DEPARTMENT OF
ECOLOGY
State of Washington

Standard Operating Procedure EAP110, Version 1.7

Sampling Sediment for Chemistry

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Purpose of this document

The Washington State Department of Ecology develops Standard Operating Procedures (SOPs) to document agency practices related to sampling, field and laboratory analysis, and other aspects of the agency's technical operations.

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Washington State Department of Ecology

Environmental Assessment Program

Watershed Health Monitoring: Standard Operating Procedure for Sampling Sediment for Chemistry

Version 1.7

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EAP110

Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by the Department of Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which the Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

Revision Date	Rev number	Summary of changes	Sections	Reviser(s)
1/5/17	1.1	Added footers, changed title, general edits	All	Meghan Rosewood-Thurman
1/20/17	1.2	Updated glossary, formatting, general edits	All	Meghan Rosewood-Thurman
1/26/17	1.3	Added optional PAHs, References, general edits	All	Meghan Rosewood-Thurman
2/16/17	1.4	…Procedures to Sample Sediment for Chemistry 1.1 sediment chemistry samples; removed italics for WP and NP 2.2 Reworded paragraph 3.7 Reworded PAH as optional, removed "standard" 3.9 SDS – revised without M Updated dates for Ecology 2012 and Ecology 2015 documents 10.3, 10.4, 10.5 Updated dates, then sorted by date. 10.8 Updated date to 2016	Title 1.0 2.0 3.0 Various 10.0	Glenn Merritt
2/24/17	1.5	Removed draft dates,	Signature Page	Meghan Rosewood-Thurman
12/11/17	1.6	Clarified wording for number of jars and extracting water with pipettes	5.2.5, 5.2.6, 6.3.5 and 6.5.2	Meghan Rosewood-Thurman
1/8/18	1.7	Edited wording for optional PAHs	5.0 and 6.0	Meghan Rosewood-Thurman
10/2/18	1.7	Minor edits, e.g., 6.3.5, 6.3.6. Updated citation/reference dates Recertified	Various	Tom Gries
11/9/18	1.7	Formatting and accessibility updates	All	Ruth Froese

1.0 Purpose and Scope

1.1. This document is the Environmental Assessment Program (EAP) Standard Operating Procedure (SOP) for manually obtaining freshwater sediment chemistry samples from rivers and streams for the Watershed Health Monitoring (WHM) Program. It includes procedures for both the Narrow Protocol and the Wide Protocol, whether wading or rafting. This SOP is also used in the Ambient Biological Monitoring Program.

2.0 Applicability

2.1 This SOP should be followed when manually collecting freshwater sediment samples as described in section 1.1.

2.2 This SOP is used in conjunction with many other SOPs to complete a data collection event (DCE) for the WHM Program. The standard suite of parameters analyzed in sediment chemistry samples as part of a DCE includes Metals (As, Cu, Pb, and Zn), Total Organic Carbon (TOC), and sometimes an optional suite of Polycyclic Aromatic Hydrocarbons (PAHs). Sampling is accompanied by a visual assessment of sample grain size.

3.0 Definitions

3.1 DCE: The *Data Collection Event* is the sampling event for the given protocol. Data for a DCE are indexed using a code which includes the site ID followed by the year, month, day, and the time (military) for the start time of the sampling event. For example: WAM06600-000222-DCE-YYYY-MMDD-HH:MM. One DCE should be completed within one working day, lasting 4-6 hours, on average.

3.2 EIM: The Environmental Information Management System (EIM) is the Department of Ecology's main database for environmental monitoring data. EIM contains records on physical, chemical, and biological analyses and measurements. Supplementary information about the data (metadata) is also stored, including information about environmental studies, monitoring locations, and data quality. The “Search by map” feature enables plotting coordinates over orthophotographic imagery.

3.3 Index station: Index station: The distinct point location mapped by the site coordinates obtained from the Washington Master Sample List. The index station is called “X” and is generally located at major transect F; however the point may occur at any elevation in the stream between transects A and K.

3.4 Major Transect: One of 11 equidistant transects across the length of a site. These 11 transects run perpendicular to the thalweg and are labeled as follows: A (furthest downstream), B, C, D, E, F, G, H, I, J, and K (furthest upstream).

3.5 MEL: Manchester Environmental Laboratory.

3.6 Narrow protocol: The set of Watershed Health Monitoring SOPs that describe data collection at wadeable sites with an average bankfull width of less than 25 m at the index station.

3.7 PAH: *Polycyclic Aromatic Hydrocarbon.* A group of toxic compounds that form and are released into the environment primarily from incomplete combustion of organic material, including wood burning and vehicle emissions (Ecology, 2012). For optional WHM measurements, there are 22 analytes:

- 1-Methylnaphthalene
- 2-Chloronaphthalene (also known as PCN-002)
- 2-Methylnaphthalene
- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene (also known as Benz[a]anthracene)
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(ghi)perylene
- Benzo(k)fluoranthene
- Carbazole
- Chrysene
- Dibenzo(a,h)anthracene
- Dibenzofuran
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- Phenanthrene
- Pyrene
- Retene

3.8 QAMP: Quality Assurance Monitoring Plan. The QAMP for WHM is Cusimano *et al* (2006). An updated version is in early stages of development.

3.9 SDS: Safety Data Sheets (previously Material Safety Data Sheets or MSDS) provide both workers and emergency personnel with the proper procedures for handling or working with a particular substance. An SDS includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill/leak procedures.

3.10 Site: A site is defined by the coordinates provided to a sampling crew and the boundaries established by the protocol's site layout method (Hartman, 2017 (SOP EAP105) for the Wide Protocol; Merritt, 2017 (SOP EAP106) for the Narrow Protocol). Typically, a site is centered on the index station and equal in length to 20 times the average of 5 bankfull width measurements. Sites cannot be longer than 2 km nor shorter than 150 m. Narrow protocol sites range from 150 m to 500 m long. Wide Protocol sites are up to 2 km long. The most downstream end of a site coincides with major transect A; the most upstream end coincides with major transect K.

3.11 SITE ID: Identity code for the proposed sampling site.

The Format is WAM06600 - # # # # # #

- Random sites from the Washington Master Sample have a *WAM*06600- prefix.
- Statewide sentinel sites have a *SEN*06600- prefix.
- Ambient Bioassessment Sites have a *BIO*06600- prefix

3.12 Thalweg: Path of a stream that follows the deepest part of the channel (Armantrout, 1998). For WHM, we emphasize Armantrout's use of the word "path" because the thalweg longitudinal profile excludes (sometimes deeper) side pools that are not part of the dominant flow path.

3.13 Thalweg transect: One of one hundred (100) equidistant measurement locations in the thalweg, across the length of a site. For example the thalweg stations at/above each major transect are named as follows:

- A0, A1, A2, A3, A4, A5, A6, A7, A8, A9,
- B0. B1, B2, B3, B4, B5, B6, B7, B8, B9,
- C0, C1, C2, C3, C4, C5, C6, C7, C8, C9,
- …
- J0, J1, J2, J3, J4, J5, J6, J7, J8, J9, and
- K0

3.14 TOC: Total Organic Carbon.

3.15 WHM: Watershed Health Monitoring, a status and trends monitoring program within the Environmental Assessment Program at the Washington State Department of Ecology.

3.16 Wide protocol: The set of WHM SOPs that describes the sample and data collection at non-wadeable sites or sites wider than 25 m bankfull width. It is an abbreviated version of the Narrow Protocol and is typically accomplished by use of rafts.

4.0 Personnel Qualifications/Responsibilities

4.1 This SOP pertains to all Environmental Assessment Program field staff collecting and entering data for WHM.

4.2 All field staff must comply with the requirements of the EAP Safety Manual (Ecology, 2017).

4.3 Because this procedure requires the use of hazardous materials, training is required as described in the Ecology's *Chemical Hygiene Plan and Hazardous Material Handling Plan* (Section 1) (Ecology, 2018) which includes Laboratory Safety Orientation, Job-Specific Orientation, and Chemical Safety Procedures. Follow the Standard Operating Procedures in Section 16 of this document for chemical handling guidance.

4.4 All field staff must have completed the annual WHM field training and be familiar with both of the WHM protocols: *Narrow Protocol* and *Wide Protocol.* Training includes sampling goals and objectives as defined in the QAMP.

4.5 Field staff must be annually trained to minimize the spread of invasive species. See SOP EAP070 (Parsons et al., 2018).

5.0 General Equipment and Supplies

5.1 Pre-sampling Decontamination

5.1.1 Heavy-duty aluminum foil

5.1.2 Personal protective equipment

5.1.2.1 Eye protection

5.1.2.2 Apron

5.1.2.3 Gloves for solvents and acids (see *Chemical Hygiene Plan and Hazardous Material Handling Plan* (Section 6) (Ecology, 2018).

5.1.3 Fume hood

5.1.4 Stainless steel bowls

5.1.5 Stainless steel spoons

5.1.6 Cleaning brushes

5.1.7 Wash bottles for solvents

5.1.8 Decontaminating liquids.

5.1.8.1 Tap water.

5.1.8.2 Deionized water (DI).

5.1.8.3 10 % reagent grade nitric acid. See EAP090 (Friese, 2014) for SDS. Dilute reagent grade nitric acid to 10% with DI water.

5.1.8.4 Acetone, Certified ACS HPLC Grade ≥99.5%. See EAP090 (Friese, 2014) for SDS and safety requirements (optional for PAH sampling).

5.1.8.5 Hexane, Certified ACS HPLC Grade ≥99.5%. See EAP090 (Friese, 2014) for SDS and safety requirements (optional for PAH sampling).

5.1.8.6 Empty glass bottles for properly disposing of used solvents (see *Chemical Hygiene Plan and Hazardous Material Handling Plan* (Section 11) (Ecology, 2018).

5.1.9 Sink and drainboard.

5.2 Field Sampling

5.2.1 Electronic Tablet (fully charged) with WHM e-forms.

5.2.2 Talc-free nitrile exam gloves

5.2.3 Stainless steel bowl (decontaminated)

5.2.4 Stainless steel spoon (decontaminated)

5.2.5 Two pre-cleaned, glass sample jars (4 oz.; MEL Index #8), and one extra if sampling for PAHs

5.2.6 Sterilized pipettes

6.0 Summary of Procedure

6.1 Pre-sampling Preparation

6.1.1 Sampling bowls and spoons must be cleaned and decontaminated prior to use. Refer to Ecology SOP EAP090 *Procedures for Decontaminating Field Equipment for Sampling Toxics in the Environment* (Friese, 2014) for a detailed description of the principles behind this procedure. Section 7 of SOP EAP090 describes the decontamination process in detail. The basic steps are listed below.

6.1.1.1 Wash in Liquinox detergent, then

6.1.1.2 Rinse (3 times) with tap water, then

6.1.1.3 Wash with 10% nitric acid, then

6.1.1.4 Rinse with deionized water, then

6.1.1.5 In fume hood, rinse with acetone (optional for PAH sampling), then

6.1.1.6 In fume hood, rinse with hexane (optional for PAH sampling), then

6.1.1.7 In fume hood, air dry, then

6.1.1.8 Wrap with aluminum foil (shiny side facing out).

6.1.1.9 Properly dispose of hazardous wastes.

6.1.2 Obtain sample jars from the Manchester Environmental Laboratory (MEL) and arrange for sample analyses. Use MEL's most current Sample Container Request and Pre-Sampling Notification forms (Appendices A and B). MEL's sample manager will provide lab sample numbers after these forms are submitted.

6.1.3 Notify the laboratory at least two weeks prior to sampling.

6.1.4 Weekly, email or call the MEL sample manager, to indicate which samples to expect during the following week.

6.1.5 Ensure that there is an adequate supply of blank sample tags prior to sampling. Each jar needs a label with the following information: project name, site ID, date, time, sampler name, parameter name, and MEL sample number (Figure 1).

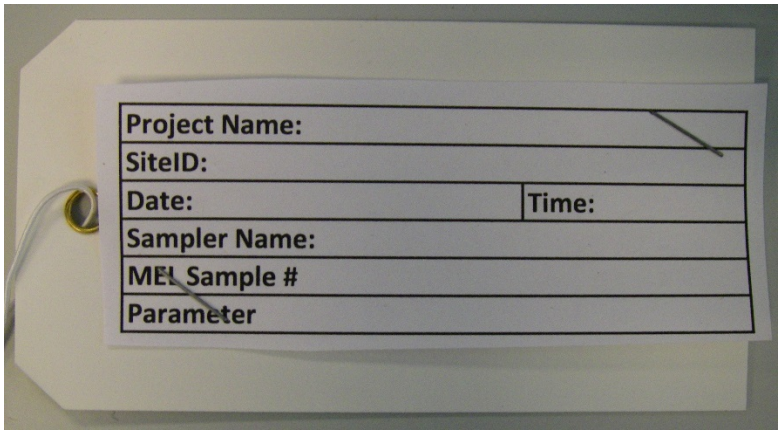

Figure 1: Blank sediment sample tag

6.2 General Considerations and Cautions

6.2.1 Each week, plan to deliver samples to the laboratory by Friday, before noon.

6.2.2 To avoid sample contamination, when wading, collect the sediment *after* sampling the water (see a separate SOP for water sampling). When rafting to sites, crews may delay sediment sampling until reaching the last transect, to minimize duration between sampling and lab delivery.

6.2.3 Choose a sediment sampling location within the boundaries of the site (between transects A and K).

6.2.4 Refrain from using sunscreen, insect repellent, or other contaminants prior to sampling.

6.3 Sampling Sediment

6.3.1 This sediment sampling method is based on Johnson (1997).

6.3.2 Collect the sample by compositing from 3 suitable locations. A suitable location should have the following characteristics:

6.3.2.1 Undisturbed surface sediment dominated by particles < 2 mm diameter. Seek locations with 100% fines, without any sand or gravel. This may not always be possible.

6.3.2.2 Sediment deposited by general fluvial processes and not from a local bank failure,

6.3.2.3 Water depth above the sediment is < 30 cm,

6.3.2.4 Sediment has not been exposed to air due to fluctuating stream levels,

6.3.2.5 The location is upstream from where staff have entered the stream channel.

6.3.3 Put on nitrile gloves and remove the aluminum foil from the sampling spoon and bowl. Scoop top 2 cm of sediment with pre-cleaned stainless steel spoon and place into pre-cleaned stainless steel bowl. Avoid adding excess water to the bowl. Collect at least 3 aliquots (spoons-full) from each of the 3 locations.

6.3.4 Homogenize the sample by stirring with the spoon until a uniform color and texture is achieved.

6.3.5 Transfer the sediment into sample jars, being careful not to contaminate the cap, neck, or the inside of the bottle with your fingers, wind-blown particles, or water dripping from your clothes, body, or overhanging structures.

6.3.6 Fill two sample jars to no more than 80% of capacity to prevent jars from cracking when frozen. Fill a third jar if PAHs are to be analyzed. Avoid adding excess water to each jar.

6.3.7 Reseal the jars. Try to avoid getting sediment on the outside threads of the jar. This may cause them to crack when resealed. With a gloved hand carefully wipe any sediment from the threads.

6.4 Grain Size Analysis

6.4.1 Visually estimate the composition of the sediment in the composite sample. Record percent gravel (2-16 mm), sand (>0.06 – 2 mm), and fines (silt/clay/muck) on the *Chemistry* page (Figure 2).

6.4.2 Fines should be the dominant component of the sample. Sand is gritty to the touch whereas fines are not. You can check the feel of *residue in the bowl* for the presence of sand or fines after sample jars have been filled.

6.5 Sample Labeling and Storage

6.5.1 Upon collection, cover and chill samples. Wrap all chemistry samples in a black garbage bag and chill (close to 4 °C) in the dark. Store sediment samples with lids upright to facilitate removal of excess water.

6.5.1.1 Use a cooler of ice if rafting.

6.5.1.2 Use the stream to chill sample jars if wading and distant from work vehicle. Transfer jars to a cooler of ice as soon as possible.

6.5.2 At conclusion of the DCE, gently remove each of the sediment jars from storage, and briefly uncap each to extract excess water with a pipette.

6.5.3 Label the samples with the following information: project name (e.g., Watershed Health Monitoring), site ID, date, time (military), sampler name, parameter name, and MEL sample number (these are assigned by the laboratory). Ensure the information on sample labels (Figure 1) is accurate for the DCE. Sample labels should be printed on waterproof paper and information written in waterproof ink or pencil. Write legibly.

6.5.4 Staple the label to a sample tag. Secure tag around the neck of the sample bottle tightly so it does not slip off during sample transport.

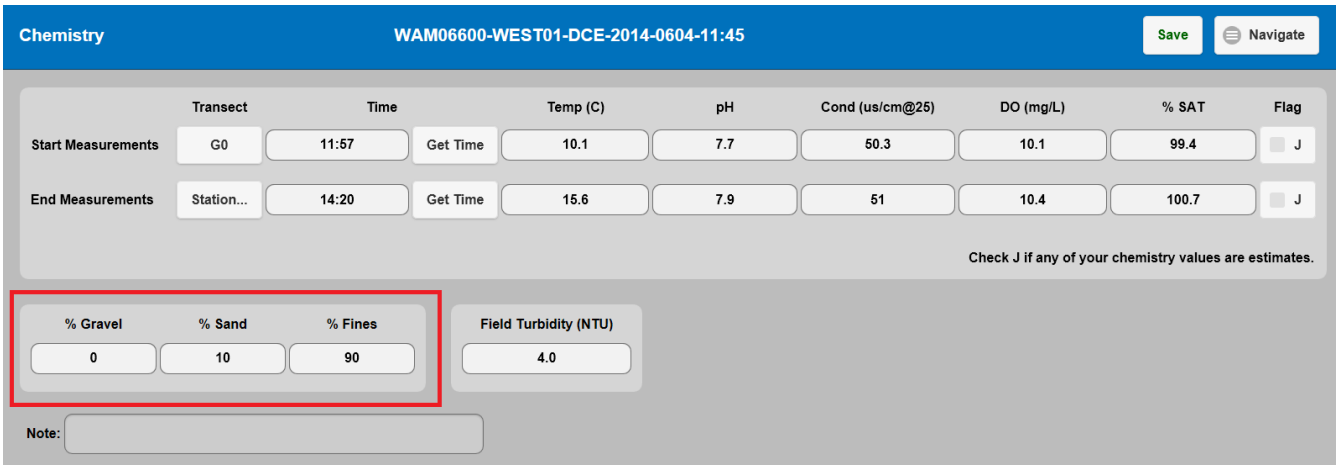

Figure 2: *Chemistry* page showing visual estimation of grain size.

6.6 Sample Delivery and Transport

6.6.1 While stored at 0-6 °C sediment chemistry samples have a 14-day field holding time.

6.6.2 There are two options for sample delivery. Crews can drop off samples at the EAP Operations Center (OC) or they may ship samples by commercial courier.

6.6.2.1 Option 1: Deliver weekly samples to the OC by Thursdays for next day transport to the laboratory by MEL courier.

6.6.2.2 Complete an LAR form for each shipment and create a copy for inclusion in the cooler(s). An example of a completed form can be found in Appendix C.

6.6.2.3 Pack samples in fresh ice. Add a copy of the LAR, sealed in a clear zip-closed bag.

6.6.2.4 Deliver the shipping cooler(s) to the walk-in cooler.

6.6.2.5 Place the completed original LAR form in the “Out” box near the walk-in cooler.

6.6.2.6 Option 2: Deliver weekly samples using an overnight commercial freight service. Ensure delivery to the laboratory occurs no later than Friday morning.

6.6.2.7 Complete an LAR form for each shipment and create a copy for inclusion in the cooler(s). Place a copy in a zip-closed bag and tape the bag to the inside lid of a shipping cooler.

6.6.2.8 Line each shipping cooler with 2 large garbage bags (one inside of the other). For commercial shipments, it is best to use shipping coolers without drain plugs that tend to leak water.

6.6.2.9 Pack samples in the lined shipping cooler(s) using fresh, contained ice. Ice must be contained with zip-closed bags labeled "ice" or in pre-frozen 16-oz bottles of water. Add as much ice as possible. Twist close the liners and secure with a zip-tie.

6.6.2.10 Seal the cooler shut with strapping tape. Apply completed (courier-provided) shipping labels.

6.6.2.11 Notify the MEL sample manager of the sample shipment, including the number of coolers and the tracking number. If you have an electronic copy of the LAR, email it. If not, provide all the pertinent information.

7.0 Records Management

7.1 Click on the *Samples* button of the WHM electronic field forms *Navigation Pane* (Figure 3). This opens the Samples page.

7.2 Within the *Samples* page (Figure 4), record the following information:

7.2.1 *Work Order #*: Issued by MEL

7.2.2 *Sample #*: Water, Sediment, and Chlorophyll samples should each have a unique 2-digit number.

7.2.3 Click *Jars Collected for Lab Shipment*: Select each parameter that you sampled.

7.2.4 *Sample Station*: The thalweg transect where the samples were collected, usually F0 for waded streams and A0 for rafted rivers.

7.3 Refer to SOP EAP125 (Janisch, 2017) for validating, loading, and committing completed WHM field forms to the WHM database.

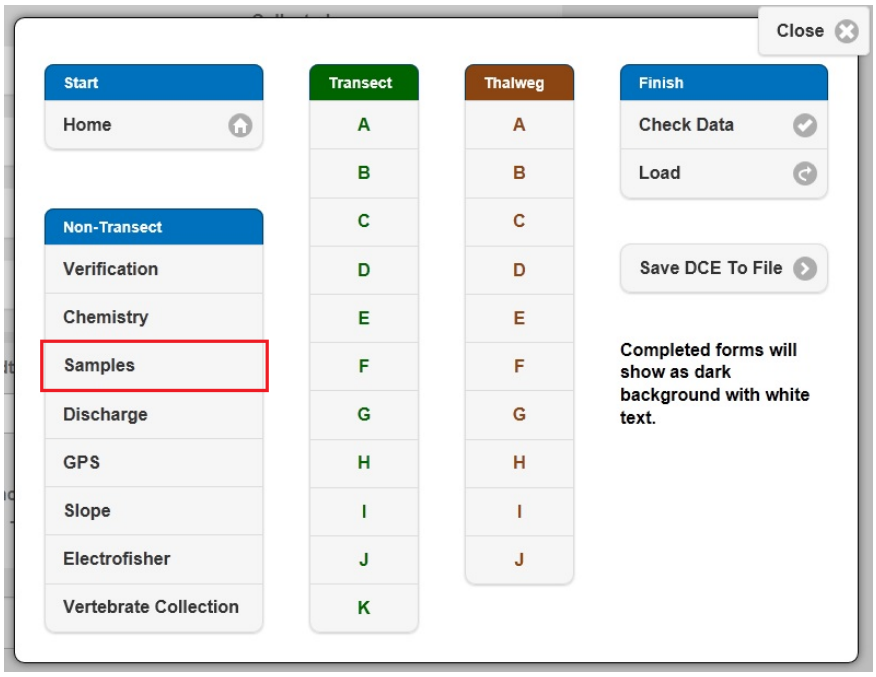

Figure 3. Location of the *Samples* page within the *Navigate* pane of the WHM electronic field forms.

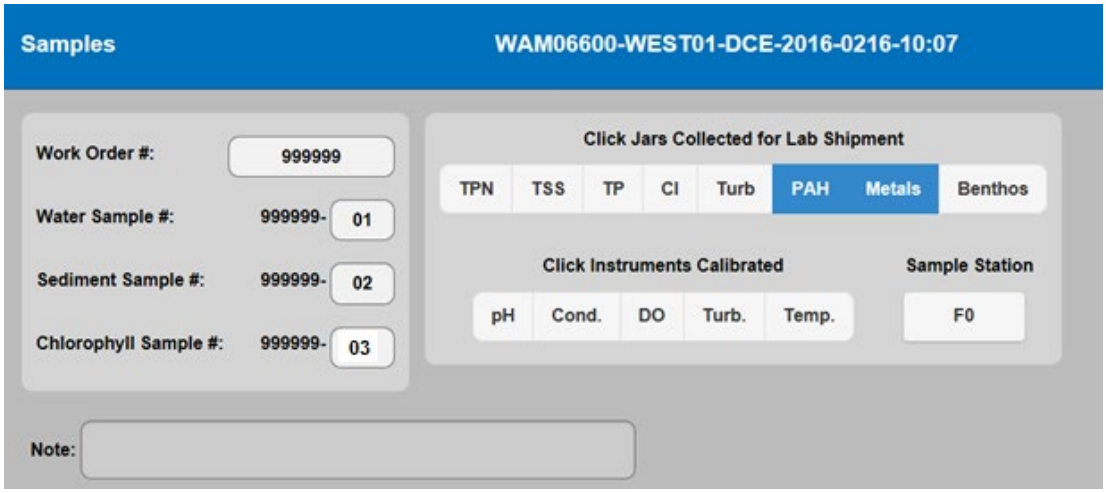

Figure 4: Data fields within the *Samples* page of the WHM electronic field forms.

8.0 Quality Control and Quality Assurance

8.1 PROJECT QA/QC is discussed in the Quality Assurance Monitoring Plan (Cusimano et al., 2006), which is in the process of being updated.

8.1.1 PRECISION: Re-visit 10% of sites per year to collect replicates. Timing of replicates should be within the same index period.

8.1.2 BIAS: Persons using this SOP must either attend the annual training event (June), or be trained by someone who did.

8.1.3 REPRESENTATIVENESS: Use the site selection design for choosing coordinates of the site. For WHM, this is the Generalized Random Tessellation Stratified (GRTS) design. Choice of reference sites (e.g. for Ambient Biological Monitoring) is described in Wilmoth et al. (2015).

8.2 SAMPLING QA/QC

8.2.1 PRECISION: Collect within-date field duplicates at 10% of sites sampled in a given year.

8.2.2 BIAS: MEL analyzes quality control samples with each batch to assess analytical bias.

8.2.3 REPRESENTATIVENESS: Samples must be collected from within the site boundaries (between transects A and K). Sediment should be collected on the same day that all other data are collected for the DCE.

9.0 Safety

9.1 Laboratory

9.1.1 Decontamination procedures require the use of hazardous materials (solvents and acid). Therefore, Ecology personnel must read and understand the safety procedures described in Ecology (2018).

9.1.2 For a detailed discussion of laboratory safety, including SDS, see Friese (2014).

9.2 Field

9.2.1 All field staff must comply with the requirements of the EAP Safety Manual (Ecology, 2017), especially Chapter 1 'General Field Work,' which includes special circumstances like fall protection and working in rivers and streams.

9.2.2 Sampling from a boat requires one person onboard to be a qualified boat operator and all persons onboard must be familiar with Chapter 3 of the EA Safety Manual, 'Boating.'

9.2.3 For further field health and safety measures refer to the EAP Safety Manual (Ecology, 2017)

9.2.4 Wear nitrile gloves to avoid bacterial or chemical exposure. Use anti-bacterial soap or hand sanitizer before ingesting food or drink.

10.0 References

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11.0 Appendices

Appendix A

Manchester Environmental Laboratory *Sample Container Request* form

Sample Container Request Form

Please **FAX** to: (360) 871-8850
Contact: Leon Weiks, Lab Assistant and Courier
Phone: (360) 871-8825 Email: lwei461@ecy.wa.gov
Please allow about 2 weeks for typical requests; longer for special requests

Requestor: _____ Project Name: _____

Phone: _____ Today's Date: _____

Location for Delivery: _____ Date Needed by: _____

Index #	Description	Qty.
1	1 gallon jar WM, CLR (BNA)	
2	1/2 gallon jar WM, CLR	
3	1 liter jar WM, CLR (Organics) for HCID only, no preservative	
4	1 liter jar NM, CLR w/ 1:1 HCl 15mL dropper bottle included (Oil & Grease)	
7	16 oz short jar WM, CLR	
5	8 oz short jar WM, CLR	
8	4 oz short jar WM, CLR	
34	2 oz short jar WM, CLR	
13	2 oz short jar WM, CLR, w/septum	
11	40mL vial AMB w/septum □ pre-preserved with HCl □ dropper bottle of HCl □ ascorbic acid for chlorinated VOA samples	
14	20mL vial w/acetic acid (Carbamates)	
39	1 liter glass NM, AMB (TPH-D)	
15	1 liter glass NM, AMB (All other Organics)	
16	500mL HDPE bottle w/5mL 1:1 nitric acid (Metals including **standard** level mercury)	
17	1 gallon cubitainer (BOD)	
19	125mL Nalgene WM, CLR w/1:1 sulfuric acid (Nutrients or COD)	
20	125mL Nalgene WM, AMB (filters and syringe also required for orthophosphate)	
21	125mL poly NM, CLR (Hardness) w/ 1:1 sulfuric acid *Hexachrome request w/o acid*	

Index #	Description	Qty.
22	500mL poly WM, CLR (General Chem.)	
23	1000mL poly WM, CLR (TSS)	
24	1000mL poly WM, AMB (Chlorophyll)	
25	250mL poly NM, AMB (Cyanide)	
26	125mL poly WM, CLR w/ 1:1 hydrochloric acid (TOC/DOC or TP) □ Filters and syringe for DOC	
27	250mL poly WM, CLR (Fecal Coli)	
28	500mL poly WM, CLR (Multiple Micro Tests)	
29	250mL poly WM, CLR w/thiosulfate (Fecal Coliform - Chlorinated)	
30	500mL poly WM, CLR w/thiosulfate (Multiple Micro Tests - Chlorinated)	
31	8oz plastic jar (Grain size only)	
32	1 liter jar WM, CLR w/sulfuric acid (Phenolics)	
33	4oz sterile specimen cup (Micro - sediment)	
35	Soil VOA/BTEX Airtight Sampling Capsules (3 per sample)	
36	Soil VOA/BTEX Sampling Handle (1 per sampling event)	
37	500mL Teflon NM, CLR (low level mercury ONLY) □ **Total**, Recoverable - nitric acid and no filter □ **Dissolved** w/filter and nitric acid	
38	Nalgene Metals Filters 0.45um	
Other Supplies		

All containers for organics are organic free with Teflon lined lids
WM = Wide Mouth **NM** = Narrow Mouth **CLR** = Clear **AMB** = Amber

Appendix B

Manchester Environmental Laboratory *Pre-Sampling Notification* form

Pre-Sampling Notification Form

Fax to Manchester Laboratory: (360) 871-8850

Or email to Nancy Rosenbower: nros461@ecy.wa.gov and cc: Leon Weiks: lwei@ecy.wa.gov

☐ Enforcement
☐ Monitoring
☐ Emergency
☐ Class II
☐ Preliminary Invest
☐ Special turnaround

Project Name: _____ **SIC:** _____

Requested by: _____ Sampling Date(s): _____

Program: _____ Date to Lab: _____

Phone No.: _____ Sample Pickup Location: _____

Date results needed by: _____ QAPP: ☐Yes ☐ No EIM Study ID (if available) _____

General Chemistry	W	S	O	Microbiology	W	S	O	Organic Chemistry	W	S	O
Alkalinity				Fecal Coliforms ☐MF ☐MPN				Base/Neutral/Acids (BNA)			
Conductivity				E. Coli MF ☐ MPN ☐				Polynuclear Aromatics (PAH)			
Hardness				E. Coli MPN							
pH				% Klebsiella				Volatile Organic Analysis (VOA)			
Turbidity								BTEX			
☐ Fluoride ☐ Chloride ☐ Sulfate								Pest/PCBs (Organochlorine)			
Cyanide ☐ Total ☐ Dissociable				**Metals**	W_T	W_D	S O	Pesticides only (Organochlorine)			
Total Solids				Priority Pollutant Metals (13 elements)				PCBs only			
Total Nonvolatile Solids (TNVS)				TCLP metals				OP - Pests (Organophosphorous)			
Total Suspended Solids (TSS)				Hardness				Herbicides (Chlorophenoxy)			
Total Nonvolatile Suspended Solids (TNVSS)								Nitrogen Pesticides			
Total Dissolved Solids (TDS)				Mercury (Hg) Low Level ☐ 245.7 ☐ 1631E Regular ☐				Organochlorine Pesticides by GCMS 8270			
Chlorophyll ☐ Filtered in field ☐ Filtered at lab				Other: List individual elements below:				PBDEs			
% Solids								Hydrocarbon ID (match to source)			
% Volatile Solids (TVS)								TPH-ID (gas/diesel/oil)			
Total Organic Carbon								TPH-D_X			
Dissolved Organic Carbon								TPH-G_X			
Biochemical Oxygen Demand (BOD) 5 day											
BOD - Inhibited											
BOD - Ultimate											
Ammonia											
Nitrate-Nitrite											
Orthophosphate											
Total Phosphorous											
☐ TPN ☐ TKN				Asbestos							

Comments:

Enter the number of samples in the appropriate box(es) above

W = water S = soil/sediment O = other (please specify)
W_T = water total W_D = water dissolved

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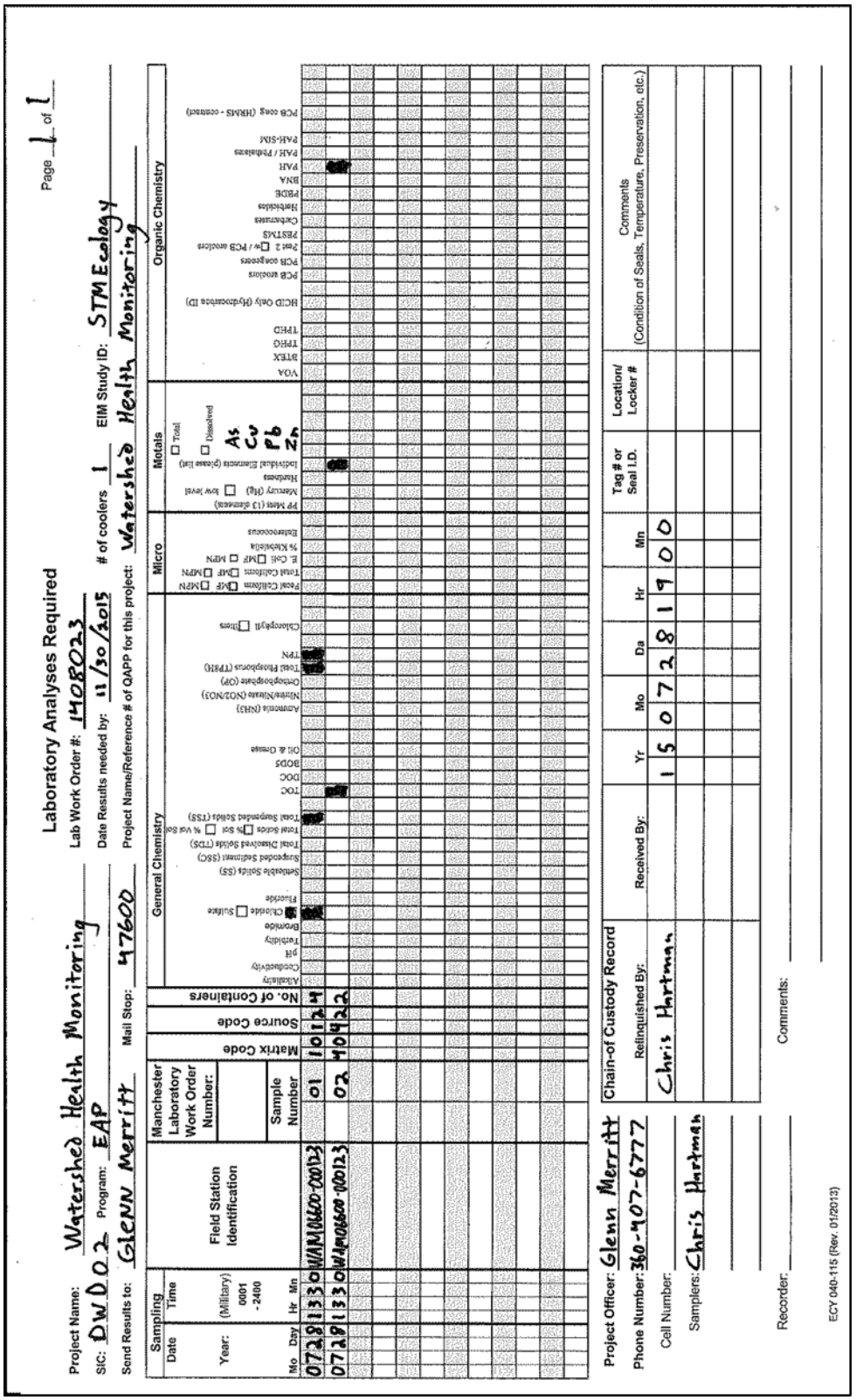
Appendix C

Manchester Environmental Laboratory *Laboratory Analysis Required* form



Laboratory Analyses Required

Page 1 of 1

Project Name: Watershed Health Monitoring — Lab Work Order #: 140823

SIC: DW002 — Program: EAP — Date Results needed by: 11/30/2015 — # of coolers: 1 — EIM Study ID: STM Ecology

Send Results to: Glenn Merritt — Mail Stop: 97600 — Project Name/Reference # of QAPP for this project: Watershed Health Monitoring

Sampling Date Mo	Day	Time Hr	Mn	Field Station Identification	Manchester Laboratory Work Order Number: Sample Number	Matrix Code	Source Code	No. of Containers
Year:		(Military) 0001 - 2400						
07	28	13	30	WANOLEO-00013	01	10	12	4
07	28	13	30	WAMOSCO-00013	02	40	22	

General Chemistry: Alkalinity; Conductivity; pH; Turbidity; Bromide; Chloride; Sulfate; Fluoride; Settleable Solids (SS); Suspended Sediment (SSC); Total Dissolved Solids (TDS); Total Solids; % Sol; % Vol Sol; Total Suspended Solids (TSS); TOC; DOC; BOD5; Oil & Grease; Ammonia (NH3); Nitrate/Nitrate (NO2/NO3); Orthophosphate (OP); Total Phosphorus (TPH); TPN; Chlorophyll; Titers

Micro: Fecal Coliform; Total Coliform; E. Coli; % Klebsiella; Enterococcus

Metals: PP Metals (13 elements); Mercury (Hg); Hardness; Tactical Elements (please list); Total; Dissolved; As Cu Pb Zn

Organic Chemistry: VOA; BTEX; TPHG; TPHD; HCID Only (Hydrocarbon ID); PCB aroclors; PCB congeners; PEST/MS; Carbamates; Herbicides; PBDE; BNA; PAH; PAH / Petrolatems; PAH-SIM; PCB congs (HRMS - contract)

Tag # or Seal I.D.	Location/ Locker #	Comments (Condition of Seals, Temperature, Preservation, etc.)

Project Officer: Glenn Merritt

Phone Number: 360-407-6777

Cell Number:

Samplers: Chris Hartman

Chain-of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn
Chris Hartman		15	07	28	19	00

Recorder:

Comments:

ECY 040-115 (Rev. 01/2013)