DOE/RL-2012-01
Revision 0

Hanford Site Environmental Surveillance Far Field Sampling Schedule Calendar Year 2012

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

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Summary

Mission Support Alliance (MSA) conducts environmental surveillance of the Hanford Site and surrounding areas for the U.S. Department of Energy (DOE). Sampling is conducted to evaluate levels of radioactive and nonradioactive pollutants in the Hanford Site environs, as required in DOE Order 450.1A, *Environmental Protection Program*, and DOE Order 458.1, *Radiation Protection of the Public and the Environment*.[1,2] The environmental surveillance sampling design is described in the *Hanford Site Environmental Monitoring Plan*, United States Department of Energy, Richland Operations Office (DOE/RL-91-50).[3]

This document contains the calendar year 2012 schedule for the routine collection of far-field samples for the Environmental Surveillance (ES) Project. Each section includes sampling locations, sampling frequencies, sample types, and analyses to be performed. In some cases, samples are scheduled on a rotating basis. If a sample will not be collected in 2012, the anticipated year for collection is provided. Maps showing approximate sampling locations are included for media scheduled for collection in 2012.

Far Field Environmental Surveillance Project Sampling

The far-field ES project is a multimedia environmental surveillance effort to measure the concentrations of radionuclides and chemicals in environmental media to demonstrate compliance with applicable environmental quality standards and public exposure limits, and assess environmental impacts. Project personnel annually collect selected samples of ambient air, surface water, agricultural products, fish, wildlife, and sediments. Soil and vegetation samples are collected approximately every five years. Analytical capabilities include the measurement of radionuclides at environmental concentrations and in selected media; and nonradiological constituents including metals, anions, volatile organic compounds, and total organic carbon.

Data Management

The Hanford Environmental Information System (HEIS) database is used as a repository for data gathered during environmental surveillance activities at the Hanford Site. For ease in retrieving ES data from the HEIS database, the majority of the location names in this document are the location names used in the database.[4]

Schedule Changes

This schedule is subject to modification during the year in response to changes in Hanford Site operations, program requirements, and the nature of the observed results. Operational limitations such as weather, mechanical failures, sample availability, and other factors may also impact scheduled sampling. Therefore, this document may not be an accurate record of samples collected during the year.

[1] DOE Order 450.1A. 2008. *Environmental Protection Program*. U.S. Department of Energy, Washington, D.C.
[2] DOE Order 5400.5, Chg 2. 1993. *Radiation Protection of the Public and the Environment*. U.S. Department of Energy, Washington, D.C.
[3] DOE/RL-91-50, Rev. 4. 2008. *Environmental Monitoring Plan, United States Department of Energy, Richland Operations Office*. U.S. Department of Energy, Richland Operations Office, Richland, Washington.
[4] HEIS. 1989. *Hanford Environmental Information System*. Environmental Database Management, CH2M HILL Plateau Remediation Company, Richland, Washington.

Multi-Agency Samples

By joint agreement, some samples are collected by ES personnel and provided to the Washington State Department of Health. All planned cooperative sampling efforts are indicated in this schedule.

Acronyms and Symbols

Acronyms

ALE	Fitzner/Eberhardt Arid Lands Ecology Reserve
DOE	U.S. Department of Energy
DOH	Washington State Department of Health
DR	downriver
ES	Environmental Surveillance
FFTF	Fast Flux Test Facility
HEIS	Hanford Environmental Information System
HRM	Hanford River Marker
ICP-MS	inductively coupled plasma mass spectrometry
MSA	Mission Support Alliance
NASQAN	National Stream Quality Accounting Network
PRD	Priest Rivers Dam
UR	upriver
USGS	U.S. Geological Survey

Analytical Symbols

Generally, standard element, chemical, and isotope designations are used to indicate the analyses performed. Other analytical designations used include the following:

Alpha	gross alpha activity of sample
Anions	major anions – generally chloride, fluoride, nitrate, nitrite, sulfate
Beta	gross beta activity of sample
Cr+6	hexavalent chromium
Gamma Scan	analysis of photon energy spectrum for individual photon-emitting radionuclides
HTO	tritiated water ($^{3}H^{1}H^{16}O$)
Hg-CVAA	mercury by cold vapor atomic absorbance spectrometry
Hg-CVAF	total mercury in water by cold vapor atomic fluorescence
ICP-MS	major metals by inductively coupled plasma mass spectrometry – samples unfiltered unless otherwise noted
Lo ^{3}H	low-level method for the electrolytic enrichment of tritium
Pu	isotopic plutonium (^{238}Pu, $^{239/240}Pu$)
TOC	total organic carbon
U	isotopic uranium (^{234}U, ^{235}U, ^{238}U)
VOA	volatile organic compounds

Frequency Symbols

A	annually
BE	biennially (every two years)
BW	biweekly (every two weeks)
M	monthly
M Comp.	monthly composite
Q	quarterly
Q Comp.	quarterly composite
SA	semiannually (twice each year)
TE	triennially (every three years)
TA	tri annual (three times a year)

Contents

Figures

1.0 Air Surveillance

1.1 Particulate Filter

Location	Individual Samples			Composited Samples		
	Location Number[a]	Frequency	Analyses	Composite Group	Frequency	Analyses
Onsite						
100 K Area	1	BW	Beta, Alpha	100 Areas	Q	^{90}Sr, Pu, Gamma Scan
100 N-1325 Crib	2	BW	Beta, Alpha			
100 D Area	3	BW	Beta, Alpha			
100 F Met Tower	4	BW	Beta, Alpha	Hanford Townsite	Q	^{90}Sr, Pu, Gamma Scan
Hanford Townsite	5	BW	Beta, Alpha			
Gable Mountain	6	BW	Beta, Alpha	Gable Mountain	Q	Pu, U, Gamma Scan
200 ESE	7	BW	Beta, Alpha	200 E Area	Q	^{90}Sr, Pu, U, Gamma Scan
S of 200-E	8	BW	Beta, Alpha			
B Pond	9	BW	Beta, Alpha	B Pond	Q	Pu, U, Gamma Scan
Army Loop Camp	10	BW	Beta, Alpha	200 W South East	Q	^{90}Sr, Pu, U, Gamma Scan
200 Tel. Exchange	11	BW	Beta, Alpha			
SW of B/C Cribs	12	BW	Beta, Alpha			
200 W SE	13	BW	Beta, Alpha	200 W Area	Q	Pu, U, Gamma Scan
300 Water Intake	14	BW	Beta, Alpha	300 Area	Q	^{90}Sr, Pu, U, Gamma Scan
300 South Gate	15	BW	Beta, Alpha			
300 South West	16	BW	Beta, Alpha			
300 Trench	17	BW	Beta, Alpha	300 NE	Q	^{90}Sr, Pu, U, Gamma Scan
300 NE	18	BW	Beta, Alpha			
400 E	19	BW	Beta, Alpha	400 Area	Q	^{90}Sr, Pu, Gamma Scan
400 N	20	BW	Beta, Alpha			
Wye Barricade[b]	21	BW	Beta, Alpha	Wye Barricade	Q	Pu, U, Gamma Scan
Perimeter						
Ringold Met Tower	22	BW	Beta, Alpha	Ringold Met Tower	Q	Pu, Gamma Scan
W End of Fir Road[b]	23	BW	Beta, Alpha	W End of Fir Road	Q	^{90}Sr, Pu, U, Gamma Scan
Dogwood Met Tower	24	BW	Beta, Alpha	Dogwood Met Tower	Q	^{90}Sr, U, Gamma Scan
Byers Landing	25	BW	Beta, Alpha	Byers Landing	Q	^{90}Sr, Pu, U, Gamma Scan
Battelle Complex[b]	26	BW	Beta, Alpha	Battelle Complex	Q	U, Gamma Scan
Horn Rapids Substation	27	BW	Beta, Alpha	Prosser Barricade	Q	^{90}Sr, Pu, Gamma Scan
Prosser Barricade[b]	28	BW	Beta, Alpha			
Yakima Barricade[b]	29	BW	Beta, Alpha	Yakima Barricade	Q	^{90}Sr, Pu, Gamma Scan
Rattlesnake Springs	30	BW	Beta, Alpha			
Wahluke Slope	31	BW	Beta, Alpha	Wahluke Slope	Q	^{90}Sr, Pu, Gamma Scan
S End Vernita Bridge	32	BW	Beta, Alpha			

1.1 Particulate Filter

Location	Individual Samples			Composited Samples		
	Location Number[a]	Frequency	Analyses	Composite Group	Frequency	Analyses
Community						
Basin City School	33	BW	Beta, Alpha	Basin City School	Q	Pu, U, Gamma Scan
Leslie Groves-Richland	34	BW	Beta, Alpha	Leslie Groves-Richland	Q	^{90}Sr, Pu, U, Gamma Scan
Pasco	35	BW	Beta	Tri Cities	Q	^{90}Sr, Pu, U, Gamma Scan
Kennewick-Ely Street	36	BW	Beta, Alpha			
Benton City	37	BW	Beta	Benton City	Q	Gamma Scan
Mattawa	38	BW	Beta	Mattawa	Q	Gamma Scan
Othello	39	BW	Beta	Othello	Q	U, Gamma Scan
Distant						
Yakima	40	BW	Beta, Alpha	Yakima	Q	^{90}Sr, Pu, U, Gamma Scan

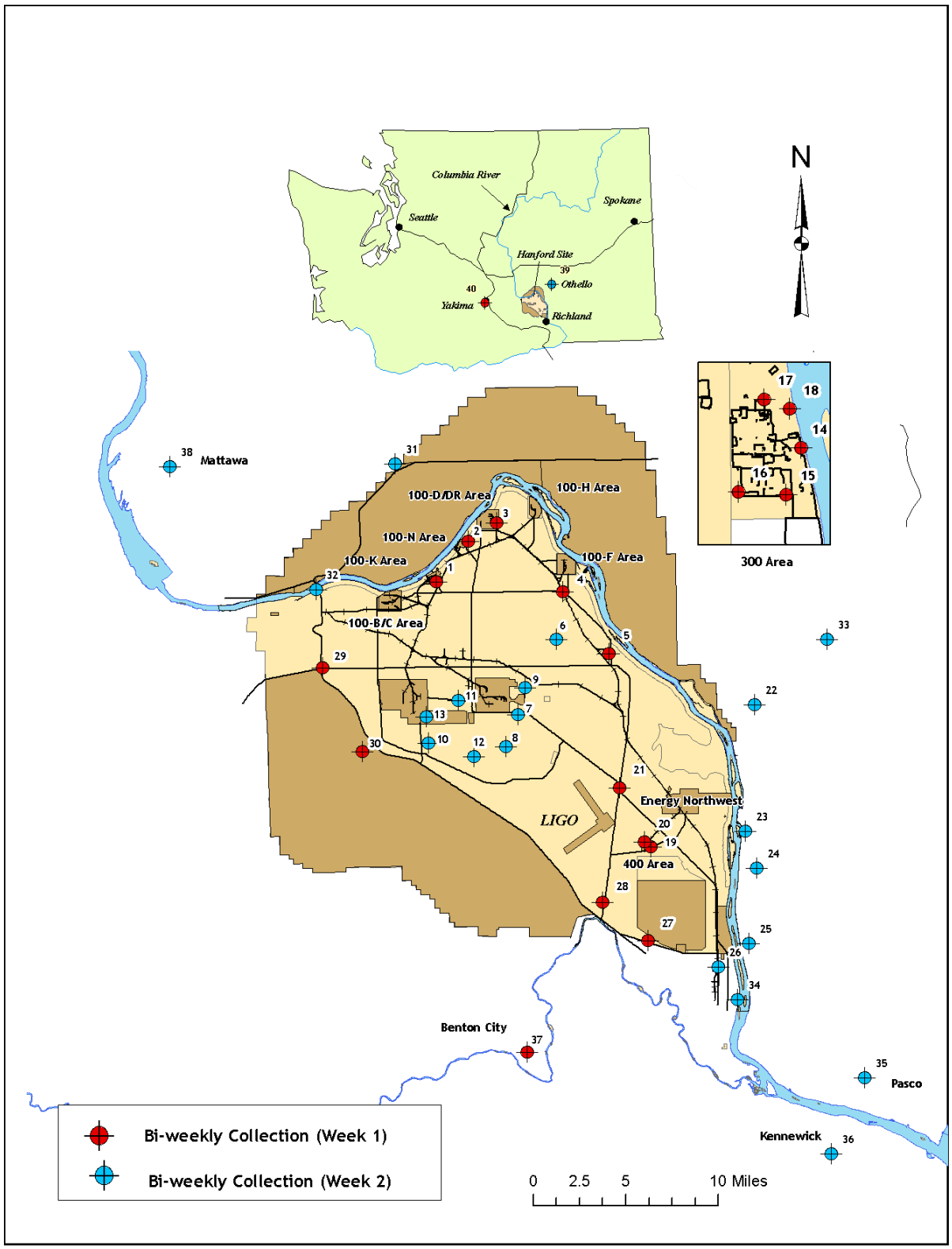
(a) Refer to Figure 1.1, *2012 Air Sampling Locations*.
(b) Washington State Department of Health (DOH) air sampler also at this location.

1.2 Tritium

Location	Location Number[a]	Frequency	Analysis(b)
Onsite			
100 K Area	1	M	^{3}H
100 N-1325 Crib	2	M	^{3}H
200 ESE	7	M	^{3}H
200 Tel. Exchange	11	M	^{3}H
300 Water Intake[c]	14	M	^{3}H
300 South Gate[d]	15	M	^{3}H
300 South West	16	M	^{3}H
300 Trench	17	M	^{3}H
300 NE	18	M	^{3}H
400 E	19	M	^{3}H
Perimeter			
Ringold Met Tower	22	M	^{3}H
W End of Fir Road	23	M	^{3}H
Dogwood Met Tower	24	M	^{3}H
Byers Landing	25	M	^{3}H
Battelle Complex[c]	26	M	^{3}H
Prosser Barricade	28	M	^{3}H
Wahluke Slope	31	M	^{3}H
Community			
Basin City School	33	M	^{3}H
Leslie Groves-Richland	34	M	^{3}H
Distant			
Yakima	40	M	^{3}H

(a) Refer to Figure 1.1, 2012 Air Sampling Locations
(b) As tritiated water (HTO)
(c) DOH air sampler also at this location
(d) Two tritium samples are collected from this location

Figure 1.1. 2012 Air Sampling Locations



2.0 Surface Water Surveillance

2.1 Columbia River

Location[a]	Sample Type	Frequency	Analyses
Priest Rapids-River	Cumulative[c]	M Comp.[b]	Alpha, Beta, Lo ^{3}H, ^{90}Sr, ^{99}Tc, U
	Particulate (filter)	M Comp.[d]	Gamma Scan
		Q Comp.[d]	Pu
	Soluble (resin)	M Comp.[d]	Gamma Scan
		Q Comp.[d]	Pu
Richland Pump House HRM 46.4	Cumulative	M Comp.[b]	Alpha, Beta, Lo ^{3}H, ^{90}Sr, ^{99}Tc, U
	Particulate (filter)	M Comp.[d]	Gamma Scan
		Q Comp.[d]	Pu
	Soluble (resin)	M Comp.[d]	Gamma Scan
		Q Comp.[d]	Pu
Richland Pump House -1 HRM46.4[e]	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House -2 HRM46.4	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House -3 HRM46.4	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House -5 HRM46.4	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House -7 HRM46.4	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House -10 HRM46.4	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Richland Pump House HRM 43.5	Nearshore	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered
Richland Pump House HRM 43.9	Nearshore	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered
Richland Pump House HRM 45.0	Nearshore	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered
Richland Pump House HRM 45.8	Nearshore	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	ICP-MS, Hg-CVAF, ICP-MS Filtered
Vernita-1 HRM 0.3	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	^{99}Tc, ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Vernita-2 HRM 0.3	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	^{99}Tc, ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Vernita-3 HRM 0.3	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	^{99}Tc, ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
Vernita-4 HRM 0.3	Transect	Q	Lo ^{3}H, ^{90}Sr, U, Anions
		A	^{99}Tc, ICP-MS, Hg-CVAF, ICP-MS Filtered, VOA
100 N -1 HRM 9.5[f]	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N -2 HRM 9.5	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N -3 HRM 9.5	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N -5 HRM 9.5	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N -7 HRM 9.5	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N -10 HRM 9.5	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N Shore HRM 8.4[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N Shore HRM 8.9[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N Shore HRM 9.2[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
100 N Shore HRM 9.8[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite-1 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, ^{99}Tc, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite -2 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite -3 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite -5 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite -7 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions

Location[a]	Sample Type	Frequency	Analyses
Hanford Townsite -10 HRM 28.7	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite HRM26[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, ^{99}Tc, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite HRM27[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, ^{99}Tc, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite HRM28[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, ^{99}Tc, U, ICP-MS, ICP-MS Filtered, Anions
Hanford Townsite HRM30[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, ^{99}Tc, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -1 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -2 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -3 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -5 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -7 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area -10 HRM 43.1	Transect	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area Shore HRM41.5[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area Spring 42-2[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area Spring DR 42-2[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions
300 Area Shore HRM42.9[g]	Nearshore	A	Lo ^{3}H, ^{90}Sr, U, ICP-MS, ICP-MS Filtered, Anions

(a) Refer to Figure 2.1, *2012 Surface Water Sampling Locations*. Hanford River Markers (HRMs) are a series of signposts along the Hanford Site shoreline of the Columbia River that are roughly 1.6 km (1 mi) apart. The Vernita Bridge is HRM #0 and Ferry Street in Richland is HRM #46. Samples collected between HRMs are assigned a decimal.
(b) Sample is collected weekly and composited monthly for analysis.
(c) Additional sample provided to the DOH (January and June only).
(d) Sample is collected biweekly and composited for analysis.
(e) Quality assurance sample submitted for analyses twice per year.
(f) Quality assurance sample submitted for analyses once per year.
(g) Additional sample provided to the DOH.

2.2 River Shoreline Springs

Location[a]	HRM[b]	Sample Type	Frequency	Analyses
100-B Spring 38-3	3.8	Grab	A	^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-B Spring 42-1	4.2	Grab	A	^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-K Spring 63-1[c]	6.3	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, C-14, ICP-MS, ICP-MS Filtered, Anions, VOA
100-K Spring 77-1[c]	7.6	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, C-14, ICP-MS, ICP-MS Filtered, Anions, VOA
100-N Spring 8-10	9.0	Grab	A	^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-N Spring 89-1	9.1	Grab	A	^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions, TPH
100-N Spring 8-13[c]	9.3	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-D Spring 102-1[c]	10.2	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc , U, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-D Spring 107-1	10.7	Grab	A	^{3}H, ^{99}Tc , U, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-D Spring 110-1[c]	11.0	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc , U, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-H Spring 145-1	14.4	Grab	A	^{3}H, ^{99}Tc, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-H Spring 153-1[c]	15.3	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions
100-F Spring 207-1	20.7	Grab	A	^{3}H, ^{90}Sr, ICP-MS, ICP-MS Filtered, Anions, VOA
Hanford Spring 28-2[c]	28.1	Grab	A	Alpha, Beta, ^{3}H, Anions, ^{129}I
Hanford Spring 30-1[c]	30.0	Grab	A	Alpha, Beta, ^{3}H, Anions, ^{129}I
300 Area Spring 42-2[c]	42.1	Grab	A	Alpha, Beta, ^{3}H, U, Anions, VOA
300 Area Spring DR 42-2[c, d]	42.4	Grab	A	Alpha, Beta, ^{3}H, U, Anions, VOA

(a) Refer to Figure 2.1, *2012 Surface Water Sampling Locations*.
(b) HRMs are a series of signposts along the Hanford Site shoreline of the Columbia River that are roughly 1.6 km (1 mi) apart. The Vernita Bridge is HRM #0 and Ferry Street in Richland is HRM #46. Samples collected between HRMs are assigned a decimal.
(c) Additional sample provided to the DOH.
(d) DR = Downriver from noted location

2.3 Onsite Pond

Location[(a)]	Sample Type	Frequency	Analyses
West Lake	Grab	Q	^{3}H, U
FFTF Pond[(b)]	Grab	Q	Alpha, Beta, ^{3}H, Gamma Scan

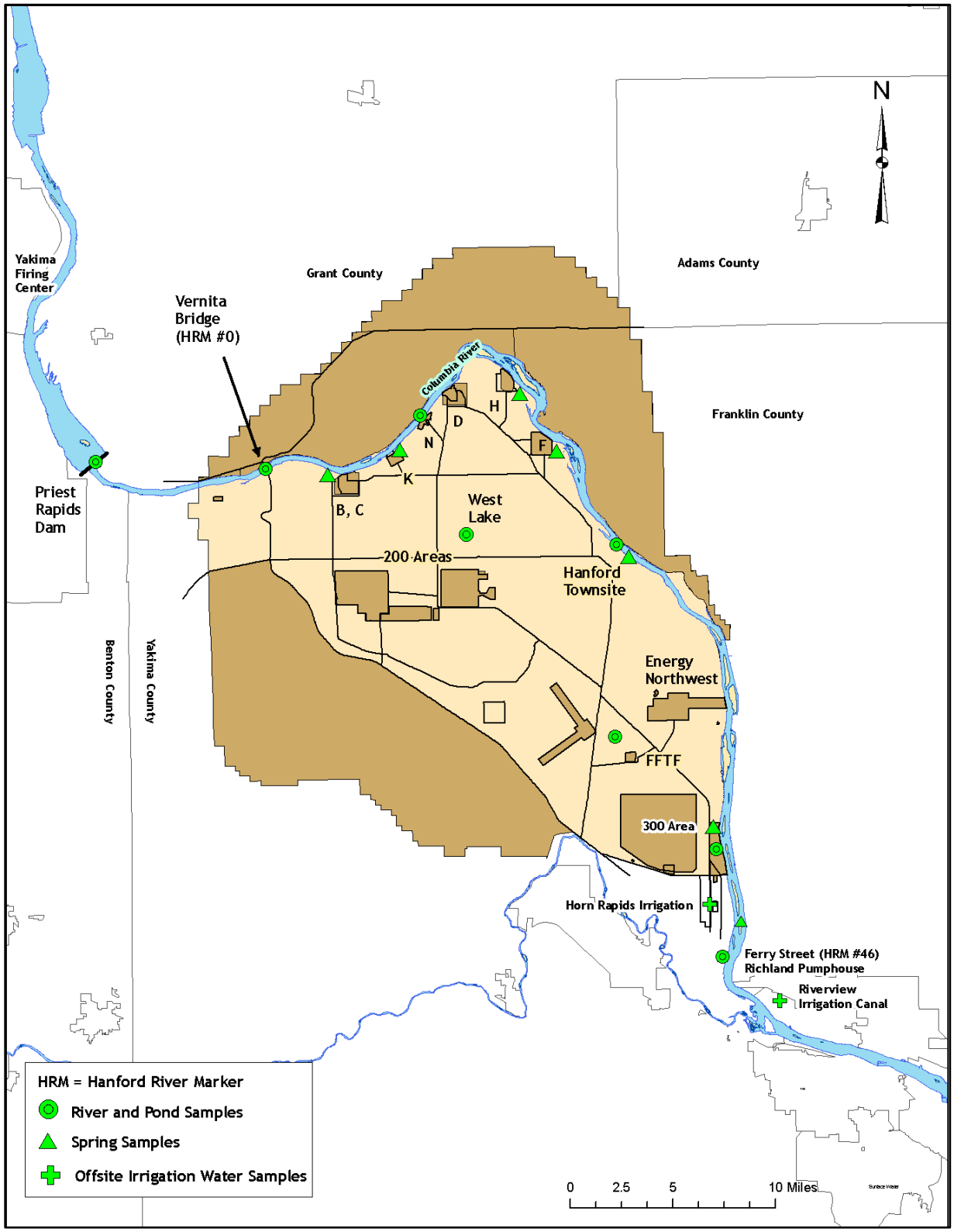
(a) Refer to Figure 2.1, *2012 Surface Water Sampling Locations*.
(b) Quality assurance sample submitted for analyses once per year. FFTF = Fast Flux Test Facility (400 Area).

2.4 Offsite Irrigation

Location(a)	Sample Type	Frequency	Analyses
Riverview Canal[(b)]	Grab	TA (May-Sept)	Alpha, Beta, Lo ^{3}H, ^{90}Sr, U, Gamma Scan
Horn Rapids Area[(b)]	Grab	TA (May-Sept)	Alpha, Beta, Lo ^{3}H, ^{90}Sr, U, Gamma Scan

(a) Refer to Figure 2.1, *2012 Surface Water Sampling Locations*.
(b) Additional sample provided to the DOH.

Figure 2.1. 2012 Surface Water Sampling Locations



3.0 Biota

3.1 Food and Farm Products

3.1.1 Milk

Location[a]	Frequency	Analyses
East Wahluke Area[b]	Q	Lo ^{3}H, ^{90}Sr, Gamma Scan
Sagemoor Composite[b,c]	Q	Lo ^{3}H, ^{90}Sr, Gamma Scan
Sunnyside Area	Q	Lo ^{3}H, ^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations*
(b) Sample composited from multiple dairies in each area
(c) Quality assurance sample submitted for analyses once per year

3.1.2 Leafy Vegetables

Location[a,b]	Frequency[c]	Analyses
Riverview Area[d]	A	^{90}Sr, Gamma Scan
Sunnyside Area	A	^{90}Sr, Gamma Scan
East Wahluke Area[d]	BE (2012)	^{90}Sr, Gamma Scan
Sagemoor Area[d]	BE (2013)	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations* identifying those locations scheduled for collection in 2012.
(b) Two samples collected for Mission Support Alliance (MSA) within each area; one sample is analyzed and one is archived.
(c) Samples are collected in 2012 according to their specified frequency unless otherwise noted.
(d) Additional sample provided to the DOH.

3.1.3 Vegetables

Location[a,b]	Sample Type	Frequency[c]	Analyses
Riverview Area[d][e]	Potatoes	A	^{90}Sr, Gamma Scan
Sunnyside Area	Potatoes	A	^{90}Sr, Gamma Scan
East Wahluke Area[e]	Potatoes	A	^{90}Sr, Gamma Scan
Sagemoor Area[e]	Potatoes	TE (2012)	^{90}Sr, Gamma Scan
Horn Rapids Area[e]	Potatoes	BE (2013)	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations* identifying those locations scheduled for collection in 2012.
(a) Two samples collected for MSA within each area; one sample is analyzed and one is archived.
(b) Samples are collected in 2012 according to their specified frequency unless otherwise noted.
(c) Other vegetables may be substituted if potatoes are not available.
(d) Additional sample provided to the DOH.

3.1.4 Fruits

Location[a,b]	Sample Type	Frequency[c]	Collection Period	Analyses
Sagemoor Area	Apples[d]	TE (2012)	June-September	^{90}Sr, Gamma Scan
	Grapes[e][d]	TE (2013)	June-September	^{90}Sr, Gamma Scan
	Cherries[d]	TE (2014)	June-September	^{90}Sr, Gamma Scan
Sunnyside Area	Tomatoes	A	June-September	^{90}Sr, ^{3}H, Gamma Scan
	Apples[d]	TE (2012)	June-September	^{90}Sr, Gamma Scan
	Grapes[e]	TE (2013)	June-September	^{90}Sr, Gamma Scan
	Cherries[d]	TE (2014)	June-September	^{90}Sr, Gamma Scan
Riverview Area	Tomatoes	A	June-September	^{90}Sr, ^{3}H, Gamma Scan
	Apples[d]	TE (2012)	June-September	^{90}Sr, Gamma Scan
	Grapes[d, e]	TE (2013)	June-September	^{90}Sr, Gamma Scan
	Cherries	TE (2014)	June-September	^{90}Sr, Gamma Scan
Ringold Area	Cherries[d]	TE (2014)	June-September	^{90}Sr, Gamma Scan
East Wahluke Area	Cherries[d]	TE (2014)	June-September	^{90}Sr, Gamma Scan
Mattawa Area	Apples[d]	TE (2012)	June-September	^{90}Sr, Gamma Scan
Cold Creek Area	Grapes[e]	TE (2013)	June-September	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations* identifying those locations scheduled for collection in 2012.
(b) Two samples collected for MSA within each area; one sample is analyzed and one is archived.
(c) Samples are collected in 2012 according to their specified frequency unless otherwise noted.
(d) Additional sample provided to the DOH.
(e) Concord grapes preferred; table grapes acceptable if concord grapes are unavailable.

3.1.5 Wines

Location[a,b]	Sample Type	Frequency	Collection Period	Analyses
Columbia Basin[c]	White[d]	BE (2013)	December	Lo ^{3}H, Gamma Scan
	Red[d]	BE (2013)	December	Lo ^{3}H, Gamma Scan
Yakima Valley	White[d]	BE (2013)	December	Lo ^{3}H, Gamma Scan
	Red(d)	BE (2013)	December	Lo ^{3}H, Gamma Scan
Mattawa Area	White[d]	BE (2013)	December	Lo ^{3}H, Gamma Scan
	Red[d]	BE (2013)	December	Lo ^{3}H, Gamma Scan

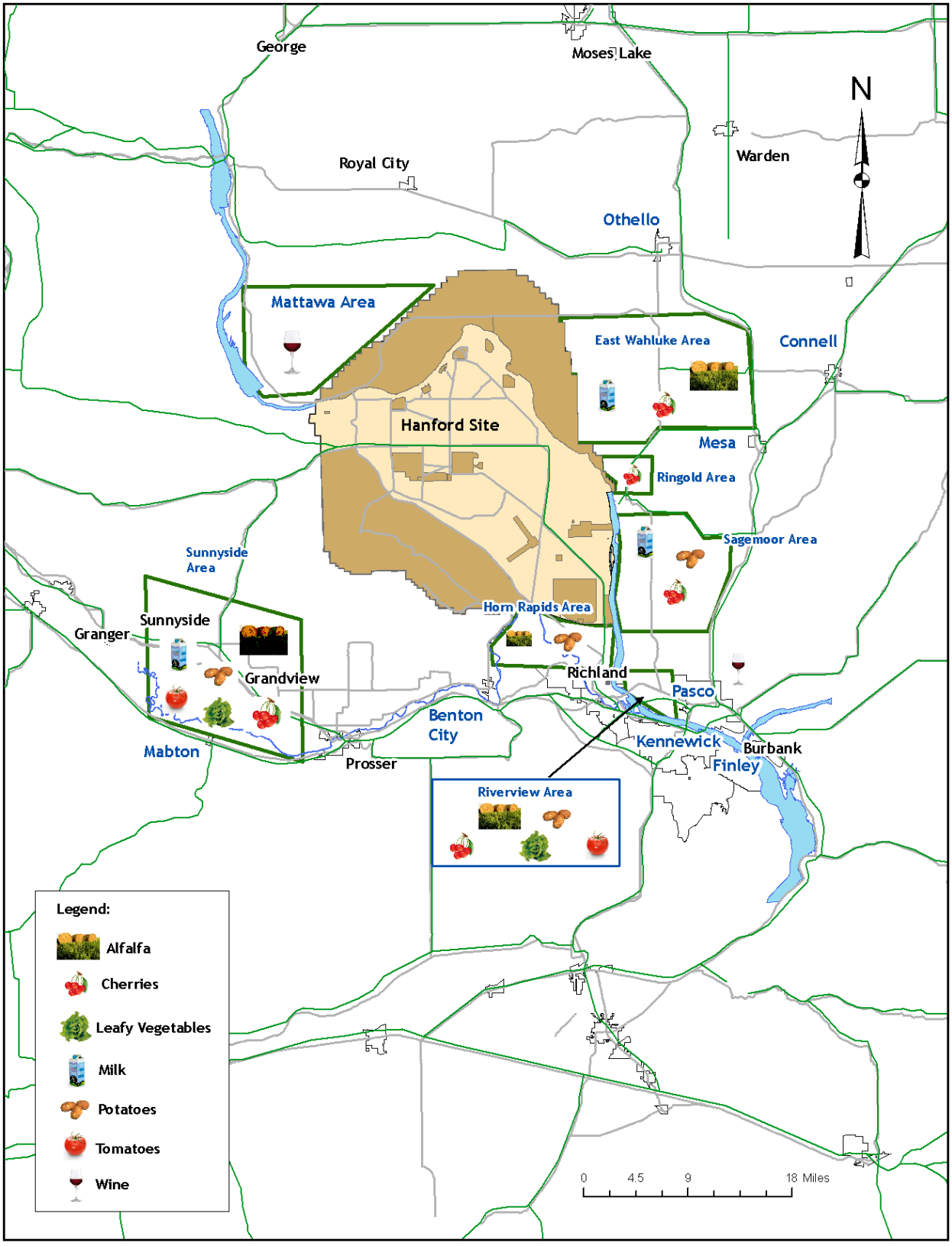
(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations*.
(b) Two samples of each type collected for MSA within each area.
(c) Location refers to Benton and Franklin Counties.
(d) Additional sample provided to the DOH.

3.1.6 Alfalfa

Location[a,b]	Sample Type	Frequency	Collection Period	Analyses
Sagemoor Area	Alfalfa	BE (2013)	May	^{90}Sr, Gamma Scan
Riverview Area[c]	Alfalfa	BE (2013)	May	^{90}Sr, Gamma Scan
Sunnyside Area	Alfalfa	BE (2013)	May	^{90}Sr, Gamma Scan
Horn Rapids Area[c]	Alfalfa	BE (2013)	May	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, *2012 Food and Farm Products Sampling Locations*.
(b) Two samples collected for MSA within each area; one sample is analyzed and one is archived.
(c) Additional sample provided to the DOH.

Figure 3.1. 2012 Food and Farm Products Sampling Locations



3.2 Wildlife

3.2.1 Fish

Location[a] Species/ Sample	Number of Samples	Frequency[b]	Collection Period	Analyses
300 Area				
Sturgeon[c] Fillet	1	TE (2013)	April-July	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Sturgeon[c] Carcass	1	TE (2013)	April-July	^{90}Sr
Bass[c] Fillet	3-5	BE (2012)	April-June	Gamma Scan
Bass[c] Fillet	1[d]	BE (2012)	April-June	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Bass[c] Carcass	3-5	BE (2012)	April-June	^{90}Sr
100 Areas				
Sturgeon[c] Fillet	1	TE (2013)	April-July	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Sturgeon[c] Carcass	1	TE (2013)	April-July	^{90}Sr
Bass[c] Fillet	3-5	BE (2012)	April-June	Gamma Scan
Bass[c] Fillet	1[d]	BE (2012)	April-June	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Bass[c] Carcass	3-5	BE (2012)	April-June	^{90}Sr
Whitefish[c] Fillet	3-5	BE (2013)	October-November	Gamma Scan
Whitefish[c] Fillet	1[d]	BE (2013)	October-November	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Carcass	3-5	BE (2013)	October-November	^{90}Sr
Reference -Desert Aire/ Vantage				
Sturgeon Fillet	1	TE (2013)	April-July	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Sturgeon Carcass	1	TE (2013)	April-July	^{90}Sr
Bass[c] Fillet	3-5	BE (2012)	April-June	Gamma Scan
Bass[c] Fillet	1[d]	BE (2012)	April-June	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Bass[c] Carcass	3-5	BE (2012)	April-June	^{90}Sr
Reference -Priest Rapids/ Wanapum Pools				
Whitefish Fillet	3-5	TE (2013)	November	Gamma Scan
Whitefish Fillet	1[d]	TE (2013)	October-November	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Whitefish Carcass	3-5	TE (2013)	November	^{90}Sr
Hanford Slough/Townsite				
Bass[c] Fillet	3-5	BE (2012)	April-June	Gamma Scan
Bass[c] Fillet	1[d]	BE (2012)	April-June	Gamma Scan, U, Pu, Cr+6, ICP-MS, Hg-CVAA, ^{90}Sr, H^3
Bass[c] Carcass	3-5	BE (2012)	April-June	^{90}Sr

(a) Refer to Figure 3.2, *2012 Wildlife Sampling Locations* identifying those locations scheduled for collection in 2012.
(b) Samples are collected in 2012 according to their specified frequency unless otherwise noted.
(c) Additional whole fish sample provided to the DOH.
(d) Composite sample may contain multiple individuals to obtain enough filet to meet laboratory sample mass minimum for entire suite of selected analyses

3.2.2 Upland Game Birds

Location[c]	Species/ Sample[a]	Number of Samples	Frequency	Collection Period	Analyses
100-D to 100-H					
	Pheasant[b] Muscle	3-5	BE (2012)	September	Gamma Scan
	Pheasant[b] Bone	3-5	BE (2012)	September	^{90}Sr
100-H to 100-F					
	Pheasant[b] Muscle	3-5	BE (2012)	September	Gamma Scan
	Pheasant[b] Bone	3-5	BE (2012)	September	^{90}Sr
Reference					
	Pheasant Muscle	3-5	BE (2012)	September	Gamma Scan
	Pheasant Bone	3-5	BE (2012)	September	^{90}Sr

a) Pheasants preferred; chukar or quail acceptable if pheasants are unavailable.
b) Additional whole bird sample provided to the DOH.
c) Refer to Figure 3.2, *2012 Wildlife Sampling Locations* identifying those locations scheduled for collection in 2012.

3.2.3 Waterfowl

Location	Species/ Sample	Number of Samples	Frequency	Collection Period	Analyses
100 Areas					
	Waterfowl Muscle	3-5	BE (2013)	May-July	Gamma Scan
	Waterfowl Bone	3-5	BE (2013)	May-July	^{90}Sr
Hanford Townsite to 300 Area					
	Waterfowl Muscle	3-5	BE (2013)	May-July	Gamma Scan
	Waterfowl Bone	3-5	BE (2013)	May-July	^{90}Sr
Reference –Desert Aire/Vantage					
	Waterfowl Muscle	3-5	BE (2013)	May-July	Gamma Scan
	Waterfowl Bone	3-5	BE (2013)	May-July	^{90}Sr

3.2.4 Rabbits

Location	Species/Sample	Number of Samples	Frequency	Collection Period	Analyses[b]
300 Areas					
	Cottontail[a] Muscle	3-5	BE (2013)	January-December	Gamma Scan
	Cottontail[a] Bone	3-5	BE (2013)	January-December	^{90}Sr
Reference					
	Cottontail Muscle	3-5	BE (2013)	January-December	Gamma Scan
	Cottontail Bone	3-5	BE (2013)	January-December	^{90}Sr

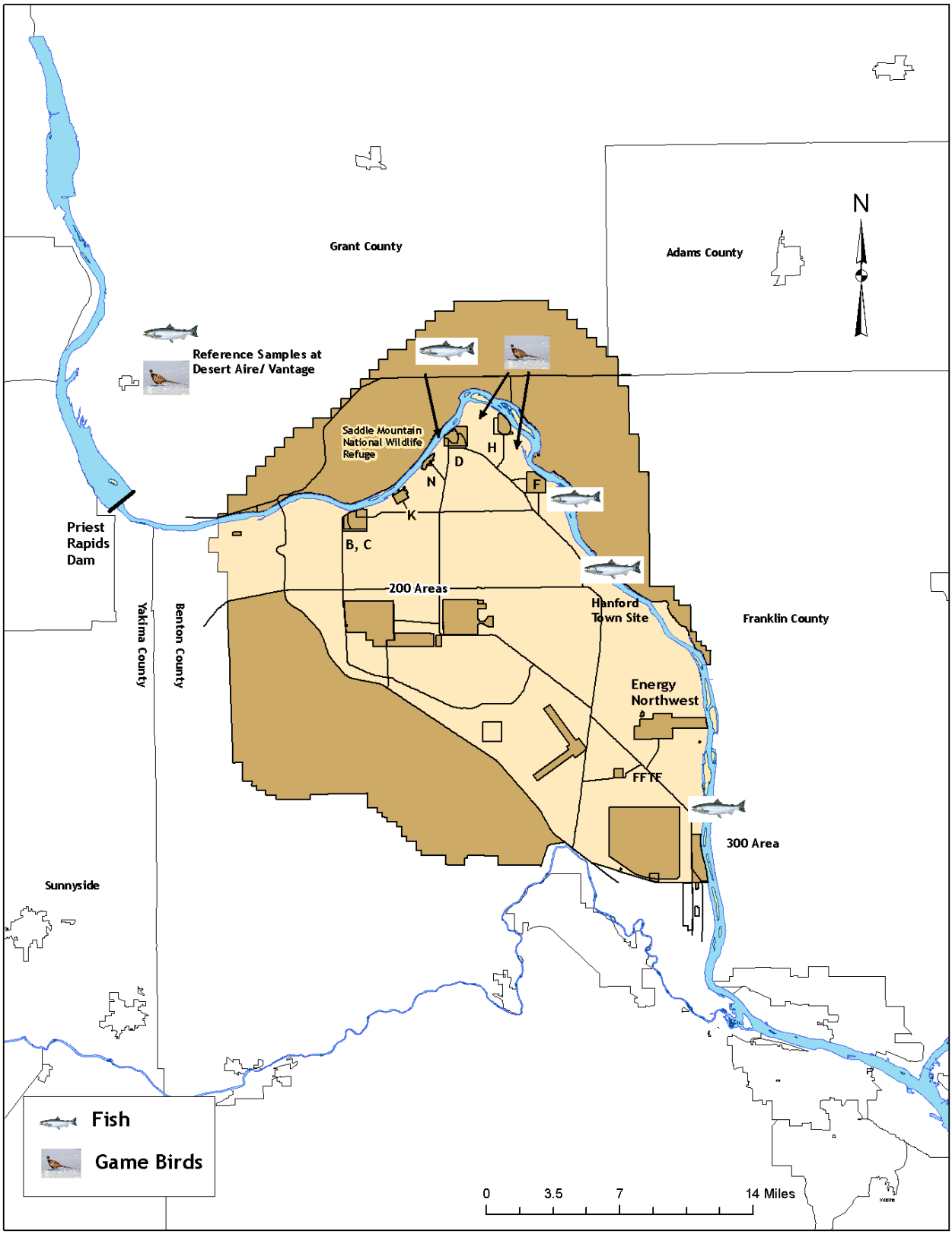
(a) Additional whole rabbit sample provided to the DOH.
(b) Initiate tissue-specific sampling and analysis (Bone/^{90}Sr) when external radiation detection readings are less than two times background radiation detection readings.

3.2.5 Deer/Elk

Location	Species/ Sample	Number of Samples	Frequency	Collection Period	Analyses
Road Kill at Onsite Locations[b]					
	Mule Deer or Elk[a] Muscle	≤10	BE (2012)	As Available	Gamma Scan
	Mule Deer or Elk[a] Bone	≤10	BE (2012)	As Available	^{90}Sr
	Mule Deer or Elk[a] Liver	≤10	BE (2012)	As Available	Gamma Scan, Pu, ICP-MS, Hg-CVAA
Reference [c]					
	Mule Deer or Elk Muscle	1	BE (2012)	As Available	Gamma Scan
	Mule Deer or Elk Bone	1	BE (2012)	As Available	^{90}Sr
	Mule Deer or Elk Liver	1	BE (2012)	As Available	Gamma Scan, Pu, ICP-MS, Hg-CVAA

(a) Additional sample provided to the DOH.
(b) As available, according to location.
(c) The reference sample is obtained from the DOH.

Figure 3.2. 2012 Wildlife Sampling Locations



4.0 Soil and Vegetation

4.1 Soil

Location	Frequency[a]	2013 Collection Period [a]	Analyses
100 K Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
NE of 100 N Area	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
E of 100 N Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
100N Shore Above HGP	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
100N Spring Shoreline	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Above 100D Pumphouse	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
100 Area Fire Stat	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
200 ENC	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
E of 200 E[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
200 ESE	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu, ^{241}Am
S of 200 E	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
SW of B/C Cribs[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu, ^{241}Am
E of 200 W Gate[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu , ^{241}Am
S of 200 W[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Rattlesnake Springs[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Yakima Barricade	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
400 E	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
SE Side of FFTF[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
North of 300 Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
South of 300 Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Hanford Townsite	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Wye Barricade[c]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Prosser Barricade	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
ALE Field Lab	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
N End Vernita Bridge	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Wahluke Slope	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Berg Ranch	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Ringold Area	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
W End of Fir Road	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Taylor Flats No. 2	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Sagemoor Farm[c]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu, ^{241}Am
Byers Landing	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Riverview-Harris	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Benton City	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Sunnyside	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu, ^{241}Am
McNary Dam	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Walla Walla	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Washtucna	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Toppenish	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
George[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Othello[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Wanapum[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu

(a) Samples are collected once every 3 to 5 years and were collected in 2008. Next collection will occur in 2013.
(b) Additional sample provided to the DOH.
(c) Quality assurance samples submitted for analyses.

4.2 Vegetation

Location	Frequency[a]	Collection Period	Analyses
100 K Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
NE of 100 N Area[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
E of 100 N Area	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
100N Spring Shoreline	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
E of 200 W Gate	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
300 Area Shoreline[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Hanford Townsite	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Hanford Townsite HRM28[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Ringold Area	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Sagemoor Farm	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Byers Landing	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Riverview-Harris	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Sunnyside	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Toppenish	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
George[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Othello[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu
Wanapum[b]	3 to 5 years	June-September	Gamma Scan, ^{90}Sr, U, Pu

(a) Samples are collected once every 3 to 5 years and were collected in 2008. Next collection will occur in 2013.
(b) Additional sample provided to the DOH.

5.0 Sediment

5.1 Columbia River

Location[(a)]	Frequency	Analyses
McNary Dam		
Oregon Side Near Dam[(b)]	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC
Washington Side Near Dam[(b)]	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC
Priest Rapids Dam		
Grant Side Near Dam(b)	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC
Yakima Side Near Dam(b)	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC
White Bluffs Slough[(b)]	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC
Hanford Slough	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA, TOC

(a) Refer to Figure 5.1, *2012 Sediment Sampling Locations*.
(b) Additional sample provided to the DOH.

5.2 Shoreline Sediment

Location[(a)]	Frequency	Analyses
Johnson Island	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA
Locke Island	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA
Savage Island	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA
Nelson Island	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA
Bateman Island	A	Gamma Scan, ^{90}Sr, U, Pu, Anions, Cr+6, ICP-MS, Hg-CVAA

(a) Refer to Figure 5.1, *2012 Sediment Sampling Locations*.

5.3 Onsite Pond

Location[(a)]	Frequency	Analyses
West Lake	SA (February & June)	Gamma Scan, ^{90}Sr, U, ^{99}Tc, Alpha, Beta

(a) Refer to Figure 5.1, *2012 Sediment Sampling Locations*.

Figure 5.1. 2012 Sediment Sampling Locations