise (IBL) for non-radiological analyses and to Idaho State University's Environmental Monitoring Laboratory (ISU-EML) for radiological analyses during the quarter. All analyses and QC measures at the analytical laboratories used by the ESP are performed in accordance with approved written procedures maintained by each respective analytical laboratory. Sample collection is performed in accordance with written procedures maintained by the DEQ-INL OP.

Analytical results for blanks, duplicates, and spikes are used to assess the precision, accuracy, and representativeness of results from analyzing laboratories. During the first quarter of 2013, the DEQ-INL OP submitted 77 QC samples for various radiological and non-radiological analyses (**Table 22**).

Blank Samples

Blank samples consist of matrices that have negligible, acceptably low, or immeasurable amounts of the analyte(s) of interest in them. They are designed to determine if analyses will provide a "zero" result when no contaminant is expected to be present or an acceptable measure of "background," and therefore monitor any bias that may have been introduced during sample collection, storage, shipment, and analysis. Blank sample results submitted for gross alpha and gross beta screening in air for the first quarter of 2013 are presented in **Table 23**.

Blank sample results for select gamma emitters in air from composited air filters are presented in **Table 24**. Data for blank analyses used to assess data quality for tritium in water vapor in air are presented in **Table 25**. Blank analysis results for radiochemical separation analyses for TSP particulate filters collected during 2012 are presented in **Table 26.** Blank analyses results for radiological and non-radiological analytes in ground and surface water are presented in **Table 27**, **Table 28**, **Table 29**, and **Table 30**.

There was one anomaly observed from the assessment of field blank water samples as measured by the analytical laboratories used by DEQ-INL OP for the first quarter of 2013. The anomaly includes a result for Total Alkalinity found at 1 mg/L, which is above the MDC. Sample results for Total Alkalinity this quarter range from 128 to 158 mg/L (**Table 19**), which is significantly above the blank value of 1 mg/L; no qualifiers or flags will be attached with any Total Alkalinity results this quarter.

Duplicate Samples

Duplicate samples are collected in a manner such that the samples are thought to be essentially identical in composition and are used to assess analytical precision. The difference between the original sample and the duplicate sample is expressed as a relative percent difference (RPD):

$RPD = (R_1-R_2)/((R_1+R_2)/2)*100$
R_1 = first sample result
R_2 = second sample result

and is used to measure a laboratory's ability to reproduce consistent results. A relative percent difference is acceptable at ± 20 percent.

DEQ-INL OP also uses standard radiological counting error (expressed as one standard deviation) to compare results for radiological analyses. Comparison tests that have an absolute difference in the two sample results of no more than three times the pooled error (or "3 sigma") for these measurements are considered acceptable. This is accomplished using the following equation:

$$/ R_1 - R_2 / \leq 3(S_1^2 + S_2^2)^{1/2}$$

Where:

R_1 = First sample value.

R_2 = Second sample value.

S_1 = Counting error (one standard deviation) associated with the laboratory measurement of the first sample.

S_2 = Counting error (one standard deviation) associated with the laboratory measurement of the second sample.

Duplicate results for ground and surface water are presented in **Table 31**, **Table 32**, and **Table 33** for radiological analyses, and non-radiological analyses.

No analyses failed the duplicate criteria for the first quarter of 2013.

Spiked Samples

Spiked samples are samples to which known concentrations of specific analytes have been added in order to assess the bias a laboratory may have in accurately measuring these analytes. To determine agreement after laboratory analysis, DEQ-INL OP calculates the ratio of the spike concentration determined from the laboratory measurement to the known spike concentration in the sample. This result is known as percent recovery (%R) and the acceptable range used by DEQ-INL OP is 100 ± 25 percent. Additionally, all results were qualified as "estimates (J)" if the associated quality control spike sample had a recovery of 50-74% or 126-150%, provided that each result was greater than the instrument detection limit (IDL). All results were qualified as "rejected (R)" if the associated quality control spike sample had a recovery of <50% or >150%, provided each result was also greater than the IDL.

Spiked samples were not used during the first quarter of 2013.

DEQ-INL OP also prepares additional "spike-like" quality control samples to assess ambient radiation measurement bias. Once per quarter, DEQ-INL OP irradiates a number of electret ionization chambers (EIC) to verify EIC response. Irradiations of EICs are conducted in a repeatable geometry to a known exposure of 30 mR and two additional exposures, ranging from 15 to 60 mR. EIC responses are compared directly with the exposure received from the NIST traceable cesium-137 source provided by ISU-EML. EIC response is considered acceptable if each measurement agrees within 25 percent of the known irradiated quantity. The irradiation results for first quarter 2013 are presented in **Table 34**. Real-time pressure correction is used to calculate the net exposure measured by these EIC control sets.

There were no anomalies observed from the assessment of spiked samples as measured by DEQ-INL OP or the analytical laboratories used by DEQ-INL OP for the first quarter of 2013.

Analytical QA/QC Assessment

There were no issues involving sample chain of custody, sample holding times, analysis of blank, duplicate, or spiked samples that were observed during the first quarter of 2013 which significantly affected data quality. Methodologies and data reports issued by the contracting laboratories generally conformed to the requirements of DEQ-INL OP during the first quarter of 2013.

Data usability is the measure of data that is not rejected compared to the amount that was expected to be obtained. The overall data usability rate for the first quarter of 2013 met the minimum criteria of the DEQ-INL OP ESP and is summarized in **Table 22**.

Preventative Maintenance and Equipment Reliability

All equipment was calibrated and checked according to pre-described periodicity. Service reliability for air sampling equipment for the first quarter of 2013 is summarized in **Table 35**.

Conclusion

All data collected for the first quarter of 2013, have been assigned the applicable qualifiers to designate the appropriate use of the data. In addition, all data has been verified and deemed complete meeting the requirements and data quality objectives established by DEQ-INL OP.

Table 22. Summary of the analytical performance and usability of the analyses performed for the DEQ-INL OP ESP, first quarter, 2013.

Media Sampled	Collection Device	Analyte	Test Analyses	Blank Analyses	Duplicate Analyses	Spike Analyses	Data Rejected[1]	Analyzing Lab[2]
AIR								
Particulate	4 inch filter	Gross alpha	156	13	0	0	2	ISU-EML
		Gross beta	156	13	0	0	2	ISU-EML
		Gamma emitters	12	1	0	0	0	ISU-EML
		Radiochemical	44	4	0	0	0	ISU Sub
Water Vapor	Desiccant column	Tritium	18	2	0	0	0	ISU-EML
Gaseous	Charcoal filter	Iodine-131	13	0	0	0	0	ISU-EML
Precipitation	Poly bottle	Tritium	6	0	0	0	0	ISU-EML
		Gamma emitters	6	0	0	0	0	ISU-EML
WATER								
Groundwater & Surface Water	Grab or composite	Gross alpha	6	1	2	0	0	ISU-EML
		Gross beta	6	1	2	0	0	ISU-EML
		Gamma emitters	6	1	2	0	0	ISU-EML
		Tritium	6	1	2	0	0	ISU-EML
		Enriched tritium	26	2	1	0	0	ISU-EML
		Technetium-99	6	0	2	0	0	ISU-EML
		Radiochemical	20	0	8	0	0	ISU Sub
		Metals	6	1	2	0	0	IBL
		Common Ions	6	1	2	0	0	IBL
		Nutrients	6	1	2	0	0	IBL
		Volatile Organics	1	1	0	0	0	IBL
TERRESTRIAL								
Milk	Grab or composite	Gamma emitters	12	0	0	0	0	ISU-EML
Soil	*in situ*	Gamma emitters	0	0	0	0	0	DEQ-INL OP
	Grab – "puck"	Gamma emitters	0	0	0	0	0	ISU-EML
RADIATION								
Ambient	EICs	Gamma Radiation	55	0	0	9	0	DEQ-INL OP
	HPICs	Gamma Radiation	12	NA	NA	NA	NA	DEQ-INL OP
Total Analyses			**585**	**43**	**25**	**9**	**4**	
Total of QC Analyses (blanks, duplicates, and spikes)			**77**					
Percentage of QC analyses of Total Test analyses[3]			**13.2%**					
Percentage of usable data[4]			**99.3%**					

1 Combined Laboratory and DEQ-INL OP rejection criteria (data was rejected for any reason).
2 ISU-EML = Idaho State University – Environmental Monitoring Laboratory; ISU Sub = Subcontract laboratory to ISU-EML; IBL = Idaho Bureau of Laboratories, Boise; IBL Sub = Subcontract laboratory to IBL; DEQ-INL OP = Analyzed by INL Oversight Program, Idaho Department of Environmental Quality.
3 Analyzing quality control samples at a rate of approximately 5 to 10 percent of the total number of test analyses performed for the year is deemed appropriate for the DEQ-INL OP ESP.
4 Data usability rate [total analyses – rejected data]/[total analyses] of 90 percent or higher is acceptable for the DEQ-INL OP ESP.

Table 23. Blank analysis results for gross alpha and beta in particulate air (TSP), first quarter, 2013.

Collection Period		Corrected volume (m^3) [1]	Gross alpha		Gross beta	
Start	Stop		Value	Uncertainty (± 2 SD)	Value	Uncertainty (± 2 SD)
12/27/2012	01/03/2013	2028	0.1	0.1	0.1	0.4
01/03/2013	01/10/2013	2028	-0.1	0.1	0.1	0.4
01/10/2013	01/17/2013	2028	0.0	0.1	0.1	0.4
01/17/2013	01/24/2013	2028	-0.1	0.1	-0.1	0.5
01/24/2013	01/31/2013	2028	-0.1	0.1	-0.4	0.5
01/31/2013	02/07/2013	2028	-0.1	0.1	0.1	0.4
02/07/2013	02/14/2013	2028	0.0	0.1	-0.2	0.4
02/14/2013	02/21/2013	2028	0.1	0.1	0.2	0.4
02/21/2013	02/28/2013	2028	0.0	0.1	0.2	0.4
02/28/2013	03/07/2013	2028	0.0	0.1	0.3	0.4
03/07/2013	03/14/2013	2028	0.0	0.1	-0.1	0.4
03/14/2013	03/21/2013	2028	0.0	0.1	-0.1	0.4
03/21/2013	03/28/2013	2028	0.0	0.1	-0.3	0.4

Note: Concentrations and associated uncertainties (±2 SD) are expressed in 1 x 10^{-3} pCi/m^3.
[1] A volume equal to the average of the volumes collected through each valid field filter was used to compute "concentrations" for the blank for meaningful comparison to sample results. No air was passed through the blank filters.

Table 24. Blank analysis results for gamma spectroscopy for TSP particulate air filters, first quarter, 2013.

Analysis Date	Beryllium-7			Ruthenium-106/ Rhodium-106			Antimony-125		
	Concentration[1]	± 2 SD	MDC	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
04/15/2013	-2	21	37	-1	21	36	-1	4	7

Analysis Date	Cesium-134			Cesium-137		
	Concentration[1]	± 2 SD	MDC	Concentration	± 2 SD	MDC
04/15/2013	0	2	4	-1	2	4

Note: Concentrations are expressed in 1 x 10^{-5} pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).
[1] These concentrations are from blank filters collected weekly, composited, and analyzed for the calendar quarter. A composite volume equal to the sum of the average volumes collected through each valid field filter was used to compute "air concentrations" for the blank for meaningful comparison to sample results. No air was actually passed through the blank filters.

Table 25. Blank analysis results for tritium in water vapor from air samples, first quarter, 2013.

Sample Number	Start Date	Collect Date	Analysis Date	Tritium		
				Concentration	± 2 SD	MDC
OP121ZTR01	03/20/2013	03/25/2013	04/30/2013	0.11	0.13	0.21
OP121ZTR02	04/09/2013	04/15/2013	04/30/2013	0.00	0.13	0.21

Note: Concentrations are expressed in nCi/L of water with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

Table 26. Blank analysis results for 2012 TSP annual radiochemical composites of air filters.

Location	^{90}Sr			^{238}Pu			^{239}Pu/^{240}Pu			^{241}Am		
	Value[1]	± 2 SD	MDC	Value[1]	± 2 SD	MDC	Value[1]	± 2 SD	MDC	Value[1]	± 2 SD	MDC
Blank	-0.40	0.81	1.42	0.19	0.21	0.33	-0.08	0.10	0.24	0.33	0.31	0.45

Note: Concentrations are expressed in 1 x 10^{-5} pCi/m^3 with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).
[1] These concentrations are from blank filters collected weekly, composited, and analyzed for the calendar year. A composite volume equal to the sum of the average volumes collected through each valid field filter was used to compute "air concentrations" for the blank for meaningful comparison to sample results. No air was actually passed through the blank filters.

Table 27. Radiological blank analysis in ground and surface water for samples for the first quarter, 2013.

Sample Number	Sample Date	Concentration	± 2 SD	MDC	Within Blank Criteria?
Gross Alpha					
131W001	3/5/2013	-0.2	0.4	0.7	Yes
Gross Beta					
131W001	3/5/2013	-0.3	0.6	1.0	Yes
Cesium-137					
131W001	3/5/2013	-1.3	2.0	3.6	Yes
Tritium					
131W002	3/5/2013	60	100	170	Yes
Enriched Tritium					
121W421	5/17/2012	26*	6	10	Yes
121W516	6/26/2012	22*	5	8	Yes

Note: Concentrations are expressed in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentration (MDC).

*Note: Reflects typical concentrations found in DI water.

Table 28. Blank analysis results (µg/L) for metals in ground and surface water for the first quarter, 2013.

Sample Number	Sample Date	Arsenic	Barium	Chromium	Iron	Lead	Manganese	Selenium	Zinc
131W004	3/5/2013	<5	<2	<5	<10	<5	<2	<10	<5

Table 29. Blank analysis results (mg/L) for common ions and nutrients in ground and surface water for the first quarter, 2013.

Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity	Total Nitrogen	Total Phosphorus	Ammonia as N
131W005,004,003	3/5/2013	<0.1	<0.1	<0.1	<0.1	<0.2	<0.4	<0.8	1	<0.01	<0.005	<0.01

Table 30. Blank analysis results (µg/L) for VOCs in ground and surface water for the first quarter, 2013.

Sample Location	Sample Date	1,1-Dichloroethene	Carbon tetrachloride	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethylene (PERC)	Trichloroethylene	Vinyl chloride
131W017	3/5/2013	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Table 31. Duplicate radiological analysis results in pCi/L for ground and surface water, first quarter, 2013.

Analysis/ Sample Location	Original Sample Number	Concentration	±2 SD	Duplicate Sample Number	Concentration	±2 SD	$/R_1-R_2/$	$3(s_1^2+s_2^2)^{1/2}$	Within Criteria?[1]
Gross Alpha									
ICPP-2020	131W038	9.1	1.9	131W048	6.2	1.6	2.9	3.7	Yes
USGS-067	131W078	6	1.7	131W088	5.8	1.7	0.2	3.6	Yes
Gross Beta									
ICPP-2020	131W038	120.2	2.8	131W048	112.2	2.7	8.0	5.8	Yes*
USGS-067	131W078	104.7	2.6	131W088	113.4	2.7	8.7	5.6	Yes*
Gamma Spectroscopy Cesium-137									
ICPP-2020	131W038	0.2	1.3	131W048	0.2	1.4	0.0	2.9	Yes
USGS-067	131W078	-0.1	1.5	131W088	1.6	2.1	1.7	3.9	Yes
Tritium									
ICPP-2020	131W043	1900	140	131W053	1810	140	90	297	Yes
USGS-067	131W083	2940	160	131W093	2730	160	210	339	Yes
Enriched Tritium									
MV-54	121W546	18	8	121W501	22	5	4	14	Yes
Strontium-90									
ICPP-2020	131W041	10.1	2.5	131W051	11.2	2.7	1.1	5.52	Yes
USGS-067	131W081	13.8	3.4	131W091	15	3.6	1.2	7.43	Yes
Technetium-99									
ICPP-2020	131W042	287.4	1.7	131W052	282.3	1.7	5.1	3.61	Yes*
USGS-067	131W083	182.5	1.3	131W093	184.1	1.3	1.6	2.76	Yes
Plutonium-238									
ICPP-2020	131W040	0.005	0.011	131W050	0	0.013	0.01	0.03	Yes
USGS-067	131W080	-0.002	0.02	131W090	0.011	0.031	0.01	0.06	Yes
Plutonium-239/240									
ICPP-2020	131W040	0.009	0.011	131W050	0.009	0.019	0.00	0.03	Yes
USGS-067	131W080	-0.002	0.02	131W090	0.005	0.031	0.01	0.06	Yes
Uranium-234									
ICPP-2020	131W044	1.63	0.36	131W054	1.62	0.38	0.01	0.79	Yes
USGS-067	131W084	1.49	0.35	131W094	1.78	0.48	0.29	0.89	Yes
Uranium-235									
ICPP-2020	131W044	0.063	0.056	131W054	0.027	0.048	0.04	0.11	Yes
USGS-067	131W084	0.039	0.048	131W094	0.14	0.11	0.10	0.18	Yes
Uranium-238									
ICPP-2020	131W044	1	0.25	131W054	1.07	0.28	0.07	0.56	Yes
USGS-067	131W084	0.8	0.23	131W094	0.88	0.29	0.08	0.56	Yes
Americium-241									
ICPP-2020	131W039	-0.007	0.018	131W049	-0.007	0.014	0.00	0.03	Yes
USGS-067	131W079	-0.009	0.018	131W089	0.001	0.022	0.01	0.04	Yes

[1] $/R_1-R_2/ \leq 3(s_1^2+s_2^2)^{1\backslash 2}$

* Compared using the Relative Percent Difference (RPD) between each sample. Both of the sample results exceeded five times the minimum detectable concentration (MDC). RPD = (R1-R2) / ((R1+ R2)/2)*100

Table 32. Duplicate results for metals (µg/L) in ground water and/or surface water for the first quarter, 2013.

Sample Location	Sample Number	Sample Date	Arsenic	Barium	Chromium	Iron	Lead	Manganese	Selenium	Zinc
ICPP-2020	131W046	3/18/2013	<5	110	74	400	<5	13	<10	<5
ICPP-2020	131W056	3/18/2013	<5	110	68	380	<5	13	<10	<5
RPD			**0**	**0**	**8**	**5**	**0**	**0**	**0**	**0**
USGS-067	131W086	3/25/2013	<5	110	7.2	15	<5	<2	<10	<5
USGS-067	131W096	3/25/2013	<5	120	7.2	18	<5	<2	<10	<5
RPD			**0**	**-9**	**0**	**-18**	**0**	**0**	**0**	**0**

Relative Percent Difference (RPD) = (R1-R2) / ((R1+ R2)/2)*100.

Table 33. Duplicate results for common ions and nutrients (mg/L) in ground water and/or surface water for first quarter, 2013.

Sample Location	Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity	Total Nitrogen	Total Phosphorus	Ammonia as N
ICPP-2020	131W047,046,045	3/18/2013	58	17	19	3	0.218	50.1	36.1	139	3.9	0.034	<0.01
ICPP-2020	131W057,056,055	3/18/2013	57	17	19	3	0.232	45.5	36.4	140	3.9	0.033	<0.01
RPD			**1.7**	**0**	**0**	**0**	**-6.2**	**9.6**	**-0.8**	**-0.7**	**0**	**3.0**	**0**
USGS-067	131W087,086,085	3/25/2013	53	15	24	3.5	0.270	47.7	28.8	137	5.6	0.03	<0.01
USGS-067	131W097,096,095	3/25/2013	53	15	24	3.6	0.257	47.2	28.7	137	5.6	0.03	<0.01
RPD			**0**	**0**	**0**	**-3**	**4.9**	**1.1**	**0.3**	**0**	**0**	**0**	**0**

Relative Percent Difference (RPD) = (R1-R2) / ((R1+ R2)/2)*100

Table 34. Electret ionization chamber irradiation results (categorized as spiked samples) for first quarter, 2013.

Electret #	Exposure Received		Net Measured Exposure[1]		%R
	(mR)	Uncertainty (mR)	(mR)	Uncertainty (mR)	
Spike 1	42.0	2.1	37.7	1.3	89.9%
Spike 1	42.0	2.1	40.1	1.3	95.5%
Spike 1	42.0	2.1	43.4	1.3	103.5%
Spike 2	30.0	1.5	30.6	1.4	102.2%
Spike 2	30.0	1.5	30.0	1.3	100.1%
Spike 2	30.0	1.5	29.9	1.3	99.6%
Spike 3	24.0	1.2	22.1	1.4	92.0%
Spike 3	24.0	1.2	23.5	1.3	97.9%
Spike 3	24.0	1.2	22.6	1.3	94.3%

Note: A percent recovery (%R) of 100 ± 25 is considered acceptable.
[1] Net measured exposure estimate includes a correction for atmospheric pressure.

Table 35. Air sampling field equipment service reliability (percent operational), first quarter, 2013.

Station Locations	Sample Type			
	TSP	Radioiodine	Atmospheric Moisture	Precipitation
Onsite Locations				
Big Lost River Rest Area	100 %	100 %	100 %	100 %
Experimental Field Station	100 %	100 %	100 %	NC[1]
Sand Dunes Tower	100 %	100 %	100 %	NC[1]
Van Buren Avenue	100 %	100 %	100 %	NC[1]
Boundary Locations				
Atomic City	100 %	100 %	100 %	100 %
Howe	100 %	100 %	100 %	100 %
Monteview	100 %	100 %	100 %	100 %
Mud Lake	100 %	100 %	100 %	100 %
Distant Locations				
Craters of the Moon	100 %	100 %	100 %	NC[1]
Idaho Falls	100 %	100 %	100 %	100 %

Note: The values in this table were calculated by dividing the number of weeks the equipment was in operation by the number of weeks in the quarter.
[1]NC = sample not collected at this location.

Appendix A

Table A-1. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, first quarter, 2013.

Sample location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
On-site Locations						
Rest Area	12/27/12	01/03/13	0.7	0.2	47.6	1.4
	01/03/13	01/10/13	1.2	0.3	77.5	1.8
	01/10/13	01/17/13	0.6	0.2	43.6	1.4
	01/17/13	01/24/13	1.3	0.3	63.7	1.6
	01/24/13	01/31/13	0.7	0.2	32.6	1.2
	01/31/13	02/07/13	0.4	0.2	39.6	1.3
	02/07/13	02/14/13	0.6	0.2	26.1	1.1
	02/14/13	02/21/13	0.5	0.2	22.8	1.0
	02/21/13	02/28/13	0.3	0.2	15.2	0.9
	02/28/13	03/07/13	0.6	0.2	22.3	1.0
	03/07/13	03/14/13	0.5	0.2	18.3	1.0
	03/14/13	03/21/13	0.5	0.2	22.9	1.1
	03/21/13	03/28/13	0.8	0.2	25.6	1.1
Experimental Field Station	12/27/12	01/03/13	0.7	0.2	39.3	1.4
	01/03/13	01/10/13	0.8	0.2	60.7	1.7
	01/10/13	01/17/13	0.4	0.2	31.9	1.2
	01/17/13	01/24/13	1.0	0.2	63.4	1.7
	01/24/13	01/31/13	0.3	0.2	23.0	1.1
	01/31/13	02/07/13	0.4	0.2	30.8	1.2
	02/07/13	02/14/13	0.2	0.1	18.0	1.0
	02/14/13	02/21/13	0.3	0.1	16.5	0.9
	02/21/13	02/28/13	0.3	0.2	11.9	0.8
	02/28/13	03/07/13	0.4	0.2	17.9	1.0
	03/07/13	03/14/13	0.4	0.2	14.5	0.9
	03/14/13	03/21/13	0.6	0.2	17.5	1.0
	03/21/13	03/28/13	0.5	0.2	19.4	1.0

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, first quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Sand Dunes	12/27/12	01/03/13	0.5	0.2	36.2	1.2
	01/03/13	01/10/13	1.2	0.2	63.2	1.6
	01/10/13	01/17/13	0.7	0.2	37.4	1.2
	01/17/13	01/24/13	1.3	0.2	73.9	1.7
	01/24/13	01/31/13	0.5	0.2	30.6	1.2
	01/31/13	02/07/13	0.4	0.2	31.7	1.2
	02/07/13	02/14/13	0.2	0.1	20.5	1.0
	02/14/13	02/21/13	0.3	0.1	17.6	0.9
	02/21/13	02/28/13	0.1	0.1	12.1	0.8
	02/28/13	03/07/13	0.5	0.2	19.0	0.9
	03/07/13	03/14/13	0.5	0.2	14.7	0.9
	03/14/13	03/21/13	0.5	0.2	18.0	0.9
	03/21/13	03/28/13	0.3	0.2	18.1	0.9
Van Buren	12/27/12	01/03/13	0.3	0.1	32.5	1.2
	01/03/13	01/10/13	0.9	0.2	58.9	1.6
	01/10/13	01/17/13	0.3	0.2	31.8	1.2
	01/17/13	01/24/13	0.8	0.2	47.8	1.4
	01/24/13	01/31/13	0.5	0.2	22.8	1.1
	01/31/13	02/07/13	0.5	0.2	30.5	1.2
	02/07/13	02/14/13	0.4	0.2	18.1	0.9
	02/14/13	02/21/13	0.5	0.2	17.7	0.9
	02/21/13	02/28/13	0.3	0.2	10.3	0.8
	02/28/13	03/07/13	0.6	0.2	17.8	0.9
	03/07/13	03/14/13	0.4	0.2	12.9	0.8
	03/14/13	03/21/13	0.7	0.2	16.0	0.9
	03/21/13	03/28/13	0.5	0.2	18.8	1.0
Boundary Locations						
Atomic City	12/27/12	01/03/13	0.7	0.2	38.5	1.3
	01/03/13	01/10/13	1.1	0.3	65.9	1.7
	01/10/13	01/17/13	0.5	0.2	37.8	1.3
	01/17/13	01/24/13	1.1	0.2	63.5	1.6
	01/24/13	01/31/13	0.5	0.2	20.6	1.0
	01/31/13	02/07/13	0.4	0.2	27.0	1.1
	02/07/13	02/14/13	0.3	0.1	18.7	0.9
	02/14/13	02/21/13	0.3	0.1	17.3	0.9
	02/21/13	02/28/13	0.2	0.1	10.4	0.7
	02/28/13	03/07/13	0.4	0.2	16.9	0.9
	03/07/13	03/14/13	0.4	0.2	14.0	0.9
	03/14/13	03/21/13	0.4	0.2	17.4	0.9
	03/21/13	03/28/13	0.5	0.2	18.8	1.0

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, first quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Howe	12/27/12	01/03/13	0.5	0.2	33.2	1.3
	01/03/13	01/10/13	0.9	0.2	58.3	1.6
	01/10/13	01/17/13	0.5	0.2	30.9	1.2
	01/17/13	01/24/13	1.0	0.2	63.3	1.7
	01/24/13	01/31/13	0.6	0.2	23.1	1.1
	01/31/13	02/07/13	0.4	0.2	28.6	1.2
	02/07/13	02/14/13	0.4	0.2	20.1	1.0
	02/14/13	02/21/13	0.5	0.2	16.1	0.9
	02/21/13	02/28/13	0.2	0.2	12.0	0.9
	02/28/13	03/07/13	0.4	0.2	18.2	1.0
	03/07/13	03/14/13	0.6	0.2	14.3	0.9
	03/14/13	03/21/13	0.8	0.2	18.1	1.0
	03/21/13	03/28/13	0.5	0.2	18.6	1.0
Monteview	12/27/12	01/03/13	0.5	0.2	42.7	1.4
	01/03/13	01/10/13	1.1	0.3	82.7	1.9
	01/10/13	01/17/13	0.5	0.2	36.0	1.3
	01/17/13	01/24/13	1.5	0.3	88.0	1.9
	01/24/13	01/31/13	0.4	0.2	30.7	1.2
	01/31/13	02/07/13	0.6	0.2	35.3	1.3
	02/07/13	02/14/13	0.4	0.2	20.1	1.0
	02/14/13	02/21/13	0.5	0.2	18.5	1.0
	02/21/13	02/28/13	0.2	0.2	14.7	0.9
	02/28/13	03/07/13	0.4	0.2	21.0	1.0
	03/07/13	03/14/13	0.4	0.2	13.7	0.9
	03/14/13	03/21/13	0.6	0.2	19.0	1.0
	03/21/13	03/28/13	0.7	0.2	19.2	1.0
Mud Lake	12/27/12	01/03/13	1.0	0.2	67.2	1.6
	01/03/13	01/10/13	2.0	0.3	116.6	2.2
	01/10/13	01/17/13	0.9	0.2	65.5	1.7
	01/17/13	01/24/13	1.9	0.3	112.0	2.2
	01/24/13	01/31/13	0.8	0.2	49.2	1.5
	01/31/13	02/07/13	0.6	0.2	41.5	1.4
	02/07/13	02/14/13	0.6	0.2	28.0	1.1
	02/14/13	02/21/13	0.8	0.2	28.2	1.1
	02/21/13	02/28/13	0.4	0.2	21.4	1.0
	02/28/13	03/07/13	0.6	0.2	27.4	1.1
	03/07/13	03/14/13	0.9	0.2	24.7	1.1
	03/14/13	03/21/13	1.1	0.2	31.8	1.2
	03/21/13	03/28/13	1.1	0.2	27.5	1.2

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, first quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Distant Locations						
Craters	12/27/12	01/03/13	0.3	0.2	28.4	1.2
	01/03/13	01/10/13	0.6	0.2	44.6	1.5
	01/10/13	01/17/13	0.4	0.2	28.1	1.2
	01/17/13	01/24/13	0.7	0.2	38.9	1.4
	01/24/13	01/31/13	0.1	0.1	10.3	0.8
	01/31/13	02/07/13	0.2	0.2	20.2	1.0
	02/07/13	02/14/13	0.2	0.1	15.4	0.9
	02/14/13	02/21/13	0.2	0.1	13.3	0.9
	02/21/13	02/28/13	0.0	0.1	8.7	0.8
	02/28/13	03/07/13	0.3	0.2	13.3	0.9
	03/07/13	03/14/13	0.3	0.2	11.4	0.9
	03/14/13	03/21/13	0.5	0.2	13.7	0.9
	03/21/13	03/28/13	0.2	0.2	14.1	0.9
Fort Hall[1]	12/27/12	01/03/13	0.4	0.2	20.1	1.0
	01/03/13	01/10/13	0.8	0.2	48.4	1.5
	01/10/13	01/17/13	0.5	0.2	28.7	1.1
	01/17/13	01/24/13	1.0	0.2	50.6	1.5
	01/24/13	01/31/13	0.3	0.2	14.7	0.9
	01/31/13	02/07/13	0.6	0.2	19.6	1.0
	02/07/13	02/14/13	0.5	0.2	14.0	0.9
	02/14/13	02/21/13	0.4	0.2	14.0	0.9
	02/21/13	02/28/13	0.2	0.2	8.3	0.7
	02/28/13	03/07/13	0.5	0.2	15.5	0.9
	03/07/13	03/14/13	0.3	0.2	10.2	0.8
	03/14/13	03/21/13	0.5	0.2	13.6	0.9
	03/21/13	03/28/13	0.6	0.2	12.7	0.9
Idaho Falls HVP 3804	12/27/12	01/03/13	0.5	0.2	35.1	1.2
	01/03/13	01/10/13	1.4	0.3	79.6	1.9
	01/10/13	01/17/13	1.3	0.3	55.2	1.6
	01/17/13	01/24/13	1.7	0.5	73.3	2.8
	01/24/13	01/31/13	0.5	0.2	31.1	1.2
	01/31/13	02/07/13	0.5	0.2	30.7	1.2
	02/07/13	02/14/13	0.5	0.2	22.6	1.1
	02/14/13	02/21/13	0.5	0.2	20.6	1.0
	02/21/13	02/28/13	0.4	0.2	12.6	0.8
	02/28/13	03/07/13	R[2]	R[2]	R[2]	R[2]
	03/07/13	03/14/13	0.6	0.2	14.1	0.9
	03/14/13	03/21/13	0.8	0.2	23.7	1.1
	03/21/13	03/28/13	0.7	0.2	22.8	1.1

[1] Operated by Shoshone Bannock-Tribes
[2] R – Results rejected due to insufficient sample volume caused by a power outage at the station.

Table A-1 continued. Weekly concentrations (in 1 x 10^{-3} pCi/m^3) for gross alpha and gross beta analyses for TSP filters for all locations, first quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Idaho Falls - HVP 4304[2]	12/27/12	01/03/13	0.6	0.2	42.6	1.4
	01/03/13	01/10/13	1.3	0.3	81.7	1.9
	01/10/13	01/17/13	1.0	0.2	53.9	1.5
	01/17/13	01/24/13	1.9	0.5	97.6	3.1
	01/24/13	01/31/13	0.9	0.2	38.7	1.3
	01/31/13	02/07/13	0.5	0.2	39.0	1.3
	02/07/13	02/14/13	0.7	0.2	24.8	1.1
	02/14/13	02/21/13	0.6	0.2	25.9	1.1
	02/21/13	02/28/13	0.3	0.2	14.4	0.9
	02/28/13	03/07/13	R[1]	R[1]	R[1]	R[1]
	03/07/13	03/14/13	0.5	0.2	18.1	1.0
	03/14/13	03/21/13	0.8	0.2	21.4	1.0
	03/21/13	03/28/13	0.7	0.2	23.1	1.1

[1]R – Results rejected due to insufficient sample volume caused by a power outage at the station.
[2]HVP 4304 – This is a new sampler model being operated side by side with sampler HVP 3804 to test the dependability and durability in field conditions.

Appendix B

Table B-1. Results for all electret locations, first quarter, 2013.

Sample Location	Net Corrected Exposure Rate (µR/h)	± 2 SD (µR/h)
Arco	13.7	3.5
Craters	13.4	3.4
Rest Area	13.5	3.5
Van Buren	13.6	1.2
EFS	18.7	0.4
Main Gate	13.9	3.1
Atomic City	11.9	0.4
Taber	10.9	3.4
Blackfoot	12.1	1.5
Ft. Hall[1]	9.5	0.0
Idaho Falls	9.2	2.6
Mud Lake/Terreton	16.0	1.8
Monteview	13.0	2.7
Sand Dunes	16.8	3.0
Howe Met. Tower	12.2	3.1
MP276 -20	11.4	3.0
MP274 -20	9.3	3.9
MP272 -20	9.9	3.4
MP270 -20	10.0	1.2
MP268 -20	10.2	0.8
MP266 -20	10.7	3.6
MP264 -20	11.5	2.1
MP270 -20/26	12.0	1.6
MP268 -20/26	12.5	3.3
MP266 -20/26	11.4	0.8
MP263 -20/26	10.1	1.8
MP261 -20/26	11.1	3.8
MP259 -20/26	11.2	1.4
MFC (EBR II)	9.4	2.7
EBR I	14.7	0.2
RWMC	15.0	0.4
CFA	14.1	0.5
CITRC (PBF)	16.9	2.9

[1]Station operated by Shoshone-Bannock Tribes

Table B-1 continued. Results for all electret locations, first quarter, 2013.

Sample Location	Net Corrected Exposure Rate (µR/h)	± 2 SD (µR/h)
INTEC (ICPPI)	16.3	3.2
ATR (TRA)	14.1	3.0
NRF	13.9	0.9
TAN	13.6	1.6
Mud Lake Bank of Commerce	13.0	2.5
MP43-33	17.6	2.5
MP41-33	17.5	2.5
MP39-33	17.9	2.3
MP37-33	10.1	1.3
MP35-33	12.7	3.2
MP33-33	15.2	3.8
MP31-33	14.1	3.3
MP29-33	11.2	3.3
MP27-33	12.1	3.0
MP25-33	10.8	2.2
MP23-33	10.6	2.3
Base of Howe	12.0	2.8
Rover	16.0	3.5
Hamer	12.4	2.3
Sugar City	15.1	3.5
Roberts	11.0	1.8
Big Southern Butte	14.1	2.2

Appendix C

Table C-1. List of volatile organic compounds (VOCs) analyzed for water samples. Minimum detectable concentrations (MDC) are expressed in µg/L.

Analyte	Minimum detectable concentrations (MDC) (expressed in µg/L)
Benzene	0.5
Carbon tetrachloride	0.5
Chlorobenzene	0.5
1,4-Dichlorobenzene	0.5
1,2-Dichlorobenzene	0.5
1,2-Dichloroethane	0.5
1,1-Dichloroethene	0.5
cis-1,2-Dichloroethene	0.5
trans-1,2-Dichloroethene	0.5
1,2-Dichloropropane	0.5
Ethylbenzene	0.5
Methylene Chloride	0.5
Styrene	0.5
Tetrachloroethylene (PERC)	0.5
Toluene	0.5
1,2,4-Trichlorobenzene	0.5
1,1,1-Trichloroethane	0.5
1,1,2-Trichloroethane	0.5
Trichloroethylene	0.5
Vinyl chloride	0.5
Xylenes (total)	0.5
Bromodichloromethane	0.5
Dibromochloromethane	0.5
Bromoform	0.5
Chloroform	0.5
Bromobenzene	0.5
Bromochloromethane	0.5
Bromomethane	0.5
n-Butylbenzene	0.5
sec-Butylbenzene	0.5
tert-Butylbenzene	0.5
Chloroethane	0.5
Chloromethane	0.5
2-Chlorotoluene	0.5

Table C.1 continued. List of volatile organic compounds (VOCs) analyzed for water samples. Minimum detectable concentrations (MDC) are expressed in µg/L.

Analyte	Minimum detectable concentrations (MDC) (expressed in µg/L)
4-Chlorotoluene	0.5
1,2-Dibromo-3-chloropropane (DBCP)	1.0
1,2-Dibromoethane (EDB)	0.5
Dibromomethane	0.5
1,3-Dichlorobenzene	0.5
Dichlorodifluoromethane	0.5
1,1-Dichloroethane	0.5
1,3-Dichloropropane	0.5
2,2-Dichloropropane	0.5
1,1-Dichloropropene	0.5
cis-1,3-Dichloropropene	0.5
trans-1,3-Dichloropropene	0.5
Hexachlorobutadiene	0.5
Isopropylbenzene	0.5
p-Isopropyltoluene	0.5
Methyl Tert Butyl Ether (MTBE)	1.0
Naphthalene	1.0
n-Propylbenzene	0.5
1,1,1,2-Tetrachloroethane	0.5
1,1,2,2-Tetrachloroethane	0.5
1,2,3-Trichlorobenzene	1.25
Trichlorofluoromethane	0.5
1,2,3-Trichloropropane	0.5
1,2,4-Trimethylbenzene	0.5
1,3,5-Trimethylbenzene	0.5