TABLES

TABLE 3-1
QA Objectives Summary

Data Use	Matrix	Analytical Method	No. of Field Samples	No. of Field Duplicate Samples	No. of Equipment Rinsate Samples	No. of QA (Split) Samples	Data Category	Precision (RPD)		Lab Accuracy (Matrix Spikes)	Completeness
								Field Dups	Lab Dups		
Characterize nature and extent of sediment contamination and determination of background/ambient concentrations	Sediment	EPA 8270C for SVOCs	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	45-135% Recovery	100%
	Sediment	EPA 8082 for PCB Aroclors	109	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	40-140% Recovery	100%
	Sediment	EPA 8081A for Organochlorinated Pesticides	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	40-140% Recovery	100%
	Sediment	NWTPH-Dx for Diesel Range Organics	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	50-150% Recovery	100%
	Sediment	Krone GC-MS For Butyltins	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	30-125% Recovery	100%
	Sediment	EPA 6020 for TAL Metals	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	75-125% Recovery	100%
	Sediment	EPA 7471A for Mercury	105	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	Not Applicable	80-120% Recovery	100%
Determine contaminant fate and bioavailability	Sediment	EPA 9060 for TOC	109	10	1 per day or 6 (whichever is greater)	5	Definitive	≤ 50 RPD	≤ 25 RPD	85-115% Recovery	100%
	Sediment	ASTM D422 for Grain Size	109	10	NA	5	Definitive	≤ 50 RPD	Not Applicable	Not Applicable	100%
	Sediment	EPA 9045C for pH	10	1	NA	1	Definitive	≤ 50 RPD	≤ 10 RPD	Not Applicable	100%
	Sediment	ASTM D2216-90 for Moisture Content	10	1	NA	1	Definitive	≤ 50 RPD	≤ 10 RPD	Not Applicable	100%
	Sediment	EPA Draft 821/R-91-100 for AVS/SEM	10	1	NA	1	Definitive	≤ 50 RPD	Not Applicable	75-125% Recovery	100%

TABLE 3-1
QA Objectives Summary

Data Use	Matrix	Analytical Method	No. of Field Samples	No. of Field Duplicate Samples	No. of Equipment Rinsate Samples	No. of QA (Split) Samples	Data Category	Precision (RPD)		Lab Accuracy (Matrix Spikes)	Completeness
								Field Dups	Lab Dups		
Determine contaminant fate and bioavailability	Water	EPA 160.2 for TSS	10	1	NA	1	Definitive	≤ 20 RPD	≤ 10 RPD	Not Applicable	100%
	Water	EPA 415.1 for DOC	10	1	NA	1	Definitive	≤ 20 RPD	≤ 10 RPD	Not Applicable	100%
	Water	EPA 130.2 for Hardness	10	1	NA	1	Definitive	≤ 20 RPD	≤ 10 RPD	Not Applicable	100%
	Water	EPA 150.1 for pH	10	1	NA	1	Definitive	≤ 20 RPD	≤ 10 RPD	Not Applicable	100%

Notes:

AVS/SEM – Acid Volatile Sulfides/Simultaneously Extracted Metals
DOC – Dissolved Organic Carbon
EPA – Environmental Protectin Agency
GC-MS – Gas Chromatography-Mass Spectrometry
No. – Number
NWTPH – Northwest Total Petroleum Hydrocarbons
PCB – Polychlorinated Biphenyls
PSEP – Puget Sound Estuary Program
QA – Quality Assurance (Field Duplicate submitted to the USACE QA Laboratory)
RPD - Relative Percent Difference
SVOCs- Semivolatile Organic Compounds
TAL – Target Analyte List
TOC – Total Organic Carbon
TSS- Total Suspended Solids

TABLE 5-1
Sample Methods and Container, Preservation, and Holding Time Requirements for Sediment Samples*

ANALYTICAL PARAMETER	METHOD	CONTAINER	PRESERVATION	HOLDING TIMES**
Semivolatile Organic Compounds (SVOCs)	SW8270C	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Polychlorinated Biphenyls (PCBs) - Aroclors	SW8082	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Organochlorinated Pesticides	SW8081A	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Northwest Total Petroleum Hydrocarbons – Diesel Range Organics (NWTPH-Dx)	NWTPH-Dx	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Butyltins	Krone GC/MS	1-8 oz CWMglass	4 °C	14 days to extract, then 40 days to analyze
Metals (except mercury)	SW6020	1-8 oz CWM glass	4 °C	180 days to analyze
Mercury	SW7471A	1-8 oz CWM glass	4 °C	28 days to analyze
Total Organic Carbon (TOC)	SW9060	1-8 oz CWM glass	4 °C	28 days to analyze
Grain Size (Sieve and Hydrometer)	ASTM D422	32 oz CWM	None	None
pH	9045C	1-4 oz CWM glass	4 °C	Upon receipt
Moisture Content	ASTM D2216-90	1-4 oz CWM glass	4 °C	None
Acid Volatile Sulfide (AVS) and Simultaneously Extractable Metals (SEM)	EPA Draft 821/R-91-100***	1-8 oz CWM glass	4 °C	14 days to analyze

Notes:

* An extra 8-oz CWM glass jar will be collected at each sample location to be frozen and archived at the laboratory.
*Triple volume must be collected for MS/MSD samples.
**Holding times are from date of sample collection.
***EPA Draft document entitled Analytical Method for Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment. (December 1991).
All containers will have Teflon-lined seals or septa (i.e.; NWTPH-Gx)
CWM – Clear wide mouth glass jar

TABLE 5-2
Sample Methods and Container, Preservation, and Holding Time Requirements for Water Samples*

ANALYTICAL PARAMETER	METHOD	CONTAINER	PRESERVATION	HOLDING TIMES**
Total Suspended Solids (TSS)	EPA 160.2	1-250 ml HDPE	4 °C	7 days
Dissolved Organic Carbon (DOC)***	EPA 415.1	1-250 ml AGJ	4 °C , H_2SO_4 to pH<2	28 days
Hardness	EPA 130.2	1- 125 ml HDPE	4 °C , H_2SO_4 to pH<2	6 months
pH	EPA 150.1	1- 125 ml HDPE	4 °C	Upon receipt

Notes:

*Triple volume must be collected for MS/MSD samples.
**Holding times are from date of sample collection.
***DOC sample must be field filtered before filling the sample container.
AGJ – Amber Glass Jar
HDPE- High Density Polyethylene Bottles

TABLE 6-1
Analytical Methods

Parameter	Preparation Method Number	Cleanup Method Number*	Analysis Method Number	Reference
Sediment				
Semivolatile Organic Compounds (SVOCs)	3550B	3640A if necessary	8270C	1
Polychlorinated Biphenyls (PCB) - Aroclors	3550B	3660B	8082	1
Organochlorinated Pesticides	3550B	3620B	8081A	1
Northwest Total Petroleum Hydrocarbons – Diesel Range Organics (NWTPH-Dx)	3550B	3620B or 3630C if necessary	NWTPH-Dx	1/3
Butyltins	Krone	Krone	Krone	6
Metals	3050B	None	6020	1
Mercury	Not Applicable	None	7471A	1
Total Organic Carbon (TOC)	Not Applicable	None	9060	1
Grain Size (Sieve and Hydrometer)	Not Applicable	Anticoagulation (optional)	D422	4
pH	Not Applicable	None	9045C	1
Moisture Content	Not Applicable	None	D2216-90	4
Acid Volatile Sulfide (AVS) and Simultaneously Extractable Metals (SEM)	Not Applicable	None	EPA Draft 821/R-91-100	5
Water				
Total Suspended Solids (TSS)	Not Applicable	None	160.2	2
Dissolved Organic Carbon (DOC)	Not Applicable	None	415.1	1
Hardness	Not Applicable	None	130.2	2
pH	Not Applicable	None	150.1	2

*Additional cleanup options are available as discussed in Section 6.0 and will be applied as necessary.

References:

1. USEPA, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Integrated Manual, Final Update III*, June 1997.
2. USEPA, *Methods for Chemical Analysis of Water and Wastes, EPA-600*, Revised March 1983.
3. Washington State Department of Ecology, 1997. Analytical Methods for Petroleum Hydrocarbons. ECY 97-602.
4. American Society for Testing and Materials (ASTM), 2001. Annual Book of ASTM Standards.
5. USEPA, 1991. *Draft Analytical Method for Determination of Acid Volatile Sulfide and Selected Simultaneously Extractable Metals in Sediment.* December 1991.
6. Krone, 1988. *Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Livers.*

TABLE 6-2
Sediment Reporting Limits

Analyte	Sediment Reporting Limits* (µg/kg)	DEQ Level II Screening Level Values for Freshwater Sediment ** (µg/kg)
SVOCs-8270C		
1,2,4-Trichlorobenzene	20	No value
1,2-Dichlorobenzene	20	No value
1,3-Dichlorobenzene	20	No value
1,4-Dichlorobenzene	20	No value
2,4,5-Trichlorophenol	100	No value
2,4,6-Trichlorophenol	100	No value
2,4-Dichlorophenol	60	No value
2,4-Dimethylphenol	20	No value
2,4-Dinitrophenol	200	No value
2,4-Dinitrotoluene	100	No value
2,6-Dinitrotoluene	100	No value
2-Chloronaphthalene	20	No value
2-Chlorophenol	20	No value
2-Methylnaphthalene	20	No value
2-Methylphenol	20	No value
2-Nitroaniline	100	No value
2-Nitrophenol	100	No value
4-Methylphenol	20	No value
3,3´-Dichlorobenzidine	100	No value
3-Nitroaniline	120	No value
4,6-Dinitro-2-methylphenol	200	No value
4-Bromophenyl phenyl ether	20	No value
4-Chloro-3-methylphenol	40	No value
4-Chloroaniline	60	No value
4-Chlorophenyl phenyl ether	20	No value
4-Nitroaniline	100	No value
4-Nitrophenol	100	No value
Acenaphthene	20	290
Acenaphthylene	20	160
Aniline	20	No value
Anthracene	20	57
Benzo (a) anthracene	20	32
Benzo (a) pyrene	20	32
Benzo (b) fluoranthene	20	No value
Benzo (ghi) perylene	20	300
Benzo (k) fluoranthene	20	27
Benzoic Acid	200	No value
Benzyl alcohol	20	No value
Bis(2-chloroethoxy)methane	20	No value
Bis(2-chloroethyl)ether	40	No value
Bis(2-ethylhexyl)phthalate	20	750
Butyl benzyl phthalate	20	No value
Carbazole	20	140

TABLE 6-2
Sediment Reporting Limits

Analyte	Sediment Reporting Limits* (µg/kg)	DEQ Level II Screening Level Values for Freshwater Sediment ** (µg/kg)
Chrysene	20	57
Di-n-butyl phthalate	20	110
Di-n-octyl phthalate	20	No value
Dibenz (a,h) anthracene	20	33
Dibenzofuran	20	5100
Diethyl phthalate	20	No value
Dimethyl phthalate	20	No value
Fluoranthene	20	111
Fluorene	20	77
Hexachlorobenzene	20	100
Hexachlorobutadiene	20	No value
Hexachlorocyclopentadiene	100	No value
Hexachloroethane	20	No value
Indeno (1,2,3-cd) pyrene	20	17
Isophorone	20	No value
N-Nitrosodimethylamine	20	No value
N-Nitrosodi-n-propylamine	40	No value
N-Nitrosodiphenylamine	100	No value
Naphthalene	20	176
Nitrobenzene	20	No value
Pentachlorophenol	100	No value
Phenanthrene	20	42
Phenol	20	48
Pyrene	20	53
PCBs - Aroclors		
Aroclor 1016	20	No value
Aroclor 1242	20	No value
Aroclor 1248	20	21
Aroclor 1254	20	7
Aroclor 1260	20	No value
Organochlorinated Pesticides		
Alpha-BHC	1	No value
Beta-BHC	1	No value
Gamma-BHC (Lindane)	1	0.9
Delta-BHC	1	No value
Heptachlor	1	10
Aldrin	1	40
Heptachlor Epoxide	1	0.6
Gamma chlordane	1	4.5
Alpha chlordane	1	No value
Endosulfan I	1	No value
DDE	2	1.5
Dieldrin	2	3
Endrin	2	3
Endosulfan II	2	No value
DDD	2	4

TABLE 6-2
Sediment Reporting Limits

Analyte	Sediment Reporting Limits* (µg/kg)	DEQ Level II Screening Level Values for Freshwater Sediment ** (µg/kg)
Endrin Aldehyde	2	No value
DDT	2	4
Endosulfan Sulfate	2	No value
Endrin Ketone	2	No value
Methoxychlor	10	No value
Hexchlorobutadiene	1	No value
Hexachlorobenzene	1	100
Toxaphene	100	No value
Diesel Range Hydrocarbons	5000	No Value
Heavy Oil Range Hydrocarbons	5000	No Value
Butyltins		
Monobutyltin	12	No Value
Dibutyltin	12	No Value
Tributyltin	6	No Value
Metals		
Arsenic	500	6000
Chromium	500	37000
Cobalt	200	No value
Copper	500	36000
Iron	20000	No value
Lead	1000	35000
Mercury	50	200
Nickel	500	18000
Selenium	500	No Value
Zinc	400	123000
TOC	200,000	No Value
Grain Size (Sieve and Hydrometer)	0.0014 mm	No Value

Notes:

* Reporting limits listed are highly matrix-dependent and may not always be achievable. Reporting limits for sediments are based on wet weight. The reporting limits, calculated on a dry-weight basis, will be higher. In order to compare typical laboratory reporting limits with screening values, reporting limits from Analytical Resources Incorporated laboratory were used. The laboratory contracted to conduct the analysis will obtain similar reporting limits.

**Oregon Department of Environmental Quality. 2001. Guidance for Ecological Risk Assessment, Level II Screening Level Values.

Highlighted cells indicate method reporting limits above the DEQ Level II Freshwater Sediment Screening Level Value. In all cases, the method detection limit for these compounds is below the screening level value.

TABLE 6-3
Water Reporting Limits

Analyte	Water Reporting Limits* (mg/L)	DEQ Level II Screening Level Values for Surface Water (µg/kg)
Total Suspended Solids	1.0	No value
Dissolved Organic Carbon	1.5	No value
Hardness	1.0	No value

* Reporting limits listed are from Analytical Resources Incorporated laboratory. The laboratory contracted to conduct the analysis will obtain similar reporting limits.