Department of Environmental Quality
INL Oversight Program

ENVIRONMENTAL SURVEILLANCE PROGRAM QUARTERLY DATA REPORT

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Table of Acronyms

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 third quarter, 2013 (**Figure 1**). These stations employed instrumentation for collecting airborne particulate matter, gaseous radioiodine, precipitation, and water vapor for tritium analysis (**Table 1**). 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 third 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.

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 third 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. No weighted means were measured above the minimum detectable concentration (MDC) during the third quarter of 2013. There were two individual samples within the weighted means that did exceed the MDC, located at Experimental Field Station (1.09 pCi/m^3, MDC 0.65 pCi/m^3) and Van Buren (0.89 pCi/m^3, MDC 0.75 pCi/m^3). The DEQ-INL OP action level for atmospheric tritium is 150 pCi/m^3 (40 CFR 61). Average atmospheric tritium concentrations are presented in **Table 4**.

Precipitation samples were collected at six monitoring locations during the third quarter of 2013. Precipitation samples were analyzed for tritium and gamma-emitting radionuclides. Tritium and Cesium-137 analysis results are presented **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. Tritium and gamma-emitting radionuclides were below minimum detectable concentration in precipitation collected during the third quarter of 2013.

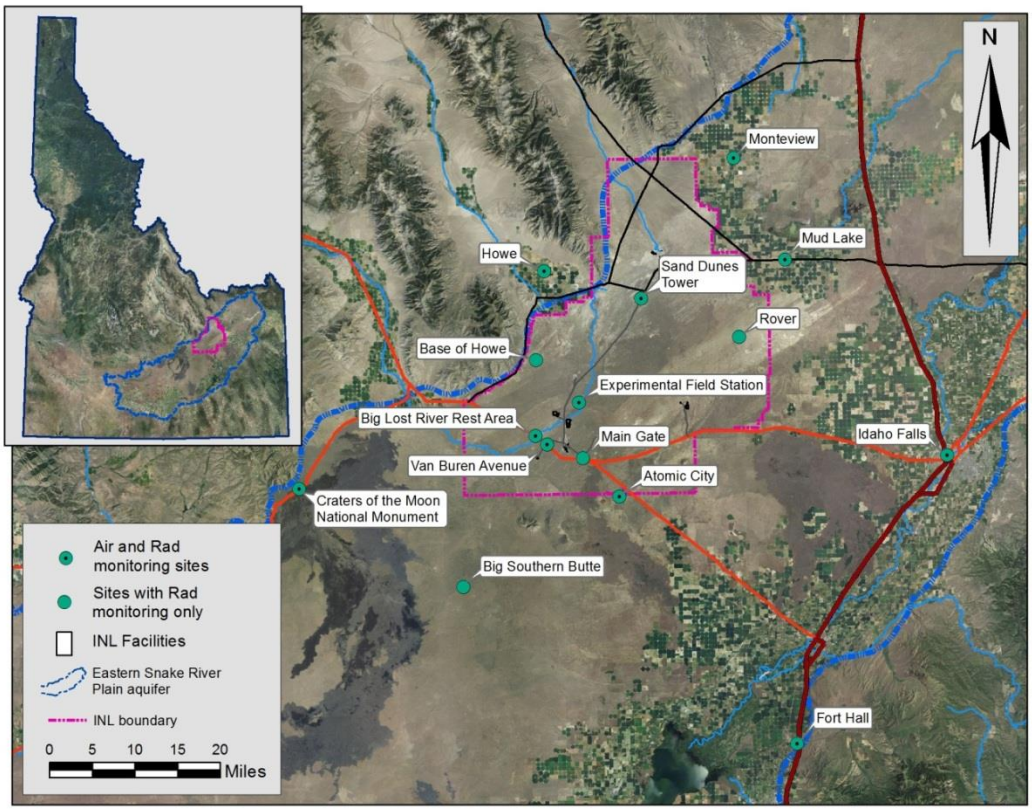

Figure 1. Air and radiation monitoring sites.

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, third quarter, 2013.

Station Location	Concentration					
	Gross Alpha			Gross Beta		
On-Site Locations						
Big Lost River Rest Area	0.6	-	2.4	22.0	-	38.5
Experimental Field Station	0.5	-	2.3	19.3	-	32.5
Sand Dunes Tower	0.5	-	2.1	17.7	-	28.1
Van Buren Avenue	0.4	-	1.8	17.2	-	30.8
Boundary Locations						
Atomic City	0.6	-	2.0	20.2	-	31.5
Howe	0.3	-	2.4	15.2	-	27.7
Monteview	0.7	-	2.3	19.2	-	33.2
Mud Lake	1.0	-	3.0	28.5	-	51.0
Distant Locations						
Craters of the Moon	0.4	-	2.6	13.4	-	24.2
Fort Hall[1]	0.5	-	1.8	13.8	-	23.5
Idaho Falls – HVP 3804	0.8	-	2.4	25.3	-	40.9
Idaho Falls – HVP 4304	0.8	-	2.0	22.0	-	35.6

[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, third 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	79.2	4.3	<MDC[2]
Experimental Field Station	63.1	3.4	<MDC
Sand Dunes Tower	63.0	3.3	<MDC
Van Buren Avenue	69.3	3.7	<MDC
Boundary Locations			
Atomic City	72.9	3.8	<MDC
Howe	71.8	3.8	<MDC
Monteview	83.4	4.3	<MDC
Mud Lake	116.3	5.9	<MDC
Distant Locations			
Craters of the Moon	57.3	3.2	<MDC
Fort Hall[1]	55.1	3.0	<MDC
Idaho Falls – HVP 3804	91.4	5.0	<MDC
Idaho Falls – HVP 4304	83.3	4.4	<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, third quarter, 2013

Station Location	Tritium		
	Concentration	± 2 SD	MDC
On-site Locations			
Big Lost River Rest Area	0.75	0.62	1.02
Experimental Field Station	0.65	0.53	0.85
Sand Dunes Tower	0.09	0.62	1.04
Van Buren Avenue	0.50	0.60	0.98
Boundary Locations			
Atomic City	-0.08	0.56	1.00
Howe	0.12	0.71	1.21
Mud Lake	0.00	0.77	1.33
Monteview	0.22	0.83	1.36
Distant Locations			
Craters of the Moon	0.10	0.48	0.79
Fort Hall[1]	-0.08	0.78	1.31
Idaho Falls	-0.06	0.76	1.28

[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, third quarter, 2013.

Station Location	Tritium			Cesium-137		
	Concentration	± 2 SD	MDC	Concentration	± 2 SD	MDC
On-site Locations						
Big Lost River Rest Area	50	90	150	0.7	2.4	4.0
Boundary Locations						
Atomic City	20	100	160	0.7	1.2	2.1
Howe	-10	90	150	-1.6	1.9	3.3
Monteview	60	90	150	0.5	1.8	3.1
Mud Lake	-10	90	150	0.6	1.5	2.5
Distant Locations						
Idaho Falls	-20	90	150	-0.1	1.5	2.6

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

Environmental Radiation Monitoring Results

The ESP operated 14 environmental radiation stations during the third 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 6**). 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.

The HPICs and EICs are used by DEQ-INL OP to measure external gamma radiation for various objectives. 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 transmitted to DEQ-INL OP and presented graphically at http://www.deq.idaho.gov/inl-oversight/monitoring/gamma-radiation-measurements.aspx.

EICs are a passive-integrating system for making cumulative measurements of environmental gamma radiation exposure. EICs are deployed, collected, and analyzed quarterly. EICs are an inexpensive means for measuring gamma radiation on a regional scale, particularly at locations that do not have a power source. EICs can also provide valuable gamma radiation data in the event of an emergency. For this reason, DEQ-INL OP deploys EICs at an additional 40 locations in a widespread network around the INL. Results for these locations are tabulated in **Appendix B.**

These two systems are used by DEQ-INL OP to measure external gamma radiation for various radiological monitoring objectives. **Table 7** lists the average radiation exposure rates measured by the HPICs for third quarter 2013. **Table 8** lists the EIC monitoring results for third quarter 2013. Overall exposure rates were within the expected historical range of values observed by DEQ-INL OP for background radiation.

Table 6. 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 7. Average gamma exposure rates, third quarter, 2013, from HPIC network.

Station Location	Exposure Rate (µR/hr)	
	Quarterly Average	± 2 SD
On-site Locations		
Base of Howe[1]	18.9	14.8
Big Lost River Rest Area	15.4	0.7
Main Gate[2]	16.5	6.2
Rover[1]	18.6	15.9
Sand Dunes Tower[1]	15.2	11.1
Boundary Locations		
Atomic City[1]	15.3	10.7
Big Southern Butte[1]	16.5	9.8
Howe Met Tower	12.8	1.1
Monteview	13.7	2.9
Mud Lake/Terreton[1]	15.8	9.7
Distant Locations		
Fort Hall[3]	12.4	3.6
Idaho Falls	11.5	0.5

[1] For periods of up to approximately 10 days in the third quarter, 2013, results at these locations reflect HPIC system over-response by a factor of approximately 2, rather than a change in actual exposure rates or variability of exposure rates. At other times during the quarter, results were within the historical range of values for exposure rate and variability.
[2]The Main Gate PIC was out of service from July 17 through September 30 because of problems with the power service.
[3]Operated by Shoshone-Bannock Tribes.

Table 8. Electret ionization chamber (EIC) cumulative average exposure rates, third quarter, 2013.

Station Location	Exposure Rate (µR/hr)	
	Quarterly Average[1]	± 2 SD
On-site Locations		
Base of Howe	12.7	3.3
Big Lost River Rest Area	14.8	0.1
Experimental Field Station	15.8	3.5
Main Gate	12.7	0.8
Rover	14.9	4.9
Sand Dunes Tower	14.8	3.2
Van Buren Avenue	14.4	2.4
Boundary Locations		
Atomic City	13.7, 14.0	-
Big Southern Butte	12.7	1.6
Howe Met Tower	11.0	1.5
Monteview	12.2	1.2
Mud Lake / Terreton	13.9	1.5
Distant Locations		
Craters of the Moon	14.2	1.3
Fort Hall[2]	11.3, 12.6	-
Idaho Falls	15.1, 15.8	-

[1] Results are the average of triplicate measurements with the associated variability (±2 SD), or of the 2 measured exposure rates remaining after deletion of an outlying value.
[2] 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 (**Figure 2 and Figure 3**). 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 third quarter of 2013, 1 up-gradient, 3 facility, 8 distant, and 1 waste water location were sampled. Of the three facility locations sampled, two of the sites are new well locations. USGS-140 and USGS-141 are new wells intended to monitor the aquifer down gradient from the planned remote-handled low-level waste (RH-LLW) disposal facility. The RH-LLW facility will be built southwest of the ATR Complex and will be used for the disposal of low-level waste streams from both the Naval Reactors Facility (NRF) and the Materials and Fuels Complex (MFC).

Most sites sampled by DEQ-INL OP 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 OP 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, and americium; 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.

Gross alpha radioactivity was detected at 4 distant locations and was within the range of concentrations observed for naturally-occurring radioactivity. The EPA maximum contaminant level (MCL) for alpha particles is 15 pCi/L.

Gross beta radioactivity was detected at every location sampled this quarter. Concentrations observed at the facility location, ICPP-MON-A-166, were consistent with historical trends. Gross beta concentrations found at the new facility locations, USGS-140 and USGS-141, are within the range for naturally-occurring radioactivity. Concentrations for up-gradient, distant, and waste water locations were consistent with historical trends except for that found at Mud Lake Water Supply (Well #1). Well #3, the well that is normally sampled, was offline for maintenance so Well #1 was sampled instead. The gross beta concentration for Well #1 is almost double those typically found in Well #3. The difference in depth of each well could account for this difference. Well #1 was completed at 260 feet below land surface (ftbls), while Well #3 was completed at 180 ftbls. The MCL for beta and gamma radioactivity is 4 mrem/year, equivalent to 8 pCi/L if the source is ^{90}Sr; 900 pCi/L if ^{99}Tc; 20,000 pCi/L if ^{3}H; or 200 pCi/L if ^{137}Cs. Man-made, gamma emitting radioactivity was not detected at any of the sampled locations. Results for gross alpha, gross beta, and man-made, gamma emitting ^{137}Cs are shown in **Table 9**.

Two sites were sampled for isotopes of uranium. Both sample sites had detectable results for ^{234}U and ^{238}U (**Table 10**). Analysis results for samples collected from USGS-140, and USGS-141 indicate uranium concentrations consistent with natural background levels. Isotopic ratios (^{234}U/^{238}U) found at USGS-140 and USGS-141 are comparable with past isotopic ratios (^{234}U/^{238}U) found at nearby wells.

Using the standard analytical method, ^{3}H was detected at two of the three facility locations, including USGS-140 and USGS-141 (**Table 11**). The ^{3}H levels found at these wells are consistent with historic INL waste disposal influences at the ATR Complex and are similar to ^{3}H concentrations observed in other nearby wells. Selected water samples with tritium concentrations not measurable using the standard method (typically a MDC of 130 pCi/L) are analyzed using an electrolytic enrichment method with a much lower MDC of 10 to 14 pCi/L. There were no samples analyzed using the enrichment method for the current quarter; however sample analyses from fourteen sites collected during previous quarters were completed and presented during this quarter (**Table 12**). A backlog of 34 samples remains.

Samples were also analyzed for metals and the results shown in **Table 13**. All results were within their expected ranges. Common ion results are shown in **Table 14** and nutrient results are shown in **Table 15**. All results are consistent with historical values at those locations.

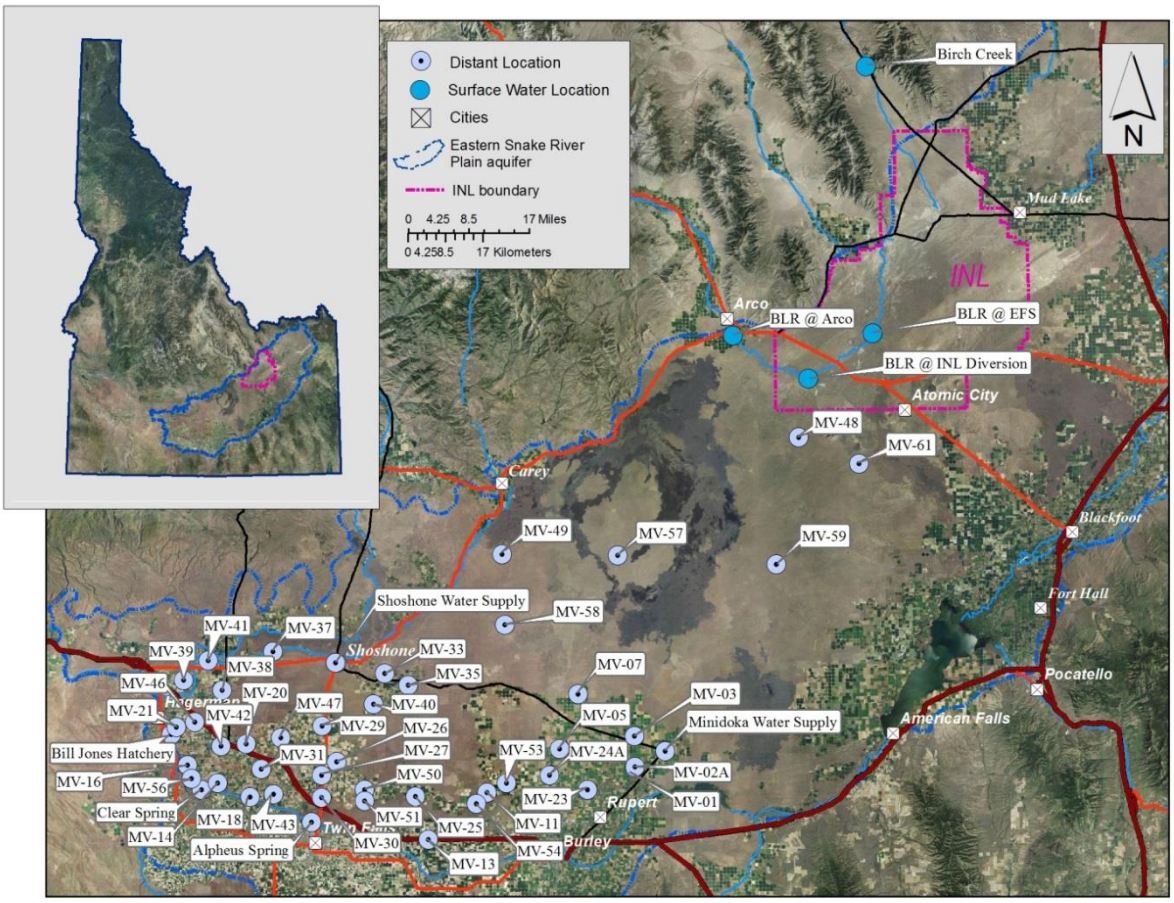

Figure 2. Distant and Surface Water monitoring locations.

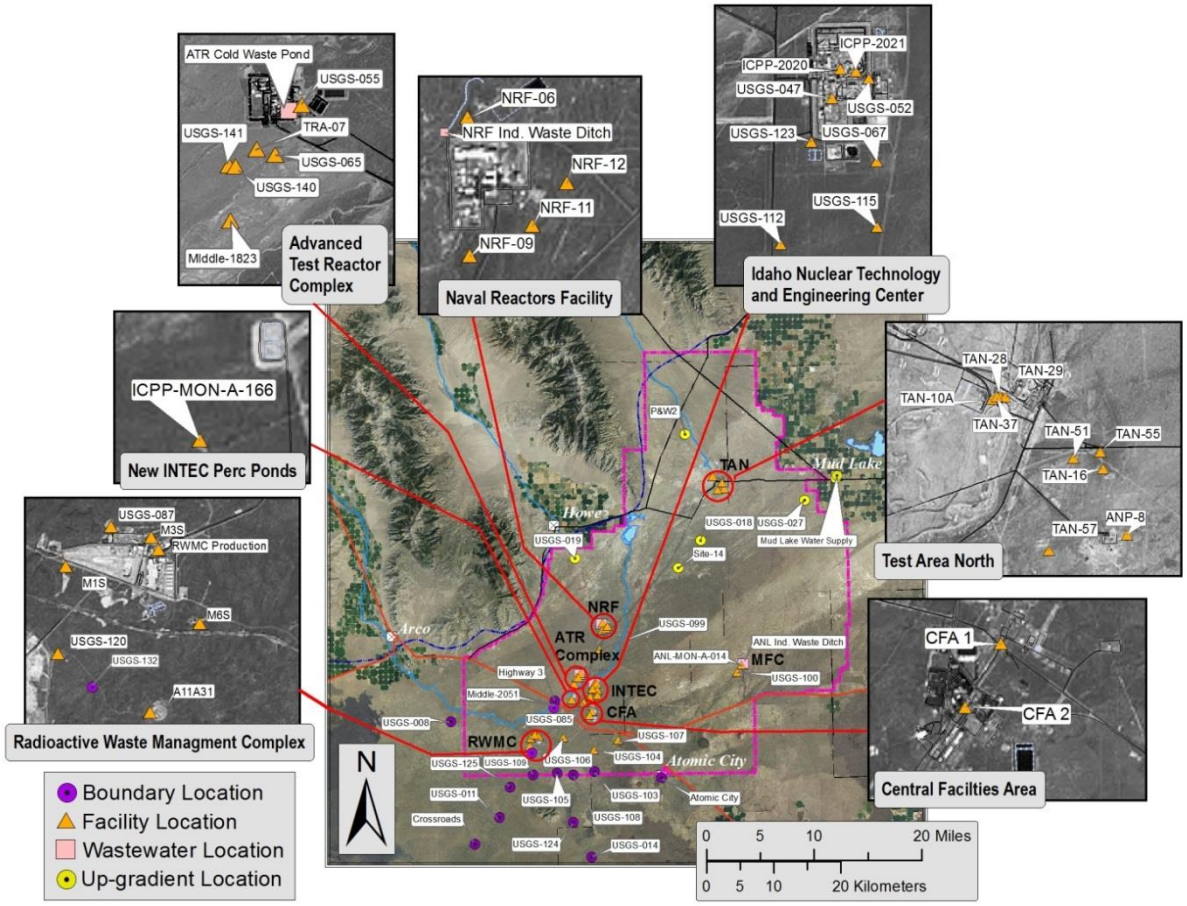

Figure 3. Upgradient, boundary, wastewater, and facility locations, third quarter 2013.

Table 9. Gross alpha, gross beta, and gamma emitting nuclide concentrations for water samples, third quarter, 2013.

Sample Location	Sample Date	Gross Alpha			Gross Beta			Man-made gamma-emitting radionuclide Cesium-137		
		Concentration[1,2]		±2 SD	Concentration[1,2]		±2 SD	Concentration[1,2]		±2 SD
Up-gradient										
Mud Lake Water Supply (Well #1)	8/15/2013	0.3	U	0.7	8.7		1.0	-0.5	U	1.6
Facility										
ICPP-MON-A-166	9/17/2013	0.6	U	0.8	2.1		0.8	-0.7	U	2.2
USGS-140	7/31/2013	0.7	U	1.1	2.7		1.0	-0.2	U	1.5
USGS-141	9/25/2013	-0.1	U	1.2	1.9		0.9	-0.2	U	1.7
Distant										
Alpheus Spring	8/13/2013	2.9		1.4	8.1		1.1	1.2	U	1.8
Bill Jones Hatchery	8/13/2013	0.3	U	1.1	4.6		1.0	-0.2	U	1.6
Clear Spring	8/13/2013	1.3	U	1.0	2.7		0.9	-0.8	U	1.7
Minidoka Water Supply	8/13/2013	3.8		1.5	4.1		1.0	-0.5	U	1.3
MV-35	7/8/2013	3.8		1.2	4.4		0.9	-0.7	U	1.5
MV-41	7/8/2013	-1.6	U	2.0	6.7		1.5	0.8	U	1.4
MV-58	8/28/2013	0.7	U	1.0	3.0		0.9	0.2	U	1.3
Shoshone Water Supply	8/13/2013	1.8		1.1	3.8		1.0	1.0	U	1.7
Waste water										
TRA Cold Waste Pond	7/17/2013	0.7	U	0.9	1.9		0.8	-0.1	U	1.3

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected.
[2]Concentrations expressed in pCi/L.

Table 10. Reported concentrations of uranium isotopes in water samples, third quarter, 2013.

Sample Location	Sample Date	Uranium-234			Uranium-235			Uranium-238		
		Concentration[1,2]		±2 SD	Concentration[1,2]		±2 SD	Concentration[1,2]		±2 SD
Facility										
USGS-140	7/31/2013	1.48		0.35	0.054	U	0.071	0.57		0.19
USGS-141	9/25/2013	1.17		0.29	0.043	U	0.048	0.61		0.19

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected.
[2]Concentrations expressed in pCi/L.

Table 11. Tritium concentrations for water samples, third quarter, 2013.

Sample Location	Sample Date	Tritium		
		Concentration[1,2]		±2 SD
Up-gradient				
Mud Lake Water Supply (Well #1)	8/15/2013	40	U	80
Facility				
ICPP-MON-A-166	9/17/2013	50	U	90
USGS-140	7/31/2013	1880		150
USGS-141	9/25/2013	1970		150
Distant				
Alpheus Spring	8/13/2013	10	U	90
Bill Jones Hatchery	8/13/2013	-50	U	100
Clear Spring	8/13/2013	40	U	100
Minidoka Water Supply	8/13/2013	-10	U	100
MV-35	7/8/2013	40	U	110
MV-41	7/8/2013	100	U	110
MV-58	8/28/2013	30	U	100
Shoshone Water Supply	8/13/2013	140	U	110
Waste water				
TRA Cold Waste Pond	7/17/2013	30	U	110

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected.
[2]Concentrations expressed in pCi/L.

Table 12. Enriched Tritium concentrations for water samples from previous sampling quarters, 2013.

Sample Location	Sample Date	Enriched Tritium		
		Concentration[1,2]		±2 SD
Up-gradient				
Mud Lake Water Supply (Well #1)	5/22/2013	-1	U	6
Facility				
NRF-06	5/14/2013	27		6
NRF-09	5/14/2013	33		6
NRF-11	5/14/2013	19		6
NRF-12	5/15/2013	18		6
USGS-107	6/17/2013	11	U	7
Boundary				
Crossroads	4/23/2013	12		6
Middle-2051 (1091.1ftbls)	6/20/2013	210		12
USGS-108 (662ftbls)	6/6/2013	38		9
USGS-108 (1174ftbls)	6/26/2013	98		10
USGS-109	6/18/2013	87		10
Distant				
Minidoka Water Supply	5/20/2013	6	U	6
MV-05	6/24/2013	1	U	7
MV-07	6/24/2013	-4	U	7

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected.
[2]Concentrations expressed in pCi/L.

Table 13. Reported metals concentrations in water samples, third quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]															
		Arsenic		Barium		Chromium		Iron		Lead		Manganese		Selenium		Zinc	
Up-gradient																	
Mud Lake Water Supply (Well #1)	8/15/2013	5.6		14		<5.0	U	<10	U	<5.0	U	21		<10	U	<5.0	U
Facility																	
ICPP-MON-A-166 (total)	9/17/2013	<5.0	U	49		6.3		38		<5.0	U	17		<10	U	<5.0	U
USGS-140	7/31/2013	<5.0	U	61		18		<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
USGS-141	9/25/2013	<5.0	U	64		18		<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
Distant																	
Alpheus Spring	8/13/2013	<5.0	U	86		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
Bill Jones Hatchery	8/13/2013	<5.0	U	22		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
Clear Spring	8/13/2013	<5.0	U	37		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
Minidoka Water Supply	8/13/2013	<5.0	U	37		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	14	
MV-35	7/8/2013	<5.0	U	13		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
MV-41	7/8/2013	<5.0	U	77		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
MV-58	8/28/2013	<5.0	U	19		<5.0	U	53		<5.0	U	6.8		<10	U	46	
Shoshone Water Supply	8/13/2013	<5.0	U	42		<5.0	U	<10	U	<5.0	U	<2.0	U	<10	U	<5.0	U
Waste water																	
TRA Cold Waste Pond (total)	7/17/2013	<5.0	U	51		<5.0	U	24		<5.0	U	<2.0	U	<10	U	<5.0	U

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected, "<" = a result below the Minimum Detectable Concentration (MDC), NR = analysis not requested.
[2]Concentrations are expressed in µg/L. Samples are filtered unless otherwise indicated.

Table 14. Reported common ion concentrations in water samples, third quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]															
		Calcium		Magnesium		Sodium		Potassium		Fluoride		Chloride		Sulfate		Alkalinity[3]	
Up-gradient																	
Mud Lake Water Supply* (Well #1)	8/15/2013	10		3.5		44		11		0.567		7.26		5.86		136	
Facility																	
ICPP-MON-A-166	9/17/2013	34		12		9.5		2.6		0.203		8.55		17.8		121	
USGS-140*	7/31/2013	51		17		12		1.9		0.237		12.8		40.1		167	
USGS-141*	9/25/2013	54		18		12		2.0		<0.200	U	12.7		39.4		163	
Distant																	
Alpheus Spring*	8/13/2013	56		20		34		6.5		0.300		41.9		55.1		183	
Bill Jones Hatchery*	8/13/2013	31		16		16		3.6		0.492		10.4		24.8		139	
Clear Spring*	8/13/2013	45		19		25		4.2		0.603		32.2		45.0		149	
Minidoka Water Supply*	8/13/2013	46		16		20		3.5		0.648		30.4		39.7		141	
MV-35*	7/8/2013	25		13		13		3.0		0.431		7.92		19.1		115	
MV-41*	7/8/2013	63		29		38		4.4		0.338		29.5		60.0		252	
MV-58*	8/28/2013	23		10		16		2.6		0.347		8.12		10.8		110	
Shoshone Water Supply*	8/13/2013	42		14		14		3.0		0.315		5.66		16.2		168	
Waste water																	
TRA Cold Waste Pond	7/17/2013	47		17		9.4		1.7		<0.200	U	11.2		25.1		169	

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected. * = samples are filtered for calcium, magnesium, sodium and potassium. "<" = a result below the Minimum Detectable Concentration (MDC). NR = analysis not requested.
[2]Concentrations are expressed in mg/L.
[3]As $CaCO_3$.

Table 15. Reported nutrient concentrations in water samples, third quarter, 2013.

Sample Location	Sample Date	Concentration[1,2]					
		Nitrite + Nitrate		Phosphorus		Total Kjeldahl Nitrogen	
Up-gradient							
Mud Lake Water Supply (Well #1)	8/15/2013	<0.01	U	0.036		NR	
Facility							
ICPP-MON-A-166 (total)	9/17/2013	0.29		0.028		NR	
USGS-140	7/31/2013	1.1		0.025		NR	
USGS-141	9/25/2013	1.1		0.024		NR	
Distant							
Alpheus Spring	8/13/2013	2.1		0.024		NR	
Bill Jones Hatchery	8/13/2013	1.2		0.020		NR	
Clear Spring	8/13/2013	1.7		0.031		NR	
Minidoka Water Supply	8/13/2013	1.1		0.018		NR	
MV-35	7/8/2013	0.57		0.025		NR	
MV-41	7/8/2013	2.7		0.077		NR	
MV-58	8/28/2013	1.4		0.022		NR	
Shoshone Water Supply	8/13/2013	1.2		0.032		NR	
Surface water							
TRA Cold Waste Pond (total)	7/17/2013	0.92		0.039		0.23	

[1]Data qualifiers: U = non-detection, J = estimate, R = rejected, NR = analysis not requested.
[2]Concentrations expressed in mg/L. Samples are filtered unless otherwise noted.

Terrestrial Monitoring Results

The DEQ-INL OP conducts terrestrial (soil and milk) monitoring to characterize deposition and migration of contaminants, and provide independent verification of DOE's terrestrial monitoring programs. Soil sampling and *in-situ* gamma spectrometry are used to characterize actual deposition and accumulation of radioactive contaminants in soils. Milk samples are collected to evaluate the potential for ingestion of radioactivity by the population around the INL.

Milk

DEQ-INL OP monitors milk for the naturally occurring radionuclide potassium-40 (^{40}K) and man-made iodine-131 (^{131}I). Milk samples are collected on a monthly basis. Results for gamma spectroscopic analyses of milk samples are presented in **Table 16**. Potassium-40 was detected in all samples within the expected range of concentrations. Iodine-131 was not detected. Based on measurements of radionuclides in milk, there were no discernable impacts to the off-site environment from INL operations.

Table 16. Gamma spectroscopy analysis data for milk samples, third 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	7/01/2013	1472	113	<MDC
	8/04/2013	1578	122	<MDC
	9/03/2013	1182	99	<MDC
Gooding/Glanbia	7/01/2013	1566	109	<MDC
	8/06/2013	1526	117	<MDC
	9/05/2013	1426	112	<MDC
Riverside	6/30/2013	1921	125	<MDC
	8/04/2013	1982	129	<MDC
Verification Samples[2]				
Howe	7/02/2013	1418	113	<MDC
Rupert	7/02/2013	1716	118	<MDC
Dietrich	8/06/2013	1363	113	<MDC
Terreton	8/06/2013	1553	108	<MDC
Dietrich	9/03/2013	1364	112	<MDC
Idaho Falls	9/03/2013	1631	112	<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.

Soil

DEQ-INL OP monitors the concentrations of radionuclides in soil using gamma spectroscopic analysis of soil samples and in-situ measurement of gamma-emitting radionuclides. This monitoring provides insight to transport, deposition, and potential long-term accumulation of radionuclides in the environment from INL operations or historical above ground testing of nuclear weapons.

In-Situ gamma spectroscopic measurements were performed at 7 on-site monitoring locations (**Figure 4**) during the third calendar quarter. No man-made radionuclides other than cesium-137 (^{137}Cs) were identified in soil. In-situ gamma spectroscopic analysis results for ^{137}Cs concentrations are shown in **Table 17**.

Table 17. In-Situ gamma spectroscopic analysis results for (^{137}Cs) soil monitoring, third quarter 2013.

Sample Location	Sample Date	Concentration[1]	±2 SD	MDA
On Site Sampling Locations				
TRA A2.2	8/13/2013	0.318	0.032	0.012
TRA A2.3	8/13/2013	0.258	0.030	0.012
TRA A2.4	8/13/2013	0.125	0.022	0.009
TRA A3.5	8/13/2013	0.211	0.028	0.011
TRA A4.5	8/13/2013	0.306	0.040	0.012
TRA 6.4	8/13/2013	0.383	0.031	0.011
RWMC 2-1	8/20/2013	1.366	0.052	0.013

[1]Concentrations are reported in pCi/g.

The average ^{137}Cs value, as determined using in-situ, was 0.42 picocuries per gram (pCi/g) with a minimum value of 0.13 pCi/g and a maximum of 1.37 pCi/g. All results were well below the DEQ-INL OP action level of 6.8 pCi/g for cesium-137 (NCRP Report 129). All soil monitoring results were consistent with historical measurements. With the exception of the ^{137}Cs measurement near the RWMC facility, all measurements were in the range of concentrations expected as a result of historic above-ground testing of nuclear weapons. Higher concentrations of ^{137}Cs are expected around some site facilities due to past INL operations. While these concentrations exceed fallout levels, they are still well below the DEQ-INL OP action level. In addition, these areas are on-site where access is controlled.

During in-situ soil measurements in 2012, measurable amounts of americium-241 (^{241}Am) were noted at the RWMC 2-1 sampling location. There was no historical or recent operational reason to suspect ^{241}Am contamination in soil at that location; however, a relatively large amount of ^{241}Am is stored in facilities located a few hundred feet away.

In 2013, five-gallon containers filled with water were used to shield the detector from the storage facilities while allowing unshielded exposure to the soil at the RWMC 2-1 sampling location. The 2013 in-situ spectra were acquired with and without the water shielding. Without the shielding, the ^{241}Am signal was clearly discernable in the field and results were elevated. With the shielding, there was no discernable ^{241}Am signal above the background, indicating that essentially all ^{241}Am gamma radiation sensed by the unshielded detector originated in the storage facilities. Analysis results for ^{241}Am concentrations are shown in **Table 18**.

Table 18. In-Situ gamma spectroscopic soil analysis results for ^{241}Am. Measurements made during the third quarter 2013.

Sample Location	Sample Date	Concentration[1]	±2 SD	MDA
On Site Sampling Locations				
RWMC 2-1 w/o water	8/20/2013	2.872	0.557	0.173
RWMC 2-1 with water	8/20/2013	0.011	0.727	0.365

[1]Concentrations are reported in pCi/g.

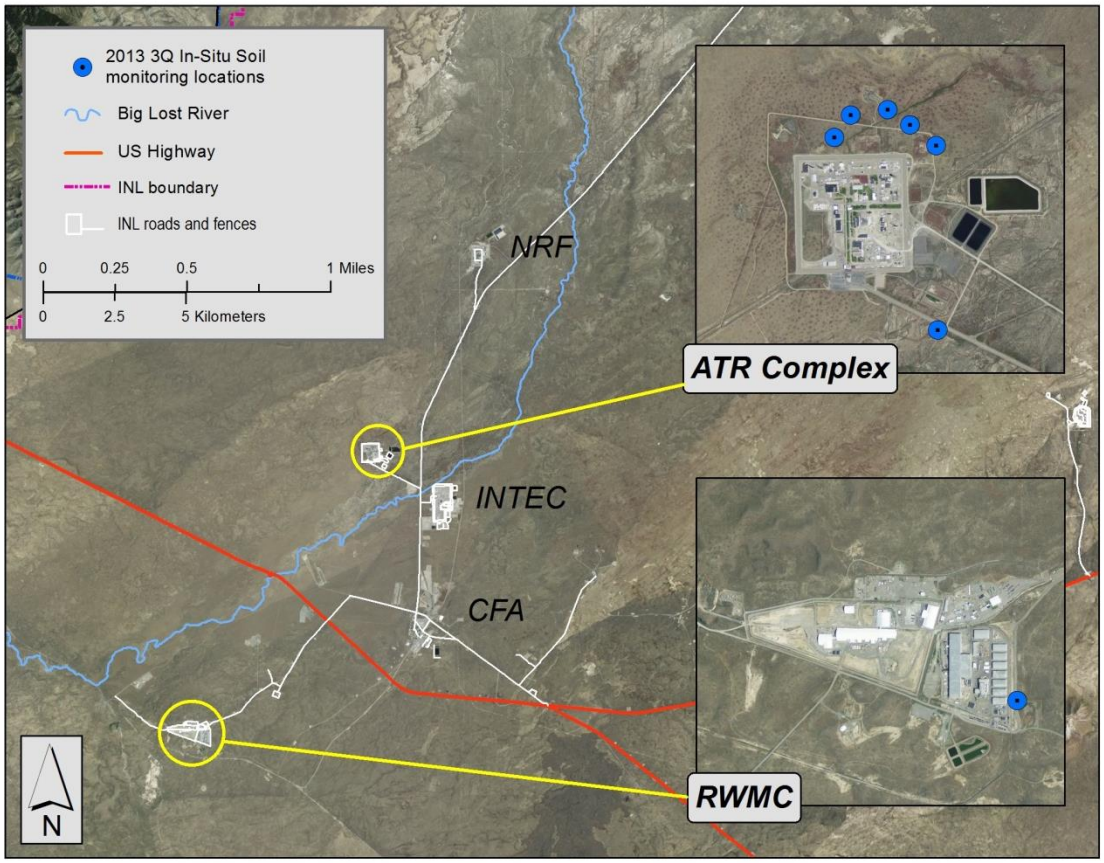

Figure 4. In-situ soil monitoring sites, third quarter 2013.

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 and, in many cases, identify and address errors or inaccuracies. The DEQ-INL OP quality assurance program is designed to (1) ensure sample integrity, (2) ensure precision and accuracy in the analytical results, and (3) ensure that the environmental data are representative and complete.

This section summarizes the results of the quality assurance (QA) assessment of the data collected for the third 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 third quarter of 2013, the DEQ-INL OP submitted 83 QC samples for various radiological and non-radiological analyses (**Table 19**).

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 an analysis will yield a "zero" result when no contaminant is present, or a sufficiently low result to serve as an acceptable measure of "background." Blank samples are used to monitor for bias introduced during sample collection, storage, shipment, and analysis. Blank sample results submitted for gross alpha and gross beta screening in air for the third quarter of 2013 are presented in **Table 20**.

Blank sample results for select gamma emitters in air from composited air filters are presented in **Table 21**. Data for blank analyses used to assess data quality for tritium in water vapor in air are presented in **Table 22**. Blank analyses results for radiological and non-radiological analytes in ground and surface water are presented in **Table 23**, **Table 24**, and **Table 25**.

There was one anomaly noticed during the assessment of field blank water samples as measured by the analytical laboratories used by DEQ-INL OP for the third quarter of 2013. This anomaly included detection for gross beta in a blank sample (**Table 23**). There was, however, one other blank sample (131W117) analyzed for gross beta on the same day that passed criteria. The other two gross beta samples analyzed on the same day were consistent with expected values. No samples will be flagged as a result of the failed gross beta blank. The only other irregularity noticed is that two of the three blank results for Total Alkalinity are right at the detection level, 1.0 mg/L. With results for alkalinity ranging from 110 to 252 mg/L (**Table 14**), significantly above the blank value of 1.0 mg/L, no qualifiers or flags will be attached to the alkalinity results associated with these blank samples.

Duplicate Samples

A laboratory's analytical precision capability, i.e, its ability to reproduce results, is assessed by comparing duplicate sample results. Duplicate samples are samples collected from the same location at approximately the same time and are considered to be essentially identical in composition. The difference between duplicate sample results is expressed as the relative percent difference (RPD), calculated from the following equation:

$$RPD = (R_1 - R_2)/((R_1 + R_2)/2)*100$$

Where:

R_1 = First sample result.

R_2 = Second sample result.

A relative percent difference of up to ± 20 percent is acceptable. For non-radiological analysis, the RPD is used to compare each set of duplicate samples in which both of the results exceed five times the detection level. If one or both of the duplicate sample results are less than five times the detection level, the absolute difference between the two results is acceptable if it is less than or equal to the method detection limit.

For radiological analysis, the RPD is calculated (using the above equation) to compare duplicate samples if both duplicate results are greater than the sample-specific minimum detectable concentration (MDC). DEQ-INL OP also considers duplicate sample results that have an absolute difference of no more than three times the pooled error (or "3 sigma") to be in acceptable agreement. 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 result.

R_2 = Second sample result.

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.

Radiological duplicate sample results satisfying either the RPD or pooled error test are considered acceptable.

Duplicate results for ground and surface water are presented in **Table 26** for radiological analyses, and **Table 27** and **Table 28** for non-radiological analyses.

All duplicate comparisons passed DEQ-INL criteria for the third quarter of 2013. A field duplicate collected at Mud Lake Water Supply for fluoride failed comparison criteria using the RPD criteria; however, duplicate sample results were less than five times the detection level and were acceptable with an absolute difference of less than the method detection limit. Samples that were analyzed for fluoride with these field duplicates will not be qualified as estimates.

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.

During third quarter 2013, no field matrices were spiked to assess the influence of the sample media on laboratory performance and there were no spiked samples created using de-ionized water and submitted to analytical laboratories for analyses to assess ground water analyte recovery rates.

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 (EICs) to verify EIC response. Irradiations of EICs are conducted in a repeatable geometry to a known exposure of near 30 mR and two additional higher and lower 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% relative difference when compared to the known irradiated quantity. The irradiation results for third quarter 2013 are presented in **Table 29**. Real-time pressure correction is used to calculate the net exposure measured by these EIC control sets. All spiked samples passed the DEQ-INL OP criteria.

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

Analytical QA/QC Assessment

Other than those listed above, no issues involving sample chain of custody, sample holding times, and the analysis of blank, duplicate, and spiked samples were observed during the third 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 third 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 third quarter of 2013 met the minimum criteria of the DEQ-INL OP ESP and is summarized in **Table 19**.

Preventative Maintenance and Equipment Reliability

All equipment was calibrated and checked according to pre-described periodicity. During the third quarter of 2013, the radioiodine pump at the Mud Lake sampling station was replaced along with TSP blower motors at Experimental Field Station, Van Buren, and Craters of the Moon sampling locations. Service reliability for air sampling equipment for the third quarter of 2013 is summarized in **Table 30**.

Conclusion

All data collected for the third 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 19. Summary of the analytical performance and usability of the analyses performed for the DEQ-INL OP ESP, third 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	7	ISU-EML
		Gross beta	156	13	0	0	7	ISU-EML
		Gamma emitters	12	1	0	0	0	ISU-EML
		Radiochemical	0	0	0	0	0	ISU Sub
Water Vapor	Desiccant column	Tritium	51	3	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	13	3	3	0	0	ISU-EML
		Gross beta	13	3	3	0	0	ISU-EML
		Gamma emitters	13	3	3	0	0	ISU-EML
		Tritium	13	3	3	0	0	ISU-EML
		Enriched tritium	14	0	1	0	0	ISU-EML
		Technetium-99	0	0	0	0	0	ISU-EML
		Radiochemical	2	0	1	0	0	ISU Sub
		Metals	13	3	3	0	0	IBL
		Common Ions	13	3	3	0	0	IBL
		Nutrients	13	3	3	0	0	IBL
		Volatile Organics	0	0	0	0	0	IBL
Terrestrial								
Milk	Grab or composite	Gamma emitters	14	0	0	0	0	ISU-EML
Soil	*in situ*	Gamma emitters	8	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 Test Analyses			**596**	**51**	**23**	**9**	**14**	
Total of QC Analyses (blanks, duplicates, and spikes)			**83**					
Percentage of QC analyses of total Test analyses[3]			**13.9%**					
Percentage of usable data[4]			**97.7%**					

[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 = 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 20. Blank analysis results for gross alpha and beta in particulate air (TSP), third quarter, 2013.

Collection Period		Corrected volume (m^3)[1]	Gross alpha		Gross beta	
Start	Stop		Value	Uncertainty (± 2 SD)	Value	Uncertainty (± 2 SD)
06/26/13	07/03/13	1990	0.1	0.1	-0.1	0.4
07/03/13	07/11/13	1990	0.0	0.1	0.5	0.4
07/11/13	07/18/13	1990	0.1	0.1	0.1	0.5
07/18/13	07/25/13	1990	0.1	0.1	-0.3	0.5
07/25/13	08/01/13	1990	0.1	0.1	0.0	0.4
08/01/13	08/08/13	1990	0.0	0.1	-0.4	0.4
08/08/13	08/15/13	1990	0.0	0.1	0.2	0.4
08/15/13	08/22/13	1990	0.0	0.1	-0.2	0.5
08/22/13	08/29/13	1990	0.0	0.1	0.2	0.4
08/29/13	09/05/13	1990	0.0	0.1	0.1	0.5
09/05/13	09/12/13	1990	0.1	0.1	-0.2	0.4
09/12/13	09/19/13	1990	0.0	0.1	-0.1	0.5
09/19/13	09/26/13	1990	0.0	0.1	0.0	0.5

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 21. Blank analysis results for gamma spectroscopy for TSP particulate air filters, third 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
10/20/13	3	27	46	1	18	31	-1	5	9
Analysis Date	**Cesium-134**			**Cesium-137**		
	Concentration[1]	**± 2 SD**	**MDC**	**Concentration**	**± 2 SD**	**MDC**
10/20/13	-1	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 weekly 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 22. Blank analysis results for tritium in water vapor from air samples, third quarter, 2013.

Sample Number	Start Date	Collection Date	Analysis Date	Tritium		
				Concentration	± 2 SD	MDC
OP133ZTR01	09/09/13	09/10/13	10/03/13	0.08	0.09	0.15
OP133ZTR02	09/19/13	09/24/13	10/14/13	-0.08	0.09	0.16
OP133ZTR03	10/08/13	10/09/13	10/28/13	-0.03	0.08	0.14

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

Table 23. Radiological blank analysis in ground and surface water for samples for the third quarter, 2013.

Sample Number	Sample Date	Concentration[1]	± 2 SD	MDC	Within Blank Criteria?
Gross Alpha					
131W507	7/17/2013	-0.1	0.4	0.8	Yes
131W542	9/26/2013	0.2	0.3	0.5	Yes
131W117	7/8/2013	-0.4	0.3	0.7	Yes
Gross Beta					
131W507	7/17/2013	2.0	0.7	1.0	No
131W542	9/26/2013	0.5	0.6	0.9	Yes
131W117	7/8/2013	0.5	0.6	1.0	Yes
Cesium-137					
131W507	7/17/2013	0.5	1.4	2.5	Yes
131W542	9/26/2013	-1.4	2.2	3.8	Yes
131W117	7/8/2013	-0.5	1.8	3.0	Yes
Tritium					
131W508	7/17/2013	40	110	180	Yes
131W543	9/26/2013	20	90	150	Yes
131W118	7/8/2013	-10	100	180	Yes

[1] Concentrations are expressed in pCi/L with associated uncertainty (± 2 SD) and minimum detectable concentrations (MDC).

Table 24. Blank analysis results (µg/L) for metals in ground and surface water for the third quarter, 2013.

Sample Number	Sample Date	Arsenic	Barium	Chromium	Iron	Lead	Manganese	Selenium	Zinc
131W510	7/17/2013	<5.0	<2.0	<5.0	<10	<5.0	<2.0	<10	<5.0
131W545	9/26/2013	<5.0	<2.0	<5.0	<10	<5.0	<2.0	<10	<5.0
131W120	7/8/2013	<5.0	<2.0	<5.0	<10	<5.0	<2.0	<10	<5.0

Table 25. Blank analysis results (mg/L) for common ions and nutrients in ground and surface water for the third quarter, 2013.

Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity	Total Nitrogen	Total Phosphorus	Total Kjeldahl Nitrogen
131W511,510,509	7/17/2013	<0.1	<0.1	<0.1	<0.1	<0.2	<0.4	<0.8	1.0	<0.01	<0.005	<0.1
131W546,545,544	9/26/2013	<0.1	<0.1	<0.1	<0.1	<0.2	<0.4	<0.8	<1.0	<0.01	<0.005	-
131W121,120,119	7/8/2013	<0.1	<0.1	<0.1	<0.1	<0.2	<0.4	<0.8	1.0	<0.01	<0.005	-

Table 26. Duplicate radiological analysis results in pCi/L for ground and surface water, third 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									
Mud Lake Water Supply	131W491	0.3	0.7	131W496	-0.1	0.7	0.4	1.5	Yes
ICPP-MON-A-166	131W532	0.6	0.8	131W537	1.1	0.9	0.5	1.8	Yes
USGS-140	131W518	0.7	1.1	131W525	0.6	1.3	0.1	2.6	Yes
Gross Beta									
Mud Lake Water Supply	131W491	8.7	1.0	131W496	10	1.0	1.3	2.1	Yes
ICPP-MON-A-166	131W532	2.1	0.8	131W537	2.2	0.9	0.1	1.8	Yes
USGS-140	131W518	2.7	1.0.	131W525	1.8	1.0	0.9	2.1	Yes
Gamma Spectroscopy Cesium-137									
Mud Lake Water Supply	131W491	-0.5	1.6	131W496	0.7	1.8	1.2	3.6	Yes
ICPP-MON-A-166	131W532	-0.7	2.2	131W537	-1.3	1.7	0.6	4.2	Yes
USGS-140	131W518	-0.2	1.5	131W525	1.2	2.0	1.4	3.8	Yes
Tritium									
Mud Lake Water Supply	131W492	40	80	131W497	-10	100	50	192	Yes
ICPP-MON-A-166	131W533	50	90	131W538	-20	80	70	181	Yes
USGS-140	131W519	1880	150	131W526	2010	160	130	329	Yes
Enriched Tritium									
USGS-107	131W361	11	7	131W368	3	7	8	15	Yes
Uranium-234									
USGS-140	131W520	1.48	0.35	131W527	1.38	0.32	0.10	0.71	Yes
Uranium-235									
USGS-140	131W520	0.054	0.071	131W527	0.045	0.046	0.01	0.13	Yes
Uranium-238									
USGS-140	131W520	0.57	0.19	131W527	0.55	0.17	0.02	0.38	Yes

[1] $/R_1-R_2/ \leq 3(S_1^2+S_2^2)$ or RPD = $(R_1-R_2) / ((R_1-R_2)/2*100$.

Table 27. Duplicate results for metals (µg/L) in ground water and/or surface water for the third quarter, 2013.

Sample Location	Sample Number	Sample Date	Arsenic	Barium	Chromium	Iron	Lead	Manganese	Selenium	Zinc
Mud Lake Water Supply	131W494	8/15/2013	5.6	14	<5.0	<10	<5.0	21	<10	<5.0
Mud Lake Water Supply	131W499	8/15/2013	5.6	14	<5.0	<10	<5.0	20	<10	<5.0
RPD			**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**
ICPP-MON-A-166	131W535	9/17/2013	<5.0	49	6.3	38	<5.0	17	<10	<5.0
ICPP-MON-A-166	131W540	9/17/2013	<5.0	50	6.4	36	<5.0	16	<10	<5.0
RPD			**0**	**-2**	**-1.6**	**5**	**0**	**6**	**0**	**0**
USGS-140	131W522	7/31/2013	<5.0	61	18	<10	<5.0	<2.0	<10	<5.0
USGS-140	131W529	7/31/2013	<5.0	62	18	<10	<5.0	<2.0	<10	<5.0
RPD			**0**	**-2**	**0**	**0**	**0**	**0**	**0**	**0**

Relative Percent Difference (RPD) = $(R_1-R_2) / ((R_1+R_2)/2)*100$, or $(R_1-R_2) \leq$ method detection limit (MDL) if (R_1 and/or R_2) < 5 x MDL.

Table 28. Duplicate results for common ions and nutrients (mg/L) in ground water and/or surface water for third quarter, 2013.

Sample Location	Sample Number	Sample Date	Calcium	Magnesium	Sodium	Potassium	Fluoride	Chloride	Sulfate	Total Alkalinity	Total Nitrogen	Total Phosphorus
Mud Lake Water Supply	131W209,208	4/15/2013	10	3.5	44	11	0.567	7.26	5.86	136	<0.01	0.036
Mud Lake Water Supply	131W214,213	4/15/2013	10	3.5	43	11	0.422	7.26	5.85	133	<0.01	0.039
RPD			**0**	**0**	**2**	**0**	**29.3**	**0**	**0.2**	**2.2**	**0**	**-8**
ICPP-MON-A-166	131W287,286	5/15/2013	34	12	9.5	2.6	0.203	8.55	17.8	121	0.29	0.028
ICPP-MON-A-166	131W293,292	5/15/2013	34	12	9.5	2.6	<0.200	8.43	17.8	122	0.29	0.029
RPD			**0**	**0**	**0**	**0**	**1.5**	**1.4**	**0**	**-0.8**	**0**	**-3.5**
USGS-140	131W363,362	6/17/2013	51	17	12	1.9	0.237	12.8	40.1	167	1.1	0.025
USGS-140	131W370,369	6/17/2013	51	17	12	2.0	0.211	12.7	40.1	167	1.1	0.027
RPD			**0**	**0**	**0**	**-5**	**11.6**	**0.8**	**0**	**0**	**0**	**-8**

Relative Percent Difference (RPD) = $(R_1-R_2) / ((R_1+R_2)/2)*100$, or $(R_1-R_2) \leq$ method detection limit (MDL) if (R_1 and/or R_2) < 5 x MDL.

Table 29. Electret ionization chamber irradiation results (categorized as spiked samples) for third quarter, 2013.

Electret #	Exposure Received		Net Measured Exposure[1]		%R
	(mR)	Uncertainty (±1 SD, mR)	(mR)	Uncertainty (±1 SD, mR)	
Spike 1	40.1	2.0	41.0	1.3	102.3%
Spike 1	40.1	2.0	37.6	1.4	93.7%
Spike 1	40.4	2.0	44.0	1.3	109.7%
Spike 2	30.0	1.5	32.6	1.2	108.6%
Spike 2	30.0	1.5	30.0	1.2	99.9%
Spike 2	30.0	1.5	28.9	1.3	96.3%
Spike 3	25.0	1.3	23.3	1.3	93.1%
Spike 3	25.0	1.3	24.5	1.2	98.0%
Spike 3	25.0	1.3	24.9	1.3	99.7%

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

Table 30. Air sampling field equipment service reliability (percent operational), third 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	92%	100%	100%	NC[1]
Sand Dunes Tower	100%	100%	100%	NC[1]
Van Buren Avenue	92%	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%	92%	100%	100%
Distant Locations				
Craters of the Moon	92%	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, third quarter, 2013.

Sample location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
On-Site Locations						
Rest Area	06/26/13	07/03/13	1.2	0.3	30.2	1.3
	07/03/13	07/11/13	0.9	0.2	33.8	1.1
	07/11/13	07/18/13	1.1	0.2	33.5	1.2
	07/18/13	07/25/13	1.7	0.3	38.5	1.4
	07/25/13	08/01/13	1.3	0.2	32.1	1.2
	08/01/13	08/08/13	1.4	0.3	23.1	1.1
	08/08/13	08/15/13	1.8	0.3	33.6	1.3
	08/15/13	08/22/13	2.4	0.4	34.7	1.4
	08/22/13	08/29/13	0.9	0.2	25.4	1.1
	08/29/13	09/05/13	1.6	0.3	29.7	1.2
	09/05/13	09/12/13	0.6	0.2	26.2	1.1
	09/12/13	09/19/13	0.9	0.2	29.6	1.2
	09/19/13	09/26/13	0.7	0.2	22.0	1.0
Experimental Field Station	06/26/13	07/03/13	0.9	0.2	25.0	1.3
	07/03/13	07/11/13	1.3	0.4	26.6	1.6
	07/11/13	07/18/13	1.0	0.2	27.4	1.2
	07/18/13	07/25/13	1.7	0.3	29.2	1.2
	07/25/13	08/01/13	1.2	0.3	28.4	1.5
	08/01/13	08/08/13	1.2	0.2	29.8	1.2
	08/08/13	08/15/13	1.7	0.3	28.4	1.2
	08/15/13	08/22/13	2.3	0.3	32.5	1.3
	08/22/13	08/29/13	0.7	0.2	22.3	1.1
	08/29/13	09/05/13	1.5	0.3	26.7	1.2
	09/05/13	09/12/13	0.5	0.2	19.3	0.9
	09/12/13	09/19/13	0.5	0.2	21.5	0.9
	09/19/13	09/26/13	0.7	0.2	19.7	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, third quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Sand Dunes	06/26/13	07/03/13	1.0	0.2	24.4	1.1
	07/03/13	07/11/13	1.1	0.2	27.4	1.0
	07/11/13	07/18/13	0.8	0.2	26.0	1.1
	07/18/13	07/25/13	1.2	0.2	28.1	1.1
	07/25/13	08/01/13	1.0	0.2	24.5	1.0
	08/01/13	08/08/13	0.9	0.2	27.2	1.1
	08/08/13	08/15/13	1.3	0.2	26.9	1.1
	08/15/13	08/22/13	2.1	0.3	28.0	1.1
	08/22/13	08/29/13	0.5	0.2	19.8	0.9
	08/29/13	09/05/13	1.5	0.3	25.5	1.1
	09/05/13	09/12/13	0.6	0.2	22.4	1.0
	09/12/13	09/19/13	0.6	0.2	25.1	1.0
	09/19/13	09/26/13	0.5	0.2	17.7	0.9
Van Buren	06/26/13	07/03/13	0.7	0.2	23.0	1.2
	07/03/13	07/11/13	0.9	0.2	30.0	1.1
	07/11/13	07/18/13	0.8	0.2	27.9	1.1
	07/18/13	07/25/13	1.8	0.3	30.8	1.2
	07/25/13	08/01/13	R[1]	R[1]	R[1]	R[1]
	08/01/13	08/08/13	R[1]	R[1]	R[1]	R[1]
	08/08/13	08/15/13	1.7	0.3	27.4	1.1
	08/15/13	08/22/13	1.5	0.3	29.0	1.2
	08/22/13	08/29/13	0.7	0.2	19.6	1.0
	08/29/13	09/05/13	1.5	0.3	25.9	1.1
	09/05/13	09/12/13	0.4	0.2	20.1	1.0
	09/12/13	09/19/13	0.7	0.2	23.7	1.1
	09/19/13	09/26/13	0.5	0.2	17.2	0.9
Boundary Locations						
Atomic City	06/26/13	07/03/13	0.9	0.2	26.8	1.2
	07/03/11	07/11/13	1.1	0.2	29.4	1.1
	07/11/13	07/18/13	0.9	0.2	27.6	1.1
	07/18/13	07/25/13	1.7	0.3	30.0	1.2
	07/25/13	08/01/13	1.2	0.2	28.1	1.1
	08/01/13	08/08/13	1.1	0.2	31.2	1.2
	08/08/13	08/15/13	1.5	0.3	30.0	1.2
	08/15/13	08/22/13	2.0	0.3	31.5	1.2
	08/22/13	08/29/13	0.9	0.2	22.8	1.0
	08/29/13	09/05/13	1.7	0.3	26.3	1.1
	09/05/13	09/12/13	0.6	0.2	25.0	1.1
	09/12/13	09/19/13	0.6	0.2	26.2	1.1
	09/19/13	09/26/13	0.6	0.2	20.2	1.0

[1]R – Results rejected due to insufficient sample volume caused by malfunctioning blower motor.

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, third quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Howe	06/26/13	07/03/13	1.2	0.3	26.4	1.3
	07/03/13	07/11/13	0.9	0.2	27.4	1.1
	07/11/13	07/18/13	1.0	0.2	24.0	1.1
	07/18/13	07/25/13	1.8	0.3	27.7	1.4
	07/25/13	08/01/13	1.3	0.3	25.5	1.1
	08/01/13	08/08/13	1.2	0.2	26.6	1.1
	08/08/13	08/15/13	1.6	0.3	27.1	1.2
	08/15/13	08/22/13	2.4	0.3	26.2	1.2
	08/22/13	08/29/13	0.7	0.2	19.3	1.0
	08/29/13	09/05/13	1.4	0.3	24.7	1.1
	09/05/13	09/12/13	0.6	0.2	19.6	1.0
	09/12/13	09/19/13	0.5	0.2	23.9	1.1
	09/19/13	09/26/13	0.3	0.2	15.2	0.9
Monteview	06/26/13	07/03/13	1.2	0.3	26.9	1.2
	07/03/13	07/11/13	1.2	0.2	31.2	1.1
	07/11/13	07/18/13	1.1	0.2	32.4	1.3
	07/18/13	07/25/13	1.4	0.2	33.2	1.3
	07/25/13	08/01/13	1.1	0.2	29.6	1.2
	08/01/13	08/08/13	1.1	0.2	28.2	1.2
	08/08/13	08/15/13	2.0	0.3	31.6	1.2
	08/15/13	08/22/13	2.3	0.3	31.2	1.2
	08/22/13	08/29/13	0.9	0.2	23.4	1.1
	08/29/13	09/05/13	1.4	0.3	29.7	1.2
	09/05/13	09/12/13	1.2	0.2	25.2	1.1
	09/12/13	09/19/13	0.8	0.2	27.7	1.2
	09/19/13	09/26/13	0.7	0.2	19.2	1.0
Mud Lake	06/26/13	07/03/13	1.5	0.3	39.4	1.4
	07/03/13	07/11/13	1.7	0.3	39.8	1.2
	07/11/13	07/18/13	1.6	0.3	44.1	1.4
	07/18/13	07/25/13	2.9	0.4	44.0	1.6
	07/25/13	08/01/13	2.5	0.4	45.2	1.5
	08/01/13	08/08/13	1.5	0.3	46.5	1.6
	08/08/13	08/15/13	2.5	0.4	44.3	1.8
	08/15/13	08/22/13	3.0	0.5	51.0	2.2
	08/22/13	08/29/13	1.5	0.3	33.9	1.2
	08/29/13	09/05/13	1.8	0.4	38.5	1.7
	09/05/13	09/12/13	1.0	0.2	37.1	1.3
	09/12/13	09/19/13	1.3	0.2	39.7	1.3
	09/19/13	09/26/13	1.0	0.2	28.5	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, third quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Distant Locations						
Craters	06/26/13	07/03/13	1.0	0.3	22.5	1.2
	07/03/13	07/11/13	0.7	0.2	21.3	1.0
	07/11/13	07/18/13	0.9	0.2	22.2	1.1
	07/18/13	07/25/13	1.6	0.3	23.0	1.1
	07/25/13	08/01/13	1.0	0.2	22.6	1.1
	08/01/13	08/08/13	1.0	0.2	23.8	1.1
	08/08/13	08/15/13	1.6	0.3	23.8	1.1
	08/15/13	08/22/13	2.6	0.4	24.2	1.3
	08/22/13	08/29/13	R[2]	R[2]	R[2]	R[2]
	08/29/13	09/05/13	1.7	0.3	22.3	1.1
	09/05/13	09/12/13	0.4	0.2	17.1	1.0
	09/12/13	09/19/13	0.7	0.2	19.1	1.0
	09/19/13	09/26/13	0.4	0.2	13.4	0.9
Fort Hall[1]	06/26/13	07/03/13	1.1	0.3	19.2	1.1
	07/03/13	07/11/13	0.9	0.2	22.7	1.0
	07/11/13	07/18/13	0.9	0.2	21.3	1.0
	07/18/13	07/25/13	1.1	0.2	23.5	1.1
	07/25/13	08/01/13	1.2	0.2	22.1	1.0
	08/01/13	08/08/13	1.3	0.2	23.5	1.1
	08/08/13	08/15/13	1.5	0.3	21.4	1.0
	08/15/13	08/22/13	1.8	0.3	22.5	1.1
	08/22/13	08/29/13	0.6	0.2	17.0	0.9
	08/29/13	09/05/13	0.8	0.2	18.5	1.0
	09/05/13	09/12/13	0.5	0.2	18.6	1.0
	09/12/13	09/19/13	0.5	0.2	19.6	1.0
	09/19/13	09/26/13	0.5	0.2	13.8	0.9
Idaho Falls HVP 3804	06/26/13	07/03/13	1.4	0.3	34.2	1.4
	07/03/13	07/11/13	1.8	0.4	38.2	1.7
	07/11/13	07/18/13	1.4	0.3	39.7	1.6
	07/18/13	07/25/13	2.0	0.3	40.9	1.4
	07/25/13	08/01/13	1.6	0.3	36.7	1.3
	08/01/13	08/08/13	R[2]	R[2]	R[2]	R[2]
	08/08/13	08/15/13	2.0	0.3	35.0	1.3
	08/15/13	08/22/13	2.4	0.3	34.7	1.3
	08/22/13	08/29/13	R[2]	R[2]	R[2]	R[2]
	08/29/13	09/05/13	1.7	0.3	33.2	1.3
	09/05/13	09/12/13	0.9	0.2	32.6	1.3
	09/12/13	09/19/13	1.1	0.2	31.8	1.3
	09/19/13	09/26/13	0.8	0.2	25.3	1.2

[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, third quarter, 2013.

Sample Location	Collection Date		Gross Alpha		Gross Beta	
	Start	Stop	Concentration	± 2 SD	Concentration	± 2 SD
Idaho Falls - HVP 4304[2]	06/26/13	07/03/13	1.2	0.3	29.8	1.3
	07/03/13	07/11/13	1.4	0.3	29.4	1.5
	07/11/13	07/18/13	1.3	0.3	33.5	1.4
	07/18/13	07/25/13	1.9	0.3	35.6	1.3
	07/25/13	08/01/13	1.5	0.3	32.5	1.2
	08/01/13	08/08/13	R[1]	R[1]	R[1]	R[1]
	08/08/13	08/15/13	1.8	0.3	34.5	1.5
	08/15/13	08/22/13	R[1]	R[1]	R[1]	R[1]
	08/22/13	08/29/13	1.1	0.4	25.3	1.7
	08/29/13	09/05/13	2.0	0.4	34.9	1.6
	09/05/13	09/12/13	1.1	0.2	28.4	1.2
	09/12/13	09/19/13	0.9	0.2	31.1	1.2
	09/19/13	09/26/13	0.8	0.2	22.0	1.0

[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, third quarter, 2013.

Sample Location	Net Corrected Exposure Rate[2] (µR/h)	± 2 SD (µR/h)
Arco	13.64	4.34
Craters	14.17	1.33
Rest Area	14.83	0.13
Van Buren	14.36	2.40
EFS	15.82	3.50
Main Gate	12.73	0.79
Atomic City	13.7, 14.0	-
Taber	12.29	2.42
Blackfoot	11.76	3.26
Fort Hall[1]	11.3, 12.6	-
Idaho Falls	15.1, 15.8	-
Mud Lake/Terreton	13.94	1.50
Monteview	12.25	1.19
Sand Dunes	14.84	3.18
Howe Met. Tower	10.99	1.53
MP276 -20	12.77	2.22
MP274 -20	12.26	0.73
MP272 -20	10.3, 11.4	-
MP270 -20	14.24	3.72
MP268 -20	13.0, 16.8	-
MP266 -20	14.9, 15.4	-
MP264 -20	12.82	5.19
MP270 -20/26	14.31	3.26
MP268 -20/26	15.33	4.01
MP266 -20/26	12.2, 14.4	-
MP263 -20/26	15.18	1.98
MP261 -20/26	11.38	1.75
MP259 -20/26	14.50	1.73
MFC (EBR II)	13.89	5.27
EBR I	12.08	0.14
RWMC	12.96	1.44
CFA	13.87	0.14
CITRC (PBF)	13.10	1.31

[1]Station operated by Shoshone-Bannock Tribes.
[2]Results are the average of triplicate exposure rate measurements with the associated variability (±2 SD), or of the 2 measured exposure rates remaining after deletion of an outlying value.

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

Sample Location	Net Corrected Exposure Rate[2] (µR/h)	± 2 SD (µR/h)
INTEC (ICPPI)	14.64	2.49
ATR (TRA)	15.38	2.81
NRF	14.42	2.11
TAN	11.77	1.18
Mud Lake Bank of Commerce	12.56	2.19
MP43-33	13.2, 13.5	-
MP41-33	17.54	1.05
MP39-33	11.0, 11.8	-
MP37-33	12.30	0.22
MP35-33	12.9, 14.5	-
MP33-33	15.01	1.34
MP31-33	NA[3]	
MP29-33	12.46	3.88
MP27-33	16.39	3.73
MP25-33	10.33	1.02
MP23-33	13.1, 13.3	-
Base of Howe	12.69	3.28
Rover	14.95	4.90
Hamer	13.5, 14.9	-
Sugar City	14.9, 15.0	-
Roberts	10.52	0.99
Big Southern Butte	12.68	1.60

[3] Results not available – measurements for all 3 EICs were inconsistent.