

## 6.0 Air Monitoring

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*CJ Perkins, DJ Rokkan*

The purpose of Hanford Site air monitoring programs is to ensure the protection of environmental and public health for the air pathway. Air quality is monitored using stack sampling at the sources and ambient air monitoring at receptor locations. The specific objectives are to measure airborne radionuclides and chemicals in order to calculate the doses to humans, plants, and animals. Measured and calculated results are compared with DOE, EPA, and/or WDOH standards. This report presents the results of the 2014 measurements.

### 6.1 Air Emissions

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Hanford Site contractors monitor airborne emissions from site facilities to determine compliance with state and federal regulatory requirements as well as to assess the effectiveness of emission control equipment and pollution management practices. Measuring devices quantify most facility emission flows, while other emission flows are calculated using process information or the fan manufacturers' specifications. Most facility radioactive air emission units are actively ventilated stacks that are sampled either continuously or periodically. Airborne emissions with a potential to contain radioactive materials at prescribed threshold levels are measured for gross alpha and gross beta concentrations and, as warranted, specific radionuclides. Nonradioactive constituents and parameters are monitored directly, sampled and analyzed, or estimated based on inventory usage.

Emission data are documented in this and other reports, all of which are available to the public. For example, DOE annually submits to EPA and the WDOH a report of Hanford Site radionuclide air emissions (e.g., [DOE/RL-2015-12](#)) in compliance with [40 CFR 61](#), Subpart H and with [WAC 246-247](#).

#### 6.1.1 Radioactive Airborne Emissions

Small quantities of particulate and volatilized forms of radionuclides are emitted to the environment through state and federally permitted radioactive emission point sources (i.e., stacks). Tritium (i.e., hydrogen-3), strontium-90, iodine-129, cesium-137, plutonium-238, plutonium-239/240, plutonium-241, and americium-241 are the isotopes most commonly measured in the emissions. Emission points are monitored continuously if they have the potential to exceed 1 percent of the standard for public dose, which is 10 millirem (100 microsievert) per year.

Distinguishing Hanford Site-produced radionuclides in the environment is challenging because concentrations of emissions from site stacks are comparable to widespread background concentrations of radionuclides that originated from historical atmospheric nuclear weapons testing. Gross alpha and gross beta concentrations in stack emissions are, on average, equivalent to concentrations in the environment, including concentrations at distant locations upwind of the Hanford Site. Radioactive emissions decreased on the Hanford Site largely because the production and processing of nuclear materials ceased.

The continuous monitoring of radioactive emissions from facilities requires analyzing samples collected at points of discharge to the environment, usually a stack. Samples are analyzed for gross alpha and gross beta as well as for selected radionuclides. Specific radionuclides are selected for sampling, analysis, and reporting based on an evaluation of the hypothetical maximum potential of emissions of known

radionuclide inventories in a facility or an outside activity occurring under normal operating conditions, with the calculated effect of pollution-abatement equipment removed, sampling criteria provided in contractor environmental compliance manuals, and the potential of each radionuclide to contribute to the public dose. Continuous air monitoring systems with alarms also are used at selected emission points where the potential exists for radioactive emissions to exceed normal operating ranges to levels that require immediate personnel alert.

Radioactive emission points are located on the Hanford Site in the 100, 200, 300, 400, and 600 Areas. The prime sources of emissions and the number of emission points by operating area are as follow:

- ⊗ In the 100 Areas, three radioactive emission points were active. Emissions originated from the 100-K West Fuel Storage Basin, which in previous years contained irradiated nuclear fuel, and from the Cold Vacuum Drying Facility (CVDF).
- ⊗ In the 200 Areas, 37 radioactive emission points were active. The primary locations of these emission points were the PFP, T Plant, B Plant, WESF, underground tanks storing high-level radioactive waste, a waste evaporator, the WRAP Facility, the 222-S Laboratory, and the PUREX Plant.
- ⊗ In the 300 Area, four radioactive emission points were active. The primary sources of these emissions were laboratories and research facilities, including the 324 Waste Technology Engineering Laboratory, 325 Applied Chemistry Laboratory, and 331 Life Sciences Laboratory.
- ⊗ In the 400 Area, three radioactive emission points were active. The sources of these emissions are three facilities that have been shut down: FFTF, Maintenance and Storage Facility, and the Fuels and Materials Examination Facility.
- ⊗ In the 600 Area, two radioactive emission points were active at WSCF where low-level radiological and chemical analyses were performed on various types of samples (e.g., particulate air filters, liquids, soil, and vegetation).

Air emission data collected in 2014 were comparable to those collected in 2013. Table 6.1 summarizes Hanford Site radioactive airborne emissions in 2014.

*Table 6.1. Hanford Site Radioactive Airborne Emissions*

Radionuclide	Half-Life	2014 Releases, Ci <sup>a</sup>				
		100 Area	200-East Area	200-West Area	300 Area	400 Area
Actinium-227	21.6 years	NA	NA	NA	3.3 x 10 <sup>-10</sup>	NA
Alpha (gross)	NA	3.6 x 10 <sup>-6</sup>	9.7 x 10 <sup>-7</sup>	2.8 x 10 <sup>-5</sup>	4.9 x 10 <sup>-8</sup>	NA
Americium-241	432.2 years	1.5 x 10 <sup>-6</sup>	2.4 x 10 <sup>-8</sup>	3.6 x 10 <sup>-6</sup>	2.3 x 10 <sup>-10</sup>	NA
Americium-243	7,380 years	NA	NA	NA	8.5 x 10 <sup>-8</sup>	NA
Beta (gross)	NA	1.3 x 10 <sup>-5</sup>	1.1 x 10 <sup>-4</sup>	1.1 x 10 <sup>-5</sup>	3.3 x 10 <sup>-6</sup>	NA
Cesium-134	2.1 years	NM	NM	NM	NM	NM
Cesium-137	30 years	5.5 x 10 <sup>-7</sup>	3.7 x 10 <sup>-5</sup>	2.1 x 10 <sup>-7</sup>	1.6 x 10 <sup>-6</sup>	4.3 x 10 <sup>-7 (b)</sup>
Curium-243/-244	29.1 years	NA	NA	NA	ND	NA
Europium-152	13.5 years	NM	NM	NM	1.6 x 10 <sup>-9</sup>	NA
Europium-154	8.6 years	3.7 x 10 <sup>-10</sup>	NM	NM	5.5 x 10 <sup>-9</sup>	NA
Gadolinium-153	240.4 days	NA	NA	NA	1.0 x 10 <sup>-10</sup>	NA
Iodine-129	16,000,000 years	NA	9.8 x 10 <sup>-4</sup>	NA	NA	NA
Krypton-85	10.7 years	NA	NA	NA	5.6 x 10 <sup>-7</sup>	NA

Table 6.1. Hanford Site Radioactive Airborne Emissions

Radionuclide	Half-Life	2014 Releases, Ci <sup>a</sup>				
		100 Area	200-East Area	200-West Area	300 Area	400 Area
Neptunium-237	2,144,000 years	NA	NA	NA	2.9 x 10 <sup>-9</sup>	NA
Plutonium-238	87.7 years	3.3 x 10 <sup>-8</sup>	3.7 x 10 <sup>-11</sup>	5.5 x 10 <sup>-7</sup>	3.7 x 10 <sup>-8</sup>	NA
Plutonium-239/240	24,110 years	2.6 x 10 <sup>-7</sup>	3.3 x 10 <sup>-8</sup>	1.3 x 10 <sup>-5</sup>	8.5 x 10 <sup>-9</sup>	2.0 x 10 <sup>-7(c)</sup>
Plutonium-241	14.4 years	1.1 x 10 <sup>-6</sup>	ND	4.7 x 10 <sup>-6</sup>	3.9 x 10 <sup>-7</sup>	NA
Protactinium-231	32,760 years	NA	ND	NA	NA	NA
Radium-226	1,600 years	NA	NA	NA	4.8 x 10 <sup>-10</sup>	NA
Radon-220	55.6 seconds	NA	NA	NA	7.5 x 10 <sup>+1</sup>	NA
Radon-222	3.8 days	NA	NA	NA	2.4 x 10 <sup>-2</sup>	NA
Sodium-22	2.6 years	NA	NA	NA	NA	1.4 x 10 <sup>-9(d)</sup>
Strontium-90	29.1 years	2.8 x 10 <sup>-7</sup>	9.3 x 10 <sup>-5</sup>	3.9 x 10 <sup>-7</sup>	5.8 x 10 <sup>-7</sup>	NA
Technetium-99	211,100 years	NA	NA	NA	4.1 x 10 <sup>-6</sup>	NA
Tritium (elemental)	12.3 years	NA	NA	NA	3.1 x 10 <sup>+2</sup>	NA
Tritium (tritiated water vapor)	12.3 years	NA	NA	NA	3.1 x 10 <sup>+2</sup>	1.8 x 10 <sup>-3</sup>
Uranium-232	68.9 years	NA	NA	NA	5.3 x 10 <sup>-9</sup>	NA
Uranium-233	159,200 years	NA	NA	NA	1.8 x 10 <sup>-8</sup>	NA
Yttrium-90	1.5 seconds	NA	9.3 x 10 <sup>-5</sup>	NA	NA	NA

<sup>a</sup> To convert to the International System of Units; multiply pCi/g by 0.037 to obtain Bq/g.

<sup>b</sup> This release value derives from data on gross beta emissions from 400 Area stacks.

<sup>c</sup> This release value derives from data on gross alpha emissions from 400 Area stacks.

<sup>d</sup> Calculated from estimated residual sodium inventory remaining in FFTF primary coolant piping.

NA = Not applicable.

ND = Not detected (i.e., either the radionuclide was not detected in any sample during the year or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels).

NM = Not measured.

### 6.1.2 Criteria and Toxic Air Pollutants

Criteria and toxic air pollutants emitted from chemical-processing and electricity-generating engines fueled by petroleum are monitored when activities are known to release pollutants of concern, such as particulate matter, sulfur oxides, nitrogen oxides, volatile organic compounds, carbon monoxide, and lead. Total annual releases of these constituents are reported in accordance with the air quality standards established in [WAC 173-400](#), *General Regulations for Air Pollution Sources*. Based on the quantities of petroleum fuel consumed at Hanford Site power plants, emissions were calculated using EPA-approved formulas ([AP-42](#), *Compilation of Air Pollutant Emission Factors*, Volume I: *Stationary Point and Area Sources*). Table 6.2 summarizes the Hanford Site emissions of nonradioactive criteria and toxic air pollutants discharged to the atmosphere.

Table 6.2. Hanford Site Criteria and Toxic Air Pollutant Emissions

Constituent	2014 Releases	
	lb	kg
<b>Criteria Pollutants</b>		
Particulate matter-total	0	0
Particulate matter-10	2,000	907
Particulate matter-2.5	0	0
Lead	0	0
Nitrogen oxides	32,000	14,515
Sulfur oxides	0	0
Carbon monoxide	20,000	9,072
Volatile organic compounds	10,000	4,536
Ammonia	6,000	2,722
<b>Toxic Air Pollutants</b>		
Acetic acid	1	0.45
Acetone	2	0.91
Benzene	1	0.45
Carbon tetrachloride	200	2.7
Chloroform	2	0.45
Dichloromethane	11	5.0
1,1,1-Trichloroethane	2	0.91
Trichlorofluoromethane	1	0.45

## 6.2 Ambient Air Monitoring

*CJ Perkins*

Atmospheric releases of radioactive materials from Hanford Site facilities and operations to the surrounding region are potential sources of exposure to humans. Radioactive constituents in air are monitored at Hanford Site facilities and operations, at locations away from site facilities, and offsite around the site perimeter as well as in nearby and distant communities. Information about these ambient air-monitoring efforts, including detailed descriptions of air sampling and analysis techniques, is provided in RL's environmental monitoring plan ([DOE/RL-91-50](#)).

Comparing measured radionuclide concentrations from locations on and around the Hanford Site to concentrations measured at upwind locations assumed to be uninfluenced by Hanford Site operations provides an evaluation of the impact of radionuclide air emissions from the Hanford Site on surrounding ambient air.

### 6.2.1 Hanford Site Ambient Air Monitoring

A network of continuously operating samplers at 63 locations across the Hanford Site was used during 2014 to monitor radioactive airborne materials in air near Hanford Site facilities and operations (Table 6.3). Most air samplers were located at or within approximately 1,640 feet (500 meters) of sites and facilities having the potential for, or a history of, environmental releases. The samplers were primarily located in the prevailing downwind direction. Samples were collected according to a schedule established before the 2014 monitoring year. Airborne particle samples were collected at each location by drawing air through a cellulose filter. The filters were collected biweekly, field-surveyed for gross radioactivity, held

for at least 5 days, and then analyzed for gross alpha and beta activity. The 5-day holding period is necessary to allow for the decay of naturally occurring, short-lived radionuclides that would otherwise obscure the detection of longer-lived radionuclides associated with emissions from nuclear facilities. The gross radioactivity measurements were used to indicate changes in trends in the onsite facility environment.

For most specific radionuclide analyses, the amount of radioactive material collected on a single filter during a 2-week period was too small to be measured accurately. The individual samples collected during the year at each location were combined into semiannual, location-specific, composite samples (Table 6.3) to increase the accuracy of the analysis. Composite samples were routinely analyzed for gamma-emitting isotopes, strontium-90, uranium-234, uranium-235, plutonium-238, uranium-238, and plutonium-239/240. Americium-241 and plutonium-241 were analyzed at locations associated with spent nuclear fuel processing.

Figure 6.1 shows the annual average air concentrations of selected radionuclides in the 100, 200, and 600 Areas compared to EPA concentration values and air concentrations measured in distant communities. The EPA concentration values for environmental compliance ([40 CFR 61](#), Appendix E, Table 2) are dose-based reference values used as indices of performance. The concentration values are concentrations that would result in a dose of 10 millirem (100 microsievert) per year under conditions of continuous exposure. The 2014 data indicate a large degree of variability by location. Air samples collected from locations at or directly adjacent to Hanford Site facilities had higher radionuclide concentrations than samples collected farther away. In general, analytical results for most radionuclides were at or near Hanford Site background levels, which are much less than EPA concentration values but greater than those measured offsite. The data also show that concentrations of certain radionuclides were higher and widely variable within different Hanford Site operational areas. Appendix C, Table C.5 shows the annual average and maximum concentrations of radionuclides in air samples collected near Hanford Site facilities and operations during 2014.

Air monitoring was conducted only through April 2014 at the 100-N Area deactivation, decommission, decontamination and demolition (D4) project. All radionuclides of concern were below analytical detection limits.

Ambient air was monitored in 2014 at six locations in the 100-K Area, and analytical results showed radionuclide concentrations at or below typical Hanford Site levels. Uranium-234 and uranium-238 were detected in approximately 17 percent of the samples, and tritium was detected in approximately 30 percent of the samples. All other radionuclides of concern were below analytical detection limits.

Air sampling was conducted at 21 locations in the 200 East Area during 2014. Generally, radionuclide levels measured in the 2014 air composite samples were similar to those measured in previous years. Uranium-234 and uranium-238 were detected in approximately 30 percent of the samples. All other radionuclides of concern were below analytical detection limits.

Air sampling was conducted at 23 locations in the 200 West Area during 2014. Radionuclide levels measured were similar to results for previous years. Uranium-234 and uranium-238 were detected in approximately 25 percent of the samples. Plutonium-239/240 was detected in approximately 10 percent of the samples. Noteworthy for the second consecutive year (2014) was that there were no elevated

plutonium-239/240 concentrations at air-sampling location N165, located near the 216-Z-9 Trench (see Figure 6.2).

Air sampling in support of the 300 Area D4 and Field Remediation project continued in 2014. Uranium-234 and uranium-238 were detected in 85 percent of the samples at levels similar to those measured in previous years.

Air sampling was conducted at five locations at ERDF (200 West Area). Radionuclide levels measured at this site were similar to typical Hanford Site levels. Uranium-234 and uranium-238 were detected in 10 percent of the samples, and all other radionuclides of concern were below analytical detection limits.

Air monitoring was conducted at four locations at the 618-10 Burial Ground Project (north of the 300 Area). The analytical results showed that plutonium-239/240 was detected in 75 percent of the samples, and uranium-234, uranium-238, and americium-241 were detected in approximately 38 percent of the samples. During the second-half of 2014, one air monitoring result from one station located at the 618-10 Burial Ground project was greater than 10 percent of EPA's concentration values ([40 CFR 61](#), Appendix E, Table 2) and was reported to EPA and WDOH. Plutonium-239/240 at station N548 was elevated, and no contributing cause was specifically identified. Similar results were reported at this location during 2011 and 2012 (see Figure 6.3).

Table 6.3. Hanford Site Monitoring Locations and Analyses for Ambient Air Monitoring Samples

Site/Project	Number of Samplers	EDP Code	Analyses	
			Bi-Weekly	Composite
100-K Area	6	N476, N534, N535, N575, N576 <sup>a</sup> , N578	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238, americium-241
100-N Area D4 Project	3	N102, N103, N106	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238, americium-241
200-East Area	17	N019, N158, N498, N499, N957, N967, N968, N969, N970, N972, N973, N976, N977, N978, N984 <sup>a</sup> , N985, N999	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
Canister Storage Building (200-East Area)	2	N480, N481	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
Integrated Disposal Facility (200-East Area)	2	N532, N559	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
200-West Area	23	N155, N161, N165 <sup>a</sup> , N168, N200, N304, N433, N441, N442, N449, N456, N457, N554, N555, N956, N963, N964, N965, N966, N974, N975, N987, N994	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
300 Area D4 and Field Remediation Project <sup>b</sup>	2	N557, N130	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
Environmental Restoration Disposal Facility	5	N482 <sup>a</sup> , N168, N517, N518, N963	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
600 Area (WYE Barricade)	1	N981 <sup>a</sup>	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238
618-10 Burial Ground	4	N548 <sup>a</sup> , N549, N579, N580	Alpha, Beta	GEA, strontium-90, plutonium-238, -239/240, uranium-234/-235/-238

<sup>a</sup>. Collocated sampling location with Washington State Department of Health.

<sup>b</sup>. Offsite air sampling station(s) provide supplemental air monitoring data. See Table 6.4 for a listing of locations.

D4 = deactivation, decommission, decontamination and demolition.

EDP = Environmental data point code = sampler location code.

GEA = Gamma energy analysis.

Figure 6.1. Hanford Site Average Radionuclide Concentrations in Ambient Air Samples Compared to Distant Community Samples

Because of figure scale, some uncertainties (error bars) are concealed by the point symbol. KBC = K Basins Closure Project.

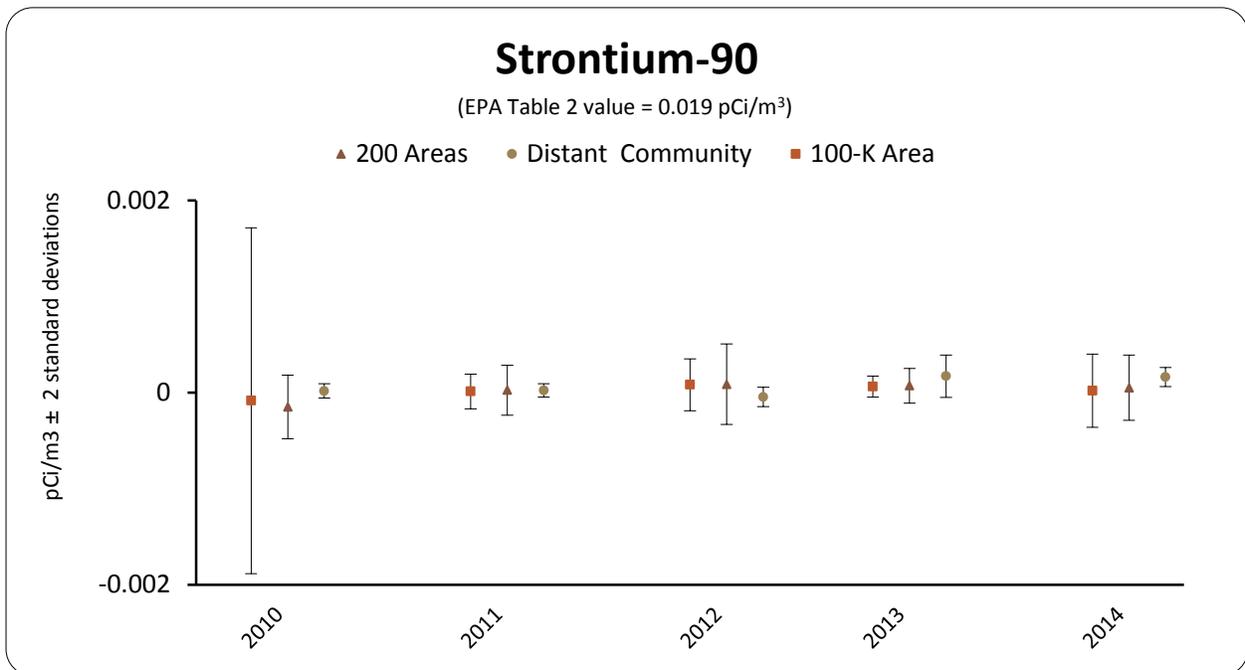
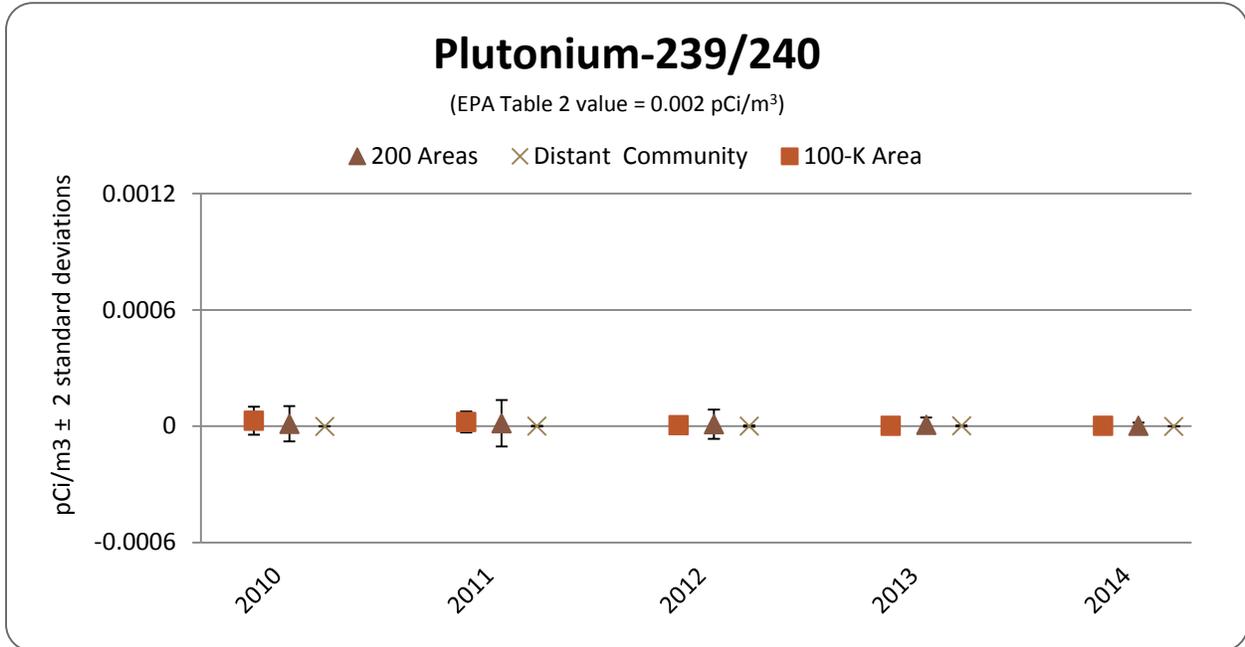


Figure 6.1 Hanford Site Average Radionuclide Concentrations in Ambient Air Samples Compared to Distant Community Samples (Cont.)

Because of figure scale, some uncertainties (error bars) are concealed by the point symbol. KBC = K Basins Closure Project.

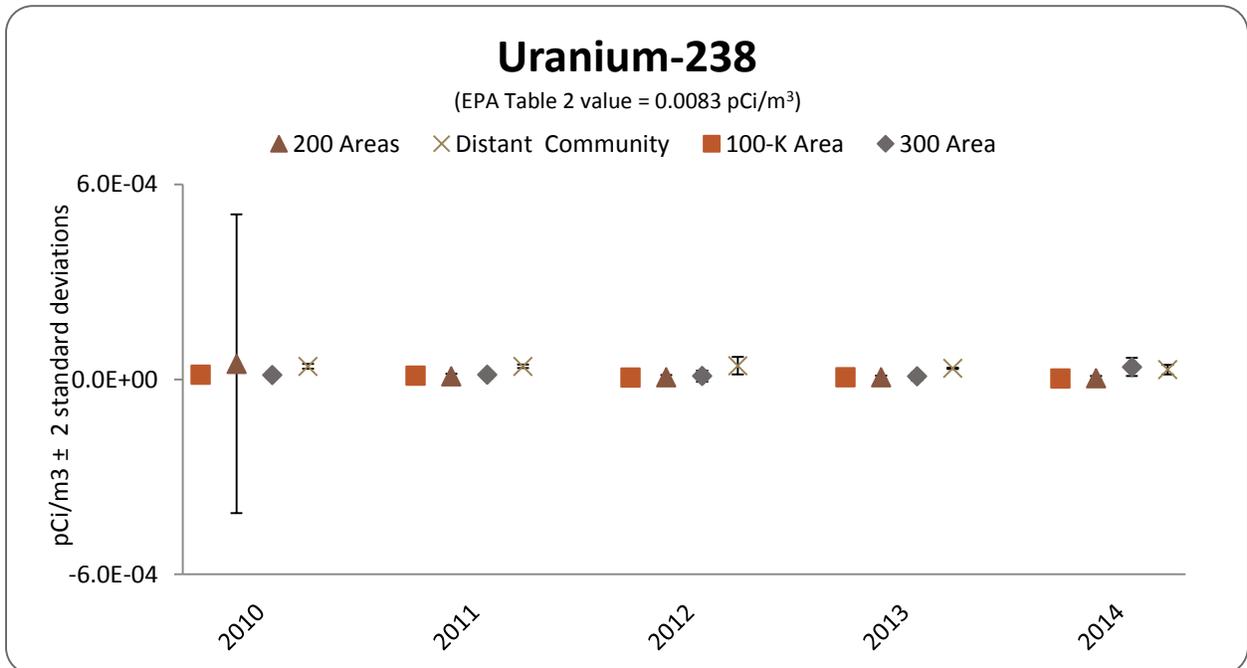
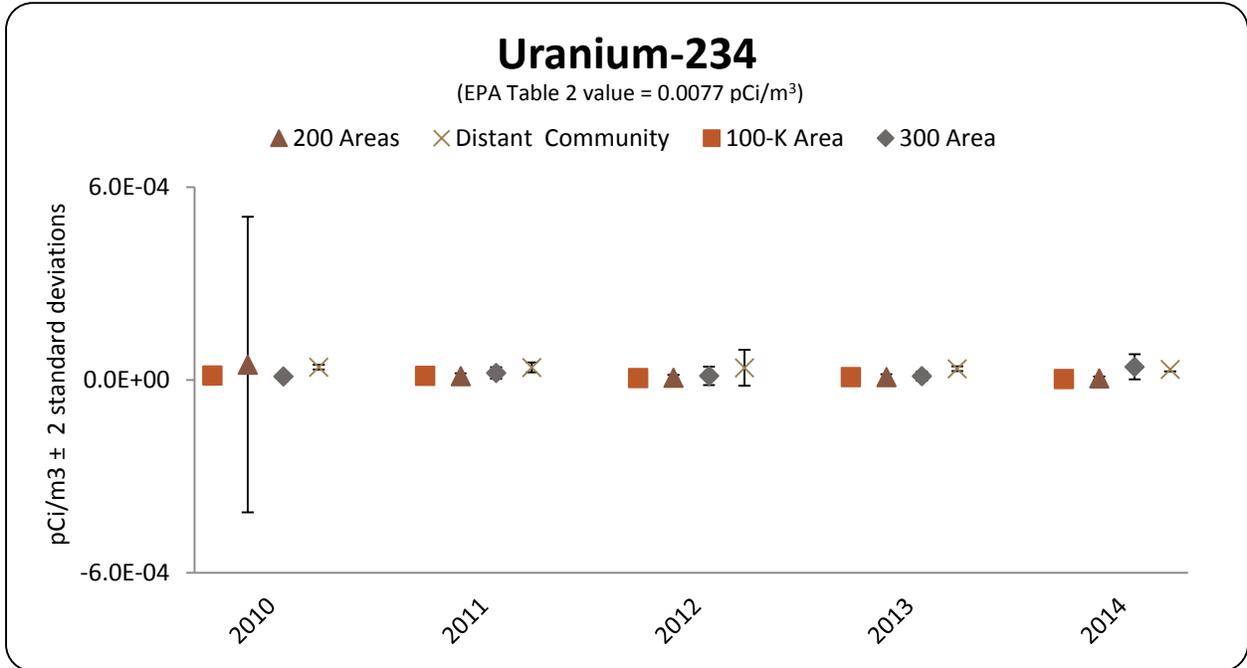


Figure 6.2. Plutonium-239/240 Air Concentrations at 216-Z-9 Trench

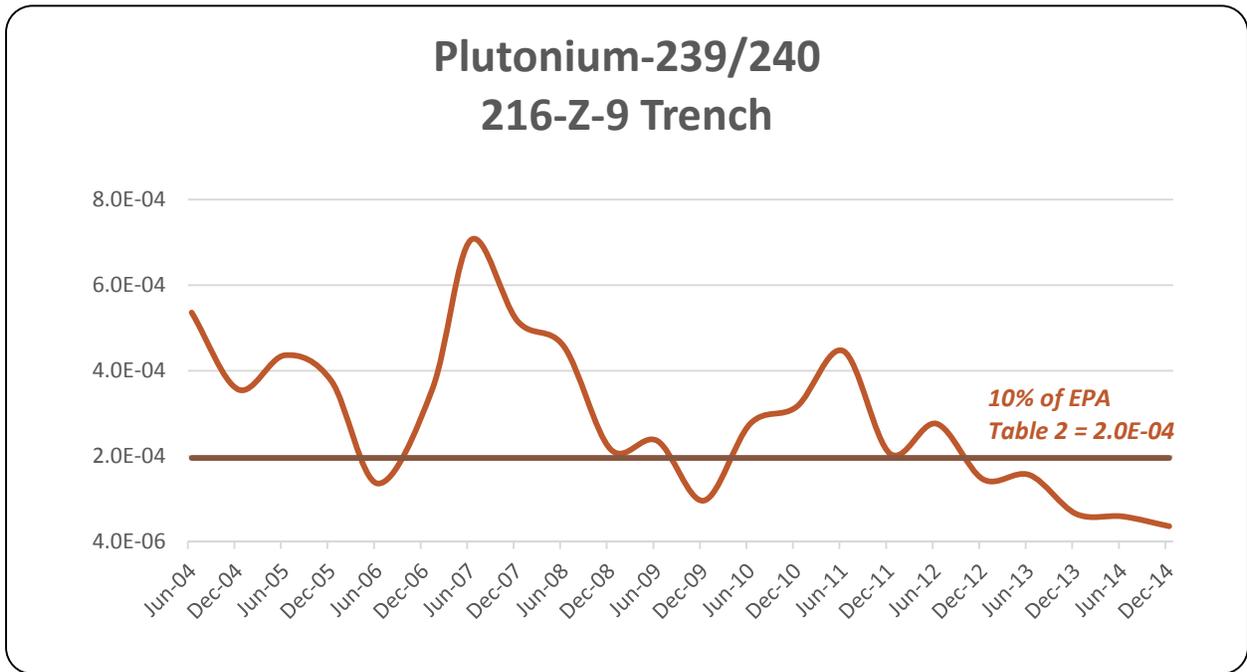
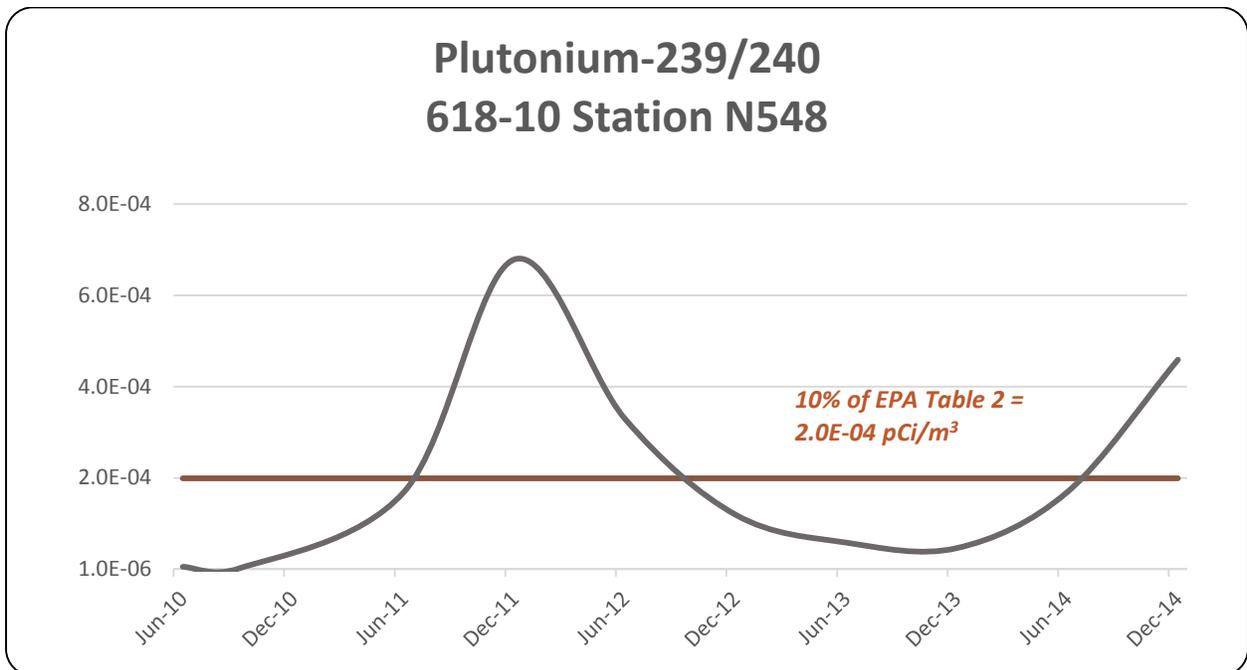


Figure 6.3. Plutonium-239/240 Air Concentrations at 618-10 Station N548



## 6.2.2 Hanford Site and Offsite Ambient Air Monitoring

Airborne radionuclide samples were collected in 2014 by 40 continuously operating samplers at or in the vicinity of the Hanford Site. The sampling stations were grouped into four location classifications: 1) Hanford Site (21 stations), 2) perimeter (11 stations), 3) nearby Hanford Site communities (7 stations), and 4) distant community (1 station) (Figure 6.4 and Table C.6, Appendix C). Hanford Site air samplers were located primarily around major operational areas to maximize the capability to detect radiological contaminants resulting from site operations. Perimeter samplers were located around the site boundary with emphasis on the prevailing downwind directions to the south and east. Samplers located in Basin City, Benton City, Kennewick, Mattawa, Othello, Pasco, and Richland, Washington, provided data for the nearest population centers. A sampler in Yakima, Washington, provided background data from a community essentially unaffected by Hanford Site operations.

### 6.2.2.1 Sampling and Analysis

Samples were collected and analyzed according to a schedule established prior to the monitoring year for offsite samples ([DOE/RL-2013-53](#), *Hanford Site Environmental Surveillance Master Sampling Schedule Calendar Year 2014*). Airborne particle samples were collected biweekly at each location by continuously drawing air through a glass-fiber filter. The filter samples were transported to an analytical laboratory and stored for at least 72 hours. The storage time allows for the decay of short-lived, naturally occurring radionuclides (e.g., radon gas decay products) that would otherwise obscure the detection of longer-lived radionuclides potentially present from Hanford Site emissions. The filters were then analyzed for gross beta radiation. Selected filters were also analyzed for gross alpha radiation. Historically, for most radionuclides, the amount of radioactive material collected on a filter during a 2-week period has been too small to analyze accurately individual radionuclides of concern. Biweekly samples were combined into semiannual composite samples to increase the sensitivity and accuracy of the analysis. The compositing procedure results in a 26-week average concentration for specific radionuclides present in the atmosphere as particulates. The composite samples were analyzed for gamma-emitting radionuclides, and most were analyzed for strontium-90, uranium-234, uranium-235, plutonium-238, uranium-238, and plutonium-239/240. Table 6.4 shows the analyses for the discrete filters and composite samples.

Atmospheric water vapor was collected for tritium analysis at 20 locations in 2014 by continuously drawing air through multi-column samplers containing adsorbent silica gel. The water-vapor samplers were exchanged every 4 weeks to prevent loss of the sample as a result of breakthrough (i.e., oversaturation). The collection efficiency of the silica gel adsorbent is discussed in *Ambient Air Sampling for Tritium-Determination of Breakthrough Volumes and Collection Efficiencies for Silica Gel Adsorbent* ([Patton et al. 1997](#)). The collected water was distilled from the silica gel and analyzed for its tritium content.

### 6.2.2.2 Monitoring Results

All sample results in 2014 showed very low radiological concentrations in air. With the exception of one sample, all radionuclide concentrations (Table C.6, Appendix C) were less than their respective EPA Table 2 concentration values. The EPA concentration values ([40 CFR 61](#), Appendix E, Table 2) are concentrations that would result in an annual dose of 10 millirem (100 microsievert) per year from airborne radiological material.

Gross alpha concentrations in the air samples collected in 2014 from Hanford Site, perimeter, and nearby Hanford Site communities were comparable to each other and slightly higher than samples from the distant community. Gross alpha concentrations in 2014 were comparable to concentrations seen in the previous 5 years.

Gross beta and gross alpha concentrations in air peaked during the fall and winter months in 2014 (Figure 6.5), repeating a pattern of natural radioactivity fluctuations (*Environmental Radioactivity from Natural, Industrial, and Military Sources* [Eisenbud 1987]). This fluctuation is seen in both Hanford Site and distant location concentrations.

During the second-half of 2014, one air monitoring result from a perimeter station located east of the Hanford Site was slightly greater than 10 percent of EPA's concentration value (40 CFR 61, Appendix E, Table 2) and was reported to EPA and WDOH. Cobalt-60 was detected at the West End of Fir Road Station, and no contributing cause was specifically identified.

Plutonium-239/240 was detected at very low levels in 2 out of 64 air samples collected in 2014. Both results were less than 1 percent of the EPA concentration value. Figure 6.6 shows that plutonium-239/240 concentrations in the air samples collected in 2014 are at levels similar to those measured in previous years. There were no plutonium-238 detects in 2014.

Uranium-234 and uranium-238 were both detected in all air samples collected in 2014 from all four location classes. Figure 6.6 shows that uranium-234 and uranium-238 concentrations were at levels similar to those measured in previous years. The maximum concentrations measured in all locations were less than one percent of the EPA concentration values for both radionuclides.

Cesium-137 was detected in one sample at less than 10 percent of the EPA concentration value.

Strontium-90 was not detected in any of the samples collected during 2014.

Figure 6.4. Ambient Air Sampling Locations

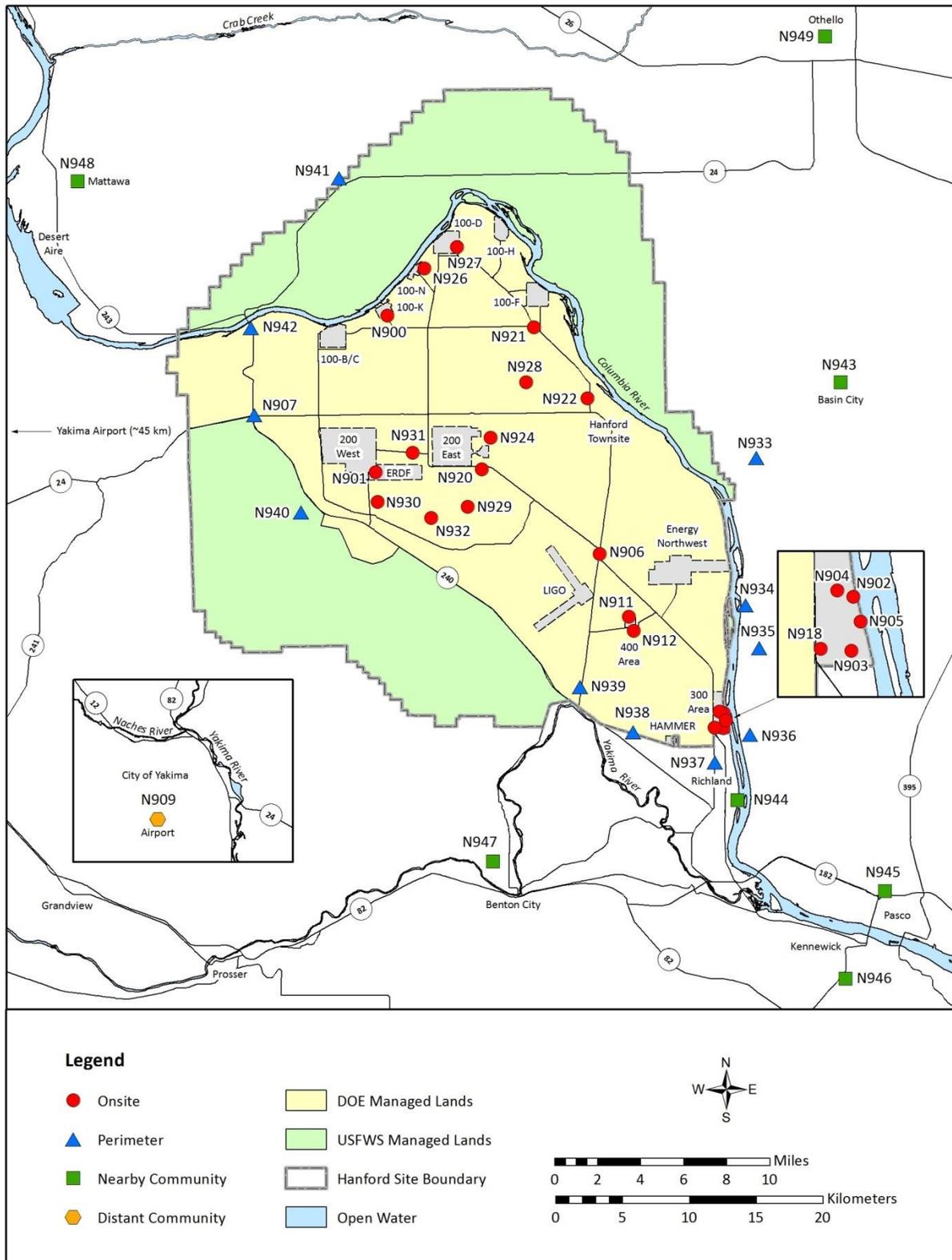


Table 6.4. Hanford Site and Offsite Ambient Air Sampling Locations and Analytes

EDP Code <sup>a</sup>	Location	Analyses		
		Bi-Weekly	Monthly <sup>b</sup>	Composite
<b>Hanford Site</b>				
N900	100 K Area	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N926	100 N-1325 Crib	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N927	100 D Area	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N921	100 F Met Tower	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N922	Hanford Townsite	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N928	Gable Mountain	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N920	200 ESE	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N929	S of 200-E	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N924	B Pond	Alpha, Beta		GEA, plutonium-238/-239/240, uranium-234/-235/-238
N930	Army Loop Camp	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N931	200 Tel. Exchange	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N932	SW of B/C Cribs	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N901	200 W SE	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N905	300 Water Intake <sup>c, d, e</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N903	300 South Gate <sup>e, f</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N918	300 South West <sup>e</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N904	300 Trench <sup>e</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N902	300 NE <sup>e</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240
N911	400 N	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240
N912	400 S	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240
N906	Wye Barricade <sup>c, g</sup>	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238

Table 6.4. Hanford Site and Offsite Ambient Air Sampling Locations and Analytes

EDP Code <sup>a</sup>	Location	Analyses		
		Bi-Weekly	Monthly <sup>b</sup>	Composite
<b>Hanford Site Perimeter</b>				
N933	Ringold Met Tower	Alpha, Beta	Tritium	GEA, plutonium-238/-239/240
N934	W End of Fir Road <sup>c, d</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N935	Dogwood Met Tower	Alpha, Beta	Tritium	GEA, strontium-90, uranium-234/-235/-238
N936	Byers Landing	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N937	Battelle Complex <sup>c, d</sup>	Alpha, Beta	Tritium	GEA, uranium-234/-235/-238
N938	Horn Rapids Substation	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240
N939	Prosser Barricade <sup>c, d</sup>	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240
N907	Yakima Barricade <sup>c</sup>	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240
N940	Rattlesnake Springs	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240
N941	Wahluke Slope	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240
N942	South End Vernita Bridge	Beta, Alpha		GEA, strontium-90, plutonium-238/-239/240
<b>Nearby Hanford Site Communities</b>				
N943	Basin City School	Alpha, Beta	Tritium	GEA, plutonium-238/-239/240, uranium-234/-235/-238
N944	Leslie Groves-Richland	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N945	Pasco	Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N946	Kennewick-Ely Street	Alpha, Beta		GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238
N947	Benton City	Beta		GEA
N948	Mattawa	Beta		GEA
N949	Othello	Beta		GEA, uranium-234/-235/-238
<b>Distant Hanford Site Community</b>				
N909	Yakima	Alpha, Beta	Tritium	GEA, strontium-90, plutonium-238/-239/240, uranium-234/-235/-238

<sup>a</sup>. EDP Code = Environmental data point code = sampler location code. Refer to Figure 6.2.

<sup>b</sup>. Atmospheric water vapor samples for tritium analysis are collected every 4 weeks using silica gel columns.

<sup>c</sup>. WDOH particulate air sampler also at this location.

<sup>d</sup>. WDOH tritium air sampler also at this location.

<sup>e</sup>. Data from this location is used to support 300 D4 and Field Remediation project.

<sup>f</sup>. Two tritium samples are collected from this location, one as a Quality Assurance duplicate sample.

<sup>g</sup>. Quality Assurance duplicate sample collected at this location.

GEA = Gamma energy analysis.

Figure 6.5. Gross Alpha and Beta Concentrations in Airborne Particulate Samples  
 (1 pCi = 0.037 Bq)

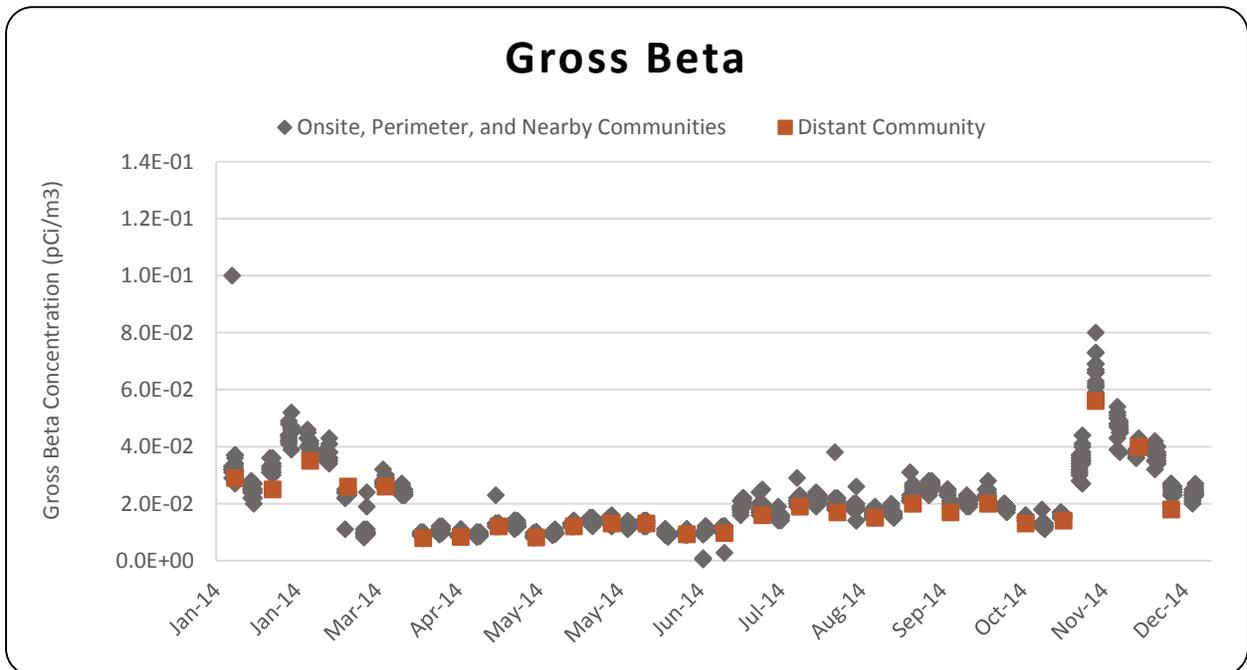
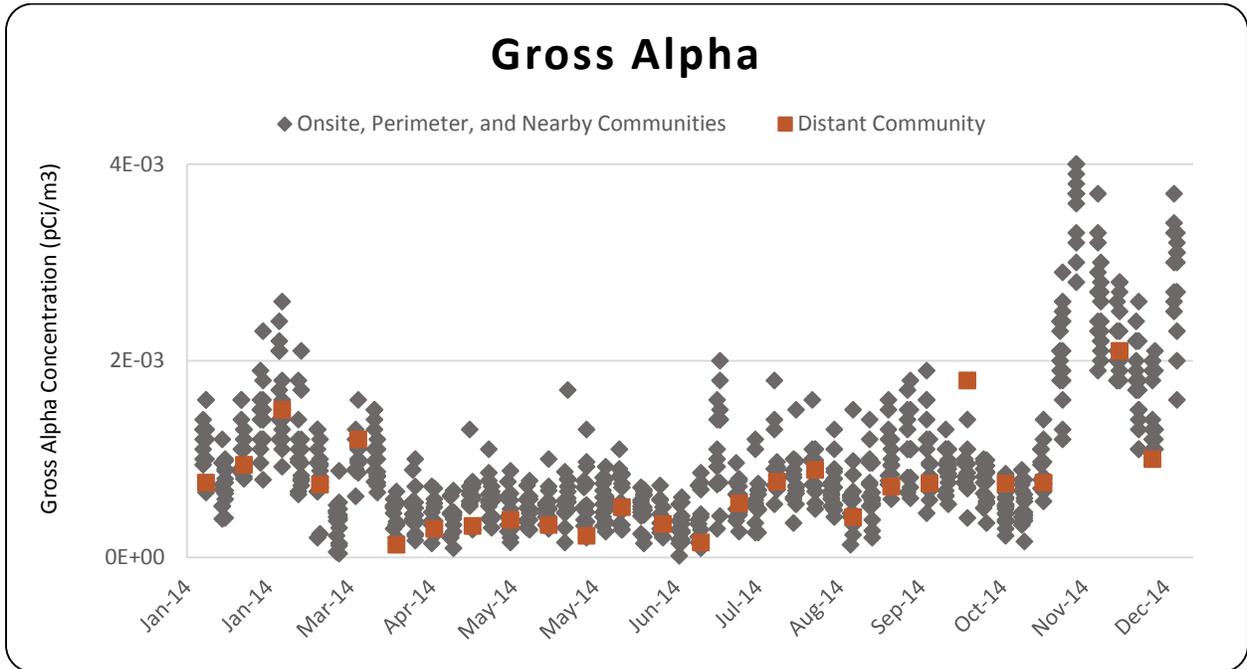


Figure 6.6. Radionuclide Concentrations in Ambient Air Samples  
 (1 pCi = 0.037 Bq)

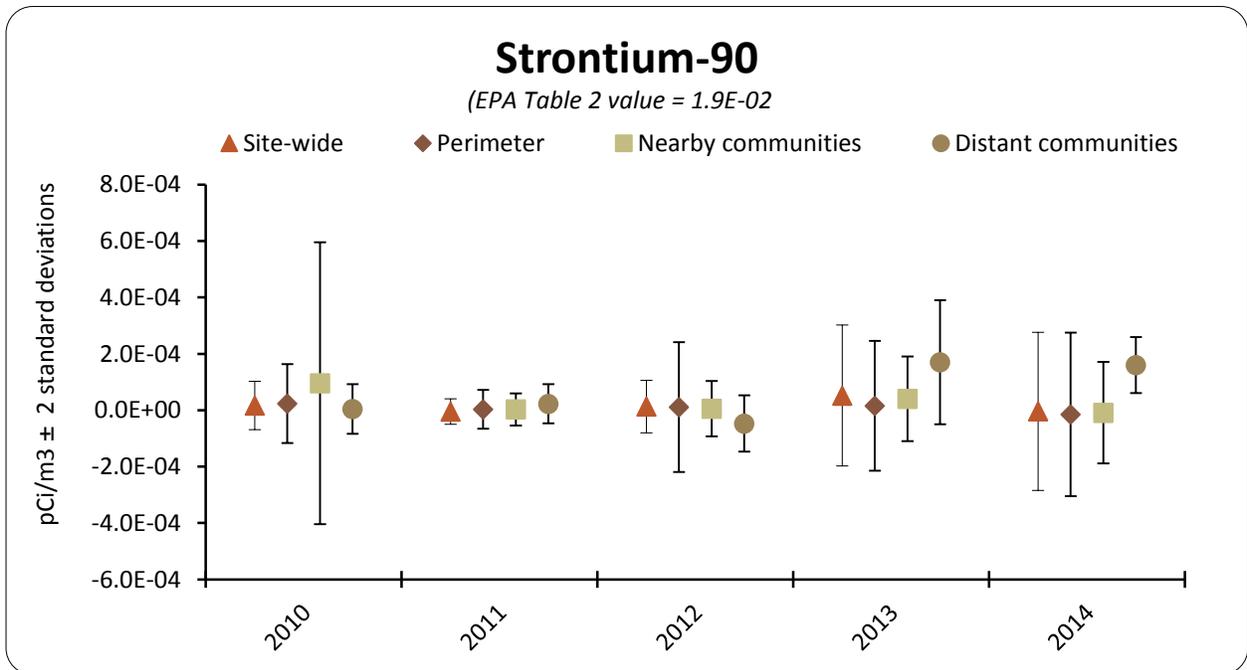
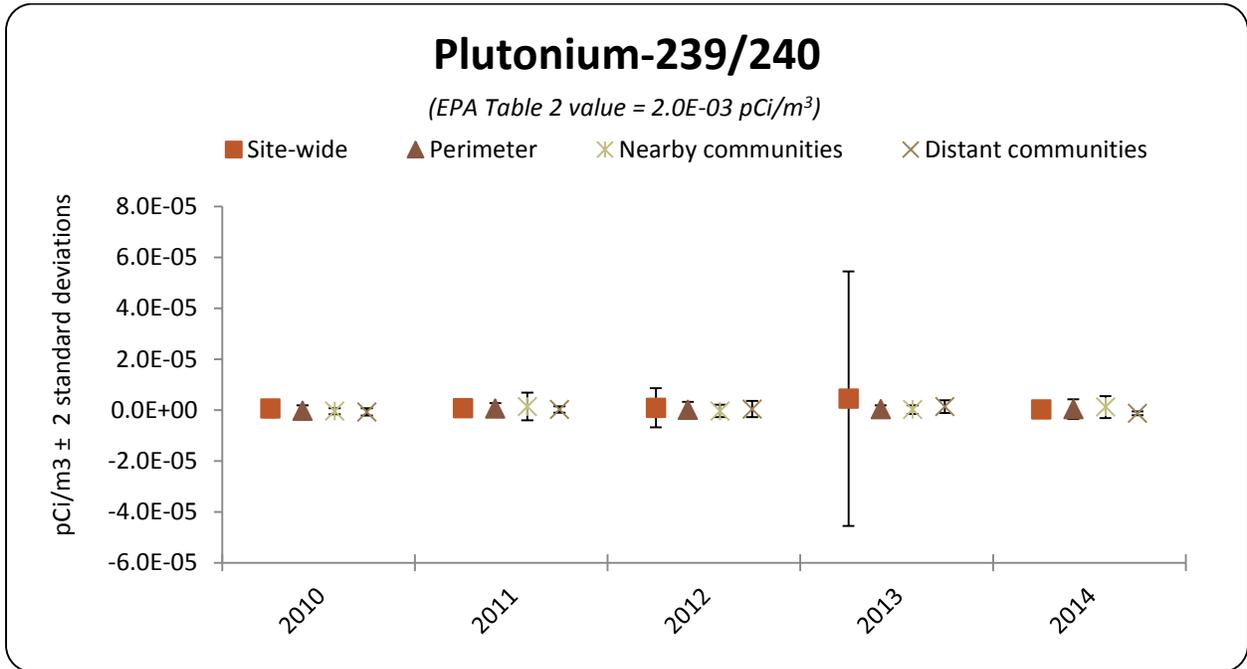


Figure 6.6. Radionuclide Concentrations in Ambient Air Samples (Cont.)  
 (1 pCi = 0.037 Bq)

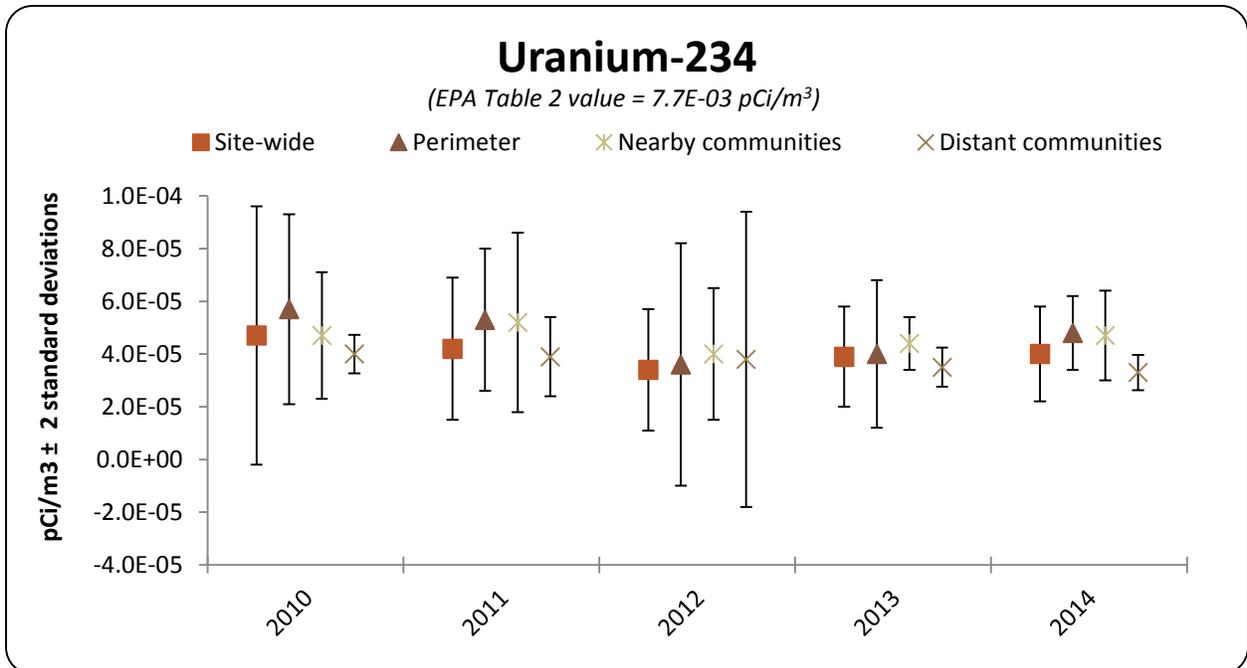
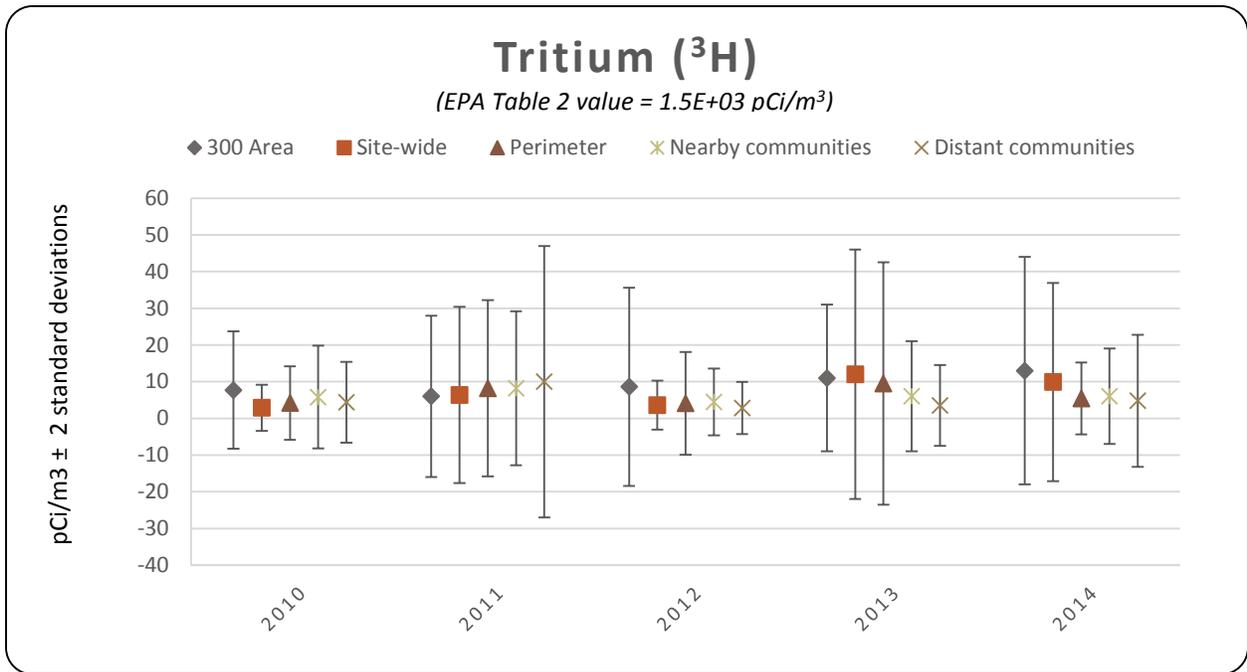
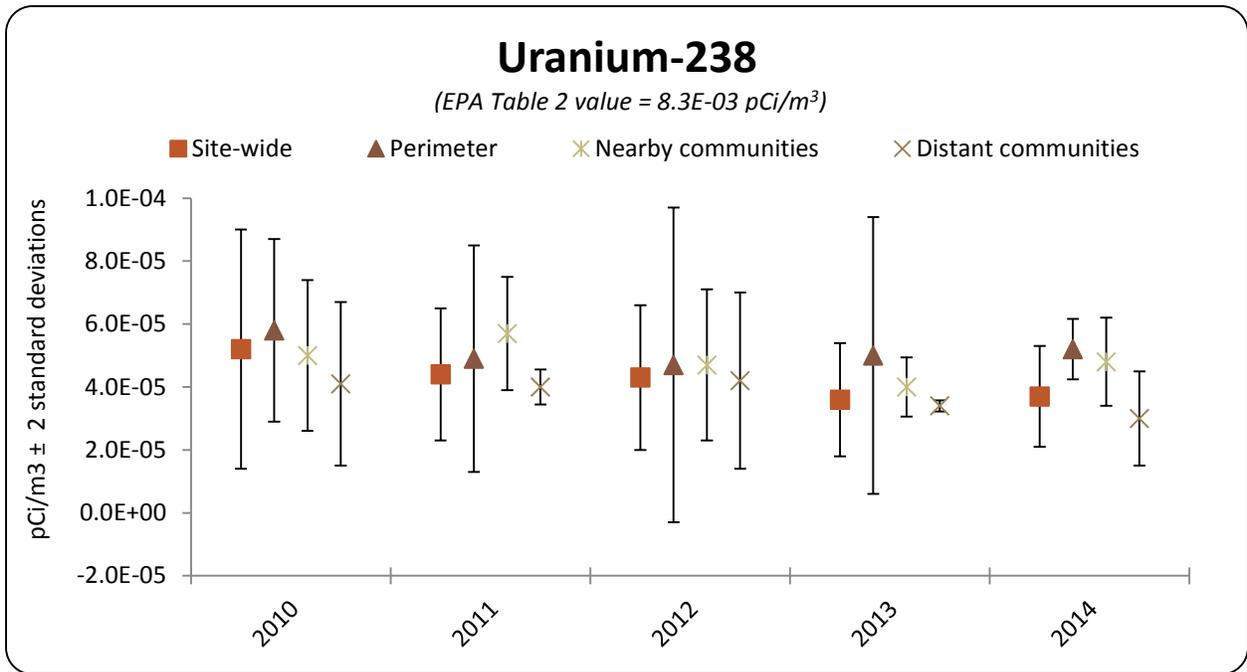


Figure 6.6. Radionuclide Concentrations in Ambient Air Samples (Cont.)  
 (1 pCi = 0.037 Bq)



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