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TRI-PARTY AGREEMENT

Change Notice Number TPA-CN- 353	TPA CHANGE NOTICE FORM	Date: 05/04/2010
Document Number, Title, and Revision: *Sampling and Analysis Plan for Aquifer Sampling Tubes*, DOE/RL-2000-59, Rev. 1		Date Document Last Issued: February 2009
Originator: John Winterhalder/Deb Alexander		Phone: 373-2522/373-7786

Description of Change:
This change allows for sampling of two sets of new aquifer sampling tubes in the 100-N Area (Spillway and Mid-point Aquifer Tubes) and two sets of previously installed aquifer tubes as part of the 100-N Remedial Investigation/Feasibility Study. The aquifer sampling tubes are listed and their locations are noted. Samples for these new aquifer sampling tubes will be collected during "high," "low," and "transition" river stages, for a total of three samples per aquifer tube. All samples collected will be analyzed for strontium-90, tritium, metals, and anions in accordance with Table C-3. In addition, samples collected from one set of aquifer tubes (C6263, C6264, C6265) will be analyzed for polychlorinated biphenyls and polynuclear aromatic hydrocarbons in accordance with Table C-3. Field screening parameters will be measured at these new aquifer sampling tubes. Samples will be unfiltered and collected in accordance with the methodologies identified in the following sections of DOE/RL-2009-42, Draft B: 3.6, Sampling Methods, 3.7 Sample Handling, 3.8 Management of Waste.

Appendix C contains the following:

- Table C-1, Aquifer Tube Identification and Completion Information
- Table C-2, Aquifer Tube Sampling Activities
- Table C-3, Analytical Performance Requirements for Aquifer Tube Water Samples
- Figure C-1, 100-N Aquifer Tube Locations
- Attachment C1, Analyte Lists for Method Based Analyses

Briant Charboneau (**DOE**) and Nina Menard (**Lead Regulatory Agency**) agree that the proposed change modifies an approved workplan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records,* and not Chapter 12.0, *Changes to the Agreement.*

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Note: Include affected page number(s)

Justification and Impacts of Change:
This change adds Appendix C to document. General agreement has been reached on the following aquifer tube sampling activities described in DOE/RL-2009-42, *Sampling and Analysis Plan for the 100-NR-1 and 100-NR-2 Operable Units Remedial Investigation/Feasibility Study* (SAP). Several issues remain to be resolved that are outside of the scope of the aquifer tube sampling data needs prior to issuing the SAP. Sampling is required to be completed to assess seasonal variations in strontium-90 and other groundwater contaminant concentrations during high, low, and transitional stages of the Columbia River; therefore, the parties have agreed that the sampling at newly installed aquifer tubes for 100-N should be conducted as planned to meet the intent of the SAP.

Approvals:

Briant L. Charboneau DOE Project Manager	6-9-2010 Date	[X] Approved [ ] Disapproved
Nina M. Menard Ecology Project Manager	6-9-2010 Date	[X] Approved [ ] Disapproved

APPENDIX C

SAMPLING OF NEW AQUIFER SAMPLING TUBES AT THE 100-N AREA

Two new clusters of aquifer tubes were installed in 100-N in April 2010. The depth of each aquifer tube screen was based on previously collected aquifer tube and well data. Table C-1 lists the identification numbers and completion information for these aquifer tubes. Table C-2 summarizes aquifer tube sampling activities.

Aquifer tube water samples will be collected for analysis during three sampling rounds to support the RI. The samples will be collected at the seasonal low, high, and transitional river stages and analyzed for the strontium-90 tritium, metals, and anions in accordance with performance requirements in Table C-3. Field screening parameters will be measured at these new aquifer sampling tubes. As described in Section 2.2.2, water is pumped from the tubes until specific conductance has stabilized. Samples for laboratory analyses will be collected regardless of whether specific conductance is >160 μS/cm.

Table C-1. Aquifer Tube Identification and Completion Information

General Location	Date Installed	Aquifer Tube ID	Top of Screen Depth (feet-bgs)	Easting (m-NAD83)*	Northing (m-NAD83)*
Spillway Aquifer Tubes	4/23/2010	C7934	14.41	571048.266	149579.533
		C7935	18.75	571048.128	149578.153
		C7936	29.19	571047.177	149578.337
Mid-point Aquifer Tubes	4/26/2010	C7937	10.10	571080.725	149623.550
		C7938	14.86	571080.414	149624.879
		C7939	19.11	571079.654	149621.897
Downgradient of Fuel Storage Basin	3/22/2008	C6320	8.53	571128.660	149677.990
		C6321	12.62	571128.660	149677.460
		C6322	18.78	571127.030	149679.680
Near Transformer	5/7-8/2008	C6263	12.75	570887.320	149364.420
		C6264	20.23	570887.190	149363.590
		C6265	27.33	570886.330	149365.430

Notes:
*Coordinates are from Garmin V hand held receiver and are accurate to within 4 or 5 meters.
bgs = below ground surface
m = meter
NAD = North American Datum 1983

Table C-2. Aquifer Tube Sampling Activities

Sampling Location	Action	Water Chemistry	
		Sample Interval Depth	Analyte List
Three new aquifer tubes at each of two locations 100-N (Mid-point and Spillway Aquifer Tubes, Figure C-1)	Sample six new aquifer tubes to support Remedial Investigation.	Collect one sample per aquifer tube and sample three rounds to represent the high, low, and transition river stages.	Field parameters and laboratory analyses in accordance with Table C-3[a]
Three existing aquifer tubes at 100-N downgradient of fuel storage basin (Figure C-1)	Sample three existing aquifer tubes to support Remedial Investigation.	Collect one sample per aquifer tube and sample three rounds to represent the high, low, and transition river stages.	Field parameters and laboratory analyses in accordance with Table C-3[a]
Three existing aquifer tubes at 100-N near transformer yard (Figure C-1)	Sample three existing aquifer tubes to support Remedial Investigation.	Collect one sample per aquifer tube and sample three rounds to represent the high, low, and transition river stages.	Field parameters and laboratory analyses in accordance with Table C-3[a]
Total number of samples:		36 (12 samples per round, 3 total rounds)	
Minimum number of field quality control samples[b]		9 (3 equipment blank, 3 field blank, 3 duplicate)	
Total number of samples:		45	

Notes:

a Sample regardless of specific conductance.

b Quality control samples for aquifer tube samples will be collected at a frequency of 1 equipment blank, 1 field blank, and 1 duplicate sample for each round of sampling (3 total rounds).

Table C-3. Analytical Performance Requirements for Aquifer Tube Water Samples

CAS Number	Analyte	Analytical Method[a]	EQL[b]	Precision Requirement (%)	Accuracy Requirement (%)	Action Level	Action Level Basis
Performance Requirements for Field Measurements							
—	Oxidation reduction potential	REDOX PROBE	±1 mV	—[c]	—[c]	N/A	N/A
—	pH measurement	PROBE	0.1 pH unit	—[c]	—[c]	N/A	N/A
—	Specific conductance	PROBE	0.1 µS/cm	—[c]	—[c]	N/A	N/A
—	Temperature	PROBE	0.1 °C	—[c]	—[c]	N/A	N/A
—	Dissolved oxygen	PROBE	0.1 mg/L	—[c]	—[c]	N/A	N/A
—	Turbidity	PROBE	0.1 NTU	—[c]	—[c]	N/A	N/A
Performance Requirements for Laboratory Measurements (Radiological)							
10098-97-2	Strontium-90[d]	Strontium-90	2 pCi/L	≤30[e]	70-130[e]	8 pCi/L	40 CFR 141.66
10028-17-8	Tritium	LSC – Tritium	400 pCi/L	≤30[e]	70-130[e]	20,000 pCi/L	40 CFR 141.66
Performance Requirements for Laboratory Measurements (Nonradiological)							
7440-36-0	Antimony	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	5 µg/L	≤20[f]	80-120[f]	5.6 µg/L	Human Health for the Consumption of Water + Organism
7440-38-2	Arsenic	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	4 µg/L[gh]	≤20[f]	80-120[f]	0.018 µg/L	Human Health for the Consumption of Water + Organism
7440-43-9	Cadmium	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	2 µg/L[gh]	≤20[f]	80-120[f]	0.25 µg/L	Freshwater CCC
7440-47-3	Chromium	EPA 6010 (ICP metals)	10 µg/L	≤20[f]	80-120[f]	74 µg/L	Freshwater CCC
10198-40-0	Cobalt	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	4 µg/L	≤20[f]	80-120[f]	4.8 µg/L	WAC 173-340-720(4)(b)(iii)(A) and (B)

Table C-3. Analytical Performance Requirements for Aquifer Tube Water Samples

CAS Number	Analyte	Analytical Method[a]	EQL[b]	Precision Requirement (%)	Accuracy Requirement (%)	Action Level	Action Level Basis
7440-50-8	Copper	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	8 µg/L	≤20[f]	80-120[f]	9 µg/L	Freshwater CCC
7439-92-1	Lead	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	2 µg/L	≤20[f]	80-120[f]	2.1 µg/L	WAC 173-201A
7439-96-5	Manganese	EPA 6010 (ICP metals)	5 µg/L	≤20[f]	80-120[f]	50 µg/L	40 CFR 143.3
7439 97 6	Mercury	ICP/MS 200.8	0.5 µg/L[h]	≤20[f]	80-120[f]	0.05 µg/L	WAC 173-201A
7440-02-0	Nickel	EPA 6010 (ICP metals)	40 µg/L	≤20[f]	80-120[f]	52 µg/L	Freshwater CCC
7782-49-2	Selenium	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	4 µg/L	≤20[f]	80-120[f]	5 µg/L	Freshwater CCC
7440-28-0	Thallium	Trace – ICP (6010) or ICP/MS (6020 or 200.8)	2 µg/L[gh]	≤20[f]	80-120[f]	0.24 µg/L	Human Health for the Consumption of Water + Organism
7440-62-2	Vanadium	EPA 6010 (ICP metals)	25 µg/L	≤20[f]	80-120[f]	112 µg/L	WAC 173-340-720(4)(b)(iii)(A) and (B)
7440-66-6	Zinc	EPA 6010 (ICP metals)	10 µg/L	≤20[f]	80-120[f]	91 µg/L	WAC 173-201A
16984-48-8	Fluoride	EPA 300.0 (Anions by IC)	500 µg/L	≤20[f]	80-120[f]	960 µg/L	WAC 173-340-720(4)(b)(iii)(A) and (B)
14797-55-8	Nitrate (as N)	EPA 300.0 (Anions by IC)	250 µg/L	≤20[f]	80-120[f]	10,000 µg/L	40 CFR 141.62
14797-65-0	Nitrite (as N)	EPA 300.0 (Anions by IC)	250 µg/L	≤20[f]	80-120[f]	1,000 µg/L	40 CFR 141.62
14808-79-8	Sulfate	EPA 300.0 (Anions by IC)	500 µg/L	≤20[f]	80-120[f]	250,000 µg/L	40 CFR 143.3
	Polychlorinated biphenyls[i]	EPA 8082	5 µg/L	≤20[j]	80-120[j]	1E-04 to 1.8E-02 µg/L	Aroclor-specific

Table C-3. Analytical Performance Requirements for Aquifer Tube Water Samples

CAS Number	Analyte	Analytical Method[a]	EQL[b]	Precision Requirement (%)	Accuracy Requirement (%)	Action Level	Action Level Basis
	Polynuclear aromatic hydrocarbons[i]	EPA 8310	0.5 to 5 µg/L	≤20[j]	80-120[j]	2.8E-03 to 2.4E-03 µg/L	Compound-specific

Notes:

a. Equivalent methods may be substituted. For EPA Method 300.0, see EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes*. For EPA Method 200.8, see EPA-600/R-94-111, *Methods for the Determination of Metals in Environmental Samples, Supplement 1*. For the four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*.

b. Estimated quantitation limit (EQL) equal to 5 to 10 times the method detection limit (MDL) (SW-846). MDLs are listed in DOE/RL-2008-66, Table C-30. When the action limit is less than the MDL, the action limit defaults to the MDL.

c. Field measurements have no specific quality control requirement except to perform checks to verify manufacturer's expected performance.

d. Strontium-90 will be assessed as total radioactive strontium.

e. Accuracy criteria shown are for associated batch laboratory control sample percent recoveries. Additional accuracy criteria include analysis-specific evaluations performed for matrix spike, tracer, and/or carrier recoveries, as appropriate to the method. The precision criteria shown are for batch laboratory replicate sample relative percent differences.

f. Accuracy criteria shown are for associated batch analytical matrix spike samples. Additional accuracy evaluation based on statistical control of laboratory control samples also is performed. The precision criteria shown are for batch laboratory replicate matrix spike analyses or replicate sample relative percent differences.

g. To meet or approach calculated cleanup goals, laboratories must use axial-based ("trace") ICP analytical methods. The laboratory also may substitute graphite furnace or ICP/mass spectrometry methods if estimated quantitation limits are met.

h. Calculated Action Levels are less than established analytical methodology capabilities. The analytical detection limits will be used for working levels, and will be periodically reviewed to establish if lower detection limit capabilities have become available.

i. This method will be performed for samples collected from three selected aquifer sampling tubes (C6263, C6264, and C6265). See tables in Attachment 1 for a list of constituents to be reported with corresponding estimated quantitation limits, and precision and accuracy requirements.

j. Accuracy criteria shown are the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control limits, if more stringent. Additional accuracy criteria include analyte-specific evaluations performed for matrix spike and surrogate recoveries, as appropriate to the method. The precision criteria shown are for batch laboratory replicate matrix spike analysis relative percent differences.

40 CFR 141.62, "National Primary Drinking Water Regulations," "Maximum Contaminant Levels for Inorganic Contaminants"

40 CFR 141.66, "National Primary Drinking Water Regulations," "Maximum Contaminant Levels for Radionuclides"

40 CFR 143.3, "National Secondary Drinking Water Regulations," "Secondary Maximum Contaminant Levels"

WAC 173-340-720(4), "Model Toxics Control Act—Cleanup," "Ground Water Cleanup Standards," "Method B Cleanup Levels for Potable Ground Water"

Table C-3. Analytical Performance Requirements for Aquifer Tube Water Samples

CAS Number	Analyte	Analytical Method[a]	EQL[b]	Precision Requirement (%)	Accuracy Requirement (%)	Action Level	Action Level Basis
WAC 173-201A, "Water Quality Standards for Surface Waters of the State of Washington"							

°C	=	degree Celsius	ICP	=	inductively coupled plasma
µg/L	=	micrograms per liter	LSC	=	liquid scintillation counter
µS/cm	=	microSiemens per centimeter	MS	=	mass spectrometry
CAS	=	Chemical Abstracts Service	mV	=	millivolt
CCC	=	criterion continuous concentration	N/A	=	not applicable
EQL	=	estimated quantitation limit	NTU	=	nephelometric turbidity unit
IC	=	ion chromatography	pCi/L	=	picoCuries per liter

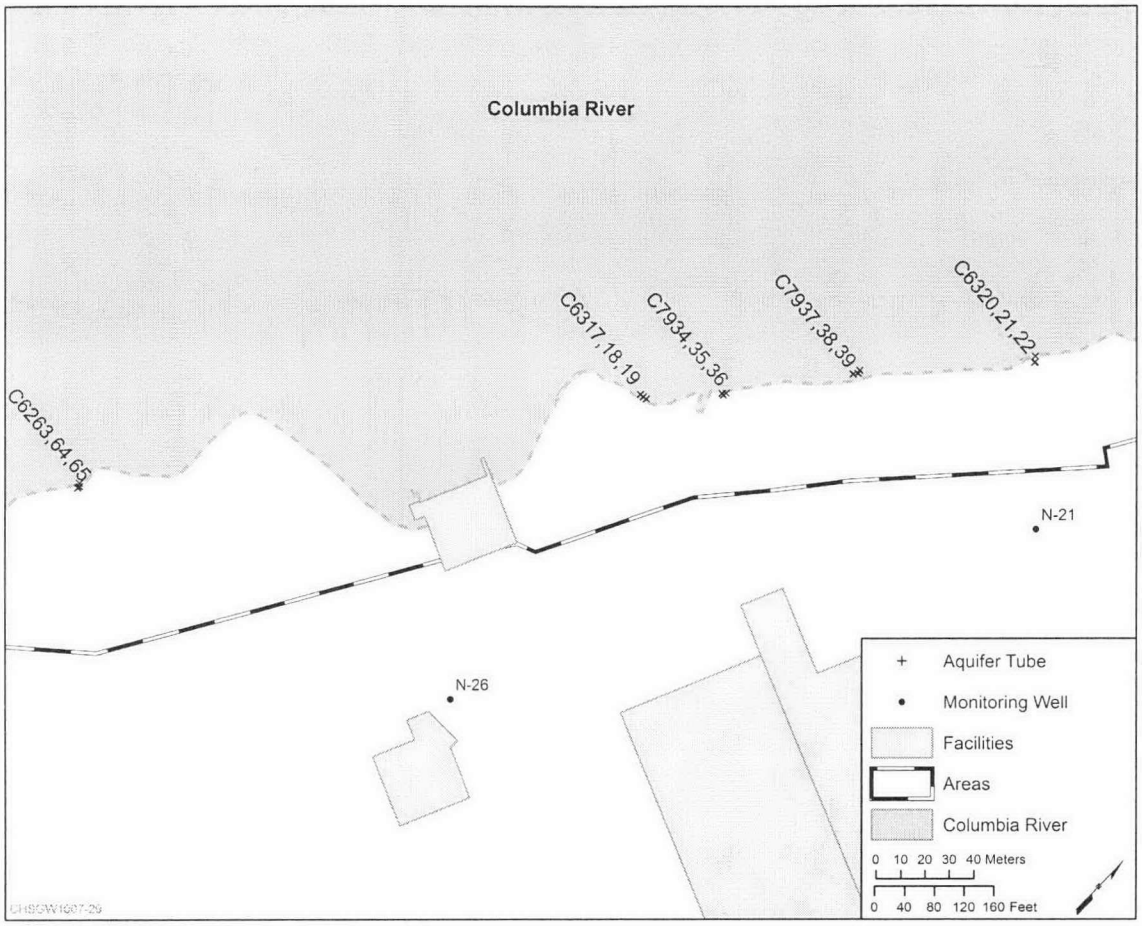

Figure C-1. 100-N Aquifer Tube Locations

Attachment C1

Analyte Lists for Method Based Analyses

C1 Analyte Lists for Method-Based Analyses

Tables C1-1 through C1-5 provide lists of analytes which will be reported when using a methods-based approach. Therefore, strontium-90, tritium, hexavalent chromium, and mercury are not listed.

C2 References

EPA-600/4-79-020, 1983, *Methods for Chemical Analysis of Water and Wastes*, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. Available at: http://www5.hanford.gov/arpir/?content=findpage&AKey=D196019611.

EPA-600/R-94-111, 1994, *Methods for the Determination of Metals in Environmental Samples, Supplement 1*, U.S. Environmental Protection Agency, Washington, D.C.

SW-846, 2007, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*, as amended, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: www.epa.gov/SW-846/main.htm.

Table C1-1. U.S. Environmental Protection Agency Method 300.0

CAS Number	Constituent	EQL (µg/L)	Precision Requirement (%)	Accuracy Requirement (%)
24959-67-9	Bromide	250	≤20	80-120
16887-00-6	Chloride	200	≤20	80-120
16984-48-8	Fluoride	500	≤20	80-120
14797-55-8	Nitrate*	250	≤20	80-120
14797-65-0	Nitrite*	250	≤20	80-120
NO3-N	Nitrogen in nitrate*	75	≤20	80-120
NO2-N	Nitrogen in nitrite*	75	≤20	80-120
14265-44-2	Phosphate*	500	≤20	80-120
14808-79-8	Sulfate	500	≤20	80-120

Notes:

* Nitrate, nitrite, and phosphate suite, or nitrogen in nitrate, nitrogen in nitrite, and phosphorus suite may either be reported.

EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes*

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EQL = estimated quantitation limit

Table C1-2. U.S. Environmental Protection Agency SW-846 Method 6010

CAS Number	Constituent	EQL (µg/L)	Precision Requirement (%)	Accuracy Requirement (%)
7429-90-5	Aluminum	50	≤20	80-120
7440-36-0	Antimony	60	≤20	80-120
7440-38-2	Arsenic	100	≤20	80-120
7440-39-3	Barium	20	≤20	80-120
7440-41-7	Beryllium	2	≤20	80-120
7440-69-9	Bismuth	100	≤20	80-120
7440-42-8	Boron	20	≤20	80-120
7440-43-9	Cadmium	2	≤20	80-120
7440-70-2	Calcium	1,000	≤20	80-120
7440-47-3	Chromium	10	≤20	80-120
7440-48-4	Cobalt	4	≤20	80-120
7440-50-8	Copper	8	≤20	80-120
7439-89-6	Iron	50	≤20	80-120
7439-92-1	Lead	50	≤20	80-120
7439-93-2	Lithium	25	≤20	80-120
7439-95-4	Magnesium	750	≤20	80-120
7439-96-5	Manganese	5	≤20	80-120
7439-98-7	Molybdenum	20	≤20	80-120
7440-02-0	Nickel	40	≤20	80-120
7723-14-0	Phosphorus	100	≤20	80-120
7440-09-7	Potassium	4,000	≤20	80-120
7782-49-2	Selenium	100	≤20	80-120
7440-21-3	Silicon	20	≤20	80-120
7440-22-4	Silver	10	≤20	80-120
7440-23-5	Sodium	500	≤20	80-120
7440-24-6	Strontium (elemental)	10	≤20	80-120
7440-28-0	Thallium	50	≤20	80-120
7440-31-5	Tin	100	≤20	80-120
7440-62-2	Vanadium	25	≤20	80-120
7440-66-6	Zinc	10	≤20	80-120

Notes:

SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EQL = estimated quantitation limit

Table C1-3. U.S. Environmental Protection Agency Method 200.8 or SW-846 Method 6020

CAS Number	Constituent	EQL (µg/L)	Precision Requirement (%)	Accuracy Requirement (%)
7440-36-0	Antimony	5	≤20	80-120
7440-38-2	Arsenic	4	≤20	80-120
7440-39-3	Barium	5	≤20	80-120
7440-41-7	Beryllium	2	≤20	80-120
7440-43-9	Cadmium	2	≤20	80-120
7440-47-3	Chromium	2	≤20	80-120
7439-92-1	Lead	2	≤20	80-120
7782-49-2	Selenium	4	≤20	80-120
7440-22-4	Silver	2	≤20	80-120
7440-28-0	Thallium	2	≤20	80-120

Notes:

SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*

For EPA Method 200.8, see EPA-600/R-94-111, *Methods for the Determination of Metals in Environmental Samples, Supplement 1.*

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EQL = estimated quantitation limit

Table C1-4. U.S. Environmental Protection Agency SW-846 Method 8082

CAS Number	Constituent	EQL (µg/L)	Precision Requirement(%)	Accuracy Requirement(%)
12674-11-2	Aroclor-1016	0.5	≤20	80-120
11104-28-2	Aroclor-1221	0.5	≤20	80-120
11141-16-5	Aroclor-1232	0.5	≤20	80-120
53469-21-9	Aroclor-1242	0.5	≤20	80-120
12672-29-6	Aroclor-1248	0.5	≤20	80-120
11097-69-1	Aroclor-1254	0.5	≤20	80-120
11096-82-5	Aroclor-1260	0.5	≤20	80-120
37324-23-5	Aroclor-1262	0.5	≤20	80-120
11100-14-4	Aroclor-1268	0.5	≤20	80-120

SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EQL = estimated quantitation limit

Table C1-5. U.S. Environmental Protection Agency SW-846 Method 8310

CAS Number	Constituent	EQL (µg/L)	Precision Requirement (%)	Accuracy Requirement (%)
83-32-9	Acenaphthene	20	≤20	80-120
208-96-8	Acenaphthylene	25	≤20	80-120
120-12-7	Anthracene	10	≤20	80-120
56-55-3	Benzo(a)anthracene	0.3	≤20	80-120
50-32-8	Benzo(a)pyrene	0.5	≤20	80-120
205-99-2	Benzo(b)fluoranthene	0.5	≤20	80-120
191-24-2	Benzo(ghi)perylene	1	≤20	80-120
207-08-9	Benzo(k)fluoranthene	0.5	≤20	80-120
218-01-9	Chrysene	5	≤20	80-120
53-70-3	Dibenz[a,h]anthracene	1	≤20	80-120
206-44-0	Fluoranthene	5	≤20	80-120
86-73-7	Fluorene	3	≤20	80-120
193-39-5	Indeno(1,2,3-cd)pyrene	1	≤20	80-120
91-20-3	Naphthalene	20	≤20	80-120
85-01-8	Phenanthrene	10	≤20	80-120
129-00-0	Pyrene	5	≤20	80-120

SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update IV-B*

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EQL = estimated quantitation limit