DEQ-INL
OVERSIGHT PROGRAM
ANNUAL REPORT
2010

Department of Environmental Quality
Idaho National Laboratory Oversight Program

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APGEMS	Air Pollutant Graphical Environmental Monitoring System
ARP	Accelerated Retrieval Project
AMWTP	Advanced Mixed Waste Treatment Project
ATR	Advanced Test Reactor
BEA	Battelle Energy Alliance, LLC
BHS	Bureau of Homeland Security
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CWI	CH2M-WG Idaho, LLC
DEQ-INL OP	Department of Environmental Quality, Idaho National Laboratory Oversight Program
DOE	U.S. Department of Energy
EIC	electret ionization chamber
EML	Environmental Monitoring Laboratory
EPA	Environmental Protection Agency
ESER	Environmental Surveillance Education and Research Program (SM Stoller)
ESP	Environmental Surveillance Program
ESRPA	Eastern Snake River Plain Aquifer
fCi/m^3	femtoCuries per cubic meter
HAD	hazard assessment document
HPIC	high-pressure ion chamber
IBL	Idaho Bureau of Laboratories
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISP	Idaho State Police
LLD	lower limit of detection
LSC	liquid scintillation counting
MFC	Materials and Fuels Complex
MCL	maximum contaminant level
µg/L	micrograms per liter
µR/hr	microRoentgen per hour
mg/L	milligrams per liter
mrem	millirem or 1/1000th of a rem
mR/hr	milliRoentgen per hour
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
NRC	Nuclear Regulatory Commission
NRF	Naval Reactors Facility
pCi/g	picocuries per gram
pCi/L	picocuries per liter
pCi/m^3	picocuries per cubic meter
PCE	tetrachloroethylene
QAPP	Quality Assurance Program Plan
QA/QC	quality assurance/quality control
RAP	Radiological Assistance Program
RCRA	Resource Conservation and Recovery Act
RH-TRU	remote-handled transuranic

RPD	relative percent difference
RWMC	Radioactive Waste Management Complex
RTC	Reactor Technology Complex
SBW	sodium-bearing waste
SMCL	secondary maximum contaminant level
TAN	Test Area North
TCE	trichloroethylene
TDS	total dissolved solids
TLD	thermoluminescent dosimetry
TMI	Three Mile Island
TRU	transuranic
TSP	total suspended particulate
TSS	total suspended solids
USGS	U.S. Geological Survey
VOC	volatile organic compound
WGA	Western Governors Association
WIPP	Waste Isolation Pilot Plant
WLAP	wastewater land application permit

Idaho's INL Oversight Mission

For more than half a century, the Idaho National Laboratory (INL) Site, operated by the Department of Energy (DOE) and its contractors, has been the site of development of peacetime uses of nuclear power, the birthplace of our nation's nuclear navy, and a storage location for spent nuclear fuel and various types of nuclear waste. Covering almost 900 square miles of the Snake River Plain and located 40 miles west of Idaho Falls, Idaho, this laboratory served as a testing ground for nuclear reactors. More recently, the major role of the laboratory has focused on environmental cleanup and restoration, as well as energy technology development.

In 1989, the Idaho Legislature established an INL oversight program to provide citizens with independent information and analysis related to the INL Site. In 2007, legislation was enacted to confirm DEQ as the agency responsible for the INL Oversight Program (DEQ-INL OP), which ensures INL Site activities are protective of public health and the environment. Our staff has expertise in radiation and health physics, hydrogeology, engineering, ecology, biology, computer science, education, and communications. We serve our fellow Idahoans by:

- Monitoring the environment on and around the INL Site.
- Evaluating potential INL Site operational impacts to the public and the environment.
- Preparing for emergencies involving radioactive materials.
- Keeping the public informed about INL Site activities.
- Overseeing compliance with the 1995 Settlement Agreement between the State of Idaho and the DOE and U.S. Navy.

The purpose of this report is to provide a summary of the activities performed by DEQ-INL OP during 2010. The report is divided into sections covering the Environmental Surveillance Program (ESP), Assessment of INL Site Impacts, Radiological Emergency Response Planning and Preparedness, and Public Outreach.

Environmental Surveillance Program

DEQ-INL OP performs independent environmental monitoring of the INL Site for the citizens of Idaho through a multifaceted monitoring program. Measurements are collected at locations on the INL Site, on public lands off the INL Site, at population centers near the INL Site, and at locations distant to the INL Site. Using their own data, DEQ-INL OP scientists also verify DOE monitoring results for air, radiation, water, soil, and milk.

In order to present independent sampling results to the public and interested agencies, DEQ-INL OP issues written quarterly and annual reports. Each quarterly report contains the detailed data and results of the DEQ-INL OP environmental monitoring program. The annual report is designed to summarize the quarterly data, look at general trends of major contaminants found in and around the INL Site, ascertains the impacts of DOE operations on the environment, and determines the validity of DOE monitoring programs.

This program is also used to provide the citizens of Idaho with information 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. To this end, the results of DEQ-INL OP environmental monitoring in and around the INL Site for 2010 are briefly summarized below.

Monitoring Results

In 2010, DEQ-INL OP conducted off-site monitoring to measure environmental radiation levels and radioactivity in air, water, soil, and milk around the INL Site. Radioactivity levels found in air, soil, and milk samples were typical of background values. DEQ-INL OP also detected small quantities of tritium in the ground water near the southern boundary of the INL Site, which were attributed to historic INL Site operations. These concentrations, although greater than natural background levels, were less than 3% of the drinking water standard for tritium. No other contaminants attributable to INL Site operations were identified in ground water samples collected off-site of the INL.

On-site environmental measurements made by DEQ-INL OP in 2010 were consistent with past results. Water samples collected from locations near INL Site facilities identified concentrations of strontium-90, chloride, manganese, and volatile organic compounds (VOCs) greater than drinking water standards. These contaminants were found in locations of known INL contaminant plumes and at levels consistent with historic trends for these sites. These water sources are not used by the public or INL Site workers. Other contaminants from historic INL Site operations were identified in water, but at concentrations less than drinking water standards and within expected levels.

Tritium was occasionally detected in atmospheric moisture samples collected from both on-site and off-site monitoring locations. When detected these levels were less than 1% of EPA regulatory limits. Environmental measurements of radioactivity in air and direct radiation were typical of background levels at all sites, as were terrestrial radioactivity contributions calculated from soil estimates.

Trends

Results for 2010 monitoring showed measurements that were consistent with historic trends. Concentrations of

Did You Know?

The amount of radioactivity in the environment is measured using terms that describe how often the material undergoes radioactive decay.

A **curie** is a unit of radioactivity, symbolized as Ci, equal to 3.7 x 10^{10} disintegrations or nuclear transformations per second. This is approximately the amount of radioactivity emitted by one gram (1g) of radium-226. The unit is named after Pierre Curie, a French physicist.

Fractions of curie are typically used to define small amounts of radioactivity. For example:

milli - millicurie is simply one one-thousandth of a curie
micro - microcurie is simply one one-millionth of a curie
nano - nanocurie is simply one one-billionth of a curie
pico - picocurie is simply one one-trillionth of a curie
femto - femtocurie is one-quadrillionth of a curie

Multiplication Factor	Prefix	Symbol
$0.001 = 10^{-3}$	milli	m
$0.000001 = 10^{-6}$	micro	µ
$0.000000001 = 10^{-9}$	nano	n
$0.000000000001 = 10^{-12}$	pico	p
$0.000000000000001 = 10^{-15}$	femto	f

radioactivity in air, soils, and milk continued to be unchanged from previous years and were consistent with background levels. Radiation levels also were consistent with historic background measurements. Concentrations of strontium-90, chloride, manganese, and VOCs exceeded federal drinking water standards at sites on the INL in 2010. Trends for tritium continue to decline. Gross beta radioactivity followed trends for strontium-90. The concentrations of some contaminants, such as gross alpha radioactivity, technetium-99, and VOCs, showed trends that were not as clearly understood, possibly responding to changes in INL operations and cleanup efforts. Tritium concentrations in atmospheric moisture remained consistent with previous years.

Comparison with DOE Data

In general, there is satisfactory agreement between the environmental monitoring data reported by DEQ-INL OP and the DOE. This level of comparability between DEQ-INL OP and DOE confirms that both programs present reasonable explanations of the state of the environment surrounding the INL. This should help to foster public confidence in both the State's and DOE's monitoring programs and conclusions drawn from their monitoring.

In the pages that follow, the results of DEQ-INL OP's monitoring for each type of media (air, radiation, water, soil, and milk) are discussed in greater detail.

Air Monitoring

Continuous air monitoring is conducted at 11 locations to monitor concentrations of radionuclides in the atmosphere. These 11 locations include one air monitoring station operated by the Shoshone-Bannock Tribes at Fort Hall, Idaho.

Air monitoring locations (and selected other DEQ-INL OP monitoring sites) are shown in **Figure 1** and a continuous air monitoring station is shown in **Figure 2**.

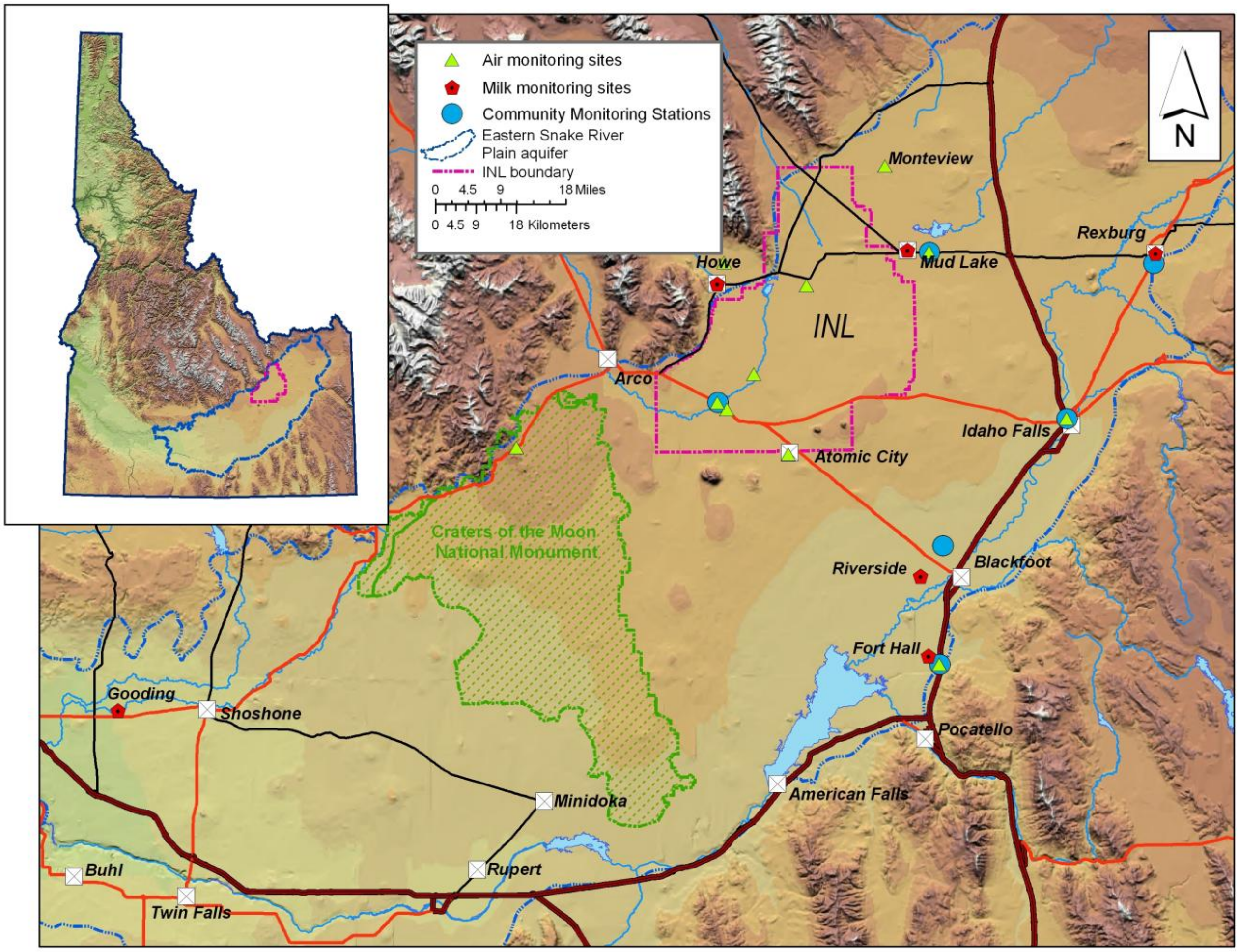

Figure 1. Locations of selected DEQ-INL OP monitoring sites.

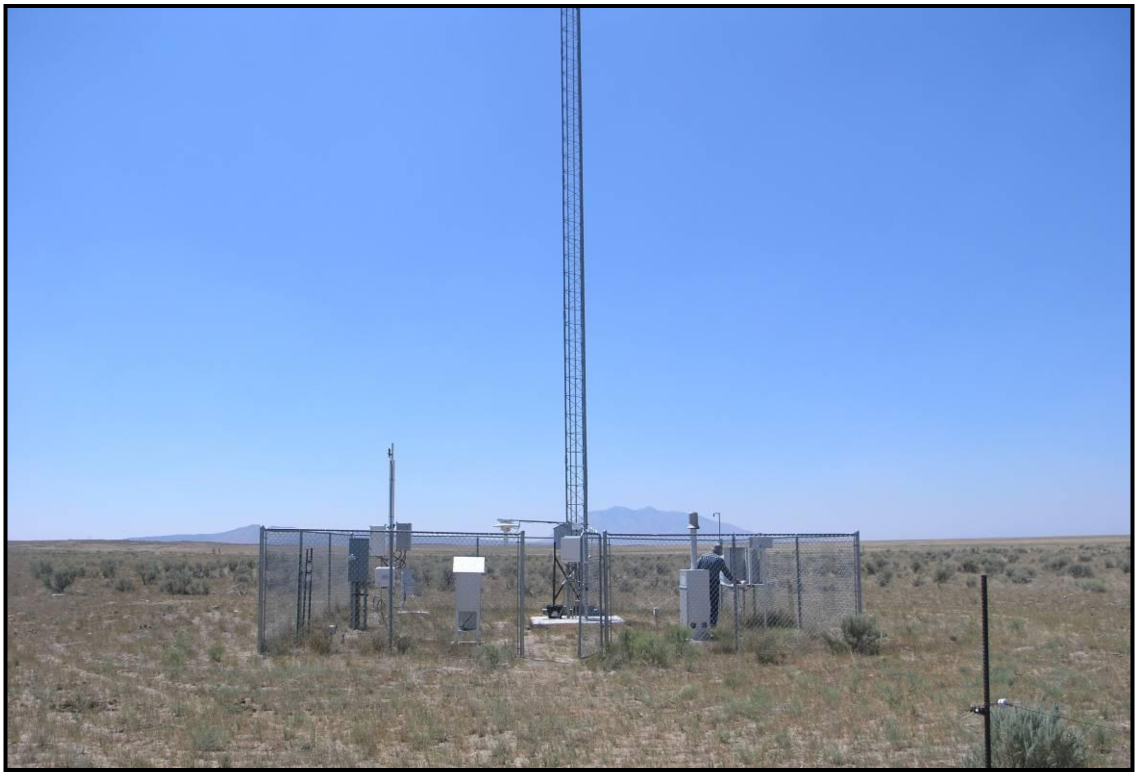

Figure 2. A DEQ-INL OP continuous air monitoring station.

Air monitoring stations are segregated into three categories:

- On-site stations are located within the INL boundary and include Experimental Field Station, Van Buren Avenue, Highway 20 Rest Area, and Sand Dunes/INL Gate 4.
- Off-site stations are located near the INL boundary and include Mud Lake, Monteview, Howe, and Atomic City.
- Distant or background locations are used for data comparisons and include the Craters of the Moon visitor center, Idaho Falls, and Fort Hall.

Particulate air samples (i.e., filters) and radioactive iodine gas samples (charcoal cartridges) are collected weekly to monitor short-term radiological conditions in the environment. Atmospheric moisture is also collected continuously to measure tritium concentrations present in the air. Finally, precipitation samples are collected at six locations to monitor for tritium and gamma-emitting radionuclides that may be present in the environment. A DEQ-INL OP air monitoring station with all four different types of sampling equipment is pictured in **Figure 3.**

Figure 3. DEQ-INL OP air monitoring station with a radioiodine sampler, an atmospheric moisture sampler, a precipitation sampler, and a total suspended particulate matter sampler (TSP).

In order to verify results, data collected by DEQ-INL OP at some air monitoring stations are directly compared to the air monitoring results obtained by the DOE and its contractors at co-located sample sites.

Air Monitoring Equipment and Procedures

Particulate matter is collected using a high-volume total suspended particulate (TSP) matter air sampler. The filters are collected weekly and are analyzed for gross alpha and gross beta radioactivity. Air concentrations are calculated based upon the amount of radioactivity on the filter divided by the quantity of air that has passed through the filter. Quarterly composite samples of all TSP filters collected from each location are analyzed for gamma-emitting radionuclides. Yearly composite samples of all TSP filters collected from each location are analyzed via radiochemical separation for strontium-90, americium-241, plutonium-238, and plutonium-239/240.

Radioactive iodine (radioiodine) 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 physically absorbs the radioiodine within its sponge-like pores. Each week, canisters are collected from all 11 air monitoring stations and analyzed together as a group. If radioiodine is detected in this grouping, the canisters are individually analyzed.

Atmospheric moisture is collected by drawing air through a column filled with molecular sieve beads (a desiccant or water-absorbing material). Upon saturation with moisture, the column is removed and the beads are heated up, causing them to release their stored moisture. This moisture is then condensed and collected as water in a sample container and subsequently analyzed for tritium.

Precipitation sampling involves the collection of precipitation using a collection tray that is heated during the winter months. At the end of each calendar quarter or once the 5-gallon sample container is full, whichever occurs first, the water sample is collected and analyzed for tritium and for gamma-emitting nuclides.

All samples collected from DEQ-INL OP's air monitoring program are analyzed by the Idaho State University Environmental Monitoring Laboratory (ISU-EML) or its subcontractor(s). Analysis methods used are consistent with industry standards.

Air Monitoring Results and Trends

The following sections include monitoring results and trends for air monitoring.

Particulate Matter in Air

A total of 556 filters from TSP samplers were collected during 2010. The results from the analyses of off-site location samples were indistinguishable from those of on-site locations. Gross alpha and beta screening results for 2010 are well below the federal regulatory limits (21 fCi/m^3 gross alpha and 770 fCi/m^3 gross beta – 40 CFR 61). Gross alpha/beta results are summarized in **Table 1**.

Table 1. Gross alpha and beta screening ranges and averages observed by DEQ-INL Oversight Program for 2010.

DEQ-INL Oversight Program	Gross Alpha Range (fCi/m^3)[a]	Gross Alpha Average (fCi/m^3)	Gross Beta Range (fCi/m^3)	Gross Beta Average (fCi/m^3)
2010	0.1 to 3.6	1.0 ± 0.3	10.0 to 97.2	36.8 ± 1.5

a. fCi/m^3 – femto(10^{-15})curies per cubic meter

The annual TSP filter composite samples showed concentrations of strontium-90 from 0.04 x 10^{-5} to 1.25 x 10^{-5} picocuries per cubic meter (pCi/m^3) for 2010. Of the transuranic radionuclides (plutonium-238, 239, 240 and americium-241) analyzed for, Pu-239/240 was the only radionuclide detected at the following locations: Craters of the Moon location with a value of 0.46 x 10^{-5} pCi/m^3 (MDC 0.38 x 10^{-5} pCi/m^3), Mud Lake location with a value of 0.42 x 10^{-5} pCi/m^3 (MDC 0.12 x 10^{-5} pCi/m^3) and the Idaho Falls location with a value of 0.16 x 10^{-5} pCi/m^3 (MDC 0.09 x 10^{-5} pCi/m^3). These values are within the expected range due to global fallout from historic above-ground weapons testing and well below the federal regulatory limits for Pu-239/240 of 200 x 10^{-5} pCi/m^3 (40 CFR 61).

Atmospheric Tritium

A total of 163 atmospheric moisture samples were collected in 2010 from 11 monitoring locations and analyzed for tritium. Detectable airborne tritium concentrations are occasionally observed in the environment. The highest airborne tritium concentrations observed by DEQ-INL OP on the INL in 2010 were 1.69 ± 0.80 pCi/m^3 at the Experimental Field Station for the time period of June 24 through July 1, 2010, 0.86 ± 0.69 pCi/m^3 at Van Buren Avenue for the time period of July 29 through August 12, 2010, 1.29 ± 0.67 pCi/m^3 at the Big Lost River Rest Area station for the time period of June 18 through July 1, 2010, and 0.90 ± 0.72 pCi/m^3 at the Sand Dunes station for the time period of June 4 through June 24, 2010.

All atmospheric tritium measurements for 2010 were less than one percent of the concentration for compliance with federal regulations (40 CFR 61). Tritium levels were at or near background levels at all locations.

Gaseous Radioiodine

No gaseous radioiodine was detected by DEQ-INL OP in 2010.

Precipitation

No tritium or manmade gamma-emitting radionuclides were detected by DEQ-INL OP in precipitation samples at any location throughout the year.

Air Monitoring Verification Results

Gross alpha and beta particle results for suspended particulate matter samples from monitoring stations used by DEQ-INL OP are compared with results from co-located stations operated by the Environmental Surveillance, Education and Research Program (ESER) and by Battelle Energy Alliance (BEA). As a convention, agreement of paired samples is taken as the two sample results being within 20 percent of each other or within 3 standard deviations. Agreement between 80% of the paired samples is considered to indicate overall statistical agreement of the programs being compared. Another test of agreement is to determine if the conclusions relevant to public health drawn from the results of one program differ from those drawn from the results of another program.

For 2010, gross alpha particle results agreed for more than 90% of the paired samples (**Table 2**).

Gross beta particle results for DEQ-INL OP, were not in overall statistical agreement with those of ESER, or BEA (**Table 2**). Variations in sampling schedule, equipment configuration and random uncertainty may contribute to observed differences. It is important to recognize that gross alpha and beta particle measurements are a screening method and do not represent quantitative measurement of specific radionuclides.

The results do agree in the important sense that all measurements from the three monitoring organizations are several orders of magnitude below the most restrictive regulatory limit for radionuclides of concern from the INL. The results from all three monitoring agencies indicate that there is no public health risk.

Table 2. Comparison of DEQ-INL OP suspended particulate matter analysis results for paired samples with DOE contractor results in 2010.
(Results are presented as percentage of samples that agree within 20 percent or a 3-sigma test.)

Sampling Agency	ESER Stoller[a]	BEA[b]
DEQ-INL OP Gross Alpha Analysis	91.4 %	91.7%
DEQ-INL OP Gross Beta Analysis	21.4 %	53.8 %[c]

a. ESER – Environmental Surveillance, Education and Research [Program], conducted by INL contractor Gonzales-Stoller Surveillance, LLC (GSS).

b. BEA – Battelle Energy Alliance, INL prime contractor during 2010.

c. BEA beta results were adjusted based on an estimate of the detector efficiencies between BEA's Sr/Y-90 and DEQ-INL OP's Cs-137 calibration sources.

Comparing tritium sample results among DEQ-INL OP, ESER, and BEA is problematic because although sampling sites are co-located, samples are not paired or split samples. Each monitoring agency collects its tritium sample when the desiccant material becomes saturated with moisture; therefore the sampling frequency is dependent on the volume of desiccant used and the sampler flow rate resulting in differences and overlaps in sampling schedules throughout the year. Also, most of the results are near or below the MDC, where statistical uncertainties are relatively high. These factors make a direct one-to-one comparison of results not possible. However, all the results agree in that they are several orders of magnitude below minimum regulatory limits. Results from all three monitoring agencies indicate no public health risk.

No iodine-131 was detected in 2010 by DEQ-INL OP, ESER or BEA, using activated charcoal canisters.

Air Monitoring Impacts and Conclusions

Based upon 2010 air quality measurements, DEQ-INL OP concludes that there are no discernable impacts to off-site locations as a result of INL operations. The results of screening analyses performed on particulate filters collected at boundary locations are consistent with the results obtained from background locations.

Atmospheric moisture sampling by all three agencies has occasionally shown detectable quantities of tritium in the environment; however, all detected quantities are well below federal regulatory limits and indicate no risk to public health.

Overall, DEQ-INL OP air monitoring results agreed with the results obtained by DOE and its contractors either (1) by direct comparison or, (2) by the fact that all results are well below regulatory limits and pose no health concerns for the citizens of Idaho.

Radiation Monitoring

Penetrating radiation is naturally present in the environment, due to cosmic sources and naturally occurring radioactive materials in rock and soil. Human-made sources include the residual radioactivity present in soil from historic above-ground testing of nuclear weapons and nuclear reactor operations. Radiological conditions on the INL and throughout the eastern Snake River

Plain are continuously monitored by DEQ-INL OP. Penetrating radiation measurements are performed by DEQ-INL OP at each air monitoring station maintained by DEQ-INL OP, at meteorological towers maintained by the National Oceanic and Atmospheric Administration (NOAA), at background locations distant to the INL, and along roadways that bound or cross the INL (**Figure 5**). Radiation monitoring results obtained by DEQ-INL OP are compared with radiation monitoring results reported by the DOE and its INL contractors for these same locations to determine whether the data are comparable.

Radiation Monitoring Equipment and Procedures

Radiological conditions are monitored continuously via a network of 11 high-pressure ion chambers (HPICs) that provide "real-time" radiation exposure rates. One of these HPIC stations is owned and operated by the Shoshone-Bannock Tribes at Fort Hall, Idaho, and uses equipment identical to that used by DEQ-INL OP. Data are collected by DEQ-INL OP via radio telemetry and are available to the public on the World Wide Web at http://www.deq.idaho.gov/inl-oversight/monitoring/gamma-radiation-measurements.aspx

DEQ-INL OP also uses a network of passive electret ion chambers (EICs) on and around the INL to cumulatively measure radiation exposure. These measurements are then used to calculate an average exposure rate for the quarterly monitoring period. The objectives of the DEQ-INL OP EIC network are to identify baseline levels (background radiation) to use for comparison in the event of an upset condition (accidental release of radioactive material), to assess dose and verify the dispersion model, and to verify contractor environmental gamma radiation data. **Figure 4** shows a DEQ-INL OP staff member collecting an EIC for analysis and installing a new one.

Figure 4. Collecting an electret ionization chamber (EIC) and installing a new one.

Radiation Monitoring Results and Trends

During the course of 2010, EIC and HPIC measurements performed at locations on INL were similar to those at off-site monitoring locations and were consistent with expected background exposures associated with natural cosmic and terrestrial sources.

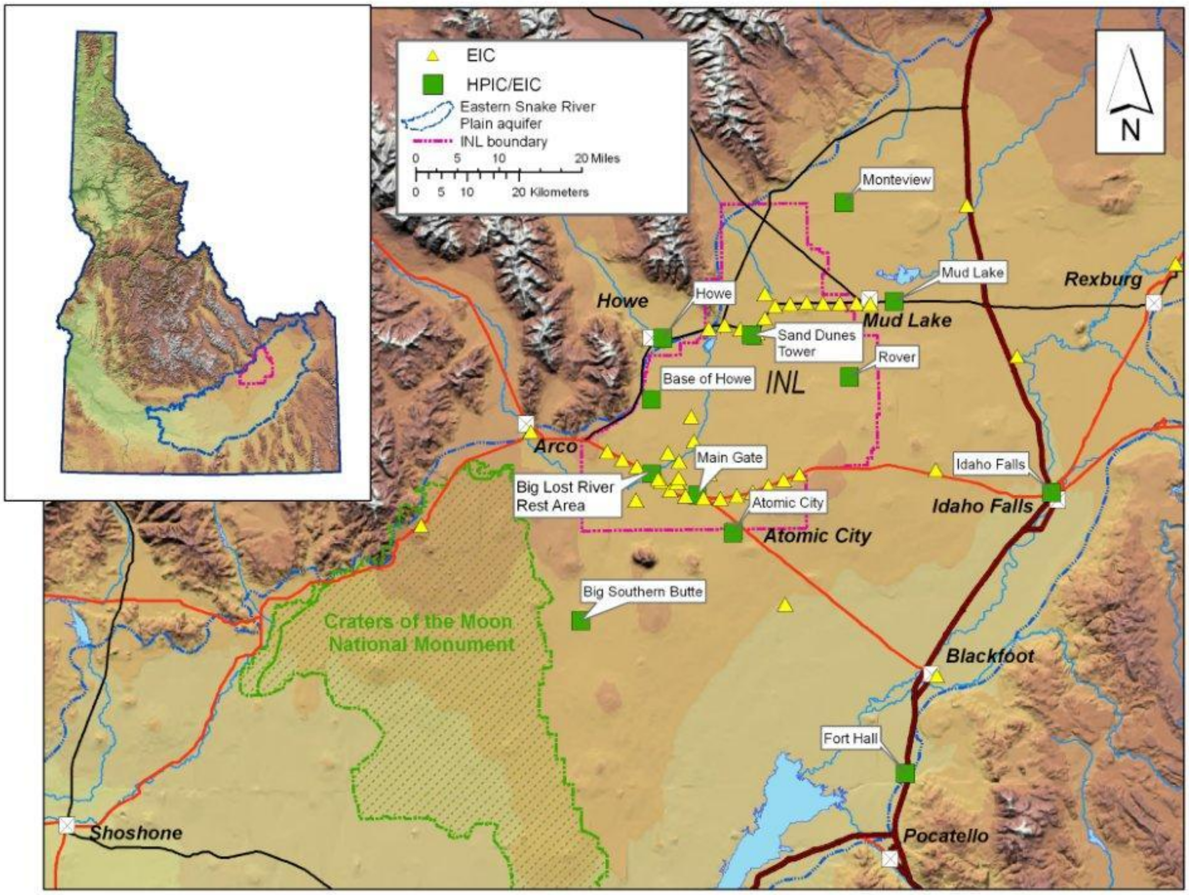

Figure 5. Locations of HPIC and EIC monitoring sites.

Radiation Monitoring Verification Results

DEQ-INL OP has placed several EICs at locations monitored by DOE contractors, using thermoluminescent dosimetry (TLD). Ambient penetrating radiation measurements during 2010 showed 100% of BEA's TLD measurements and 100% of ESER Gonzales-Stoller Surveillance, LLC (GSS)'s TLD measurements satisfied the "3 sigma" test when compared with co-located DEQ-INL OP EIC measurements (**Table 3**).

Table 3. Comparison of DEQ-INL OP, ESER GSS, and BEA radiation measurements at co-located sites in 2010. (Units in micro-Roentgen per hour or μR/h)

Statistical Measure	DEQ	ESER GSS [a]	DEQ	BEA[b]
Mean	13.31	14.34	13.16	14.65
Median	13.10	14.08	13.03	14.48
Standard Deviation	1.28	0.93	1.37	1.25
Minimum	11.15	12.89	10.85	13.02
Maximum	15.50	16.32	15.50	17.49
Average % difference		6.82%		10.89%

a. ESER – Environmental Surveillance, Education and Research [Program], conducted by INL contractor Gonzales-Stoller Surveillance, LLC (GSS).

b. BEA – Battelle Energy Alliance, INL prime contractor during 2010.

Radiation Monitoring Impacts and Conclusions

Based upon radiation measurements made by DEQ-INL OP, there are no discernible impacts from INL Site operations in 2010. Measurements on the INL are comparable to those at background locations. Averaged real-time HPIC measurements are consistent with quarterly EIC dose rates.

Water Monitoring

During 2010, 77 water monitoring sites were sampled to aid in identifying INL impacts on the Eastern Snake River Plain Aquifer. Data collected from these monitoring sites were further examined to determine trends of INL contaminants and other general ground water quality indicators. Some data were also used to determine whether the monitoring results obtained by the DOE and its contractors were consistent with the sampling results obtained by DEQ-INL OP for these same locations.

Samples collected from water monitoring sites are analyzed for radiological and non-radiological constituents. Measuring these constituents helps to identify INL impacts to the aquifer. Many of these analytes occur naturally in ground water and surface water. Elevated concentrations are also present in certain areas of the aquifer, due to historic and ongoing INL operations. Key non-radiological analytes include various common ions, trace metals, and organic compounds. Radiological analyses focus on screening measurements and specific human-made contaminants. These analytes include gross alpha and gross beta radioactivity, cesium-137 and other gamma-emitting radionuclides and tritium. Selected sites are also sampled for strontium-90, technetium-99, americium-241, neptunium-237, uranium-234, uranium-235, uranium-238, plutonium-238, plutonium-239/240, and plutonium-241.

The types of sites sampled include ground water locations (wells and springs), surface water locations (streams), and selected wastewater locations from INL Site facilities. Sample sites are also categorized as up-gradient, facility, boundary, distant, surface water, or wastewater. Up-gradient locations are not impacted by INL Site operations, so they are considered representative of background ground water quality conditions. Facility locations are sample sites within the INL

Site that are near facilities, are in areas of known contamination, or have been selected to illustrate trends for specific INL contaminants or indicators of ground water quality. Boundary locations are on or near the southern boundary of the INL Site or are down-gradient of potential sources of INL contamination. Distant locations are monitored to provide trends in water quality down-gradient of the INL Site and include wells and springs used for irrigation, public water supply, livestock, domestic, and industrial purposes. Surface water and wastewater are monitored because they are current sources of recharge to the aquifer or impacts to the aquifer. The water monitoring sites on and surrounding the INL Site are graphically depicted on **Figure 6** and **Figure 7**, providing a "big picture" of the coverage of the water monitoring program on the Snake River Plain.

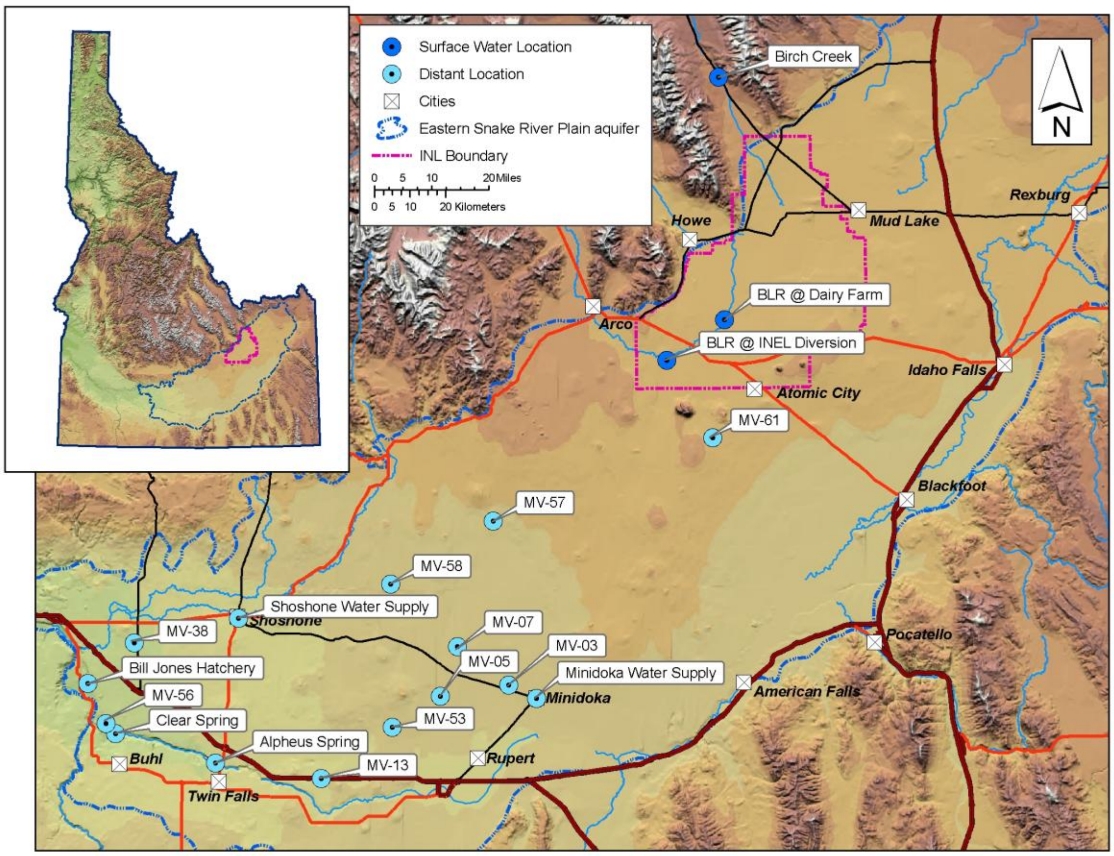

Figure 6. Water quality monitoring sites distant from the INL Site and surface water sites on Birch Creek and the Big Lost River (BLR).

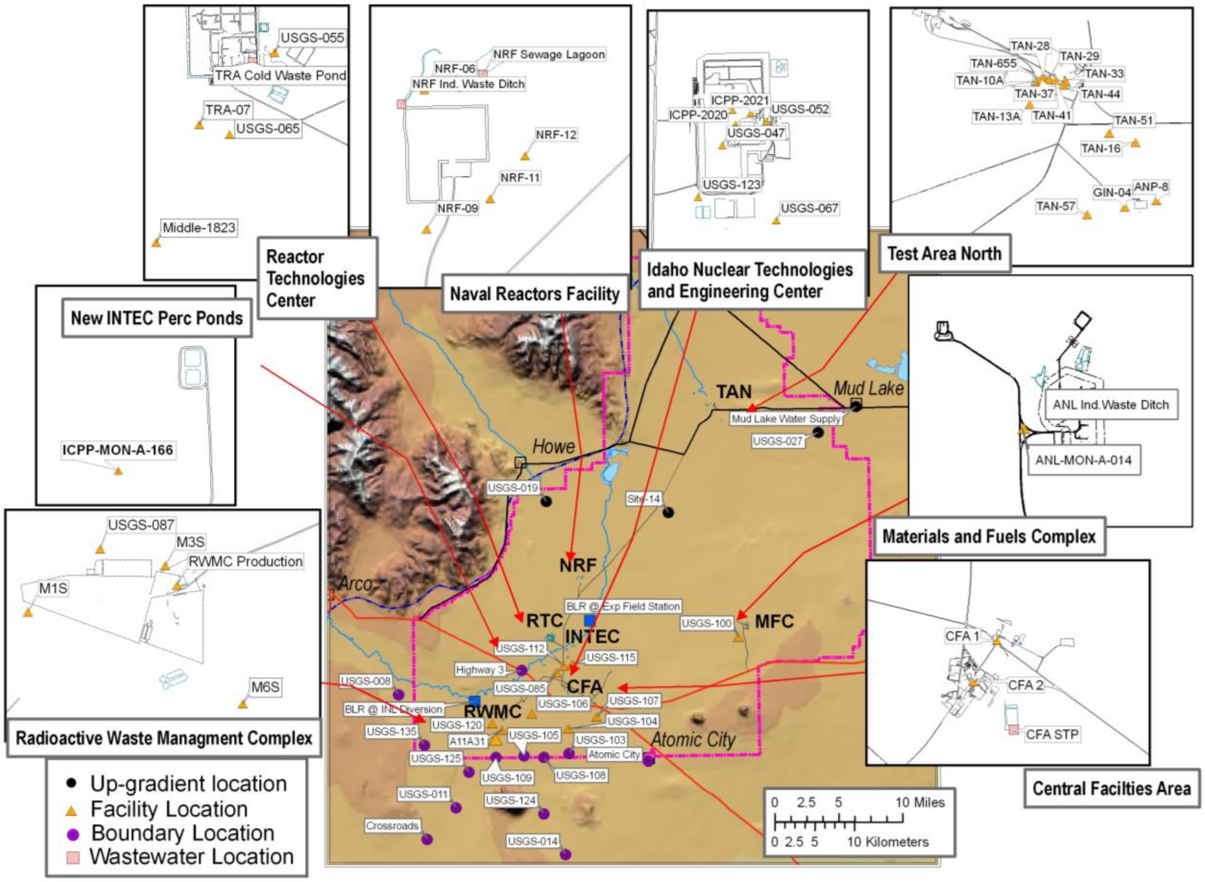

Figure 7. Water quality monitoring sites on and near the INL Site.

Water Monitoring Equipment and Procedures

Most ground water samples were collected from wells equipped with submersible pumps and concurrent with sampling by the USGS or DOE Contractor. Surface water samples were typically collected as grab samples from the water source. Water samples are collected, handled and preserved using standard methods (**Figure 8 and Figure 9**).

Sample analyses for non-radiological analytes were conducted by the Idaho Bureau of Laboratories in Boise or their subcontractor(s). Radiological analyses were performed by ISU-EML or its subcontractor(s). Analysis methods used were consistent with industry standards.

Samples from all monitoring locations were analyzed for gross alpha and gross beta radioactivity, for gamma-emitting radionuclides (by gamma spectroscopy), and for tritium. Selected sites with historic INL contamination were also sampled for strontium-90, technetium-99, and other site-specific analytes including uranium isotopes, plutonium isotopes (238, 239/240, and 241), neptunium-237, and americium-241. Samples were collected from monitoring sites for analysis of non-radiological parameters including the common ions (calcium, magnesium, sodium, potassium, chloride, fluoride, sulfate, and total alkalinity), nutrients (total nitrate plus nitrite and total phosphorus), and trace metals (barium, chromium, manganese, lead, and zinc).

Figure 8. Measuring depth to ground water with a USGS sampler.

Figure 9. DEQ-INL OP staff members collect a sample from a monitoring well.

Water Monitoring Results and Trends

A summary of the ranges of analyte concentrations observed for up-gradient, facility, boundary, distant, and surface water monitoring sites is presented here. Also, analytical results from several sample locations are highlighted and examined more closely to identify current trends. Results for all DEQ-INL OP environmental surveillance are available in quarterly data reports on the DEQ Web site at http://www.deq.idaho.gov/inl-oversight/monitoring/reports.aspx.

Radiological Analytes

Gross alpha and gross beta analyses measure radioactivity contributed by alpha or beta particles in a sample, regardless of their radionuclide source. These analyses do not differentiate among the types of radionuclides present in a sample of water. Radionuclide contributors to both gross alpha and gross beta radioactivity can occur naturally, as well as due to historic INL Site operations. Therefore, the gross alpha and gross beta radioactivity analyses are especially useful to screen for the possible presence of specific radionuclides at levels above naturally occurring radioactive concentrations.

The primary natural sources of gross alpha radioactivity in ground water and surface water are naturally occurring uranium and thorium. The gross alpha radioactivity observed in most facility, boundary, distant, and surface water sites is due to natural sources. Some facility sites do show gross alpha radioactivity from INL Site sources. This is apparent not only because concentrations are above background, but other human-made contaminants are also detectable. The highest concentration for DEQ-INL OP sampled sites was from a facility site, TAN-37 (**Table 4**). The INL contractor responsible for monitoring at TAN-37 attributes the elevated gross alpha radioactivity to historic disposal of wastes that including uranium-234. A summary of this and other radiological results from water monitoring is shown in **Table 4**.

Select locations are sampled for uranium and plutonium isotopes. In 2010, uranium isotope results were not differentiable from natural background ranges. Plutonium, neptunium-237, and americium-241 were not detected in 2010.

Table 4. Summary of selected radiological analytical results for DEQ-INL 2010 water samples, wastewater excluded.

Analyte (pCi/L)[1]	Facility			Up-gradient, Boundary, Distant, and Surface Water			Back-ground[2]	Drinking Water Standard[3]
	Min	Median	Max	Min	Median	Max		
Gross Alpha	<MDC[4]	<MDC	6.1 ± 4.3	<MDC	<MDC	5.5 ± 1.5	0-3	15
Gross Beta	<MDC	3.7	1146.8 ± 17.3	<MDC	3.2	9.2 ± 2.8	0-7	50
Cesium-137	<MDC	<MDC	3.7 ± 2.4	<MDC	<MDC	<MDC	0	200
Tritium	<MDC	520	10580 ± 290	<MDC	<MDC	440 ± 100	0-40	20,000
Strontium-90	<MDC	<MDC	650 ± 150	NS[5]	NS	NS	0	8
Technetium-99	0.5±0.1	1.3	388.9 ± 1.9	NS	NS	NS	0	900

[1] pCi/L – picocuries per liter.
[2] Background concentrations for the Snake River Plain Aquifer.
[3] The federal drinking water standard is expressed as a cumulative annual dose of 4 millirem/year. This value was converted to a specific concentration for each analyte.
[4] MDC is the minimum detectable concentration.
[5] NS – Not Sampled.

Sources of naturally occurring gross beta radioactivity include radioactive potassium-40, as well as radioisotopes that have decayed from natural uranium and thorium. Several locations on the INL Site have gross beta levels that exceed those observed from natural sources in the Eastern Snake River Plain Aquifer (ESRPA). The highest concentration of gross beta radioactivity was measured at a facility site, TAN-37 (**Table 4**). The most likely source of gross beta radioactivity at this well is strontium-90, as seen in **Figure 12**. DEQ-INL OP has been tracking the levels of gross beta radioactivity present at INL monitoring sites for several years.

Cesium-137 was detected at very low levels in two samples in 2008, TAN-37 and USGS-47. For 2010, cesium-137 was detected in one sample, again from TAN-37, at just greater than the detection level. Cesium-137 is a known contaminant for both the TAN area and INTEC area.

Monitoring samples were analyzed for additional human-made contaminants such as tritium, strontium-90, and technetium-99, and most results were consistent with concentrations measured in previous years. In the following sections, the results for tritium, strontium-90, and technetium-99 are discussed.

Tritium

Most of the radioactivity released to the aquifer was in the form of tritium from spent nuclear fuel reprocessing operations at the Idaho Nuclear Technology and Engineering Center (INTEC) and Reactor Technology Complex (RTC). At INTEC, tritium was disposed in the aquifer by injection well and later by percolation ponds. Waste pond operations that allowed tritium to infiltrate to the aquifer ceased in 1995 at INTEC and in 1993 at RTC. Tritium concentrations for selected wells with INL contamination near INTEC and RTC are presented in **Figure 10** (see **Figure 7** on page 14 for well locations). The tritium concentrations found in these wells have continued to decline because tritium is no longer disposed directly to the aquifer. Over time, the tritium contamination has undergone radioactive decay and has been diluted in the aquifer. Historic levels had previously exceeded the maximum contaminant level (MCL) of 20,000 picocuries per liter (pCi/L) for many of these sites.

Tritium concentrations found in wells near RWMC have also declined since about 1998, although they are much lower in concentration than those near INTEC and RTC. The source of tritium observed in wells at the RWMC is likely from wastes disposed at that facility, although up-gradient tritium sources at RTC and possibly INTEC may also contribute to the ground water contamination in these wells. Tritium concentrations greater than background have been measured in wells approximately 4 miles past the INL southern boundary using a low-level tritium analysis which has a lower MDC (10 to 14 pCi/L). **Figure 11** shows tritium concentrations measured in 2010.

Multi-level sampling systems have been installed by the USGS and DOE Contractor in selected wells, including sites along the INL southern boundary. USGS-103 was deepened from 800 feet (ft) below land surface (bls) to 1291 ft bls in 2008 and a Westbay™ multilevel sampling system installed. Zones were selected based on measured aquifer properties, and were correlated to aquifer zones identified in previous USGS investigations and modeling efforts. Initial USGS sample results indicated that the deepest zone (Zone 1), 1269-1291 ft bls, yielded the highest tritium concentrations. DEQ-INL OP selected this interval for monitoring. Sample results from this new, deeper completion interval in 2008 for tritium yielded a result nearly 10 times that from the previous sampling, 2007, at the 615 ft bls depth (42 pCi/L, 430 pCi/L). While results from 2009 confirmed the significantly higher result (330 pCi/L), 2010 results again supported elevated tritium levels with depth (440 pCi/L). This increased tritium is clearly indicative of an INL waste disposal influence in this deepest zone.

USGS-108 is another well that was equipped with a Westbay™ multilevel sampling system. It was deepened in 2009 from 760 ft bls to 1174 ft bls. Zones were selected based on measured aquifer properties, and were correlated to aquifer zones identified in previous USGS investigations and modeling efforts. DEQ-INL OP sampled Zones 1 and 3 for monitoring during 2010. The sample depth for Zone 1 was 1174 ft bls, while the sample depth for Zone 3 was 890 ft bls. Results for both standard tritium samples were below the minimum detectable concentration (MDC), which matches historic standard tritium results collected at the sites previous sample depth of 637 ft bls. Both samples were also analyzed using a low-level or enriched tritium method. The enriched tritium results for Zone 1 and Zone 3 were similar (79 pCi/L and 75 pCi/L respectively) and more than double the previous enriched tritium result collected in 2008 (33 pCi/L) at a sample depth of 637 ft bls. Although the enriched tritium results from Zone 1 and Zone 3 are not as large as that found at USGS-103, they are still above natural background and are consistent with INL waste disposal influence.

For more information concerning USGS wells at the INL Site with Westbay™ multilevel sampling systems see "Chemical Constituents in Groundwater from Multiple Zones In the Eastern Snake River Plain Aquifer at the Idaho National Laboratory, Idaho, 2005-2008" (http://pubs.usgs.gov/sir/2010/5116/).

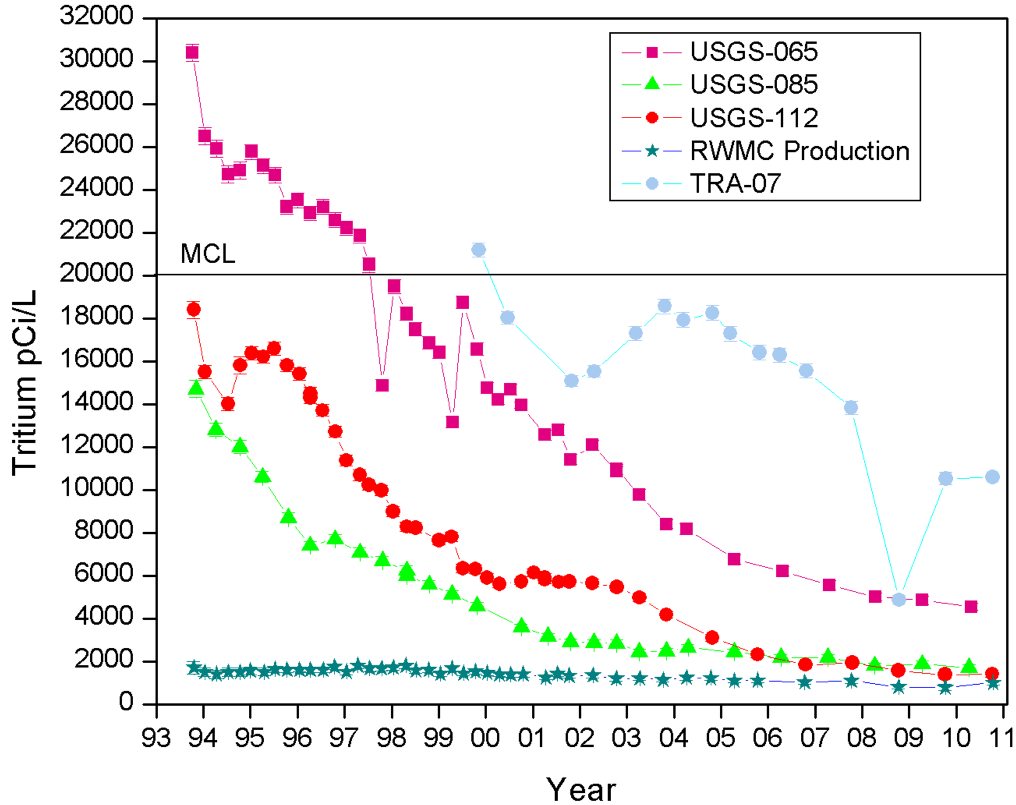

Figure 10. Tritium concentrations (pCi/L) over time for selected INL Site wells impacted by INL contamination.

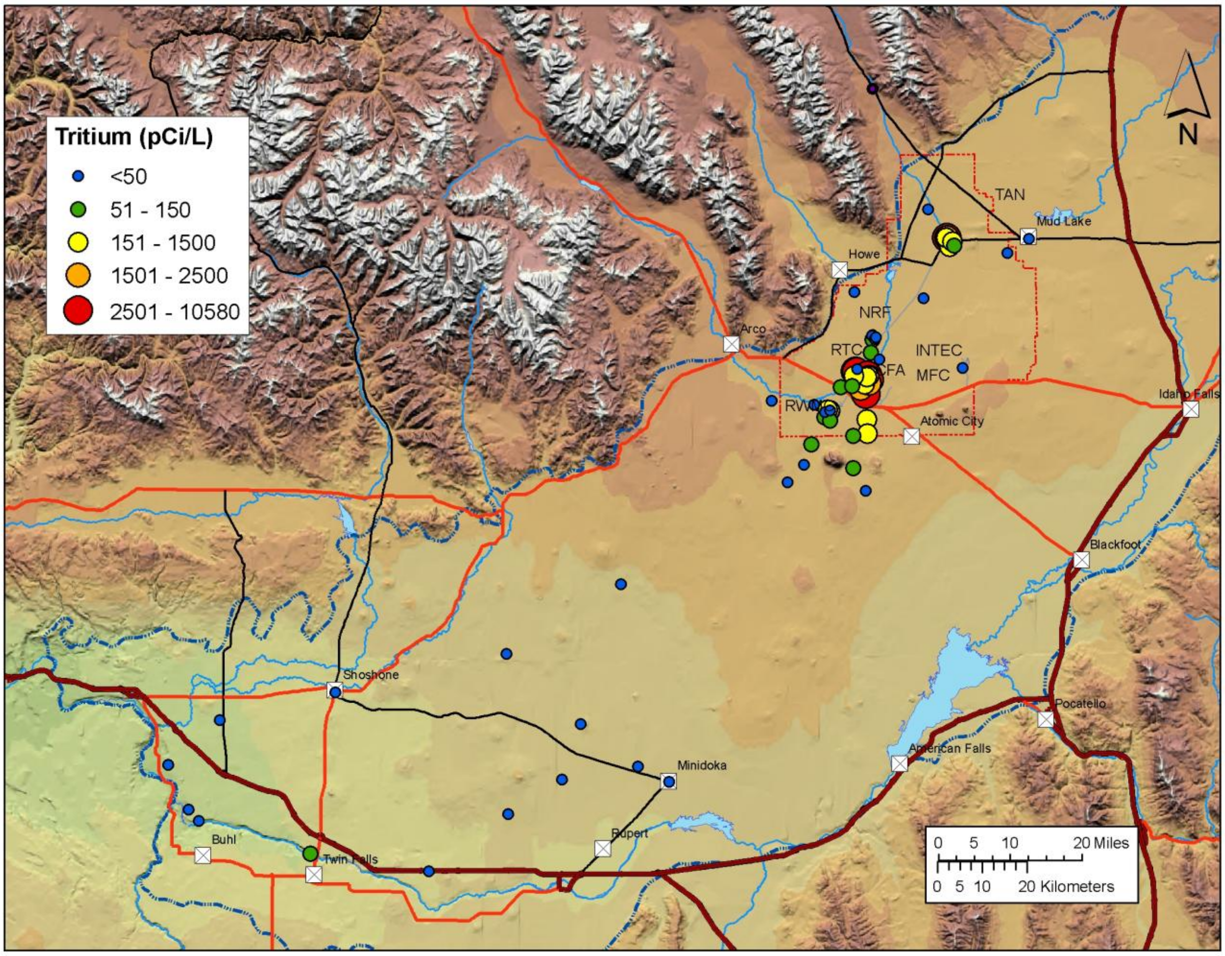

Figure 11. 2010 tritium concentrations (pCi/L) for DEQ-INL OP sample locations.

Strontium-90

Strontium-90 and technetium-99 are the primary sources of the elevated gross beta radioactivity observed in wells with INL contamination. Concentrations of strontium-90 found in the aquifer remain relatively constant for selected wells near the Test Area North (TAN). The highest strontium-90 concentration (650 ± 150 pCi/L) was from the TAN well TAN-37. This well is located near the TAN waste injection well (used from 1953-1972), and in the region of ongoing aquifer treatment for volatile organic compounds (VOCs) in the ground water. Concentrations of strontium-90 for this well and other wells located near TAN have remained relatively consistent since DEQ-INL OP first sampled these sites in 2003 (**Figure 12**). At INTEC, strontium-90 is thought to have been released due to historic waste injection at INTEC and more recently from leaks and spills associated with the INTEC Tank Farm Facility. **Figure 13** illustrates strontium-90 concentrations for wells located at or down gradient of INTEC, including, USGS-047, USGS-067, USGS-085 and USGS-112. All sites indicate that strontium-90 concentrations have been declining or holding steady. **Figure 13** also shows USGS-055, a perched aquifer well near the historic warm waste ponds located adjacent to RTC. Strontium-90 concentrations near RTC are due to past disposal practices. Concentrations found at USGS-055 have declined since 2007. This well was not sampled in 2010. **Figure 14** shows strontium-90 concentrations at DEQ-INL OP sample locations during the 2010 monitoring season.

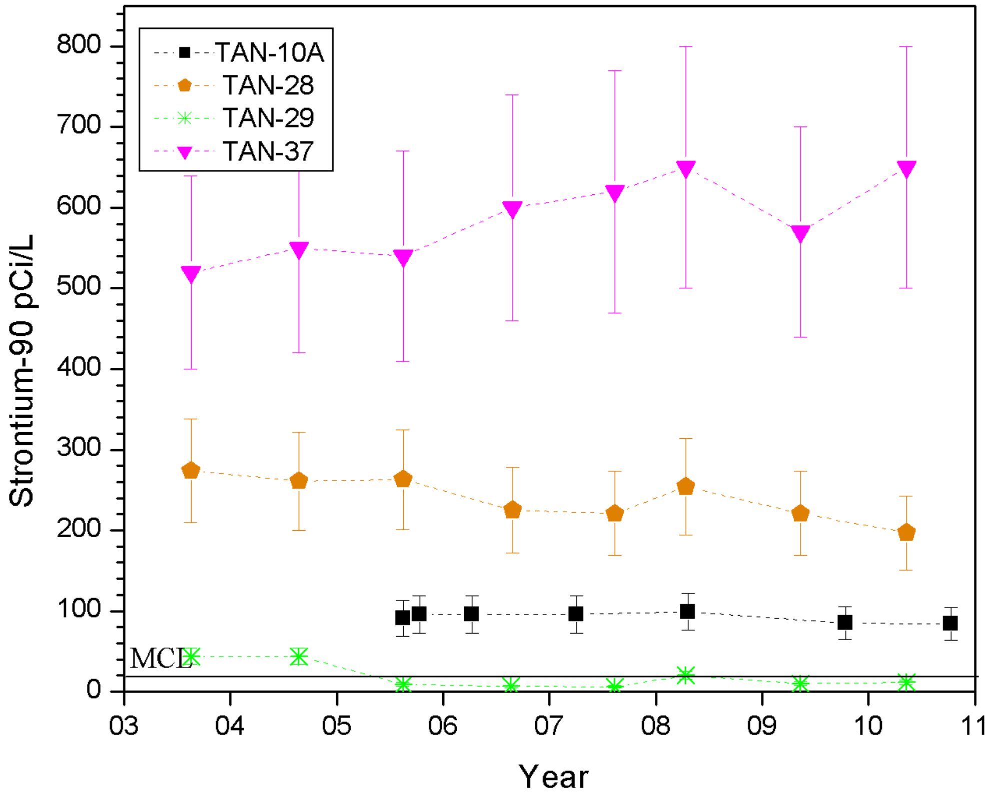

Figure 12. Strontium-90 concentrations over time for selected wells near Test Area North (TAN).

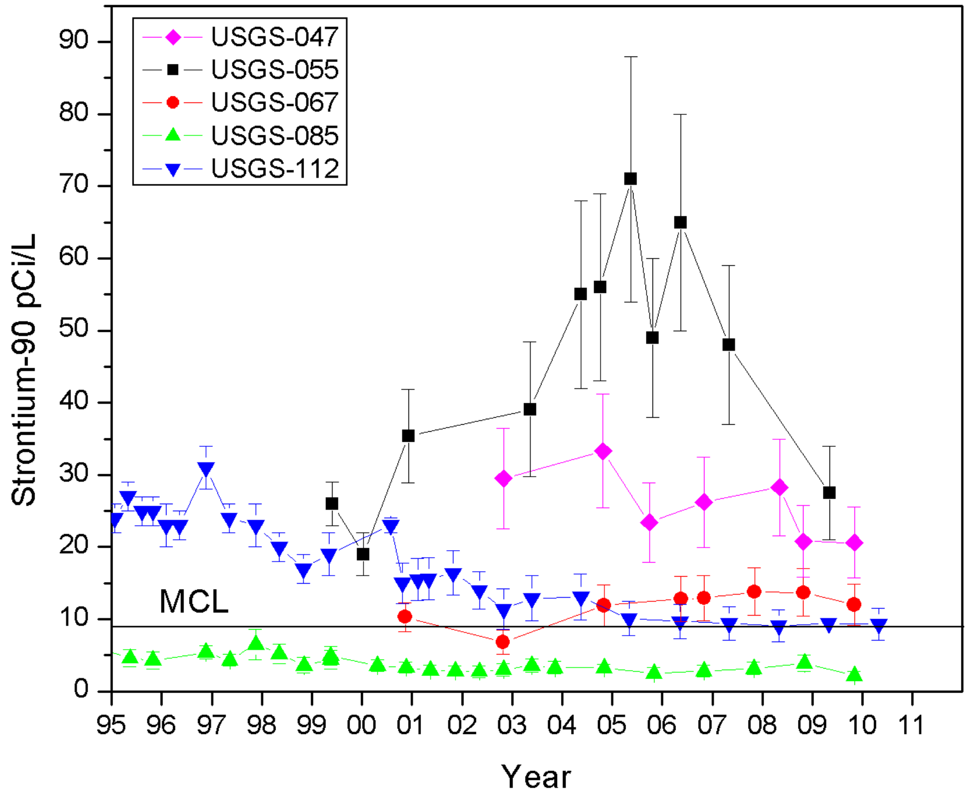

Figure 13. Strontium-90 concentrations over time for selected INL Site wells impacted by INL contamination.

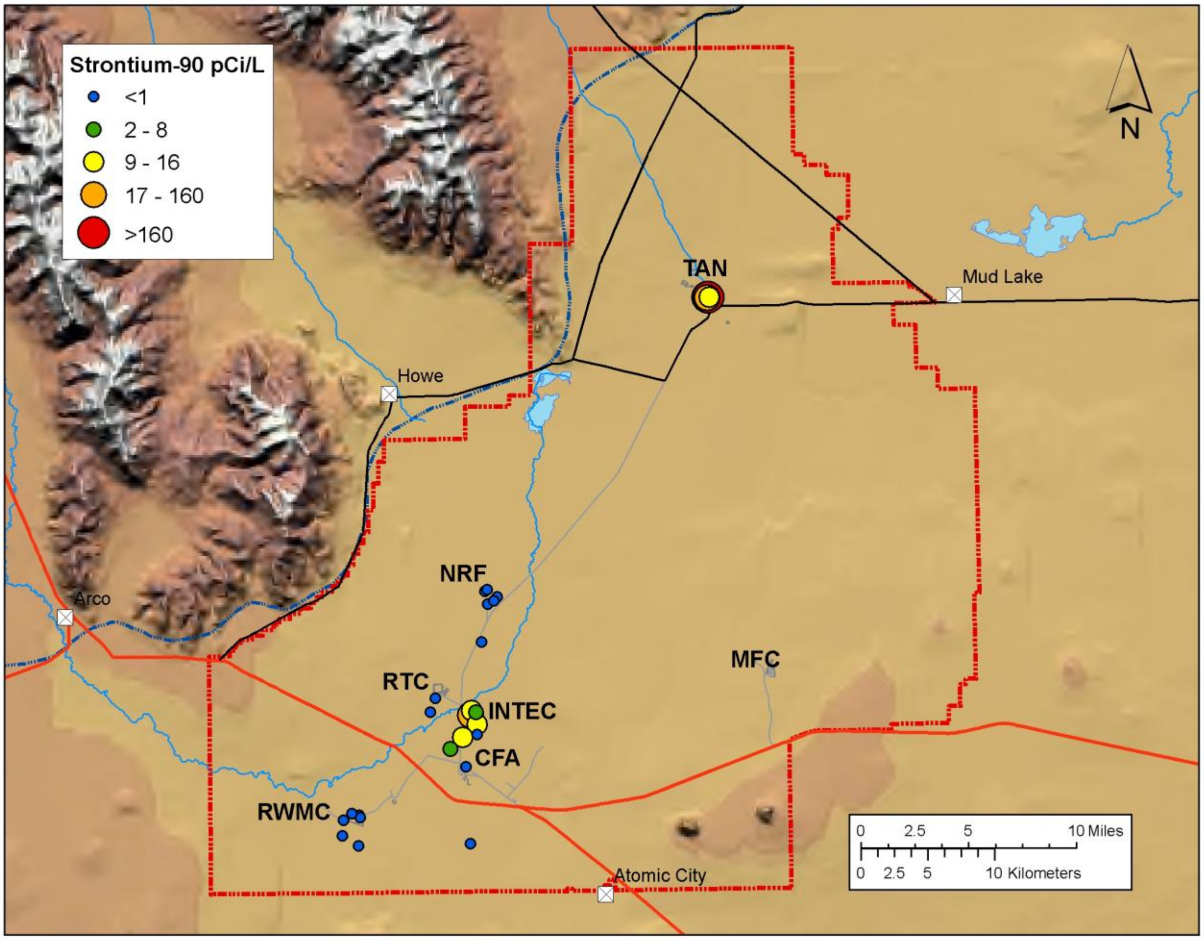

Figure 14. 2010 strontium-90 concentrations (pCi/L) for DEQ-INL OP sample locations.

Technetium-99

Technetium-99 is thought to have been released due to historic waste injection at INTEC and more recently from leaks and spills associated with the INTEC Tank Farm Facility. The greatest concentration observed for DEQ-INL OP monitored sites was for well ICPP-2020 (388.9 ± 1.9 pCi/L), located at INTEC. **Figure 15** shows technetium-99 concentrations over time for selected INL wells located near or down gradient of INTEC. Concentrations of technetium-99 at four of these wells, including, CFA-1, USGS-085, 112, and 115 appear to be constant over the past few years. Other wells included in **Figure 15** are USGS-052, USGS-067 and ICPP-2020. Results from USGS-067 show an initial increase in concentration from 2000 to 2004, however, the concentration has been steady over the last few years with minor fluctuation. Results for USGS-052 are sporadic, including large fluctuations in concentration between sampling events indicating the possibility of outside influences. The final well includes ICPP-2020. DEQ-INL OP began monitoring ICPP-2020 in 2009 and both samples collected produced the largest concentrations of technetium-99 among all DEQ-INL-OP monitored wells. ICPP-2020 is located near USGS-052 and has provided similar results. A general trend of ICPP-2020 technetium-99 concentrations cannot be determined until more results become available. All 2010 results for technetium-99 were below the MCL of 900 pCi/L. **Figure 16** shows technetium-99 concentrations at DEQ-INL OP sample locations.

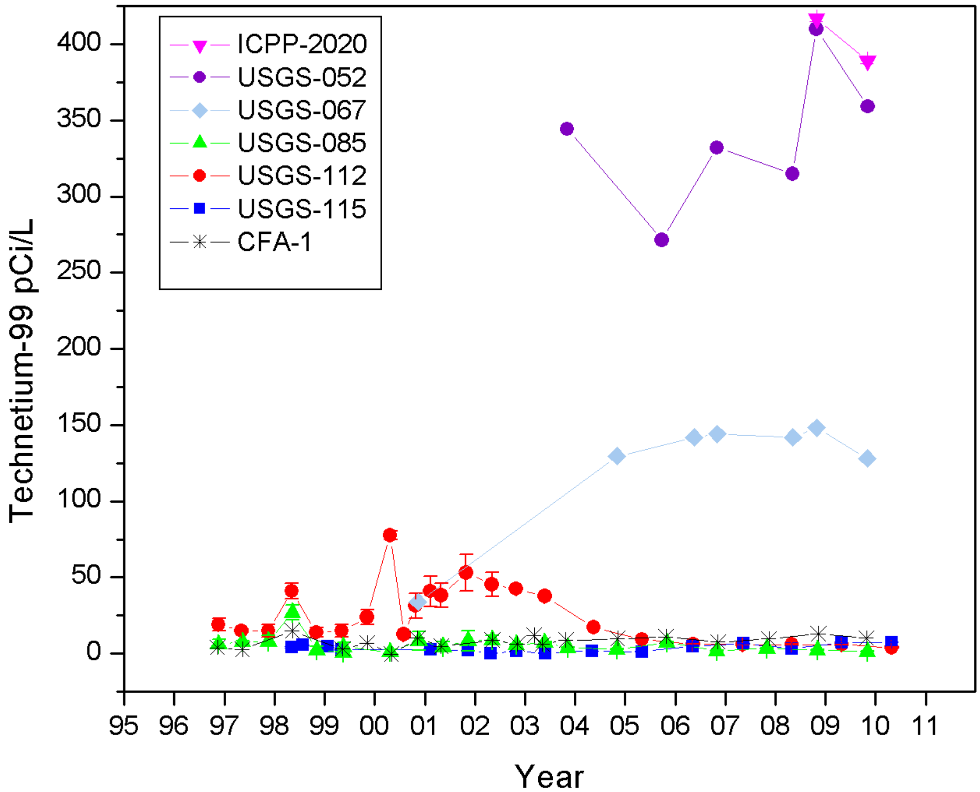

Figure 15. Technetium-99 concentrations over time for selected INL Site wells impacted by INL contamination.

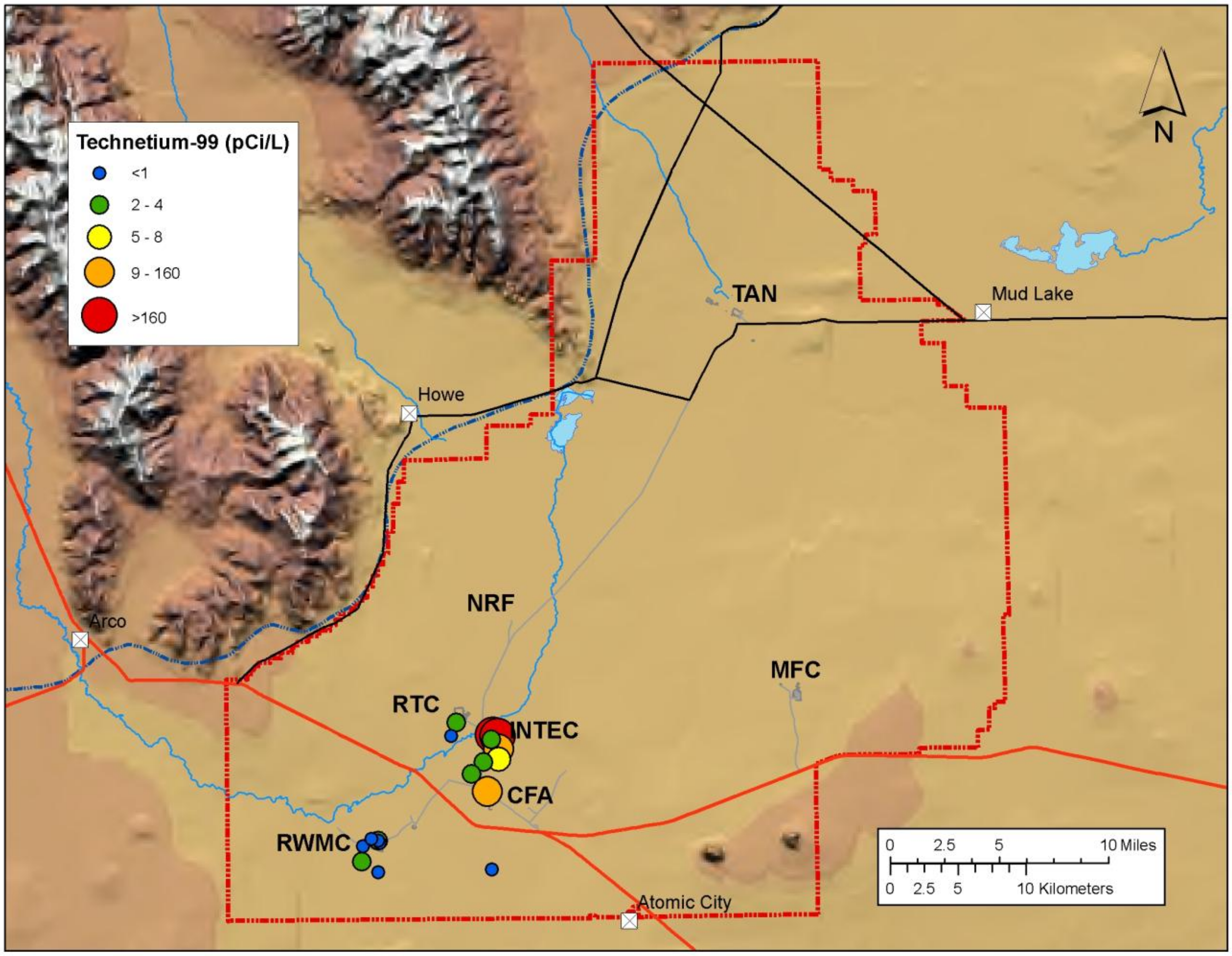

Figure 16. 2010 technetium-99 concentrations (pCi/L) for DEQ-INL OP sample locations.

Non-radiological Analytes

Common ions, nutrients, and metals comprise all the dissolved constituents in natural ground water. These constituents also comprise nearly all the chemical wastes disposed to surface water or ground water as a result of past INL waste disposal practices. Concentrations for most analytes measured in 2010 were relatively unchanged from previous years. Common ions, nutrients, and metals results found in samples collected by DEQ-INL OP in 2010 are summarized in **Table 5**. Following the table is a discussion of analytical results for chloride, chromium, manganese and VOCs, which have each exceeded their respective drinking water standards either in the past or during the 2010 monitoring season.

Table 5. Summary of selected non-radiological analytical results for DEQ-INL OP water samples for 2010.

Analyte	Up-gradient			Facility			Boundary			Distant			Back-ground[1]	Drinking water standard[2]
	Min	Median	Max	Min	Median	Max	Min	Median	Max	Min	Median	Max		
Common Ions/Nutrients (mg/L)														
Calcium	8.7	40	51	27	48	160	37	40	47	22	39	68	5 - 43	none
Magnesium	2.6	15	18	12	16	41	11	15	18	11	16	28	1 – 15	none
Sodium	7.1	14	31	8.3	15	210	6	8.2	11	11	20	55	5 – 14	none
Potassium	1.2	3.0	5.9	1.8	2.7	6.4	1.7	2.3	2.7	2.5	3.5	6.9	1 – 3	none
Chloride	5.0	10	52	8.9	24	547	6.9	13	18	6.4	23	71	2 – 16	250*
Sulfate	7.6	25	40	16	30	159	21	23	26	11	31	77	2 – 24	250*
Total Nitrate plus Nitrite	0.028	0.62	2.6	<DL	1.2	6.1	0.44	0.8	1.0	0.42	1.2	4.6	1– 2	10
Total Phosphorus	0.01	0.016	0.06	0.01	0.026	0.098	0.01	0.017	0.025	0.014	0.024	0.035	<0.02	none
Metals (µg/L)														
Barium	31	63	84	22	56	280	31	48	78	5.5	32	100	50 – 70	2000
Chromium	<DL	2.5	5	<DL	11.5	93	1.8	3.1	6.3	<DL	2.0	3.9	2 – 3	100
Lead	<DL	<DL	1.2	<DL	<DL	15	<DL	<DL	1.1	<DL	<DL	<DL	<5	15
Manganese	<DL	3.2	270	<DL	<DL	990	<DL	<DL	27	<DL	<DL	2.9	<1– 4	50*
Zinc	<DL	<DL	65	<DL	<DL	580	<DL	<DL	100	<DL	2.0	110	<10	5000*

[1] Background concentrations for the snake river plain aquifer. Depending on local geology, concentrations for sites not impacted by INL may be higher than the given background ranges.

[2] Primary standard unless otherwise noted. National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. Maximum Contaminant Levels (MCL's) are the highest level of a contaminant that is allowed in drinking water. * = Secondary Drinking Water Regulations are non-enforceable guidelines regulating contaminants that may cause cosmetic effects or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply.

Chloride

Chloride concentrations in ground water are often elevated in regions impacted by agriculture due to the evaporation of infiltrating irrigation water. At the INL, large quantities of chloride have been discharged in the wastewater. The primary source of chloride in INL wastewater includes the use of sodium chloride (salt) to regenerate water softeners. DEQ-INL OP currently monitors only one well that has chloride concentrations that have historically exceeded the secondary maximum contaminant level (SMCL) of 250 mg/L. Results for NRF-06 are illustrated in **Figure 17**. NRF-06 is located near the NRF industrial waste ditch in which wastewater from water softeners is discharged. Chloride concentrations for DEQ-INL OP 2010 sample locations are shown in **Figure 18**.

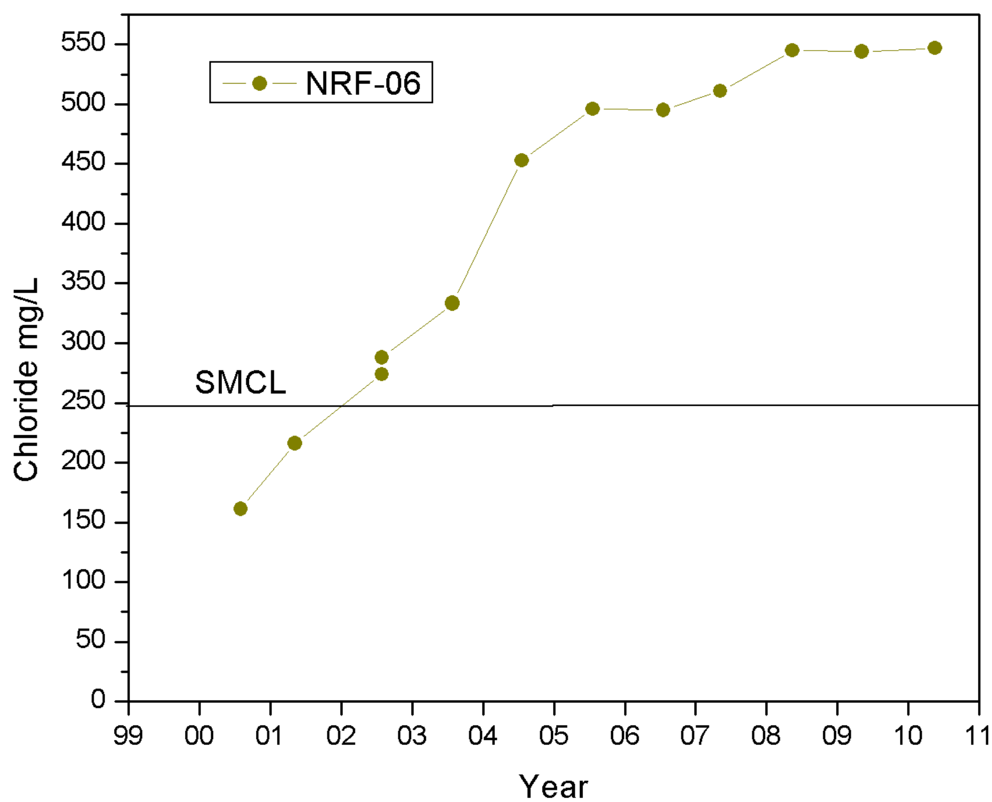

Figure 17. Chloride concentrations for sample location NRF-06 over time.

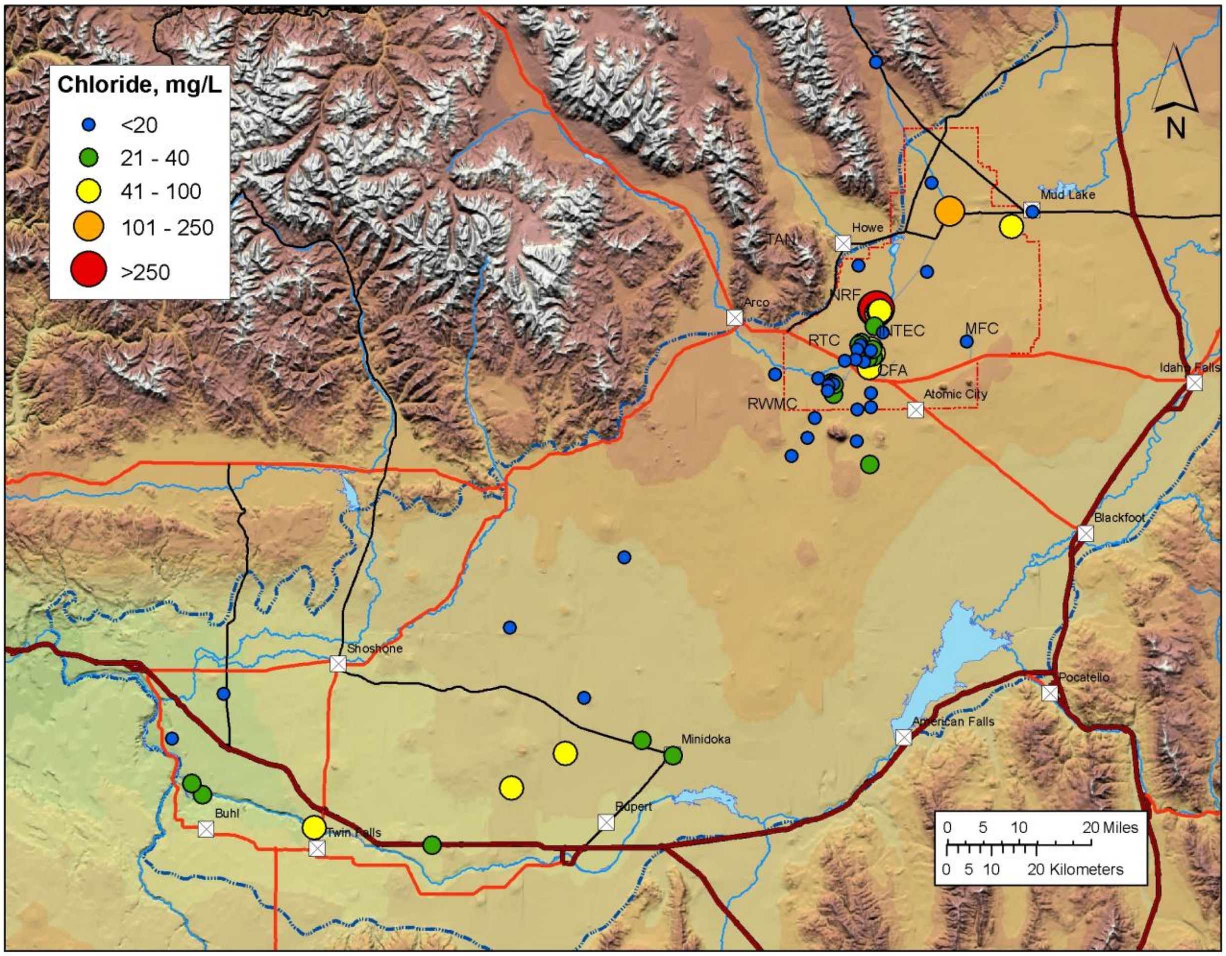

Figure 18. 2010 chloride concentrations for DEQ-INL OP sample locations.

Chromium

Chromium was used at the INL to prevent corrosion in industrial water systems until the early 1970s. Disposal practices at that time allowed chromium-contaminated water to percolate down to ground water from injection wells, open disposal ponds, and ditches. For this reason, chromium is observed at some INL ground water sampling sites. During 2010 there were no chromium concentrations found above the maximum contaminant level (MCL) of 100 µg/L at any DEQ-INL OP monitored sites. The largest concentrations of chromium found by DEQ-INL OP during 2010 were located at TRA-07 and USGS-065. Both of these sites are located near RTC and have historically shown elevated concentrations of chromium with a declining trend over time as illustrated in **Figure 19**. Concentrations for DEQ-INL OP 2010 sample locations are shown in **Figure 20**.

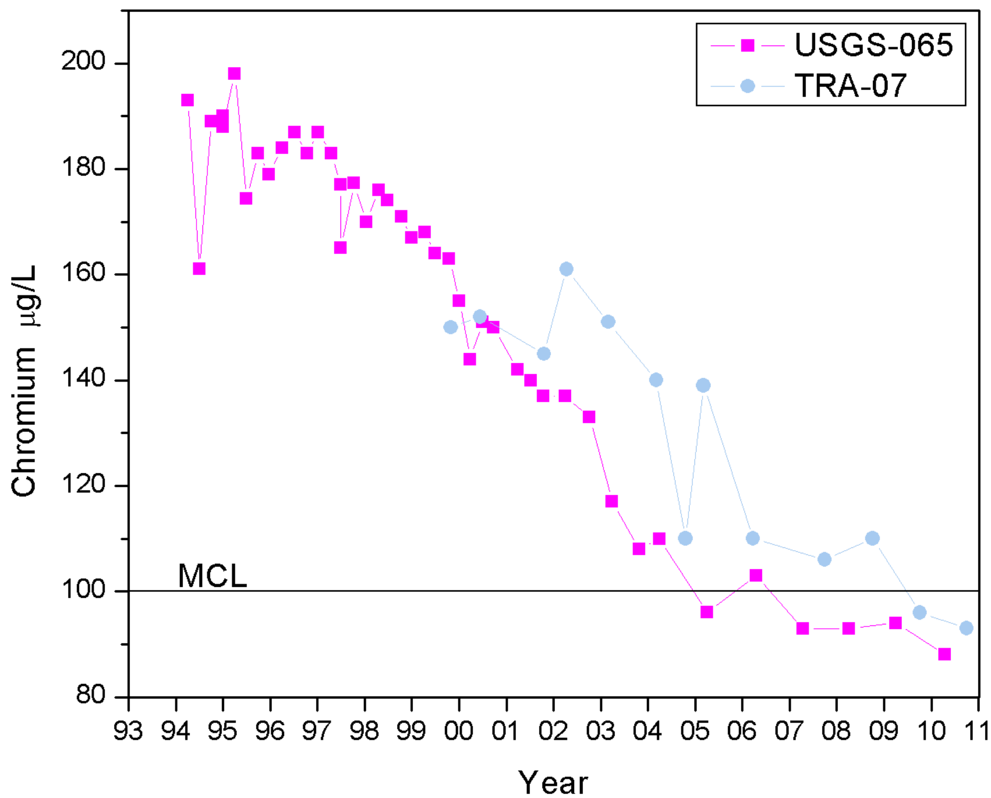

Figure 19. Chromium concentrations (µg/L) over time for selected INL Site wells impacted by INL contamination.

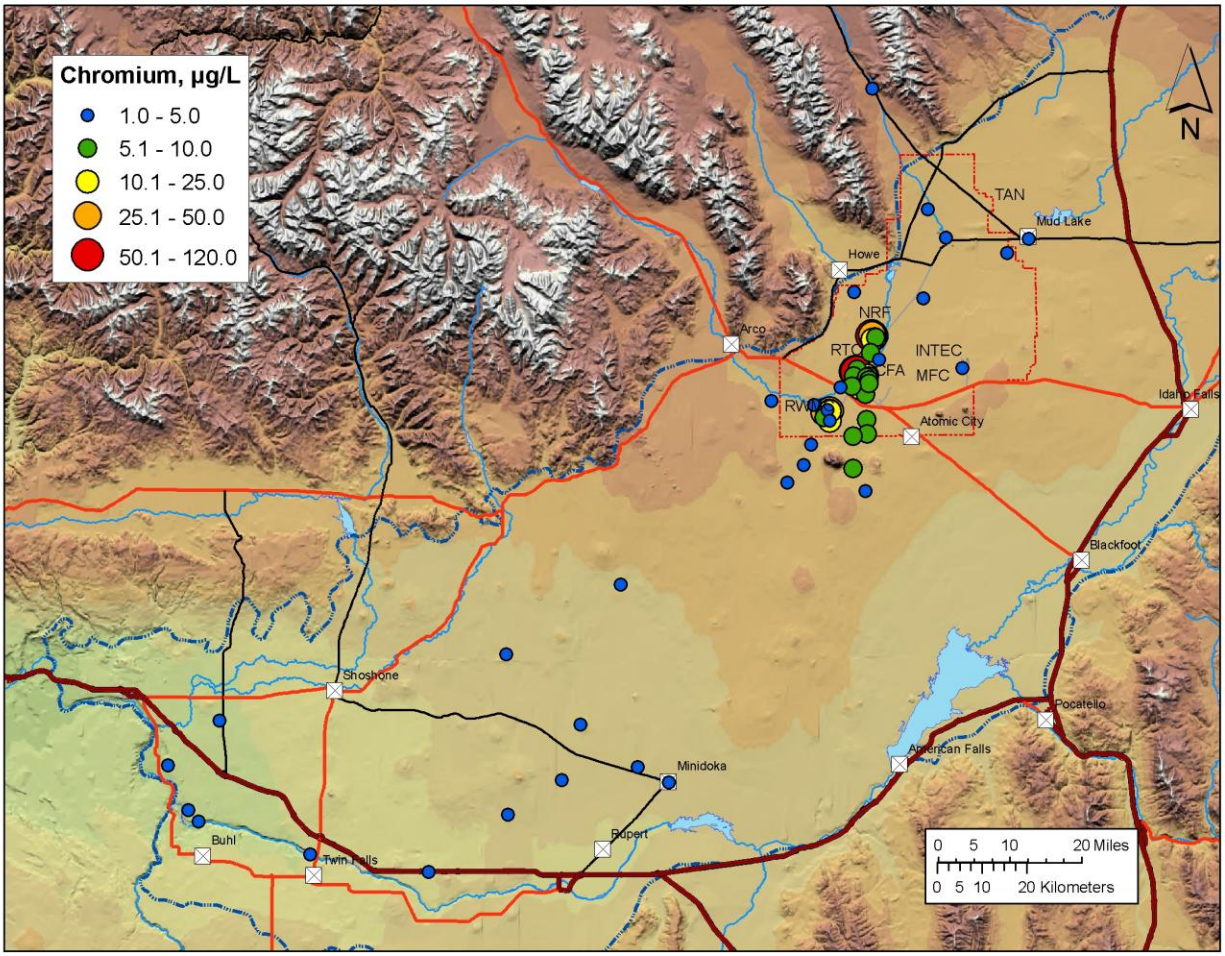

Figure 20. 2010 chromium concentrations (µg/L) for DEQ-INL OP sample locations.

Manganese

One well, TAN-10A, in the TAN area has exceeded the SMCL for manganese (50 µg/L) since 2004. In 2010 DEQ-INL OP monitoring results for TAN-10A recorded a manganese concentration of (990 µg/L) which is consistent with historical values at this location. This exceedance is most likely a byproduct of the clean-up action for VOCs at TAN, which are being remediated through natural attenuation and bioremediation. There was one other well, Mud Lake Water Supply, which tested above the SMCL for manganese during the 2010 monitoring season. The Mud Lake Water Supply had a manganese concentration of 270 µg/L, which is approximately nine times higher than previous results recorded since 1996. The largest concentration of manganese recorded by DEQ-INL OP was recorded in 2008 and measured at (50 µg/L). The Mud Lake Water Supply well is considered a background location. This result currently is an outlier when compared with previous values and will be considered as such until more results become available.

Volatile Organic Compounds

Concentrations of three VOCs continue to exceed MCL's in some wells at TAN: Tetrachloroethylene (or PERC, MCL = 5 µg/L), trichloroethylene (or TCE, MCL = 5 µg/L), and cis-1,2-dichloroethene (or DCE, MCL = 70 µg/L). A clean-up action is currently being implemented for the ground water at TAN, which is being remediated through natural attenuation and bioremediation. This clean-up action is in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Concentrations of two VOCs approach MCL's for wells at the RWMC; Carbon tetrachloride (MCL= 5 µg/L), and trichloroethylene. The 2010 sample results for specific wells can be found in the quarterly reports published on our Web site: http://www.deq.idaho.gov/inl-oversight/monitoring/reports.aspx.

Water Monitoring Verification Results

DEQ-INL OP collects water samples at the same time and location (co-sampled) with DOE or its contractors and verifies that its monitoring results are consistent with those obtained by DOE. In the event that a significant difference is found between DEQ-INL OP sample results and those of DOE, each sampling contractor's result is scrutinized individually to ascertain the cause of the difference. Some differences between results are expected due to factors that include natural variability in the media being sampled, random errors in the measurements, and systematic differences in how the samples are collected, handled and analyzed. The DEQ-INL OP verification sampling program is designed to co-sample at approximately 10% of all DOE sample locations for selected analytes. Co-sampled DEQ-INL OP results for 2010 were compared to the results obtained by DOE, both on an individual sample-by-sample basis, and on an overall sample average basis.

Radiological

A summary of the sample-by-sample comparison of DEQ-INL OP and DOE radiological results is presented in **Table 6**. Sample-by-sample comparisons showed that results were generally in very good agreement, with all compared analysis meeting our goal of 80 percent of results meeting comparison criteria.

Table 6. Radiological results for co-samples collected by DOE and DEQ-INL OP in 2010.

Analyte	Number of Co-sampled pairs in 2010	Percent of Co-sampled pairs passing criteria in 2010
Americium-241	8	100
Gross Alpha	38	95
Gross Beta	35	97
Cesium-137	42	100
Plutonium-238	12	100
Plutonium-239/240	12	100
Strontium-90	23	96
Technetium-99	12	83
Tritium	51	94
Uranium-234	11	100
Uranium-235	13	92
Uranium-238	11	100

Non-Radiological

Comparisons of non-radiological results for sites co-sampled with DOE in 2010 met verification criteria of 80 percent of results in agreement (**Table 7**). The largest differences were in the analysis for manganese, zinc, and for VOC analyses; however, these differences were still within the criteria set by the DEQ-INL OP.

Table 7. Non-radiological results for co-samples collected by DOE and DEQ-INL OP in 2010.

Analyte	Number of Co-sampled pairs in 2010	Percent of Co-sampled pairs passing criteria in 2010
Common Ions/Nutrients		
Calcium	19	100
Magnesium	19	100
Sodium	43	100
Potassium	19	89
Chloride	48	98
Sulfate	31	100
Total Nitrate plus Nitrite	8	100
Trace Metals		
Barium	19	100
Chromium	34	88
Lead	17	88
Manganese	19	84
Zinc	17	82
VOCs[1]	124	85

[1]19 cosampled VOC samples were available and 124 paired results for the same analytes were compared

Water Monitoring and Verification Impacts and Conclusions

DEQ-INL OP sample results are generally in agreement with those reported by DOE and its contractors. Results of DEQ-INL OP water monitoring have identified contamination in the Eastern Snake River Plain Aquifer as a result of historic waste disposal practices at the INL Site. Specifically:

Concentrations for strontium-90, chloride, manganese and VOCs exceeded federal drinking water standards (MCLs or SMCLs) at some sites on the INL in 2010. These sites, however, are not used for drinking water.

No sites monitored exceed federal drinking water standards for tritium. Concentration trends for tritium continue to decline. This INL contaminant is detectable at monitoring sites beyond the INL boundary at levels just higher than local background concentrations. For one well monitored at the INL southern boundary, results obtained from a newly-installed Westbay™ packer sampling system indicate that the observed tritium concentration following Westbay™ installation is greatest at the deepest level in the well, 1260 – 1280 ft bls, and significantly greater than sampling at 615 ft bls prior to deepening the well. This greatest concentration is an order of magnitude higher than previous results and indicates that historic results represent a composite of all zones.

Concentrations for other INL contaminants in water continue to decline at most locations as a result of changes in waste disposal practices.

INL impacts to the aquifer are not identifiable in water samples collected from sites distant from the INL.

Terrestrial Monitoring

Terrestrial monitoring is performed by measuring radionuclide accumulations in soil to help assess long-term trends of radiological conditions in the environment on and around the INL Site. Monitoring of milk samples is performed to indirectly verify the presence or absence of atmospheric radioiodine deposited in the terrestrial environment on and near the INL Site. Some of these data are also used to determine whether the monitoring results obtained by the DOE and its contractors were consistent with the soil and milk sampling results obtained by DEQ-INL OP for these same locations.

Terrestrial Monitoring Equipment and Procedures

DEQ-INL OP uses a combination of *in-situ* gamma spectrometry and physical soil samples to monitor concentrations of gamma-emitting radionuclides in soil at DEQ-INL OP air monitoring stations and selected soil sampling sites on and around the INL (2010 soil sampling sites are shown in **Figure 21**). A portable gamma radiation detector was used in the field to collect surface gamma radiation measurements. In addition to the *in-situ* sampling, physical soil samples were collected and prepared in the field at five locations during the third calendar quarter of 2010. Both types of measurements were then used to identify radionuclides present and to estimate soil radioactivity concentrations.

DEQ-INL OP collected milk samples from distribution centers where milk was received and from individual dairies in southern and southeastern Idaho. Milk sampling locations are shown in **Figure 1.** Raw milk samples were collected from trucks arriving at the distribution centers from each region of interest. For example, milk samples from Mud Lake were collected from a truck servicing that area once it returned to the Nelson-Ricks Creamery distribution center in Rexburg, Idaho. For the independent cow and goat dairies, DEQ-INL OP personnel drop off empty sample containers that are filled by the owner/operator of the dairy. The samples are picked up within 1-2 days of collection.

Two DEQ-INL OP milk samples were collected and split by a DOE contractor each month. One half of the split samples were analyzed by DOE and the other half were submitted to DEQ-INL OP for analysis. DEQ-INL OP used the analysis results from these split samples to verify the DOE contractor's milk sampling results and conclusions.

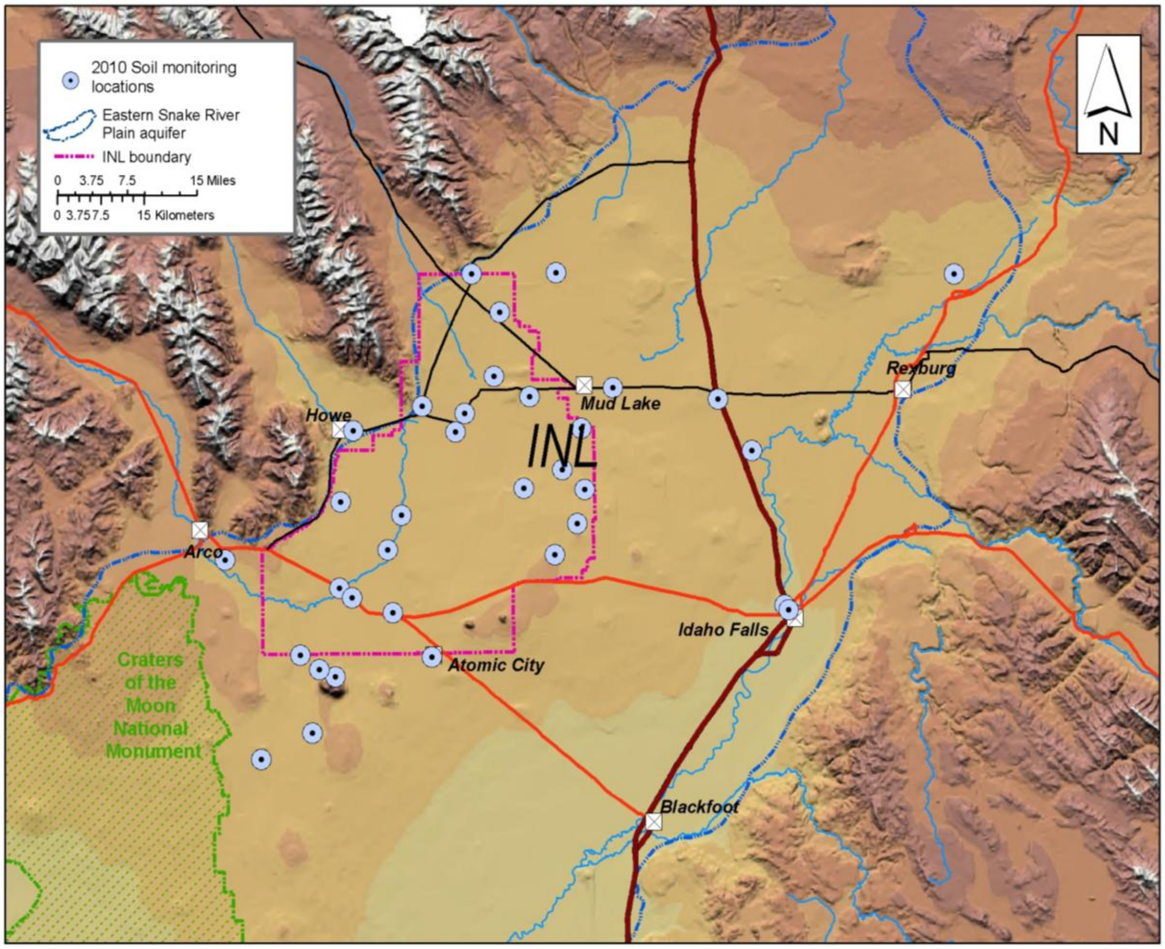

Figure 21. DEQ-INL OP soil sampling locations for 2010.

Terrestrial Monitoring Results and Trends

Monitoring concentrations of gamma-emitting radionuclides in surface soil provides insight to the transport, deposition, and accumulation of radioactive material in the environment as a result of INL operations and historic atmospheric testing of nuclear weapons. During 2010, DEQ-INL OP made *in-situ* gamma spectrometry measurements to estimate accumulations of gamma-emitting radionuclides in surface soil at 34 locations using two detectors. Both detectors were used to provide a cross check on detector 2 which had been repaired before the start of the 2010 sampling season. Detector 1 was employed at all 34 locations while detector 2, which is closer in size to the DOE contractor's detector, was used at 25 locations. DEQ-INL OP also collected 10 physical samples of surface soil at five locations. Of the 44 measurements, Cesium-137 was the only man-made radionuclide that was detected. The average Cesium-137 value, including physical samples analyzed by ISU-EML and *in-situ* measurements made by detector 1, was 0.29 picocuries per gram (pCi/g) with a minimum value of 0.05 pCi/g and a maximum of 0.64 pCi/g, well below the recommended federal screening limit for surface soil of 6.8 pCi/g.

Milk sampling is conducted by DEQ-INL OP to determine whether radioactive iodine is present or absent in the food supply. Radioactive iodine is produced in relatively large quantities during fission reactions (e.g., in nuclear reactors). The chemical nature of iodine makes it mobile under normal conditions. Gaseous radioactive iodine can be dispersed through the atmosphere and carried along with the wind until it is deposited on plants. Dairy cows and goats that graze on radioiodine-contaminated pasture or feed will accumulate iodine in the milk they produce. Drinking this milk could lead to an accumulation of radioactive iodine in the thyroid gland and a greater risk of thyroid cancer.

During 2010, DEQ-INL OP analyzed 76 milk samples. Radioactive iodine was not detected in any milk sample. Since DEQ-INL OP began monitoring milk in 1996 no radioactive iodine (specifically Iodine-131) has ever been detected in excess of the DEQ-INL OP action level of 4.4 pCi/L. This action level is based upon the radioiodine concentration in milk necessary for an infant to receive an annual thyroid radiation dose of 5 millirem. The Food and Drug Administration (FDA) recommended maximum concentration of I-131 for food, including milk, is 4600 pCi/kg.

Terrestrial Monitoring Verification Results

Naturally occurring Potassium-40 is present in milk and soil and is ideal as a quality control measurement and indicator of measurement sensitivity. Therefore, many of the comparisons conducted between DEQ-INL OP and DOE sample results include this isotope, especially since the target radionuclide (such as Iodine-131) is seldom detected in milk samples.

Gamma spectroscopic analysis results of the 23 milk split samples collected by the DOE contractor and submitted to DEQ-INL OP for analysis were compared with DOE results. Potassium-40 results obtained by DEQ-INL OP showed 100% agreement with DOE contractor results. All Iodine-131 results were below the minimum detectable activity for both agencies.

In-situ gamma spectrometry results from soil at thirteen co-located sample sites using detector 2 were compared with the DOE contractor's results. DEQ-INL OP's Potassium-40 results showed 77% agreement with DOE contractor results. DEQ-INL OP and DOE contractor Cesium-137 results showed a relative bias, with a DEQ-INL OP average of 0.34 pCi/g and a contractor average of 0.19 pCi/g. Differences in seasonal sampling schedules and detector placement may have contributed to this bias and will be investigated further. These results were well below the DEQ-INL OP action level and the recommended screening limit for surface soil.

Gamma spectrometry results from physical soil samples taken at five co-located sample sites were compared with the DOE contractor's results. Only one of the Cesium-137 results agreed within the DEQ-INL OP criteria for the five locations, although all results were well below the Federal limit. Known differences in sampling protocol may have contributed to this disagreement that will be investigated further.

Terrestrial Monitoring Impacts and Conclusions

Based upon terrestrial radiological measurements of soil and milk, there were no discernible impacts to the environment from INL operations. Long-term accumulation of radionuclides observed by soil monitoring was consistent with historical measurements and was in the range of concentrations expected as a result of historic above-ground testing of nuclear weapons.

Quality Assurance for the ESP

This section summarizes the results of the quality assurance (QA) assessment of the data collected for calendar year 2010 for the DEQ-INL OP's Environmental Surveillance Program. All analyses and quality control (QC) measures at the analytical laboratories used by the DEQ-INL OP were performed in accordance with approved written procedures maintained by each analytical laboratory. Sample collection was performed in accordance with written procedures maintained by the DEQ-INL OP. Analytical results for blanks, duplicates, and spikes were used to assess the precision, accuracy, and representativeness of results from analyzing laboratories. During calendar year 2010, the DEQ-INL OP submitted 246 QC samples for various radiological and non-radiological analyses. All data collected were assigned the applicable qualifiers to designate the appropriate use of the data, validated, and deemed complete, meeting the requirements and data quality objectives established by DEQ-INL OP.

Issues and Problems

There were no significant QC issues identified during calendar year 2010.

Comparing Data

In addition to reporting independent monitoring results, DEQ-INL OP also determines whether the information collected by DOE matches the information and/or conclusions reached by DEQ-INL OP. One basic tool used by DEQ-INL OP to conduct these comparisons for all split sampling and some co-sampling, is to perform a measure of Relative Percent Difference (RPD) between DEQ-INL OP and DOE measurements. In general, for each sample collected by both DEQ-INL OP and DOE and/or its contractors, the DEQ-INL OP result is subtracted from the DOE result to determine the difference between the two measurements. This difference is divided by the mean of the results for that data pair. Dividing by this number serves to create an RPD, which can then be compared to other RPDs, regardless of the type of analyte or original measured result. This is best explained through the use of the following equation:

RPD = (((DOE result) – (DEQ result)) / ((DEQ result+DOE result)/2)) x 100

The RPD calculated using the above equation is considered acceptable if it is within ±20%. DEQ-INL OP may also calculate an average of all the RPDs found for a specific test or analyte.

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 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 associated with the laboratory measurement of the first sample.
S_2 = Counting error associated with the laboratory measurement of the second sample.

Combined sample comparisons are considered satisfactory if at least 80% of the paired results agree to within the above criteria.

Assessing INL Impacts

DEQ-INL OP evaluates public health and environmental impacts from INL activities and proposed projects. DEQ-INL OP scrutinizes INL's management of radiological materials and wastes, including inventories, storage, treatment, transportation, and disposal. DEQ-INL OP determines whether DOE and the Navy are in compliance with their 1995 court Settlement Agreement with Idaho, which outlines milestones for safe storage, treatment, and removal from Idaho of spent fuel, high-level waste, and transuranic waste. DEQ-INL OP also reviews INL safety concerns and incidents through the DOE Occurrence Reporting and Processing System (ORPS).

DEQ-INL OP observes and maintains awareness of activities not covered by DEQ's Waste Management/Remediation and Air Quality Divisions—who have regulatory authority over CERCLA site remediation, RCRA hazardous waste management, and INL air emissions. A summary of DEQ-INL OP's key priorities is presented in the following sections.

Spent Nuclear Fuel - Receipt and Movement from Wet to Dry Storage

INL Site continues to receive spent nuclear fuel (SNF) shipments from DOE and the Navy under parameters specified in the 1995 Settlement Agreement. Most of the SNF at INL Site is currently in dry storage. According to the 1995 Settlement Agreement, DOE must complete the transfer of all INL Site SNF from wet storage to dry storage by the end of 2023.

During 2010:

- DOE completed transfer of DOE Environmental Management (EM)-owned SNF from wet storage in Building CPP-666 to dry storage in Building CPP-603. This leaves the DOE Nuclear Engineering (NE) and Navy owned SNF in CPP-666 wet storage.
- The DOE INL Site received five truck cask shipments containing SNF in 2010.

- The Navy received two rail shipments containing three containers of SNF at the Naval Reactors Facility (NRF).

Some of the activities DEQ-INL OP performed that were related to the safe management of SNF included:

- Continued to track shipments of SNF into Idaho from research reactor SNF change-outs and naval nuclear reactors.
- Maintained awareness of SNF sources, characteristics, and storage locations as the inventory of SNF changed at the INL.
- Monitored transfer of SNF from wet storage to dry storage.
- Monitored mission need activities associated with decisions regarding the Idaho Spent Fuel Facility (formerly the proposed Foster Wheeler fuel storage facility project).
- Observed SNF operations at the CPP-666 storage pool.
- Reviewed NRF SNF shipment quarterly reports.

Integrated Waste Treatment Unit Construction

During 2010, DOE continued construction of a facility – the Integrated Waste Treatment Unit (IWTU) – to treat approximately 900,000 gallons of sodium-bearing waste (SBW) currently in four 300,000 gallon tanks (one nearly empty) at the INTEC Tank Farm. Treatment will consist of solidification and preparation of this waste for off-site disposal. Solidification is a required activity to meet the 1995 Settlement Agreement milestone that states, "DOE shall complete calcination of sodium-bearing liquid high-level waste by December 31, 2012." SBW contains radioactive and hazardous constituents from previous SNF reprocessing and decontamination activities. DOE selected steam-reforming in place of calcination to treat and stabilize the waste for final disposition at a geologic repository for high-level waste. Steam-reforming is designed to convert SBW into a solid granular product that can be packaged into containers for safe storage while final disposal decisions are made.

DEQ-INL OP personnel attended meetings where IWTU progress was detailed and made INL site visits to observe IWTU construction progress.

Remote-handled Transuranic Waste Shipment

In early 2007, DOE made INL's first (and DOE's first) shipment of remote-handled transuranic (RH-TRU) waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico. Throughout 2010 DOE continued to ship RH-TRU waste to WIPP. TRU waste generally consists of protective clothing, tools, glassware, equipment, soils, and sludge contaminated with radioactive elements with atomic mass greater than uranium such as plutonium, neptunium, americium, curium, and/or californium. Transuranic waste is divided into two categories based on the surface radiation levels of unshielded containers packaged with the waste. TRU waste containers with surface radiation dose rates over 200 millirems per hour are RH-TRU waste. Containers with surface radiation dose rates below 200 millirems per hour are contact-handled transuranic (CH-TRU) waste. Because of its high surface radiation dose rate, RH-TRU waste must be handled cautiously and is transported in shielded casks.

INL's RH-TRU disposition is being approached under several disposition campaigns. The first RH-TRU disposition campaign started in 2007 and is expected to be completed in March 2011.This campaign addressed RH-TRU waste stored at the Intermediate-Level Transuranic Storage Facility (ILTSF) at the RWMC. Most of the ILTSF RH-TRU waste originated at Argonne National Laboratory (near Chicago), with smaller contributions from the NRF, INTEC, Materials and Fuels Complex, and RTC. This waste was placed in interim storage at the ILTSF in the 1970s. This waste (650 drums) was retrieved from the ILTSF vaults and sent to INTEC for venting, real-time radiography, and dose measurement to prepare the drums for loading in approved shipping containers (72B canisters) for placement in a 72B cask (shielded cask) for shipment to WIPP.

Planning for a second RH-TRU disposition campaign began in 2009. This planning included the issuance of an Environmental Assessment entitled *Proposed Remote-handled Waste Disposition Project* (DOE/EA-01386). This project involves characterizing, sorting, treating, and packaging for shipment approximately 300 m^3 of RH waste stored in below ground vaults north of MFC at the Radioactive Scrap and Waste Facility (RSWF). Under this environmental assessment, DOE looked at four alternatives for waste processing activities and selected Alternative 1: INTEC Existing Facilities Alternative. Under this alternative, DOE has modified existing hot-cells at the INTEC CPP-666 Building to be used for RH-TRU waste processing activities. Transfer of the RSWF RH-TRU waste from MFC to INTEC began in 2009. Startup of RH-TRU repackaging in CPP-666 began in January 2010 and the first RSWF RH-TRU waste shipment was sent to WIPP in February 2010.

A third RH-TRU disposition campaign – Naval Reactor Facility (NRF) sludge pan container waste - began in 2010. This waste is being characterized and packaged for shipment to WIPP.

DEQ-INL OP personnel toured packaging facilities, attended meetings, and reviewed documents pertaining to the ongoing process of shipping RH-TRU waste to WIPP.

Accelerated Retrieval Project Activities

The Accelerated Retrieval Project (ARP) is a CERCLA activity to remove targeted waste buried prior to 1970 in the Subsurface Disposal Area (SDA) in the RWMC at the INL Site. Excavated targeted waste is identified, repackaged, characterized, and shipped off-site for disposal. Targeted waste that characterizes as transuranic is shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico. Non-transuranic targeted waste is shipped to other off-site locations for treatment or disposal as appropriate. Targeted wastes consist of filters, graphite, and 741 series sludges containing transuranic radionuclides (i.e., americium-241 and plutonium-239/240), series 743 sludges containing absorbed solvents, and depleted uranium contained in roaster oxides.

The ARP is being implemented in numerous phases. ARP I was the fist phase and was completed in 2008. During this activity 0.50 acres were exhumed with the targeted waste removed and disposed. ARP II began excavation in 2007 and was completed in 2009 with excavation of 0.35 acres. ARP III began excavation in 2008 and was completed in 2009 with excavation of 0.37 acres. ARP IV construction was completed in 2009 with excavation nearly completed in 2010. ARP V construction was completed and excavation was started in 2010. ARP VI and ARP VII each had construction started in 2010.

DEQ-INL OP personnel participated in numerous site visits to observe activities at ARP facilities and attended meetings where ARP progress was addressed.

Transuranic Waste Shipments to the Waste Isolation Pilot Plant

The Advanced Mixed Waste Treatment Plant (AMWTP) at the RWMC packages transuranic (TRU) waste for shipment to the Waste Isolation Pilot Plant (WIPP) in New Mexico. According to the 1995 Settlement Agreement, INL must ship to WIPP at least 2,000 cubic meters of TRU waste per year over a three year running average. After a slow start prior to 2006, AMWTP far surpassed the yearly goal of shipping 2,000 cubic meters by shipping an average of more than 5000 cubic meters each year from 2006 through 2009. During 2010 AMWTP continued this accelerated rate of shipping, again sending over 4000 cubic meters of TRU waste from AMWTP to WIPP.

Some of the activities DEQ-INL OP performed in 2010 to ensure safe management of transuranic waste included:

- Tracked WIPP shipments and coordinated WIPP shipment safety with the Idaho State Police (ISP) (who inspect every outgoing truckload) and with other states through the Western Governors Association (WGA).
- Reviewed DOE reports detailing AMWTP progress on shipping TRU waste out of Idaho.
- Reviewed real-time radiography (RTR) screen shot paperwork for AMWTP box dumping operations to assure proper disposal volume credit was received for TRU waste processed though the AMWTP super compactor.
- Conducted visits to AMWTP to observe waste management activities.
- Joined EPA on their inspection at the AMWTP to review and observe the implementation of key procedures used to build WIPP contact-handled payloads.
- Observed the DOE Carlsbad Field Office yearly WIPP audit of AMWTP activities.

Occurrence Reporting and Processing System Reviews

The DOE Occurrence Reporting and Processing System (ORPS) is an integral part of the DOE Occurrence Reporting Program. This program provides timely notification to DOE of events that could adversely affect: public or DOE worker health and safety, the environment, national security, DOE's safeguards and security interests, or functioning of DOE facilities. DOE ORPS reports provide an important resource for obtaining information on: numbers and types of these events, common or related causes for these events, effectiveness of corrective actions, and lessons learned.

Some of the activities DEQ-INL OP performed to monitor the ORPS were:

- Reviewed OPRS reports for events that occurred on the INL site.
- Performed follow-up on selected ORPS reports to assess how DOE addressed some safety and environmental incidents which occurred at the site.

National Environmental Policy Act Monitoring and Reviews

The National Environmental Policy Act (NEPA) establishes a national framework for protecting the environment. NEPA requires that Federal agencies consider the environmental impacts of their proposed actions and reasonable alternatives to those actions. The NEPA process is intended to help public officials make decisions that are based on understanding environmental consequences and take actions that protect, restore, and enhance the environment. The three basic levels of NEPA environmental review and documentation are: (1) Environmental Impact Statement (EIS); (2) Environmental Assessment (EA); and (3) Categorical Exclusion (CX). The type of proposed action and the degree of environmental effects determine the appropriate level of environmental review.

During 2010, the DEQ-INL OP monitored the status of the following EAs and EISs pertinent to INL:

1) Idaho High-Level Waste and Facilities Disposition (DOE/EIS-0287).
2) Disposal of Greater-Than-Class-C Low-Level Radioactive Waste (DOE/EIS-0375).
3) Proposed Consolidation of Nuclear Operations Related to the Production of Radioisotope Power Systems (DOE/EIS-0373).
4) Hanford Tank Closure and Waste Management, Richland, Washington (DOE/EIS-0391).
5) Storage and Management of Elemental Mercury (DOE/EIS-0423).
6) Multipurpose Haul Road within the Idaho National Laboratory, Idaho (DOE/EA-1772).
7) Radiological Response Training Range at the Idaho National Laboratory, Idaho (DOE/EA-1776).
8) Replacement Capability for Disposal of Remote-handled Low-level Waste Generated at the Department of Energy's Idaho Site (DOE/EA-1793).
9) Stand-Off Experiment Range at the Idaho National Laboratory, Idaho (DOE/EA-1822).
10) EIS Notice of Intent (NOI) for Navy Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling and Examination at INL.

Radiological Emergency Response Planning and Preparedness

The Idaho Bureau of Homeland Security (IBHS) coordinates state emergency response actions in Idaho. For incidents involving radiological materials at the INL Site or elsewhere in Idaho, DEQ-INL OP provides technical information, assistance, and training to local and state authorities.

INL Radiological Incidents

A key element of preparing for INL radiological emergencies is DEQ-INL OP's annual review of INL hazard assessment documents (HADs). These documents explain various potential incidents that could result in the release of certain radionuclides that some INL facilities house. This information allows DEQ-INL OP to identify the scenarios that could potentially result in off-site radiological impacts and plan for those accordingly. In addition to reviewing the HADs, DEQ-INL OP uses the source inventory and accident scenarios for dose assessment modeling, using Air Pollutant Graphical Environmental Monitoring System (APGEMS) software. This allows DEQ-INL OP to run independent radiological plume projections and dose assessment using real time NOAA weather data to make timely technical and protective action recommendations to state emergency authorities.

Drills and Exercises

DEQ-INL Oversight Program co-sponsored a full scale exercise in conjunction with Idaho Bureau of Homeland Security (IBHS), the Idaho Civil Support Team, Idaho Falls Police Department Bomb Squad, Idaho Falls Fire Department, Bonneville County Sheriff's Office, Bonneville County Emergency Management, Bonneville County Commissioners, Idaho State Police, Salt Lake City Division Federal Bureau of Investigation and the DOE Region 6 Radiological Assistance Program. This exercise, named "Idaho RoadRAPTER 2010" followed guidance set forth in the Federal Emergency Management Agency (FEMA) Homeland Security Exercise and Evaluation Program (HSEEP). Personnel from all of the listed supporting groups participated in numerous training sessions as well as a Radiological Dispersal Device (RDD) exercise at Melaleuca Baseball Field in Idaho Falls. The exercise consisted of a simulated RDD which was planted at Melaleuca Field by a hate group to disrupt and injure participants of a Jewish group staging a Passover celebration in Idaho Falls. The various responder groups surveyed for, characterized, and disposed of a suspicious package discovered in the stands. **Figure 22** shows a first responder at Melaleuca Field.

Figure 22. Idaho Falls Bomb Squad makes entry at "Idaho RoadRAPTER 2010" RDD exercise.

DEQ-INL OP also participated in the 2010 INL annual exercise which consisted of a simulated accidental on-site release of radioactive material that became airborne and was transported off-site. This exercise was conducted in multiple phases to practice different areas of the response. These included transport and receiving of contaminated patients to the local hospital, environmental modeling of plume projections for the derivation of Protective Action Guides (PAGs) to be recommended to the affected counties, and deployment of State environmental monitoring teams with INL Radiological Control support.

Waste Isolation Pilot Plant Shipment Safety

DOE contracts with the Western Governors Association (WGA) to coordinate activities related to the safe shipment of transuranic waste to WIPP through western states. DEQ-INL OP works with the Idaho State Police (ISP) and the IBHS to manage WIPP shipment safety activities on the US Route 20/26, Interstate 15, and Interstate 84 / 86 corridors in Idaho.

During 2010, DEQ-INL OP:

- Reviewed the WIPP Transportation Safety Program Implementation Guide.

- Co-chaired the WIPP Technical Advisory Group meetings for western states.
- Provided emergency responder training.
- Oversaw radiological equipment procurement and calibrations for ISP, all seven Idaho regional response teams, the Shoshone-Bannock Tribes, and three area hospitals.
- Provided public information support.

Support and Training of Idaho Radiological Emergency Responders

In 2010, DEQ-INL OP continued to provide Idaho emergency responders with fundamental knowledge and skills required to respond with confidence to incidents involving radioactive material. **Figure 23** shows first responders in a training exercise. DEQ-INL OP health physicists taught courses ranging from an overview of radioactive materials to more complex topics of radiological instrumentation, incident response measures, decontamination procedures, receiving and handling of potentially contaminated patients, and internal contamination.

Figure 23. First responders participating in a radiation dispersal device (RDD) exercise.

During 2010, DEQ-INL OP performed the following activities with the assistance of DOE, ISP, and IBHS:

Trained 366 first responders on basic radiological awareness, shipping radiological material, and hands-on use of radiological instrumentation.

Included in these numbers are:

a) All 7 Idaho Regional Response Teams (RRTs)
b) Fire departments and Emergency Medical Technician (EMT) groups on the I-15 WIPP corridor
c) Fire departments and EMT groups on the I-84/86 corridor
d) Fire departments and EMT groups on the I-90 corridor
e) Idaho State Civil Support Team (CST)
f) Bonner, Power and Custer County Emergency Management personnel
g) Bonner and Bingham County Hospitals
h) Numerous Law Enforcement Officers from across the state.

- Oversight staff members attended 1 RRT Team Leaders meeting.
- DEQ-INL OP co-sponsored a radiological incident exercise with the RRT 7, Idaho Falls Fire, Local Law Enforcement, DOE Radiological Assistance Program (RAP) Team and the Idaho Civil Support Team in Idaho Falls.
- Staff covered 8 weeks as Environmental Liaison for the State of Idaho DEQ on the IBHS Hazardous Materials incident call down list.
- Staff members attended a week long Hazardous Materials Response training in Boise sponsored by Idaho Bureau of Homeland Security.
- Staff members attended a week long Federal Emergency Management Agency Weapons of Mass Destruction (WMD) Radiological/Nuclear Response Operations Course in Pocatello.
- Staff members supported Emergency Responders throughout the State of Idaho with incidents involving radiological materials.
- Staff members deployed portable high volume air monitors to collect particulates in smoke from wildfires on the INL. (No radiological contaminants above background were detected.)

Public Outreach

A fundamental aspect of DEQ-INL OP's work is sharing our findings with the public and factoring public input into our activities and policy recommendations. DEQ-INL OP uses several tools to provide Idahoans with independent, accurate, and timely information about activities relating to the INL and other DOE activities in Idaho – publications, events, our Web site, and our community monitoring network.

Publications

DEQ-INL OP regularly issues technical and non-technical publications to communicate the findings and activities of our program. In 2010, we issued:

- Four quarterly environmental surveillance data reports.

Presentations and Events

DEQ-INL OP also communicates with the public about INL-related issues through schools, fairs, special interest groups, and public events. In 2010, we gave public presentations on the aquifer, and INL Site issues to a range of school and civic groups, and special interest groups. We also participated in events such as the Twin Falls County Fair, Eastern Idaho State Fair, Idaho Falls Earth Day, Water Festival and Edible Aquifer presentations. Idaho Falls Mayor Fuhriman is reading the 2010 Earth Day Proclamation to kick off the activities in **Figure 24**. One of the many vendors at Idaho Falls Earth Day gives demonstrations of the glove box in **Figure 25**. Water Awareness 2010 Poetry Contest Display in the Idaho Falls Library is shown in **Figure 26**. In **Figure 27** children are enjoying the rain stick activity that INL oversight program provides to over 900 6th grade students during the 2010 Water Festival event held in May.

Figure 24. Idaho Falls Mayor Fuhriman reading the 2010 Earth Day Proclamation.

Figure 25. BEA employees demonstrating the glove box for Earth Day.

Figure 26. 2010 Water Awareness Poetry contest winner’s display.

Figure 27. Children enjoying the rainstick activity that INL Oversight provides at the 2010 Water Festival.

Community Monitoring Network

DEQ-INL OP also participates in a community monitoring network in Eastern Idaho in cooperation with the Shoshone-Bannock Tribes, the U.S. Department of Energy, and NOAA. Strategically located community monitoring stations provide real-time atmospheric and radiological data to the public at each station location and also transmit data to the World Wide Web at http://www.idahoop.org/. **Figure 28** shows one community monitoring station.

Figure 28. Community monitoring station at the greenbelt in Idaho Falls.