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Hanford Site Environmental Surveillance Master Sampling Schedule

L. E. Bisping

February 1999

Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
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HANFORD SITE ENVIRONMENTAL SURVEILLANCE MASTER SAMPLING SCHEDULE

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Pacific Northwest National Laboratory
Richland, Washington 99352

SUMMARY

Environmental surveillance of the Hanford Site and surrounding areas is conducted by the Pacific Northwest National Laboratory (PNNL)[a] for the U.S. Department of Energy (DOE). Sampling is conducted to evaluate levels of radioactive and nonradioactive pollutants in the Hanford environs, as required in DOE Order 5400.1, "General Environmental Protection Program," and DOE Order 5400.5, "Radiation Protection of the Public and the Environment." The sampling methods are described in the Environmental Monitoring Plan, United States Department of Energy, Richland Operations Office, DOE/RL-91-50, Rev.2, U.S. Department of Energy, Richland, Washington.

This document contains the CY1999 schedules for the routine collection of samples for the Surface Environmental Surveillance Project (SESP) and Drinking Water Monitoring Project. Each section includes the sampling location, sample type, and analyses to be performed on the sample. In some cases, samples are scheduled on a rotating basis and may not be collected in 1999 in which case the anticipated year for collection is provided. In addition, a map is included for each media showing approximate sampling locations.

SESP SAMPLING

The SESP is a multimedia environmental surveillance effort to measure the concentrations of radionuclides and chemicals in environmental media and assess the integrated effects of these materials on the environment and the public. Project staff collect samples of air, surface water, agricultural products, wildlife, and sediments. In addition, soil and natural vegetation are collected approximately every 5 years. Analytical capabilities include the measurement of radionuclides at very low environmental concentrations and nonradiological chemicals, including metals, anions, volatile organic compounds. In addition, the project includes the capability to measure ambient external radiation.

DRINKING WATER MONITORING PROJECT SAMPLING

The responsibility for monitoring onsite drinking water falls outside the scope of the SESP. The operator of the onsite drinking water systems (DynCorp) is responsible for monitoring the drinking water quality as defined in the National Drinking Water Standards and Washington Administrative code WAC 246-290. PNNL conducts radiological monitoring of onsite drinking water for DynCorp, concurrent with the SESP to promote efficiency and consistency, utilize expertise developed over the years, and reduce

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costs associated with management, procedure development, data management, quality control, and reporting.

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 data from HEIS, the location names in this document reflect the exact location names used in HEIS.

SCHEDULED CHANGES

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

SPLIT SAMPLES

Environmental samples that are split and analyzed by both PNNL and the Washington State Department of Health (DOH) are indicated in the schedule as are environmental samples that are split and analyzed by both PNNL and the U.S. Food and Drug Administration (FDA).

ADDITIONAL INFORMATION

Questions relating to the content of this document can be directed to T. M. Poston, Manager, Surface Environmental Surveillance Project, (509) 376-5678 or R. W. (Bill) Hanf Jr., Manager, Drinking Water Monitoring Project, (509) 376-8264.

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ABBREVIATIONS

FREQUENCY SYMBOLS USED

A	annually
BE	biennial (every 2 years)
BW	biweekly (every 2 weeks)
M	monthly
M Comp.	monthly composite
Q	quarterly
Q Comp.	quarterly composite
SA	semiannually
TE	triennial (every 3 years)

ANALYTICAL SYMBOLS USED

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

Alpha	gross alpha activity of sample
Anions	major anions-generally Cl, F, NO_2, NO_3, SO_4
Beta	gross beta activity of sample
Comp. Only	sample analyzed as part of composite only
Gamma Scan	analysis of photon energy spectrum for individual photon-emitting radionuclides
HTO	tritiated water ($^{3}H^{1}H^{16}O$)
ICP-u, ICP-3	major metals by inductively coupled plasma spectrometry – samples unfiltered unless otherwise noted
LEP	samples analyzed by Low Energy Photon Spectrometry
Lo ^{3}H	analytical procedure includes electrolytic enrichment
Pu	Isotopic plutonium (^{238}Pu, $^{239,240}Pu$)
SEM/AVS	Simultaneously Extracted Metals/Acid Volatile Sulfide
U	Isotopic uranium (^{234}U, ^{235}U, ^{238}U)
VOA	Volatile Organic Compounds

INSTRUMENT SYMBOLS USED

BICRON	Microrem meter
GM	Geiger-Müeller counter
PIC	Pressurized ionization chamber

1.0 AIR SURVEILLANCE

1.1 AIR – PARTICULATE FILTER

Location	Individual Samples: Location Number[a]	Individual Samples: Frequency	Individual Samples: Analyses	Composited Samples: Composite Group	Composited Samples: Frequency	Composited Samples: Analyses
Onsite						
100 K Area	1	BW	Beta , Alpha	100 Areas	Q	^{90}Sr, Pu[b], 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[b], Gamma Scan
Hanford Townsite	5	BW	Beta, Alpha			
Hanford Townsite[c]	5	BW (4th Q)	Beta, Alpha	Hanford Townsite	4th Q	Gamma Scan
N of 200 E	6	BW	Beta	N of 200 E	Q	Gamma Scan
E of 200 E	7	BW	Beta , Alpha	200 E Area	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
200 ESE	8	BW	Beta , Alpha			
S of 200 E	9	BW	Beta , Alpha			
B Pond	10	BW	Beta, Alpha	B Pond	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Army Loop Camp	11	BW	Beta , Alpha	200 W South East	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
200 Tel. Exchange	12	BW	Beta , Alpha			
200 W SE	13	BW	Beta, Alpha	200 West	Q	^{90}Sr, Pu[(b], U[d], Gamma Scan
300 Water Intake	14	BW	Beta	300 Area	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
300 South Gate	15	BW	Beta , Alpha			
300 Trench	16	BW	Beta, Alpha}	Q U[d], Gamma } 300 NE	Q	^{90}Sr, Pu[b]
300 NE	17	BW	Beta, Alpha}	Q U[d], Gamma		
400 E	18	BW	Beta , Alpha	400 Area	Q	^{90}Sr, Pu[b], Gamma Scan
400 W	19	BW	Beta , Alpha			
400 S	20	BW	Beta , Alpha			
400 N	21	BW	Beta , Alpha			
Wye Barricade	22	BW	Beta, Alpha	Wye Barricade	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Wye Barricade[c]	22	BW (3rd Q)	Beta, Alpha	Wye Barricade	3rd Q	Gamma Scan
Perimeter						
Ringold Met Tower	23	BW	Beta, Alpha	Ringold Met Tower	Q	^{90}Sr, Pu[b], Gamma Scan
W End of Fir Rd	24	BW	Beta, Alpha	W End of Fir Road	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Dogwood Met Tower	25	BW	Beta, Alpha	Dogwood Met Tower	Q	^{90}Sr, Pu[b], U[d], Gamma Scan

1.1 AIR - PARTICULATE FILTER (contd)

Location	Individual Samples: Location Number[a]	Individual Samples: Frequency	Individual Samples: Analyses	Composited Samples: Composite Group	Composited Samples: Frequency	Composited Samples: Analyses
Perimeter						
Byers Landing	26	BW	Beta, Alpha	Byers Landing	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Battelle Complex	27	BW	Beta	Battelle Complex	Q	Gamma Scan
Horn Rapids Substa	28	BW	Beta, Alpha	Prosser Barricade	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Prosser Barricade	29	BW	Comp.Only			
Yakima Barricade	30	BW	Beta, Alpha	Yakima Barricade	Q	^{90}Sr, Pu[b], Gamma Scan
Rattlesnake Springs	31	BW	Beta, Alpha			
Wahluke Slope	32	BW	Beta, Alpha	Wahluke Slope	Q	^{90}Sr, Pu[b], Gamma Scan
S End Vernita Bridge	33	BW	Beta, Alpha			
Community[e]						
Basin City School	34	BW	Beta, Alpha	Basin City School	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Leslie Groves-Rchlnd	35	BW	Beta, Alpha	Leslie Groves-Rchland	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Leslie Groves-Rchlnd[c]	35	BW (1st Q)	Beta, Alpha	Leslie Groves-Richland	1st Q	Gamma Scan
Pasco	36	BW	Beta	Tri Cities	Q	^{90}Sr, Pu[b], Gamma Scan
Kennewick-Ely Street	37	BW	Beta, Alpha			
Benton City	38	BW	Beta	Benton City	Q	Gamma Scan
Edwin Markham School	39	BW	Beta, Alpha	Edwin Markham School	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Mattawa	40	BW	Beta	Mattawa	Q	Gamma Scan
Othello	41	BW	Beta	Othello	Q	Gamma Scan
Distant						
Yakima	42	BW	Beta, Alpha	Yakima	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Toppenish[e]	43	BW	Beta, Alpha	Toppenish	Q	^{90}Sr, Pu[b], U[d], Gamma Scan
Toppenish[c][e]	43	BW (2nd Q)	Beta, Alpha	Toppenish	2nd Q	Gamma Scan

(a) Refer to Figure 1.1, 1999 Air Sampling Locations.
(b) Isotopic plutonium.
(c) Sample is collected biweekly for one quarter and composited for the quarter indicated.
(d) Isotopic uranium.
(e) Community-Operated Environmental Surveillance Stations.

1.2 AIR – TRITIUM AND IODINE

Location	Location Number[a]	Frequency[b]	Analysis	Frequency	Analysis[c]
Onsite					
100 K Area	1			M	^{3}H
100 N-1325 Crib	2			M	^{3}H
200 ESE	8	Q Comp	^{129}I	M	^{3}H
200 Tel. Exchange	12			M	^{3}H
300 South Gate[d]	15			M	^{3}H
300 Trench	16			M	^{3}H
300 NE	17			M	^{3}H
400 E	18			M	^{3}H
Perimeter					
Ringold Met Tower	23	Q Comp	^{129}I	M	^{3}H
Dogwood Met Tower	25			M	^{3}H
Byers Landing	26	Q Comp	^{129}I	M	^{3}H
Prosser Barricade	29			M	^{3}H
Wahluke Slope	32			M	^{3}H
Community[e]					
Basin City School	34			M	^{3}H
Leslie Groves-Rchlnd	35			M	^{3}H
Edwin Markham School	39			M	^{3}H
Distant					
Yakima	42	Q Comp	^{129}I	M	^{3}H
Toppenish[e]	43			M	^{3}H

(a) Refer to Figure 1.1, 1999 Air Sampling Locations.
(b) Samples are collected monthly and composited for quarterly analyses.
(c) As HTO
(d) Two silica gel samples are collected from this location. One is submitted to the analytical lab on the date it is collected and the second is archived for one month and then submitted to the analytical lab.
(e) Community-Operated Environmental Surveillance Stations.

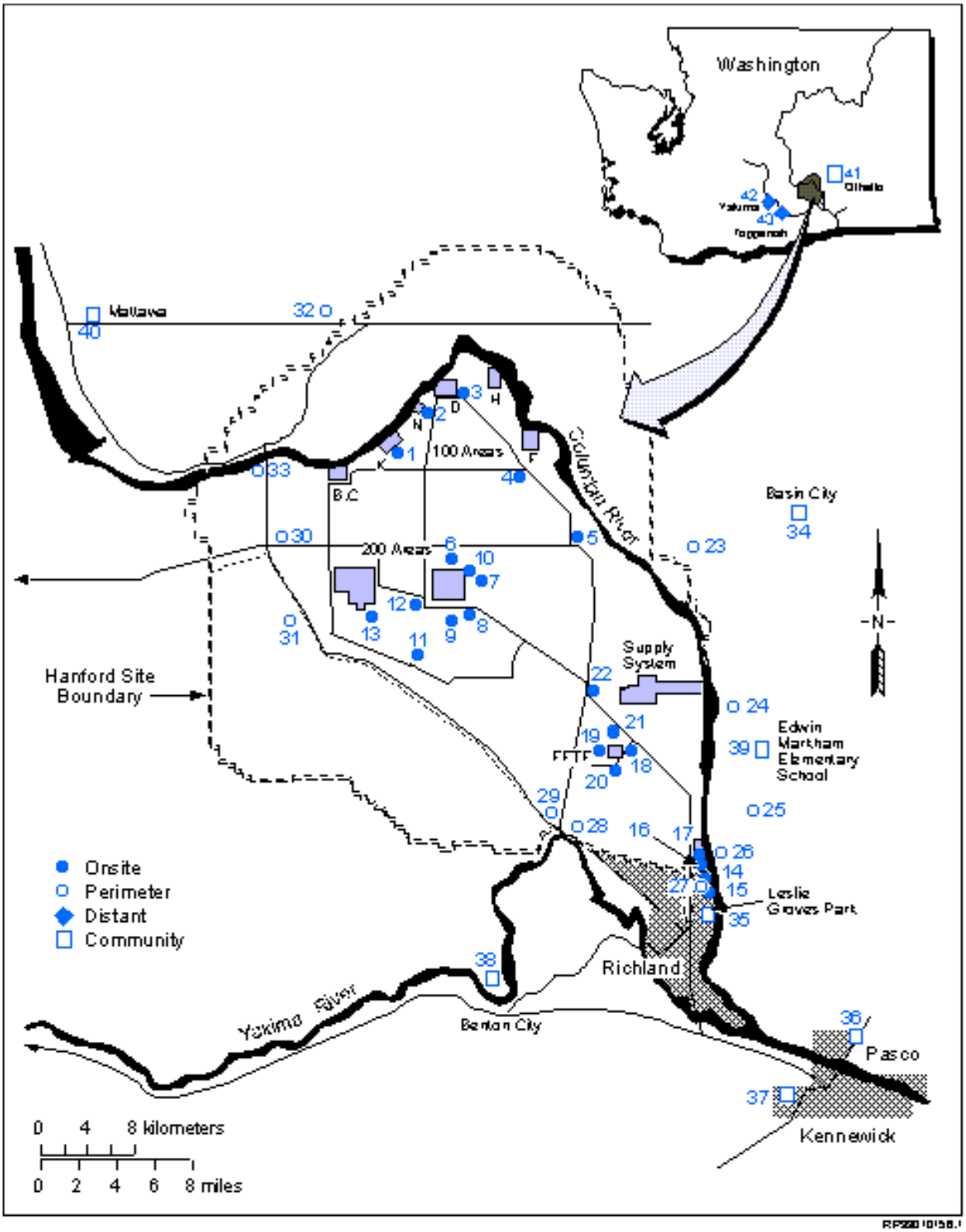

Figure 1.1. 1999 Air Sampling Locations

2.0 SURFACE WATER SURVEILLANCE

2.1 WATER – COLUMBIA RIVER

Location[a]	Sample Type	Frequency	Analyses
Priest Rapids-River	Cumulative	M Comp.[b] Q Comp.[b]	Alpha, Beta, Lo ^{3}H, ^{90}Sr, ^{99}Tc, U[c], DOH[d] ^{129}I
	Particulate (filter)	M Comp.[e] Q Comp.[e]	Gamma Scan Pu[f]
	Soluble (resin)	M Comp.[e] Q Comp.[e]	Gamma San Pu[f]
Vernita	Grab	Q	USGS-NASQAN[g]
	Grab (Transect)[h]	Q A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions Cyanide, VOA
100 N	Grab (Transect)[i]	A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions, DOH[j]
100 F	Grab (Transect)[i]	A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions
Hanford Townsite	Grab (Transect)[i]	A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions, DOH[j]
300 Area	Grab (Transect)[i]	A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions
Richland Pump house	Cumulative	M Comp.[b] Q Comp.[b]	Alpha, Beta, Lo ^{3}H, ^{90}Sr, ^{99}Tc, U[c], DOH[d] ^{129}I
	Particulate (filter)	M Comp.[e] Q Comp.[e]	Gamma Scan Pu[f]
	Soluble (resin)	M Comp.[e] Q Comp.[e]	Gamma Scan Pu[f]
	Grab (Transect)[i]	Q A	Lo ^{3}H, ^{90}Sr, U[c], ICP-3, ICP-3 Filtered, Anions Cyanide, VOA
	Grab	Q	USGS-NASQAN[g]

(a) Refer to Figure 2.1, 1999 Surface Water and Drinking Water Sampling Locations.
(b) Cumulative sample is collected weekly and composited for analysis.
(c) Isotopic uranium.
(d) Split samples collected with the Washington State Department of Health (April and October only).
(e) Sample is collected biweekly and composited for analysis.
(f) Isotopic plutonium.
(g) Analyses are performed by the United States Geological Survey (USGS) in conjunction with the National Stream Quality Accounting Network (NASQAN) Program, and includes: conductance, pH, temperature, turbidity, dissolved oxygen, hardness, Ca, Mg, alkalinity, carbonates, sulfate, Cl, F, solids, NH_4-N, NO_3+NO_2, N-Kjeldahl, P, Cr, Fe, dissolved organic carbon.
(h) 4 samples collected along cross-section.
(i) 10 samples collected along cross-section.
(j) Samples collected at transect stations 1-5 are split with the Washington State Department of Health.

2.2 RIVERBANK SPRINGS

Location[a]	Sample Type	Frequency	Analyses
100-B Spring 37-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-B Spring 39-2	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-K Spring 63-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, VOA
100-K Spring 77-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, VOA
100-N Spring 8-13	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, DOH[b]
100-N Spring Near 199N-46	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-D Spring 110-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-D Spring 102-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-H Spring 152-2	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, U[c], Gamma Scan, ICP-3, ICP-3 Filtered, Anions, DOH[b]
100-H Spring 145-2	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, U[c], Gamma Scan, ICP-3, ICP-3 Filtered, Anions
100-F Spring 207-1	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, U[c], Gamma Scan, ICP-3, ICP-3 Filtered, Anions, VOA, DOH[b]
Hanford Spring 28-2	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc, U[c], ^{129}I, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, DOH[b]
Hanford Spring Upriver 28-2	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc, U[c], ^{129}I, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
Hanford Spring Downriver 28-2	Grab	A	Alpha, Beta, ^{3}H, ^{99}Tc, U[c], ^{129}I, Gamma Scan, ICP-3, ICP-3 Filtered, Anions
300 Area Spring 42-2	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, U[c], ^{129}I, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, VOA
300 Area Spring Downriver 42-2	Grab	A	Alpha, Beta, ^{3}H, ^{90}Sr, U[c], ^{129}I, Gamma Scan, ICP-3, ICP-3 Filtered, Anions, VOA

(a) Refer to Figure 2.1, 1999 Surface Water and Drinking Water Sampling Locations.
(b) Split samples collected with the Washington State Department of Health.
(c) Isotopic uranium.

2.3 ONSITE PONDS

Location[a]	Sample Type	Frequency	Analyses
West Lake	Grab	Q	Alpha, Beta, ^{3}H, ^{90}Sr, ^{99}Tc, U[b], Gamma Scan
FFTF Pond	Grab	Q	Alpha, Beta, ^{3}H, Gamma Scan

(a) Refer to Figure 2.1, 1999 Surface Water and Drinking Water Sampling Locations.
(b) Isotopic uranium.

2.4 OFFSITE WATER SYSTEMS

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

(a) Refer to Figure 2.1, 1999 Surface Water and Drinking Water Sampling Locations.
(b) Isotopic uranium.

2.5 ONSITE DRINKING WATER

Location[a]	Sample Type	Frequency	Analyses
100 B Area-River	Grab	Q	Alpha, Beta, Lo ^{3}H, ^{90}Sr
100 D Area	Grab	Q	Alpha, Beta, ^{3}H, ^{90}Sr
100 K Area	Grab	Q	Alpha, Beta, Lo ^{3}H, ^{90}Sr
FFTF	Grab	Q	Alpha, Beta, ^{3}H, ^{90}Sr, DOH[b]
Firing Range	Grab	A[c]	Alpha, Beta, ^{3}H, ^{90}Sr

(a) Refer to Figure 2.1, 1999 Surface Water and Drinking Water Sampling Locations.
(b) Split samples collected during 2nd quarter with Washington State Department of Health.
(c) One sample collected 1st quarter only.

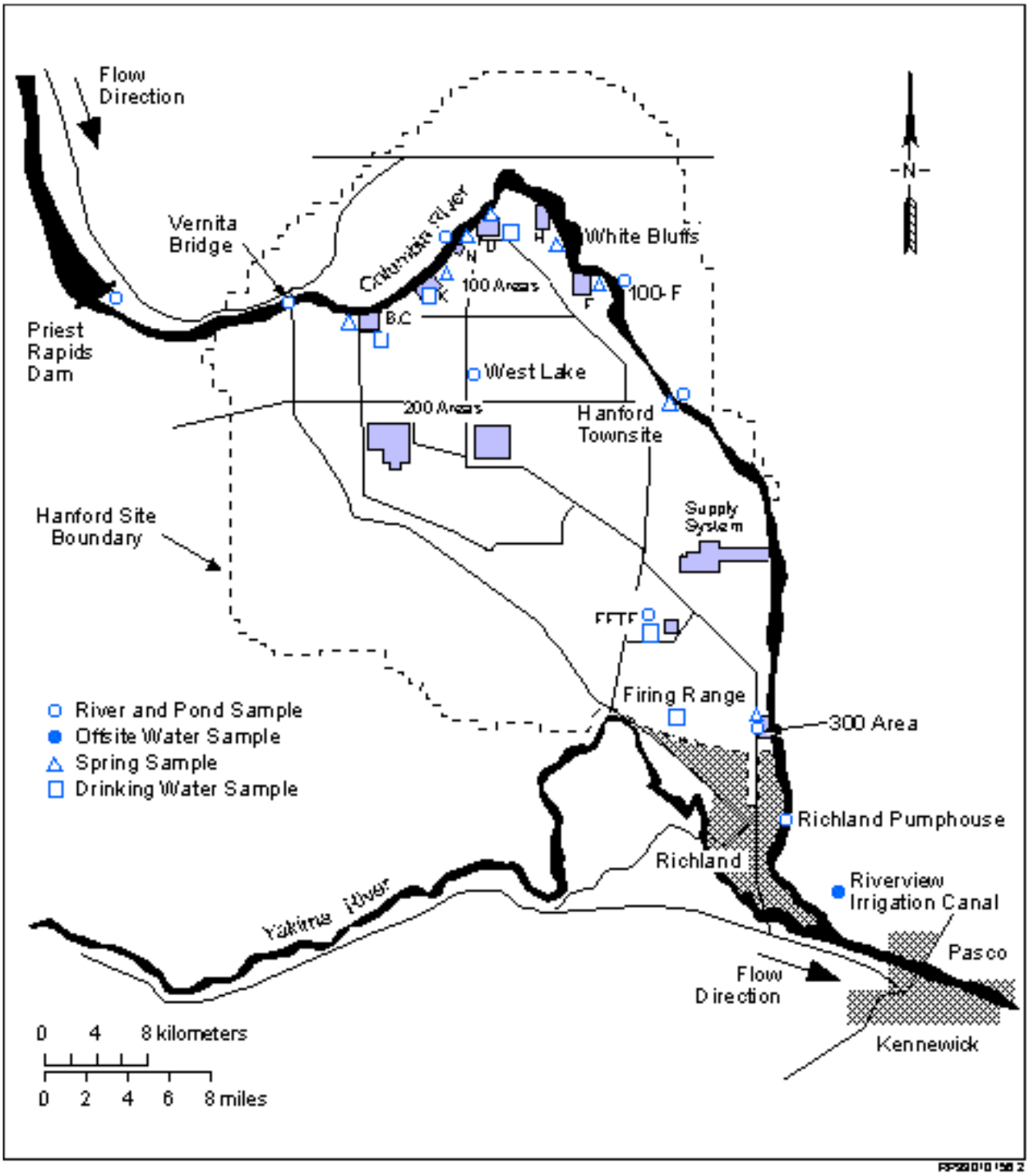

Figure 2.1. 1999 Surface Water and Drinking Water Sampling Locations

3.0 BIOTA

3.1 FOODSTUFFS AND FARM PRODUCTS

3.1.1 Whole Milk

Location[a]	Frequency	Analyses
East Wahluke Area[b]	Q	^{90}Sr, Gamma Scan
	SA	^{129}I
Sagemoor Composite[b]	Q	^{90}Sr, Gamma Scan
	SA	^{129}I
Sunnyside Area	Q	^{90}Sr, Gamma Scan
	SA	^{129}I

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Sample composited from multiple dairies in each area.

3.1.2 Leafy Vegetables

Location[a][b]	Frequency[c]	Analyses
Riverview Area	A	^{90}Sr, Gamma Scan, FDA[d]
Sunnyside Area	A	^{90}Sr, Gamma Scan, FDA[d], DOH[e]
Sagemoor Area	BE (1999)	^{90}Sr, Gamma Scan, DOH[e]
East Wahluke Area	BE (2000)	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Two samples collected within each area, one sample analyzed and one archived.
(c) Sample are collected in 1999 according to their specified frequency unless otherwise noted.
(d) Split samples sent to U.S. Food and Drug Administration.
(e) Split samples collected with the Washington State Department of Health.

3.1.3 Vegetables

Location[a][b]	Sample Type	Frequency[c]	Analyses
Riverview Area	Potatoes	A	^{90}Sr, Gamma Scan, DOH[d]
	Tomatoes	A	^{90}Sr, Lo ^{3}H, Gamma Scan, DOH[d]
Sunnyside Area	Potatoes	A	^{90}Sr, Gamma Scan, FDA[e]
East Wahluke Area	Potatoes	A	^{90}Sr, Gamma Scan, DOH[d]
Harrah/Wapato Area[f]	Tomatoes	A	^{90}Sr, Lo ^{3}H, Gamma Scan
Horn Rapids Area	Potatoes	TE (1999)	^{90}Sr, Gamma Scan, FDA[e]
Sagemoor Area	Potatoes	TE (2000)	^{90}Sr, Gamma Scan, FDA[e]

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Two samples collected within each area, one sample analyzed and one archived.
(c) Samples are collected in 1999, according to their specified frequency unless otherwise noted.
(d) Split samples collected with the Washington State Department of Health.
(e) Split samples sent to U.S. Food and Drug Administration.
(f) Samples provided to PNNL by Washington State Department of Health.

3.1.4 Fruit

Location[a][b]	Sample Type	Frequency[c]	Collection Period	Analyses
Sagemoor Area	Cherries	TE (1999)	June	^{90}Sr, Gamma Scan, FDA[d], DOH[e]
	Apples	TE (2000)	September	^{90}Sr, Gamma Scan, FDA[d], DOH[e]
	Concord Grapes[f]	TE (2001)	September	^{90}Sr, Gamma Scan, DOH[e]
Sunnyside Area	Cherries	TE (1999)	June	^{90}Sr, Gamma Scan, DOH[e]
	Apples	TE (2000)	September	^{90}Sr, Gamma Scan
	Concord Grapes[f]	TE (2001)	September	^{90}Sr, Gamma Scan
Riverview Area	Cherries	TE (1999)	June	^{90}Sr, Gamma Scan
	Apples	TE (2000)	September	^{90}Sr, Gamma Scan, FDA[d]
	Concord Grapes[f]	TE (2001)	September	^{90}Sr, Gamma Scan, DOH[e]
Ringold Area	Cherries	TE (1999)	June	^{90}Sr, Gamma Scan
East Wahluke Area	Cherries	TE (1999)	June	^{90}Sr, Gamma Scan
Mattawa Area	Apples	TE (2000)	September	^{90}Sr, Gamma Scan, DOH[e]
Cold Creek Area	Concord Grapes[f]	TE (2001)	September	^{90}Sr, Gamma Scan

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Two samples collected within each area, one sample analyzed and one archived.
(c) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(d) Split samples sent to the U.S. Food and Drug Administration.
(e) Split samples collected with the Washington State Department of Health.
(f) Concord grapes preferred; table grapes acceptable if concord grapes are unavailable.

3.1.5 Wine

Location[a][b]	Sample Type	Frequency	Collection Period	Analyses
Columbia Basin	White	A	December	Lo ^{3}H, Gamma Scan, DOH[c]
	Red	A	December	Lo ^{3}H, Gamma Scan, DOH[c]
Yakima Valley	White	A	December	Lo ^{3}H, Gamma Scan, DOH[c]
	Red	A	December	Lo ^{3}H, Gamma Scan, DOH[c]

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Two samples of each type collected within each area.
(c) Split samples collected with the Washington State Department of Health.

3.1.6 Alfalfa

Location[a][b]	Sample Type	Frequency[c]	Collection Period	Analyses
Sagemoor Area	Alfalfa	BE (1999)	May	^{90}Sr, Gamma Scan
Riverview Area	Alfalfa	BE (1999)	May	^{90}Sr, Gamma Scan, DOH[d]
Sunnyside Area	Alfalfa	BE (1999)	May	^{90}Sr, Gamma Scan
Horn Rapids Area	Alfalfa	BE (1999)	May	^{90}Sr, Gamma Scan, DOH[d]

(a) Refer to Figure 3.1, 1999 Food and Farm Product Sampling Locations.
(b) Two samples collected within each area, one sample analyzed and one archived.
(c) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(d) Split samples collected with the Washington State Department of Health.

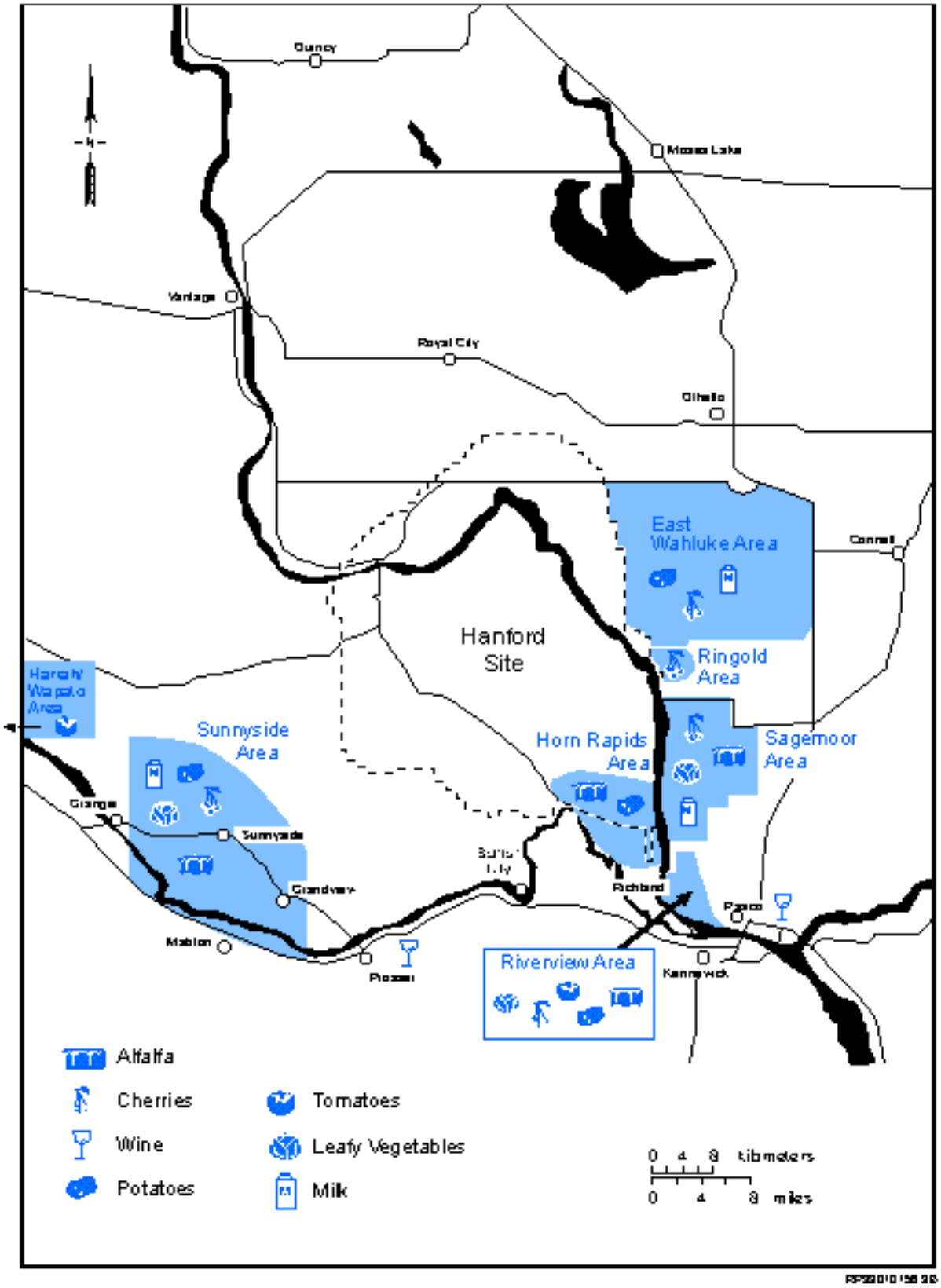

Figure 3.1. 1999 Food and Farm Product Sampling Locations

3.2 WILDLIFE

3.2.1 Aquatic Biota

Location[a]	Species/ Sample	Number of Samples	Frequency[b]	Collection Period	Analyses
100 N Area to 100 D Area[c]	Whitefish				
	Fillet	5	BE (1999)	January	Gamma Scan, DOH[d]
	Carcass	5	BE (1999)	January	^{90}Sr, DOH[d]
	Carp				
	Fillet	5	BE (2000)	June	Gamma Scan, DOH[d]
	Carcass	5	BE (2000)	June	^{90}Sr, DOH[d]
100 F Slough	Bass				
	Fillet	5	TE (1999)	May-June	Gamma Scan
	Carcass	5	TE (1999)	May-June	^{90}Sr
Hanford Slough	Bass				
	Fillet	5	TE (1999)	May-June	Gamma Scan
	Carcass	5	TE (1999)	May-June	^{90}Sr
300 Area[c]	Whitefish				
	Fillet	5	BE (1999)	January	Gamma Scan, DOH[d]
	Carcass	5	BE (1999)	January	^{90}Sr, DOH[d]
	Carp				
	Fillet	5	BE (2000)	June	Gamma Scan, DOH[d]
	Carcass	5	BE (2000)	June	^{90}Sr, DOH[d]
Desert Aire	Bass				
	Fillet	5	TE (1999)	June	Gamma Scan, DOH[d]
	Carcass	5	TE (1999)	June	^{90}Sr, DOH[d]
Vantage	Carp				
	Fillet	5	BE (2000)	June	Gamma Scan
	Carcass	5	BE (2000)	June	^{90}Sr

(a) Refer to Figure 3.2, 1999 Wildlife Sampling Locations.
(b) Samples are collected in 1999 according to their specified frequency unless otherwise note.
(c) If available, PNNL will collect one Squawfish sample and provide to the Washington State Department of Health.
(d) Split one sample with the Washington State Department of Health.

3.2.2 Geese

Location[a]	Species/Sample	Number of Samples	Frequency[b]	Collection Period	Analyses
100 N Area to 100 D Area	Western Canadian Goose				
	Muscle	5	BE (1999)	August	Gamma Scan, DOH[c]
	Bone	5	BE (1999)	August	^{90}Sr, DOH[c]
Hanford Townsite	Western Canadian Goose				
	Muscle	5	BE (1999)	August	Gamma Scan
	Bone	5	BE (1999)	August	^{90}Sr
Vantage	Western Canadian Goose				
	Muscle	5	BE (1999)	August	Gamma Scan
	Bone	5	BE (1999)	August	^{90}Sr

(a) Refer to Figure 3.2, 1999 Wildlife Sampling Locations.
(b) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(c) Split one sample with the Washington State Department of Health.

3.2.3 Game Birds

Location	Species/Sample[a]	Number of Samples	Frequency[b]	Collection Period	Analyses
100 D Area to 100 H Area	Pheasant				
	Muscle	4	BE (2000)	October	Gamma Scan, DOH[c]
	Bone	4	BE (2000)	October	^{90}Sr, DOH[c]
100 H Area to 100 F Area	Pheasant				
	Muscle	6	BE (2000)	October	Gamma Scan, DOH[c]
	Bone	6	BE (2000)	October	^{90}Sr, DOH[c]

(a) Pheasant preferred; chukar or quail acceptable if pheasant is unavailable.
(b) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(c) Split one sample with the Washington State Department of Health.

3.2.4 Rabbits

Location[a]	Species/Sample	Number of Samples	Frequency[b]	Collection Period	Analyses
100 N Area	Cottontail or Jack Rabbit				
	Muscle	4	BE (1999)	April	Gamma Scan, DOH[c]
	Bone	4	BE (1999)	April	^{90}Sr, DOH[c]
200 E Area	Jack Rabbit				
	Muscle	4	BE (1999)	April	Gamma Scan
	Bone	4	BE (1999)	April	^{90}Sr
200 West	Jack Rabbit				
	Muscle	4	BE (1999)	April	Gamma Scan
	Bone	4	BE (1999)	April	^{90}Sr

(a) Refer to Figure 3.2, 1999 Wildlife Sampling Locations.
(b) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(c) Split one sample with the Washington State Department of Health.

3.2.5 Deer

Location	Species/ Sample	Number of Samples	Frequency[a]	Collection Period	Analyses
100 N Area	Mule				
	Muscle	2	BE (2000)	December	Gamma Scan
	Bone	2	BE (2000)	December	^{90}Sr
200 Ponds	Mule				
	Muscle	2	BE (2000)	December	Gamma Scan, DOH[b]
	Bone	2	BE (2000)	December	^{90}Sr, DOH[b]
Road Kill at Onsite Locations[c]	Mule				
	Muscle	6	BE (2000)	As Available	Gamma Scan
	Bone	6	BE (2000)	As Available	^{90}Sr
Background[c]	Mule				
	Muscle	2	(2000)	October	Gamma Scan
	Bone	2	(2000)	October	^{90}Sr

(a) Samples are collected in 1999 according to their specified frequency unless otherwise noted.
(b) Split one sample with the Washington State Department of Health.
(c) As available, according to location.

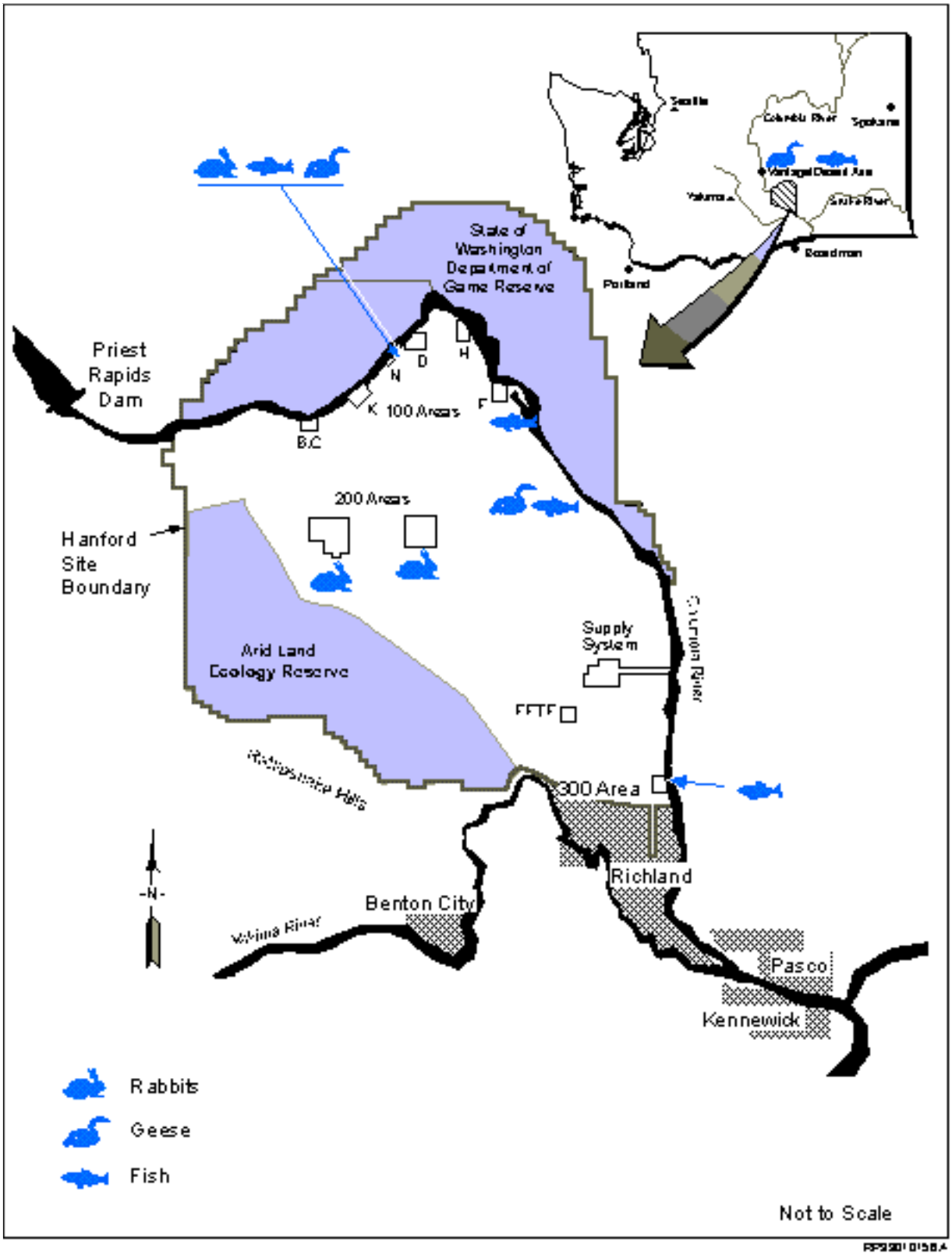

Figure 3.2. 1999 Wildlife Sampling Locations

4.0 SOIL AND VEGETATION

4.1 SOIL

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

(a) Samples are collected once every 3 to 5 years and will be collected in 2001.
(b) Samples will be collected and archived but may be submitted for analyses at a later date.
(c) Isotopic uranium.
(d) Isotopic plutonium.
(e) Split samples with the Washington State Department of Health.

4.2 VEGETATION

Location	Frequency[a]	Collection Period	Analyses
100 K Area	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
NE of 100 N Area	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
E of 100 N Area	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
100N Spring Shoreline	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
E of 200 W Gate	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
300 Area Shoreline	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
Hanford Townsite	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
Hanford Twnsite HRM28	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], ^{99}Tc, DOH[d]
Ringold Area	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
Sagemoor Farm	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
Byers Landing	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
Riverview-Harris	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c], DOH[d]
Sunnyside	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]
Toppenish	3 to 5 yrs	June-Sept	Gamma Scan, ^{90}Sr, U[b], Pu[c]

(a) Samples are collected once every 3 to 5 years and will be collected in 2001.
(b) Isotopic uranium
(c) Isotopic plutonium.
(d) Split samples with the Washington State Department of Health.

5.0 SEDIMENT

Location[a]	Frequency	Analyses
River		
McNary Dam		
McNary Oregon Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
McNary-1/3 OR. Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
McNary-2/3 OR. Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
McNary-Wash. Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
Priest Rapids Dam		
PRD-Grant County	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
PRD-1/3 Grant Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
PRD-2/3 Grant Shore	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
PRD-Yakima Cnty Shor	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
White Bluffs Slough	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS
100 F Slough	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS, DOH[d]
Hanford Slough	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS
Richland	A	Gamma Scan, ^{90}Sr, U[b], Pu[c], ICP-u, SEM/AVS
Springs		
100-B Spring 37-1	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
100-B Spring 39-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
Hanford Spring 28-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u, DOH[d]
Hanford Spring Upriver 28-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
Hanford Spring Downriver 28-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
300 Area Spring 42-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
300 Area Spring Downriver 42-2	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
100-K Spring 63-1	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
100-K Spring 77-1	A	Gamma Scan, ^{90}Sr, U[b], ICP-u
100-F Spring 207-1	A	Gamma Scan, ^{90}Sr, U[b], ICP-u, DOH[d]

(a) Refer to Figure 5.1, 1999 Sediment Sampling Locations.
(b) Isotopic uranium.
(c) Isotopic plutonium.
(d) Split samples collected with the Washington State Department of Health.

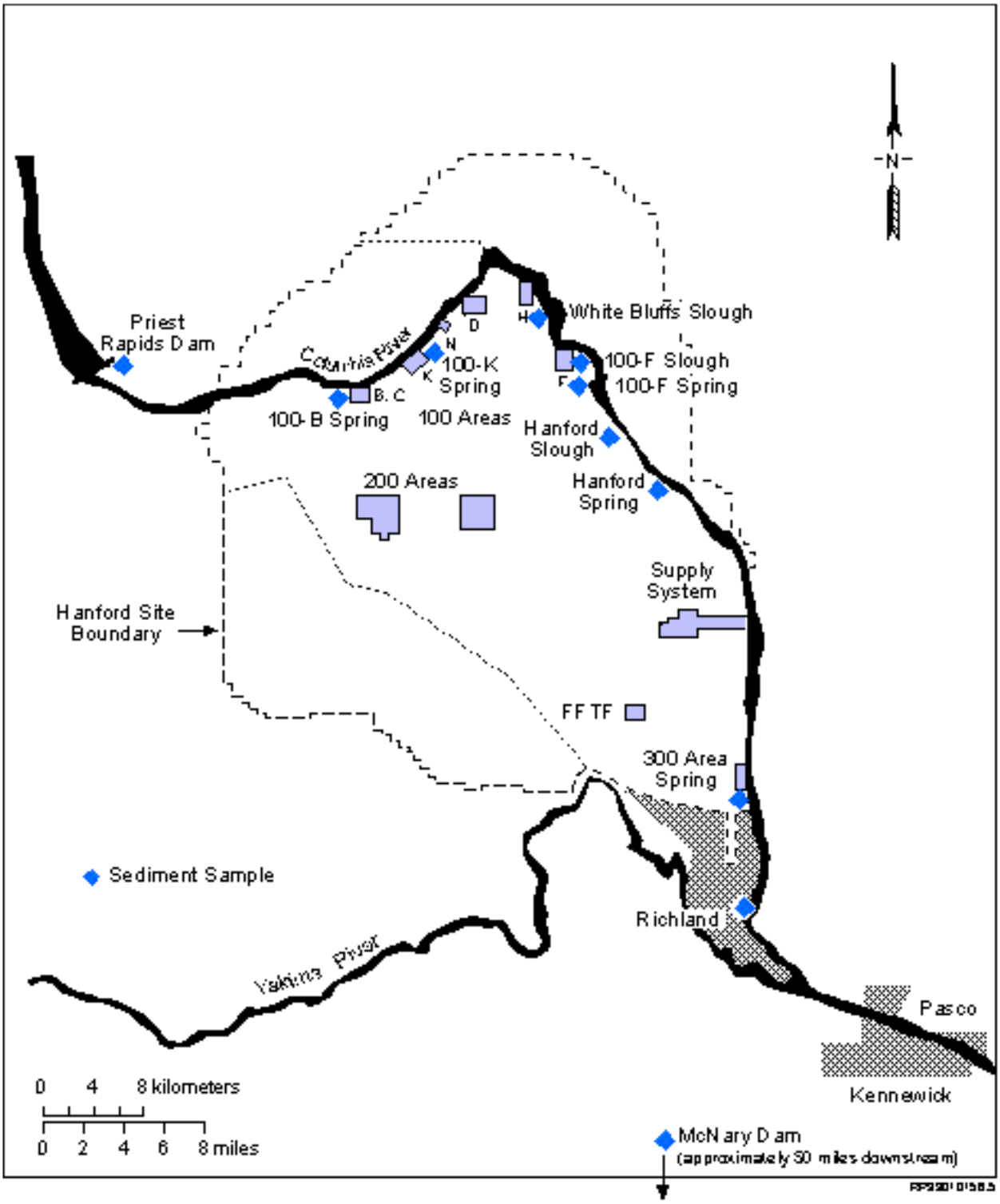

Figure 5.1. 1999 Sediment Sampling Locations

6.0 EXTERNAL RADIATION

6.1 THERMOLUMINESCENT DOSIMETERS (TLDS)

6.1.1 Terrestrial Locations

Location	Location Number	Frequency	Measurement	Instrument
Onsite[a]				
100 K Area[b]	1	Q	Ambient Dose	
100 D Area[b]	2	Q	Ambient Dose	
N of 200 E[b]	3	Q	Ambient Dose, DOH[c]	
100 F Met Tower[b]	4	Q	Ambient Dose	
Hanford Townsite[b]	5	Q	Ambient Dose	
200 Tel. Exchange[b]	6	Q	Ambient Dose	
200 W SE[b]	7	Q	Ambient Dose	
S of 200 E[b]	8	Q	Ambient Dose, DOH[c]	
B Pond[b]	9	Q	Ambient Dose	
E of 200 E[b]	10	Q	Ambient Dose, DOH[c]	
200 ESE[b]	11	Q	Ambient Dose, DOH[c]	
Army Loop Camp[b]	12	Q	Ambient Dose	
3705 Bldg. 300 Area	13	Q	Ambient Dose	
300 Water Intake[b]	14	Q	Ambient Dose	
300 Southwest Gate	15	Q	Ambient Dose	
300 South Gate[b]	16	Q	Ambient Dose	
300 Trench[b]	17	Q	Ambient Dose	
300 NE[b]	18	Q	Ambient Dose	
400 E[b]	19	Q	Ambient Dose	
400 W[b]	20	Q	Ambient Dose	
400 S[b]	21	Q	Ambient Dose	
400 N[b]	22	Q	Ambient Dose	
US Ecology NE Corner	23	Q	Ambient Dose, DOH[c]	
US Ecology SE Corner	24	Q	Ambient Dose, DOH[c]	
US Ecology NW Corner	25	Q	Ambient Dose, DOH[c]	
US Ecology SW Corner	26	Q	Ambient Dose, DOH[c]	
Wye Barricade[b]	27	Q	Ambient Dose, DOH[c]	
WPPSS 1; S of WNP 2	28	Q	Ambient Dose, DOH[c]	
Perimeter[d]				
Ringold Met Tower[b]	1	Q	Ambient Dose	
W End of Fir Road[b]	2	Q	Ambient Dose, DOH[c]	
Dogwood Met Tower[b]	3	Q	Ambient Dose	
Byers Landing[b]	4	Q	Ambient Dose	
Battelle Complex[b]	5	Q	Ambient Dose	
WPPSS 4; WPS Warehse	6	Q	Ambient Dose, DOH[c]	
Horn Rapids Substa[b]	7	Q	Ambient Dose	
Prosser Barricade[b]	8	Q	Ambient Dose	
Yakima Barricade[b]	9	Q	Ambient Dose, DOH[c]	
Rattlesnake Springs[b]	10	Q	Ambient Dose	
Wahluke Slope[b]	11	Q	Ambient Dose	
S End Vernita Bridge[b]	12	Q	Ambient Dose	

6.1.1 Terrestrial Locations (contd)

Location	Location Number	Frequency	Measurement	Instrument
Community[d][e]				
Mattawa[b]	13	Q	Ambient Dose	
Othello[b]	14	Q	Ambient Dose, DOH[c]	
Basin City School[b]	15	Q	Ambient Dose	PIC
Edwin Markham School[b]	16	Q	Ambient Dose	PIC
Leslie Groves-Rchlnd[b]	17	Q	Ambient Dose	PIC
Pasco[b]	18	Q	Ambient Dose	
Kennewick-Ely Street[b]	19	Q	Ambient Dose	
Benton City[b]	20	Q	Ambient Dose	
Distant[d]				
Yakima[b]	21	Q	Ambient Dose, DOH[c]	
Toppenish[b][e]	22	Q	Ambient Dose, DOH[c]	PIC

(a) Refer to Figure 6.1, 1999 Thermoluminescent Dosimeter (TLD) Locations on the Hanford Site.
(b) Collocated with air sampling stations.
(c) Washington State Department of Health TLD also at this location.
(d) Refer to Figure 6.2, 1999 Thermoluminescent Dosimeter (TLD) Locations for Perimeter, Community, and Distant Sites.
(e) Community-Operated Environmental Surveillance Stations.

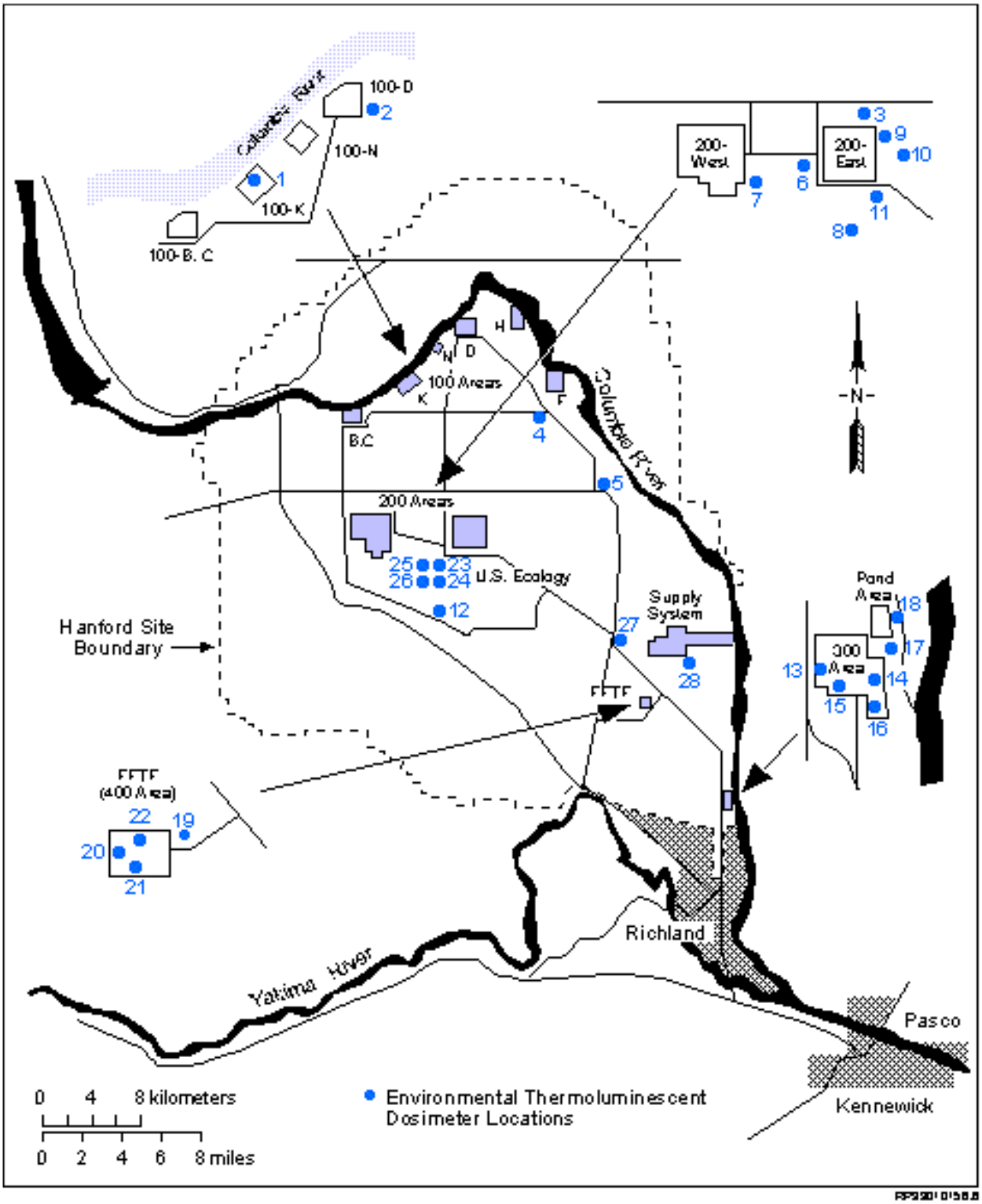

Figure 6.1. 1999 Thermoluminescent Dosimeter (TLD) Locations on the Hanford Site

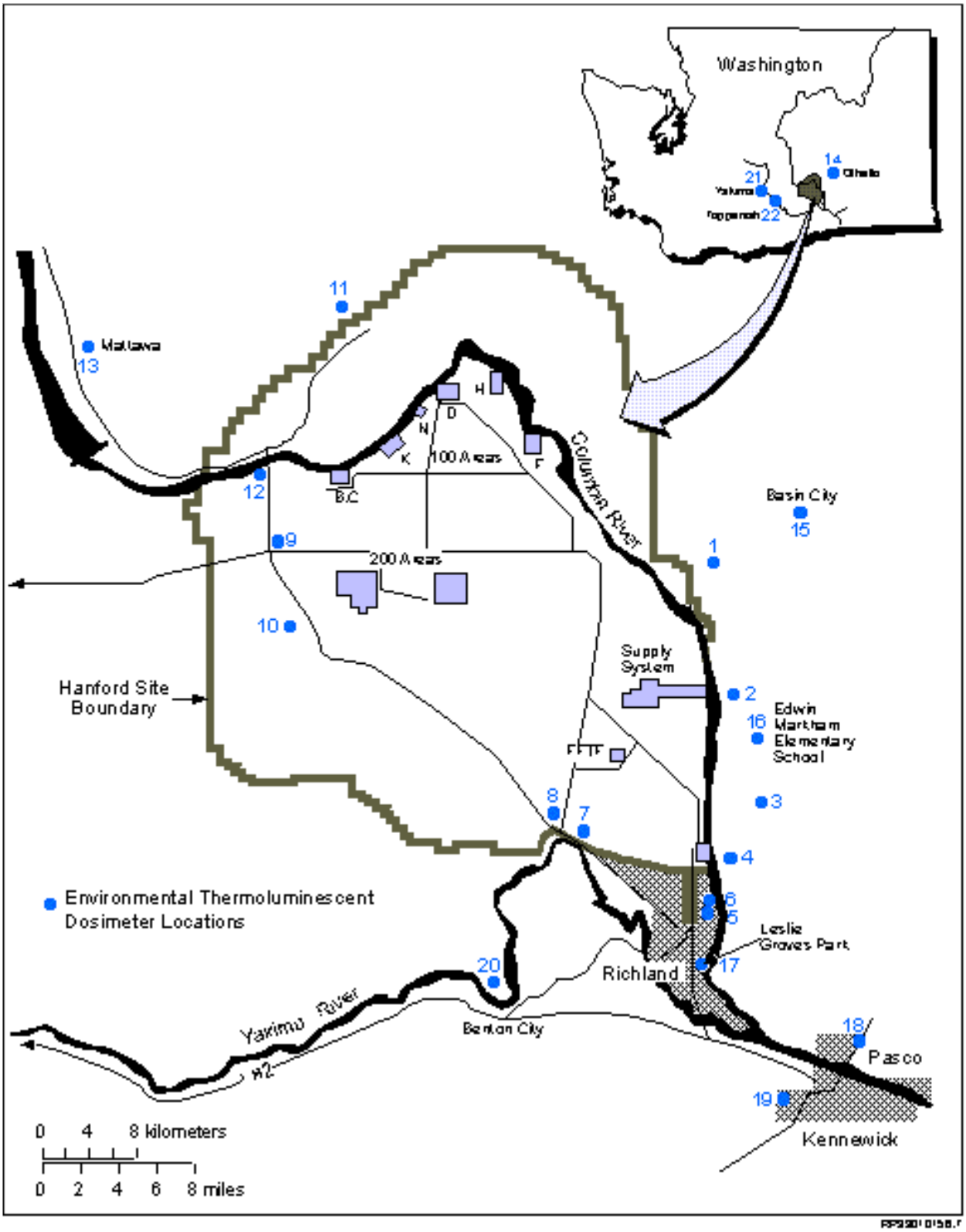

Figure 6.2. 1999 Thermoluminescent Dosimeter (TLD) Locations for Perimeter, Community, and Distant Sites

6.1.2 Columbia River Shoreline Locations

Location[a]	Location Number	Frequency	Measurement
Above 100 B Area	1	Q	Ambient Dose
Below 100 B Ret Basin	2	Q	Ambient Dose
Above 1K Boat Ramp	3	Q	Ambient Dose
Below 100N Outfall	4	Q	Ambient Dose
Above Tip 100N Berm	5	Q	Ambient Dose
100 N Trench Spring	6	Q	Ambient Dose
Below 100 D Area	7	Q	Ambient Dose
100-D Island	8	Q	Ambient Dose
Lo End Locke Isl	9	Q	Ambient Dose
White Bluffs Fy Lnd.	10	Q	Ambient Dose
White Bluffs Slough	11	Q	Ambient Dose
Below 100 F	12	Q	Ambient Dose
100 F Floodplain	13	Q	Ambient Dose
Hanford Slough	14	Q	Ambient Dose
Hanf Powerline Xing	15	Q	Ambient Dose
Hanford RR Track	16	Q	Ambient Dose
Savage Isl Slough	17	Q	Ambient Dose
Ringold Island	18	Q	Ambient Dose
Powerline Crossing	19	Q	Ambient Dose
S End Wooded Island	20	Q	Ambient Dose
Islnd Above 300 Area	21	Q	Ambient Dose
Island Near 300 Area	22	Q	Ambient Dose
Port of Benton-River	23	Q	Ambient Dose
Isl DS Bateman Isl	24	Q	Ambient Dose

(a) Refer to Figure 6.3, 1999 Thermoluminescent Dosimeter (TLD) Locations on the Hanford Reach of the Columbia River.

6.2 COLUMBIA RIVER SHORELINE RADIATION SURVEYS

Location[a]	Location Number	Frequency	Measurement	Instrument
Above 1K Boat Ramp	3	Q	Exposure, Surface contamination	BICRON, GM
Below 100N Outfall	4	Q	Exposure, Surface contamination	BICRON, GM
Above Tip 100N Berm	5	Q	Exposure, Surface contamination	BICRON, GM
100 N Trench Spring	6	Q	Exposure, Surface contamination	BICRON, GM
100-D Island	8	Q	Exposure, Surface contamination	BICRON, GM
Lo End Locke Isl	9	Q	Exposure, Surface contamination	BICRON, GM
White Bluffs Fy Lnd.	10	Q	Exposure, Surface contamination	BICRON, GM
Below 100 F	12	Q	Exposure, Surface contamination	BICRON, GM
Hanf Powerline Xing	15	Q	Exposure, Surface contamination	BICRON, GM
Hanford RR Track	16	Q	Exposure, Surface contamination	BICRON, GM
Ringold Island	18	Q	Exposure, Surface contamination	BICRON, GM
Powerline Crossing	19	Q	Exposure, Surface contamination	BICRON, GM
Isl Above 300 Area	21	Q	Exposure, Surface contamination	BICRON, GM

(a) Refer to Figure 6.3, 1999 Thermoluminescent Dosimeter (TLD) Locations on the Hanford Reach of the Columbia River.

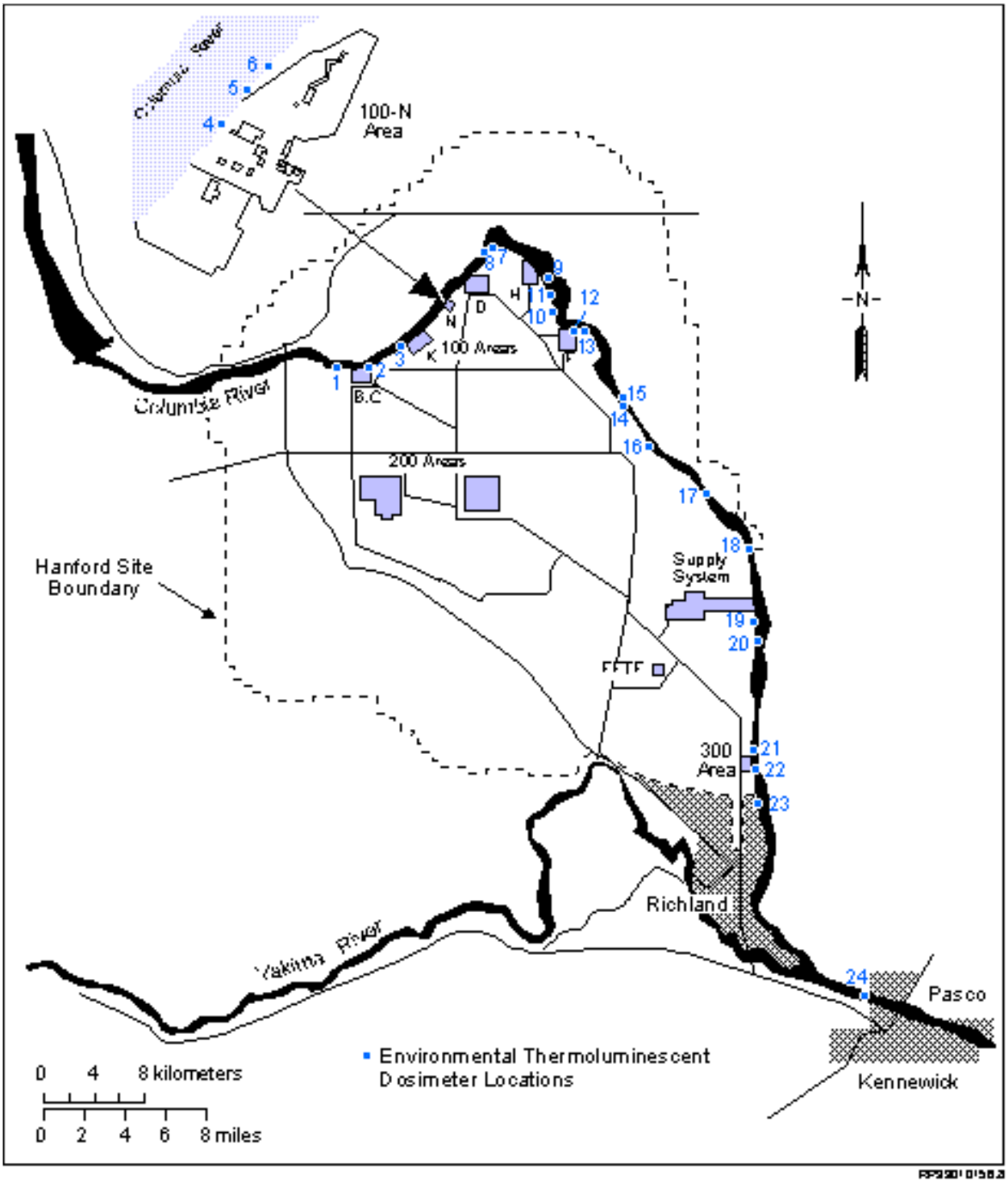

Figure 6.3. 1999 Thermoluminescent Dosimeter (TLD) Locations on the Hanford Reach of the Columbia River

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