DOH/320-048

Environmental Radiation Monitoring and Assessment Program

2007 Hanford/Wautoma Wildfire Summary

March 2008

Division of Environmental Health

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Introduction

On August 16, 2007, a wildfire occurred on and near the Hanford Site, which resulted in the U.S. Department of Energy (DOE) declaring an Alert. This document describes the timeline for the incident, focusing on the activities of the Department of Health's (DOH) Office of Radiation Protection's (ORP) activities, specifically sample collection and the results of sample analysis.

Summary

The incident began at 12:48 p.m. when the Hanford Fire Department responded to a fire near Roberts Ranch off State Route 241, near the intersection with Wautoma Road. At that time the Hanford Fire Department and the U.S. Fish and Wildlife Service determined that the fire could threaten the Hanford Site. Mutual aid was requested from Benton, Franklin, Grant, Yakima, and Walla Walla Counties.

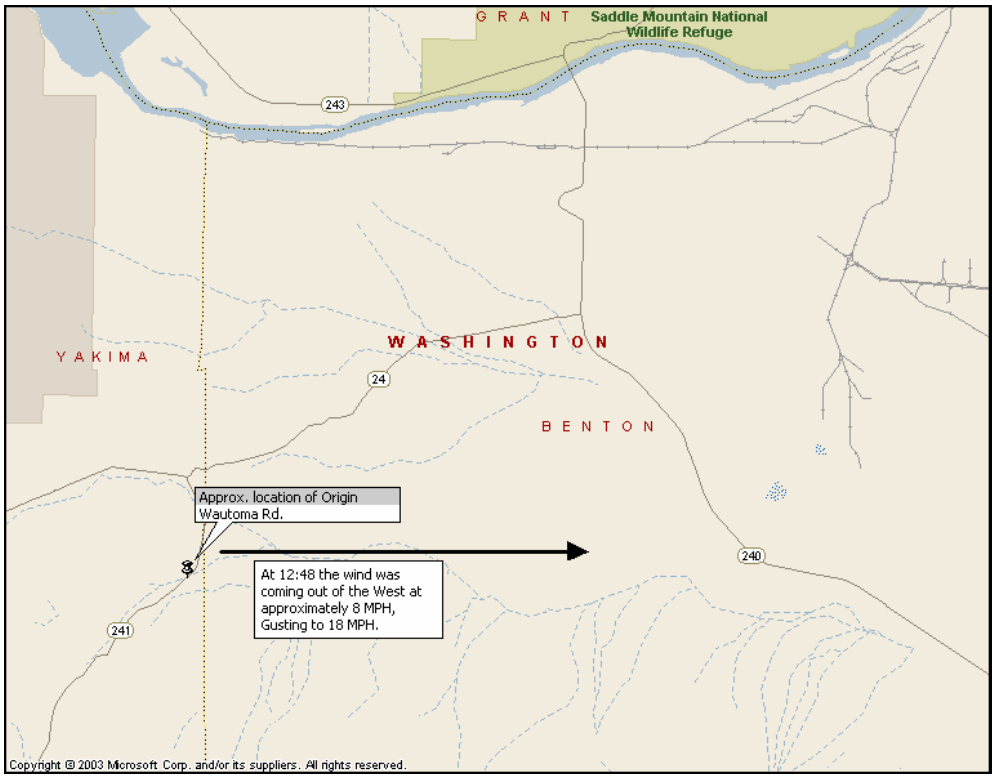

Figure 1. Location Where the Wautoma Fire Started.

At approximately 3:00 p.m., a DOE employee contacted DOH staff and told them about the wildfire and the potential threat to the Hanford Site. This was a courtesy call to allow DOH to begin planning any response that might later be needed. DOH personnel drove out SR 240 toward the fire to assess the situation, but were turned back at SR 241 and Horn Rapids Road by security personnel at approximately 4:00 p.m. DOH staff began to organize and put its personnel on alert in case an Alert was declared. Initial phone calls were made to the Public Health Lab, alerting them to the possibility that samples might be collected and sent to the lab.

The DOH staff in Richland were notified officially of an Alert about 5:00 p.m. DOH sent two people to the Emergency Operation Center, Unified Dose Assessment Center (UDAC) at the Federal Building in Richland; a State Health Liaison (SHL) and a Field Team Coordinator (FTC). One field team was assembled and DOH personnel reported to the State EOC at Camp Murray.

In addition to the DOH field team, the state had support from one DOE Radiological Assistance Program (RAP) team. DOH collected five samples total; one each at the Richland office, Sagemoor (Franklin County, adjacent to the 300 Area), the Kindercare daycare near the Battelle Complex, Hammer, and the Horn Rapids Sub-Station. RAP teams collected samples along State Route 24 north of the site and along State Route 225 near Benton City. DOH's sampling strategy was to collect samples between the Hanford Site and outlying communities. See Tables 1 and 2 below.

Not long after the fire started, the wind shifted and blew in a direction that would have carried a plume from the 200 W Area directly toward the northern part of the city of Richland.
A simulation of the potential plume path is in Figure 2 below.

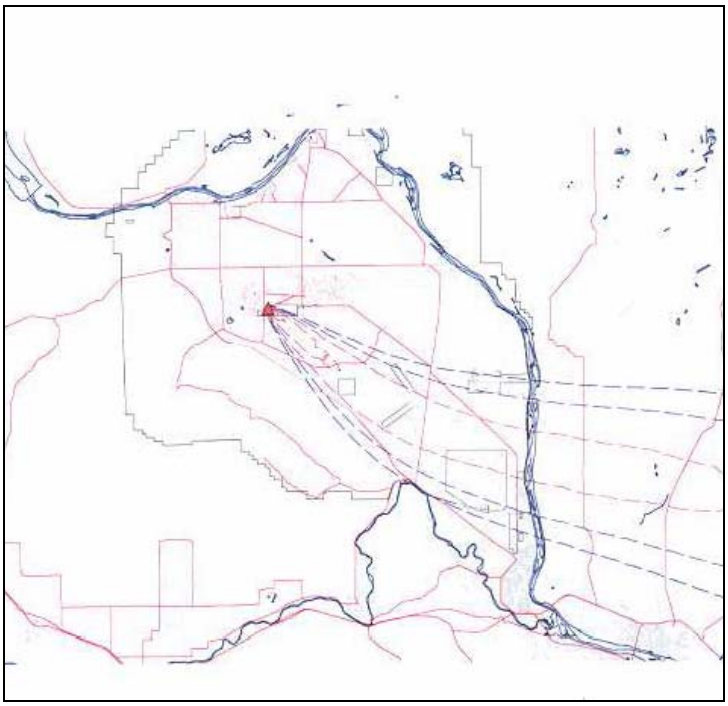

Figure 2. Potential Path of Plume

If there had been a release from the 200 W Area, this is the path it would have taken. There was no indication of a release at any time. This plot was provided by DOE.

The DOH field team collected a background sample at the Richland office at approximately 6:45 p.m. When discussing emergency air samples, it is important to understand how samples are collected and analyzed. Air is drawn through a paper filter by a calibrated air pump. Particulates in the air are trapped on the filter and can be analyzed to determine the nature and

concentration of the contaminants in the air. This analysis has to be done at a radiation laboratory; in this case, the Public Health Laboratory in Shoreline, Washington. During this Alert, as a precaution, field teams used their field instruments to take a gross count of the filter paper to determine if there was any radioactive material on the filter. This initial count determines if there has been a release large enough to be measured with portable instruments. Radon gas, which exists in nature, collects on the filters and can make it difficult to see if there are any other contaminants present. Fortunately, radon decays quickly, and in about three hours it is nearly gone. Early field team counts of the filter material indicated that there was about 300 cpm on the filters, in an environment of 50 cpm background (indicating 250 cpm above background). Three hours later the field teams were able to re-count the samples and found that they were at background levels (about 50 cpm), indicating that the original 300 counts were due to radon and its progeny.

Another important issue to understand is the concept of minimum detectable activity (MDA). When air samples are analyzed, there is a relationship between the volume of air drawn, the background radiation of the laboratory in which the sample is analyzed, the amount of time the sample is analyzed, the ambient amount of radioactivity present in the air, and the lower limit that the laboratory can see. In general, the MDA (or the level that can be detected) is smaller, the greater the volume drawn, and the longer the isotope's half-life. Normal environmental air samples – that is, samples meant to see background or natural levels of radiation – draw a little over 400 cubic meters. In an emergency, between 10 and 28 cubic meters are drawn. This means that we cannot see levels of radiation down near the environmental level, but in an emergency this is not the goal. In an emergency, the concern is seeing levels that meet the public action guides (PAGs) which govern evacuations and agricultural issues. Assessing the impact of a release at environmental levels can be done when the incident is over.

Because the Hanford wildfire split into two major legs, one north and one south of the 200 W Area, the Hanford Fire Department was able to prevent the fire from entering the 200 W Area. At 9:44 p.m., DOE issued a press release stating that the fire on the Hanford Site had been contained and that mop-up activities had begun. The fire continued to burn offsite. DOH and RAP samples were delivered to the DOH Richland office where they were processed and shipped to the PHL via Fed-Ex on August 17. The PHL analyzed the samples and reported the data the following week. Those data are tabulated below.

State personnel continued to staff the EOC in Richland until the Alert was cancelled at 12:52 a.m. on August 17, 2007.

Sample Locations

DOH's primary concern is protecting public health. During emergencies this is done by interacting with the agency or company that is the source for a potential release. Together we determine the nature and extent of the release, and then design an appropriate sampling plan. In this case, there was no release. In the event one had occurred, the winds would have spread contaminants toward the northern part of Richland. Because of this, DOH dispatched its field team to sample in a broad arc from Sagemoor to a point near Horn Rapids. This pattern (seen in Figures 3 and 4), placed the DOH field teams between the public (Richland, Pasco, and

Kennewick) and any possible release. As a precautionary measure, the RAP field team was sent north of the Hanford Site along State Route 24, between the Hanford Site and the towns of Othello, Mattawa, and Royal City, and along State Route 224 between the Hanford Site and Benton City.

At each location, the field teams collected one air sample while monitoring ambient radiation levels with field instruments. The field teams were in continuous communication with the UDAC, to ensure their safety and the relevance of their sampling efforts.

Table 1. DOH Sample Locations

			Latitude	Longitude
Hanford	Bradley Office	309 Bradley Blvd, Richland	46.2684	-119.2692
Hanford	Sagemoor - Fire	Franklin County	46.3696	-119.2593
Hanford	Kindercare	Battelle Complex, Richland	46.3386	-119.2813
Hanford	Hammer West	Horn Rapids Rd	46.3355	-119.3305
Hanford	Substation 4	Horn Rapids Rd	46.3609	-119.364

Table 2. RAP Sample Locations

			Latitude	Longitude
Hanford	9th Street & Delta Ave	9th St & Delta Avenue (corner of)	46.26488	-119.48737
Hanford	Air - Fire	Air - Fire	46.76169	-119.1763
Hanford	C Crk Sr 225 MM 3	Corral Creek Rd & SR 225 MM3 Intersection	46.28674	-119.49426
Hanford	Hwy 24	Highway 24	46.59594	-119.72746
Hanford	Hwy 24 MM 50	Highway 24 Mile Marker 50	46.70822	-119.6735
Hanford	Hwy 24 MM 60	Highway 24 Mile Marker 60	46.73831	-119.48005
Hanford	Hwy 24 MM 70	Highway 24 Mile Marker 70	46.73819	-119.26894
Hanford	SR 225 MM 6	State Rt 225 Mile Marker 6	46.3295	-119.49284

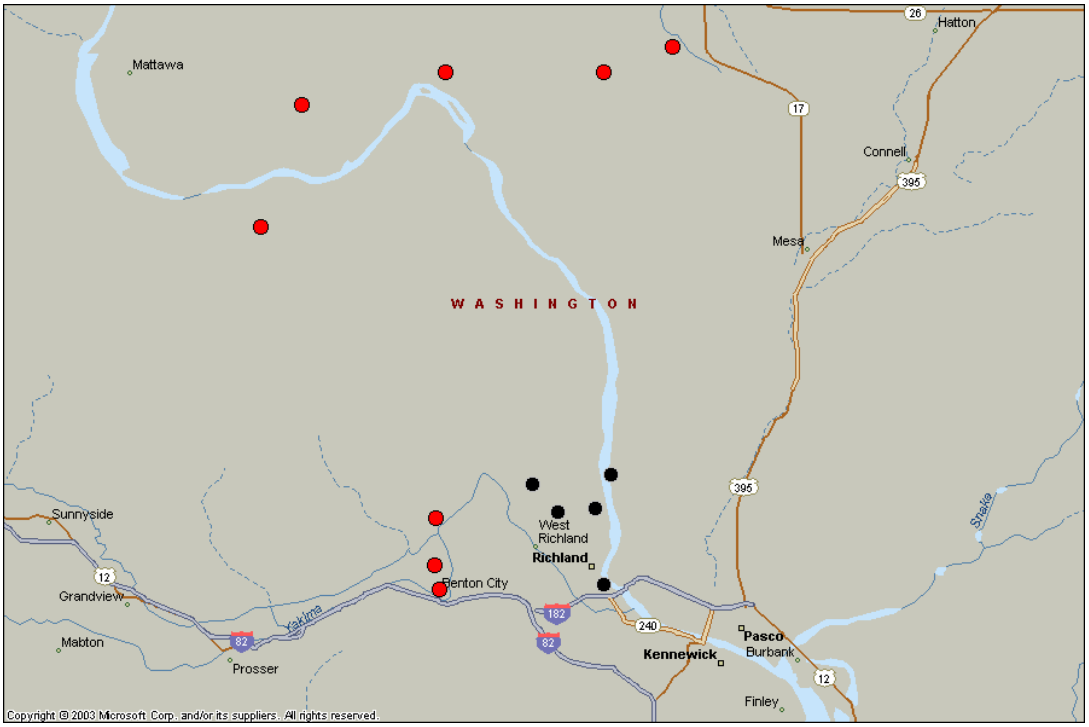

Figure 3. Sample Locations, Regional View
Black dots represent DOH sample sites and red dots represent RAP sites

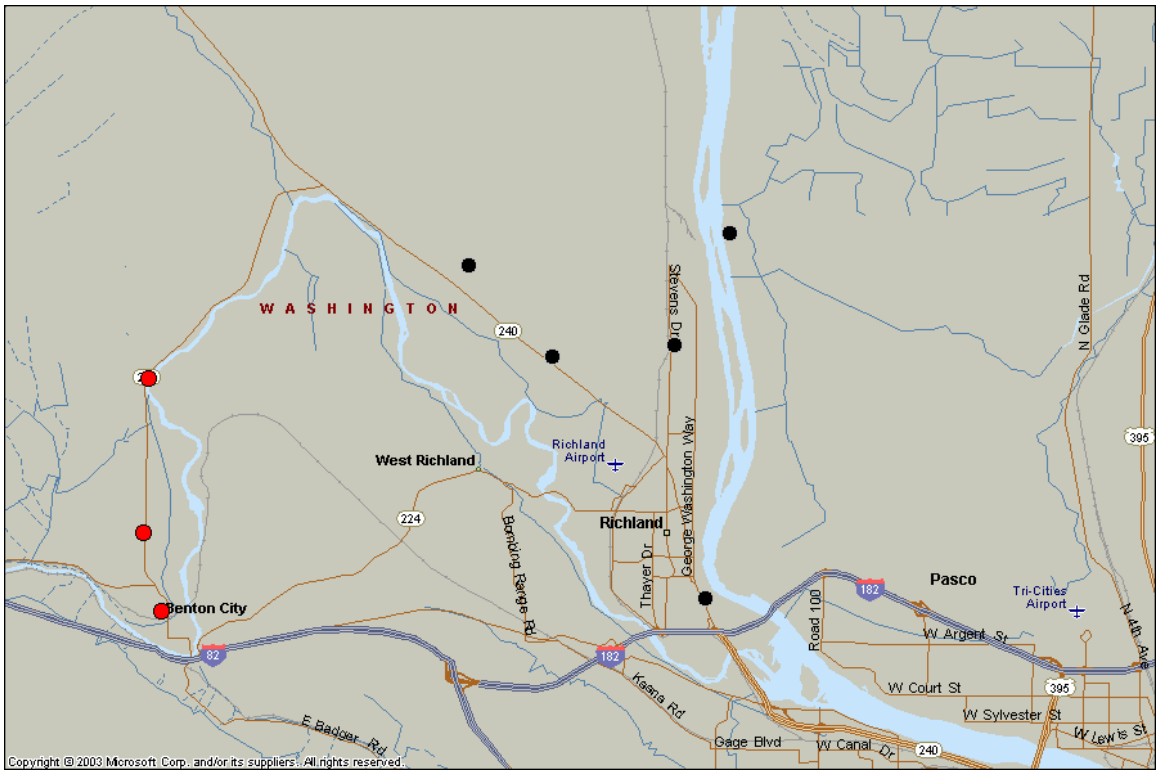

Figure 4. Sample Locations, Close View of Richland
Black dots represent DOH sample sites and red dots represent RAP sites

Sampling Results

Air samples collected in the field were counted at the Public Health Laboratory. Samples were analyzed for gross alpha, gross beta and gamma emitters. Results are reported for gross alpha, gross beta and cesium 137.

There were two gross alpha results at or above the MDA after radon decay, and several gross beta results that were above MDA. Because of the relatively low sample volume, as compared to environmental samples, the MDAs for these samples were very high. When reviewing these sample results, and taking into account the MDA and the reported analytical errors, it is difficult to say that any positive results were seen, and it is quite likely that the positive results are the result of environmentally ubiquitous radionuclides. Even if the gross alpha results are accurate and attributable to the wildfire, no public action guidelines (PAGs) were exceeded.

Air particulate filters were counted on a high purity gamma detector to assess the presence of radioactive contaminants (fission products). Each sample was counted for 30 minutes, and all samples were counted within 2.5 hours of receipt at the laboratory. No radioactive contaminants (fission products) were detected in any sample.

Table 3. Gross Alpha Results – DOH

(*italics* = after radon decay; bold = greater than MDA after radon decay)

Team	Location	Date		Result	Error	LLD	MDA	Units	Volume	Units
DOH	Bradley Office	08/17/2007	Gross Alpha	0.058	0.04	0.2	0.05	pCi/m^3	28.32	m^3
DOH	*Bradley Office*	*08/17/2007*	*Gross Alpha*	*0.04*	*0.03*	*0.2*	*0.05*	pCi/m^3	*28.32*	*m^3*
DOH	***Sagemoor - Fire***	***08/17/2007***	***Gross Alpha***	***0.05***	***0.04***	***0.2***	***0.05***	pCi/m^3	***28.32***	***m^3***
DOH	Sagemoor - Fire	08/17/2007	Gross Alpha	0.4	0.09	0.2	0.05	pCi/m^3	28.32	m^3
DOH	Hammer West	08/17/2007	Gross Alpha	0.7	0.1	0.2	0.05	pCi/m^3	28.32	m^3
DOH	*Hammer West*	***08/17/2007***	***Gross Alpha***	***0.07***	***0.04***	***0.2***	***0.05***	pCi/m^3	***28.32***	***m^3***
DOH	Substation 4	08/17/2007	Gross Alpha	0.21	0.07	0.2	0.05	pCi/m^3	28.32	m^3
DOH	*Substation 4*	*08/17/2007*	*Gross Alpha*	*0.02*	*0.03*	*0.2*	*0.05*	pCi/m^3	*28.32*	*m^3*
DOH	*Kindercare*	*08/17/2007*	*Gross Alpha*	*0.03*	*0.03*	*0.2*	*0.05*	pCi/m^3	*28.32*	*m^3*
DOH	Kindercare	08/17/2007	Gross Alpha	0.3	0.08	0.2	0.05	pCi/m^3	28.32	m^3

Table 4. Gross Alpha Results – RAP

(*italics* = after radon decay; bold = greater than MDA after radon decay)

Team	Location	Date		Result	Error	LLD	MDA	Units	Volume	Units
RAP	Hwy 24 MM 60	08/17/2007	Gross Alpha	0.7	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	*Hwy 24 MM 60*	*08/17/2007*	*Gross Alpha*	*0.06*	*0.07*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Hwy 24 MM 70	08/17/2007	Gross Alpha	0.7	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	*Hwy 24 MM 70*	*08/17/2007*	*Gross Alpha*	*0*	*0.1*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	*Air - Fire*	*08/17/2007*	*Gross Alpha*	*0.02*	*0.06*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Air - Fire	08/17/2007	Gross Alpha	1.1	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	Hwy 24	08/17/2007	Gross Alpha	0.2	0.1	0.2	0.1	pCi/m^3	12.46	m^3
RAP	*Hwy 24*	*08/17/2007*	*Gross Alpha*	*0.07*	*0.08*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	*Hwy 24 MM 50*	*08/17/2007*	*Gross Alpha*	*-0.03*	*0.05*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Hwy 24 MM 50	08/17/2007	Gross Alpha	0.03	0.07	0.2	0.1	pCi/m^3	12.46	m^3
RAP	Sr 225 MM 6	08/17/2007	Gross Alpha	1.1	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	*Sr 225 MM 6*	*08/17/2007*	*Gross Alpha*	*0.02*	*0.06*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	*C Crk Sr 225 MM 3*	*08/17/2007*	*Gross Alpha*	*0.008*	*0.06*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	C Crk Sr 225 MM 3	08/17/2007	Gross Alpha	1.1	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	9th St & Delta Ave	08/17/2007	Gross Alpha	0.9	0.2	0.2	0.1	pCi/m^3	12.46	m^3
RAP	*9th St & Delta Ave*	*08/17/2007*	*Gross Alpha*	*0.02*	*0.06*	*0.2*	*0.1*	pCi/m^3	*12.46*	*m^3*

Table 5. Gross Beta Results – DOH

(*italics* = after radon decay; bold = greater than MDA after radon decay)

Team	Location	Date		Result	Error	LLD	MDA	Units	Volume	Units
DOH	Bradley Office	08/17/2007	Gross Beta	0.3	0.06	0.001	0.07	pCi/m^3	28.32	m^3
DOH	Bradley Office	08/17/2007	Gross Beta	**0.2**	0.05	0.001	0.06	pCi/m^3	28.32	m^3
DOH	Sagemoor - Fire	08/17/2007	Gross Beta	0.7	0.08	0.001	0.07	pCi/m^3	28.32	m^3
DOH	*Sagemoor - Fire*	*08/17/2007*	*Gross Beta*	***0.2***	*0.05*	*0.001*	*0.06*	pCi/m^3	*28.32*	*m^3*
DOH	Hammer West	08/17/2007	Gross Beta	1.4	0.1	0.001	0.07	pCi/m^3	28.32	m^3
DOH	*Hammer West*	*08/17/2007*	*Gross Beta*	***0.2***	*0.05*	*0.001*	*0.06*	pCi/m^3	*28.32*	*m^3*
DOH	*Substation 4*	*08/17/2007*	*Gross Beta*	***0.22***	*0.05*	*0.001*	*0.06*	pCi/m^3	*28.32*	*m^3*
DOH	Substation 4	08/17/2007	Gross Beta	0.5	0.07	0.001	0.07	pCi/m^3	28.32	m^3
DOH	*Kindercare*	*08/17/2007*	*Gross Beta*	***0.3***	*0.05*	*0.001*	*0.06*	pCi/m^3	*28.32*	*m^3*
DOH	Kindercare	08/17/2007	Gross Beta	0.6	0.07	0.001	0.07	pCi/m^3	28.32	m^3

Table 6. Gross Beta Results - RAP
(*italics* = after radon decay; bold = greater than MDA after radon decay)

Team	Location	Date		Result	Error	LLD	MDA	Units	Volume	Units
RAP	Hwy 24 MM 60	08/17/2007	Gross Beta	1.3	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	*Hwy 24 MM 60*	*08/17/2007*	*Gross Beta*	***0.4***	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	*Hwy 24 MM 70*	*08/17/2007*	*Gross Beta*	***0.3***	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Hwy 24 MM 70	08/17/2007	Gross Beta	1.4	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	*Air - Fire*	*08/17/2007*	*Gross Beta*	***0.4***	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Air - Fire	08/17/2007	Gross Beta	2	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	Hwy 24	08/17/2007	Gross Beta	0.6	0.1	0.001	0.1	pCi/m^3	12.46	m^3
RAP	*Hwy 24*	*08/17/2007*	*Gross Beta*	*0.3*	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	*Hwy 24 MM 50*	*08/17/2007*	*Gross Beta*	***0.4***	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	Hwy 24 MM 50	08/17/2007	Gross Beta	0.7	0.1	0.001	0.1	pCi/m^3	12.46	m^3
RAP	Sr 225 MM 6	08/17/2007	Gross Beta	1.8	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	*Sr 225 MM 6*	*08/17/2007*	*Gross Beta*	***0.4***	*0.1*	*0.001*	*0.1*	pCi/m^3	*12.46*	*m^3*
RAP	C Crk SR 225 MM 3	08/17/2007	Gross Beta	1.8	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	C Crk SR 225 MM 3	08/17/2007	Gross Beta	0.3	0.1	0.001	0.1	pCi/m^3	12.46	m^3
RAP	9th St & Delta Ave	08/17/2007	Gross Beta	1.4	0.2	0.001	0.1	pCi/m^3	12.46	m^3
RAP	9th St & Delta Ave	08/17/2007	Gross Beta	0.5	0.1	0.001	0.1	pCi/m^3	12.46	m^3

Table 7. Cs-137 Results - DOH
(all results below MDA)

Team	Site	Prop Collect	Analyte	Result	Error	LLD	MDA	Units	Volume	Vol_Unit
DOH	Bradley Office	08/17/2007	Cs-137	-0.07	0.12	0.003	0.2	pCi/m^3	28.32	m^3
DOH	Sagemoor - Fire	08/17/2007	Cs-137	-0.03	0.06	0.003	0.11	pCi/m^3	28.32	m^3
DOH	Hammer West	08/17/2007	Cs-137	0.03	0.1	0.003	0.2	pCi/m^3	28.32	m^3
DOH	Substation 4	08/17/2007	Cs-137	0.02	0.11	0.003	0.23	pCi/m^3	28.32	m^3
DOH	Kindercare	08/17/2007	Cs-137	0.03	0.08	0.003	0.2	pCi/m^3	28.32	m^3

Table 8. Cs-137 Results - RAP
(all results below MDA)

Team	Site	Prop Collect	Analyte	Result	Error	LLD	MDA	Units	Volume	Vol_Unit
RAP	Hwy 24 MM 60	08/17/2007	Cs-137	0	0.2	0.003	0.4	pCi/m^3	12.46	m^3
RAP	Hwy 24 MM 70	08/17/2007	Cs-137	0.05	0.18	0.003	0.4	pCi/m^3	12.46	m^3
RAP	Air - Fire	08/17/2007	Cs-137	0.05	0.23	0.003	0.45	pCi/m^3	12.46	m^3
RAP	Hwy 24	08/17/2007	Cs-137	-0.1	0.2	0.003	0.36	pCi/m^3	12.46	m^3
RAP	Hwy 24 MM 50	08/17/2007	Cs-137	0.01	0.22	0.003	0.46	pCi/m^3	12.46	m^3
RAP	Sr 225 MM 6	08/17/2007	Cs-137	0.02	0.18	0.003	0.34	pCi/m^3	12.46	m^3
RAP	C Crk SR 225 MM 3	08/17/2007	Cs-137	-0.14	0.18	0.003	0.29	pCi/m^3	12.46	m^3
RAP	9th St & Delta Ave	08/17/2007	Cs-137	0.11	0.22	0.003	0.43	pCi/m^3	12.46	m^3

Table 9. Values Used to Evaluate Health Significance of Air Monitoring Results
(pCi/m^3)

Nuclide	1 Year PAG*	NESHAP Standard**	Hanford Area Average Background***
Gross Beta	--	--	6.2×10^{-4}
Gross Alpha	--	--	1.1×10^{-2}
^{90}Sr	141	1.9×10^{-2}	1.3×10^{-5}
^{137}Cs	5700	1.9×10^{-2}	1.3×10^{-5}
^{238}U	1.5	8.3×10^{-3}	2.2×10^{-5}
$^{239/240}Pu$	0.43	2.0×10^{-3}	0.9×10^{-6}

Taken from the 2000 Hanford Wildfire Report

Conclusion

On August 16, 2007, a fire started near Wautoma Road west of the Hanford Site. The cause of the fire is unknown. Early winds pushed the fire west toward the Hanford Site; later those winds carried the smoke plume toward the city of Richland. The Department of Health collected five air samples during the fire, and the RAP team collected an additional eight samples. The combined sample locations of DOH and RAP field teams encircled most of the Hanford Site. The analytical results of these samples indicated that no contaminants were released above the protective action guidelines for air.