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Addendum 2 to Quality Assurance Project Plan

Measuring PCBs in Biofilm, Sediment, and Invertebrates in the Spokane River: Screening Study

January 26, 2021 DRAFT

Publication Information

This Quality Assurance Project Plan Addendum pertains to a follow-up study being conducted by the Spokane River Regional Toxics Task Force (Task Force) with support from the Washington State Department of Ecology. This plan is available at the Task Force's website at: http://www.srrttf.org. This is an addition to an original Quality Assurance Project Plan. It is not a correction (errata) to the original plan.

Data for this project will be available on Ecology's Environmental Information Management (EIM) website at EIM Database. Search Study ID SWON0001.

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January 2021

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2.0 Abstract

The Washington State Department of Ecology (Ecology) has included language in the NPDES permits for the Spokane River dischargers in Washington that requires permittees to create and participate in the Spokane River Regional Toxics Task Force (Task Force), with a mission to "work collaboratively to characterize the sources of toxics in the Spokane River and identify and implement appropriate actions needed to make measurable progress towards meeting applicable water quality standards for the State of Washington" (http://srrttf.org/?page_id=607).

Sampling conducted by the Washington State Department of Ecology's (Ecology's) Environmental Assessment Program in 2018 and 2019 showed elevated PCB concentrations in biofilm in the section of the Spokane River downstream of the Mission Avenue bridge in Spokane. Initial forensic analyses conducted for the Task Force could not positively identify the source of these elevated biofilm PCB concentrations. These forensic analyses did identify several potential categories of sources, with contaminated artificial bottom fill material (i.e. bricks and concrete that have been observed on the river bottom) being one of the candidate sources of PCBs.

This project consists of collecting samples and analyzing the PCB content of the artificial fill material observed in the Spokane River in the area of high biofilm PCB concentrations. The data will be compared to PCB concentrations previously measured in Spokane River bottom sediments and serve to help confirm or refute whether artificial fill is a causative source of the elevated biofilm PCB concentrations.

3.0 Background

3.1 Introduction and problem statement

In August 2018 and 2019, Ecology's Environmental Assessment Program conducted spatial surveys of the Spokane River using biofilms to assess possible suspected and unknown sources of PCBs to the river (Wong and Era-Miller 2019). The goals of the sampling were to collect and analyze PCB concentrations in biofilm, sediment, and macroinvertebrates in the river, and to assess the presence of unidentified sources of PCBs to the river. The study was initiated in collaboration with the Task Force, which has been working to identify PCB sources in the Spokane River watershed since 2012.

Both sampling events identified one segment of the river where biofilm PCB concentrations were particularly high (Section 3.2.2). This addendum to the original Quality Assurance Project Plan (QAPP) describes sampling for 2021 designed to identify whether artificial bottom fill material in this area of the river is the source of the elevated biofilm PCB concentration.

This addendum only includes sections of the original QAPP that have been modified.

3.2.2 Summary of previous studies and existing data

The sampling for the original component of this study took place in August 2018. Biofilm samples were collected at 19 sites in the Spokane River between the Washington-Idaho state line (SL) and just below Nine-Mile Dam (NMD; Figure 1). Sediment and macroinvertebrate samples were also collected at a small subset of the biofilm sites and analyzed for PCBs. Follow-up biofilm sampling conducted in August 2019 provided additional sampling locations between the Mission Bridge (MIB) and Spokane Gage (SG) sites in the City of Spokane, the area termed the "Mission Reach" (Figure 2). Figure 3 shows that biofilm PCB concentrations were consistently higher in the Mission Reach than in other portions of the study area for both years of monitoring.

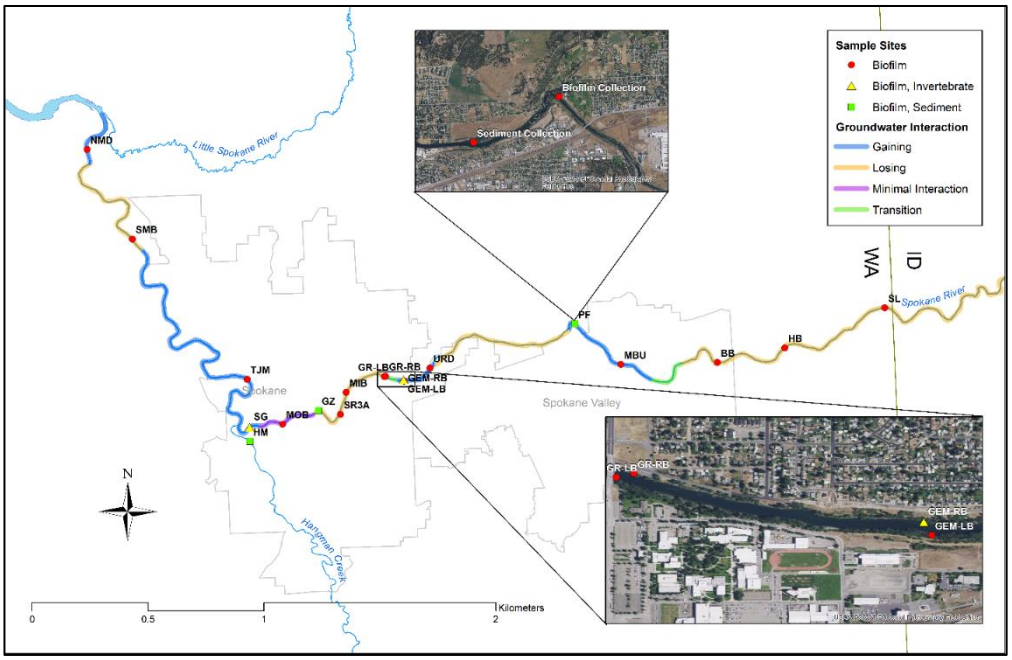

Figure 1. Map of the Spokane River showing 2018 sampling locations (from Ecology, 2020).

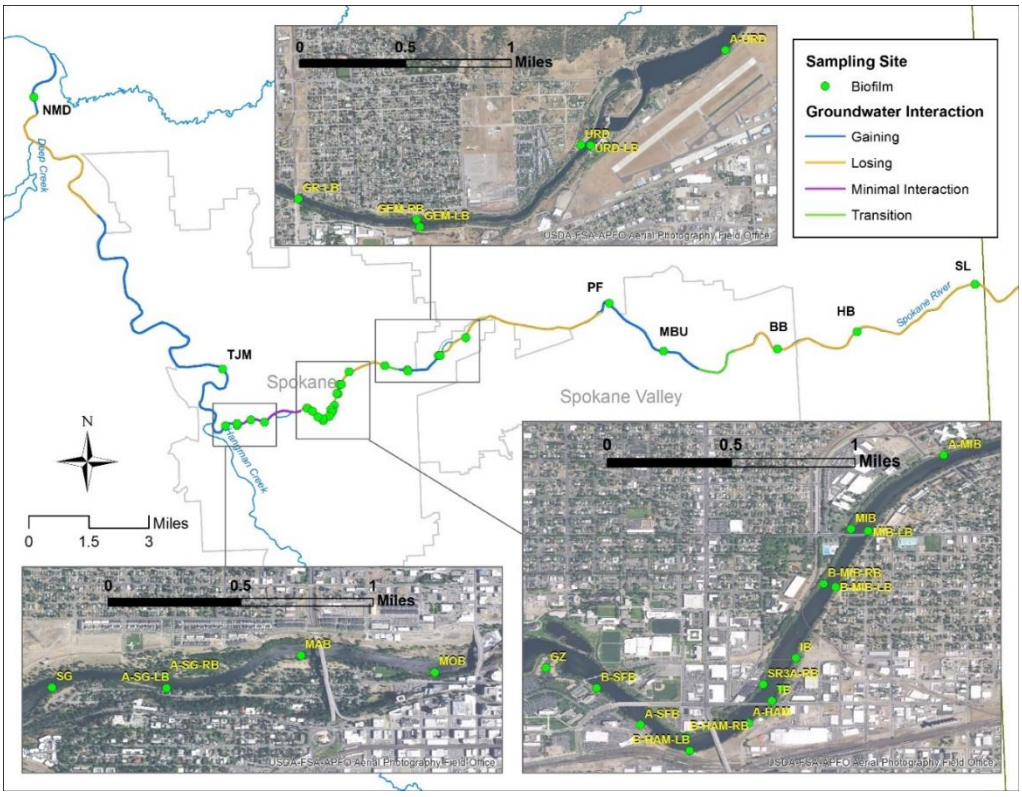

Figure 2. Map of the Spokane River showing 2019 sampling locations (from Ecology, 2020).

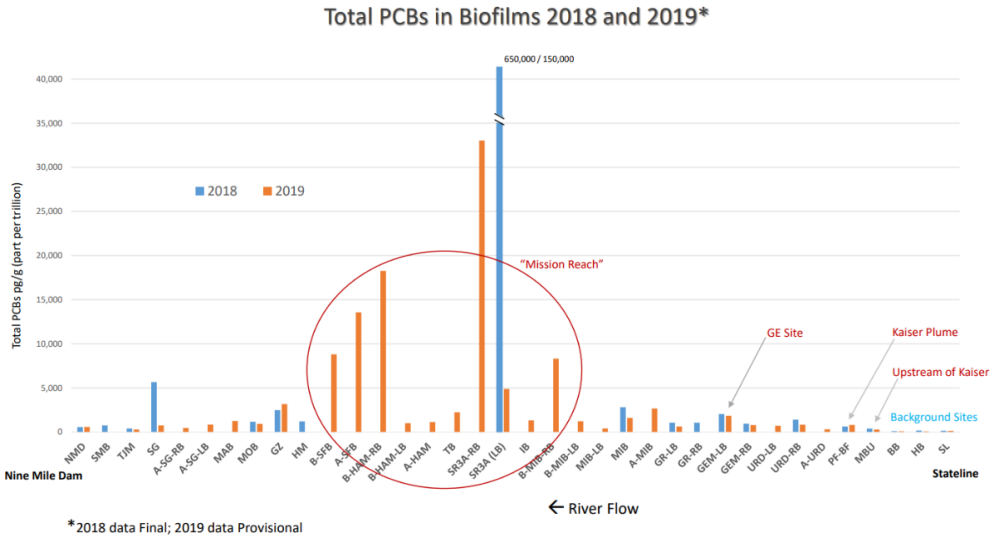

Figure 3. Total PCB concentrations measured in biofilms collected at sites in the Spokane River in 2018 and 2019 (from Era-Miller, 2020).

4.0 Project Description

4.1 Project goals

The goals of this project addendum are to:

(1) Measure PCB content in two types of artificial bottom fill material in the Mission Reach of the Spokane River,
(2) Assess whether artificial fill is a factor contributing to the elevated biofilm PCB concentrations in the Mission Reach.

4.2 Project objectives

Objectives of the follow-up sampling are to:

(1) Collect and analyze PCBs in five samples each of the two types of artificial bottom fill material (bricks and concrete) observed in the Mission Reach.
(2) Compare these concentrations to existing data on the PCB content of naturally occurring bottom sediments in Spokane.

4.4 Tasks required

Field collection will occur as a one-time sampling event in late winter or early spring of 2021, prior to the seasonal increase in river flow that will make sampling access unsafe. Tasks required include:

- Coordinate with field crew and laboratories in preparation for the sampling and analyses.
- Collect artificial fill samples during late winter of 2021 and analyze for PCB content.
- Review and assess laboratory data quality.
- Enter data into the Task Forced database and Ecology's Environmental Information Management System (EIM).
- Conduct data analysis and complete final report.

5.0 Organization and Schedule

5.1 Key individuals and their responsibilities

Table 1. Organization of project staff and responsibilities.

Staff	Title	Responsibilities
Robert Lindsay President SRRTTF-ACE Phone: 509-477-7576	Task Force Client	Manage contracts: review and approve project specifications. Ensure project is completed in timely manner.
David Dilks LimnoTech Phone: 734-332-1200	Project Manager/ Principal Investigator	Prepare the QAPP addendum. Review/approve all work products prior to delivery to SRRTTF-ACE. Ensure that work is done in accordance with QAPP. Provide oversight of field activities (variances, documentation, QA/QC). Arrange for system audits.
Adriane Borgias Water Quality Section Manager, Eastern Regional Office Phone: (509) 329-3515	Advisor	Review and approve QAPP addendum.
Karl Rains Water Quality Planner, Eastern Regional Office Phone: (509) 329-3601	Contract Manager	Review and approve QAPP, manage SRRTTF contract.
Kathryn Hall LimnoTech Phone: 734-332-1200	Project Quality Assurance Officer	Performs systematic evaluation of data quality. Receives notices, initiates investigation, documents nonconformance with DQOs. Manage the Project QA/QC file.
Shea Hewage SGS AXYS Analytical Services, Ltd. Phone: (250) 655-5800	Laboratory General Manager	Responsible for all aspects of the daily operation of the laboratory. Oversees the completion of corrective actions to address any non-conformances.
Sean Campbell SGS AXYS Analytical Services, Ltd. Phone: (250) 655-5834	Laboratory Project Manager	Responsible for the execution of project-specific laboratory activities and interactions with the Task Force.
Richard Grace SGS AXYS Analytical Services, Ltd. Phone: 905-484-2314	Sales, Marketing, Service	Serves as the main point of contact for laboratory for contract management or maintenance. Works closely with clients and laboratory management to develop project technical specifications.
Shawn Hinz Gravity Environmental Phone: (425)281-1471	Filed Manager	Collects samples in accordance with QAPP. Prepares and administers Health and Safety Plan for employees. Maintains equipment logs, field records and data sheets. Manages field equipment, conducts calibrations. Addresses nonconformance and responds to corrective actions.
Arati Kaza Phone: 360-407-6964	Ecology Quality Assurance Officer	Reviews and approves the draft QAPP and the final QAPP.

5.3 Organization chart

The lines of reporting for the organizations in the project are shown in the organization chart (Figure 4).

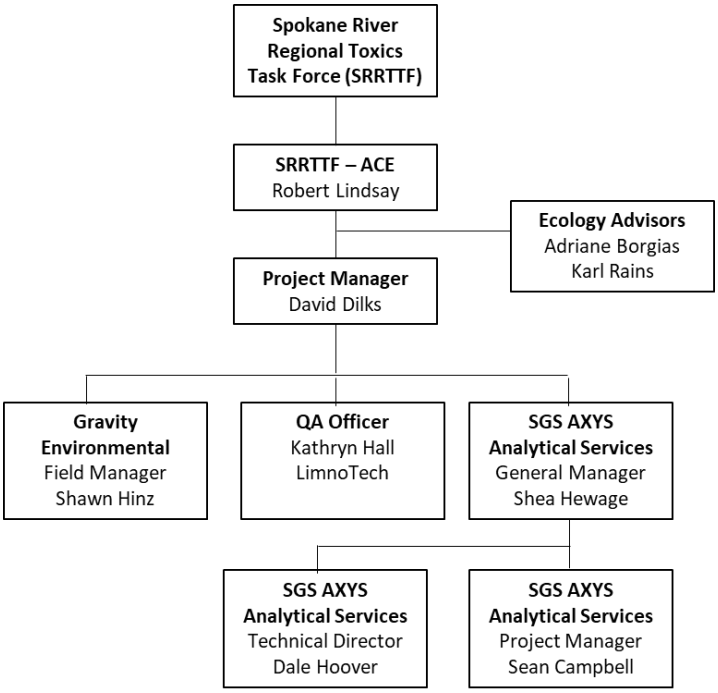

Figure 4. Project organization chart

5.4 Proposed project schedule

Start and end dates for key project activities are provided below in Table 2.

Table 2. Proposed schedule for completing field and laboratory work and reports.

Work type	Start Date	Due date	Lead staff
Field and laboratory work			
Field work	February, 2021	March, 2021	Shawn Hinz
Laboratory analyses	March, 2021	April, 2021	Sean Campbell
Laboratory data validation	April, 2021	May, 2021	Kathryn Hall
Database			
SRRTTF database entry and review	May, 2021	June, 2021	Amy Sumner
EIM data entry and review	June, 2021	June, 2021	Renn Lambert
Final report			
Draft report to Task Force	June, 2021	July, 2021	David Dilks
Final report on web	July, 2021	July, 2021	David Dilks

5.5 Budget and funding

Funding for this work was provided by the Spokane River Regional Toxics Task Force, supported in part by funding allocated to the Task Force by the WA State legislature for fiscal years 2020 and 2021. See Table 3 for a budget overview and detailed laboratory budget.

Table 3. Project budget and funding.

Budget Overview					**Total**
Salary, benefits, and indirect/overhead					$10,000
Field Sampling					$10,436
Parameter	**Number of Samples**	**Number of Field QC Samples**	**Total Number of Samples**	**Cost Per Sample**	**Lab Subtotal**
PCB Congeners	10	2	12	$920	$11,040
				Project Grand Total	$31,476

6.0 Quality Objectives

6.2 Measurement quality objectives

Measurement quality objectives (MQOs) for this addendum are shown in Table 4. MQOs are the same as the specified in the original QAPP for sediment samples.

Table 4. Measurement quality objectives.

MQO →	Precision	Bias		Sensitivity
	Laboratory Duplicate/Field Split or Duplicate	Lab Control Standard[1]	Internal Standard Recovery[2]	Lowest Concentration of Interest
	Relative Percent Difference (RPD)	Recovery Limits (%)		Concentration Units
Artificial Fill				
PCB Congeners	± 30%	50 - 150%	50 - 150%	0.5 pg/g dw

6.2.2.1 Targets for comparability, representativeness, and completeness

To ensure that data from this project are comparable to other studies, the following Standard Operating Procedures (SOPs) for field sample collection will be used:

- Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs) (EPA, 2011).

7.0 Study Design

7.1 Study boundaries

2018 and 2019 biofilm sampling locations ranged from the Washington-Idaho state line (SL) to just below Nine Mile Dam (NMD). The area of study for this project specifically corresponds to the portion of the Spokane River between the Mission Avenue bridge and the Gonzaga site (GZ) where elevated biofilm PCB concentrations have been observed. Figure 5 shows the broader scope of the biofilm sampling with the focus area of this study shown in the inset.

[1] Laboratory Control Standard is also referred to as Ongoing Precision and Recovery (OPR) Standard, in which a laboratory blank sample is spiked with known quantities of analyte.

[2] Internal Standard Recovery is also referred to as Surrogate or Labeled Compound Recovery, using $^{13}C_{12}$-labeled congeners.

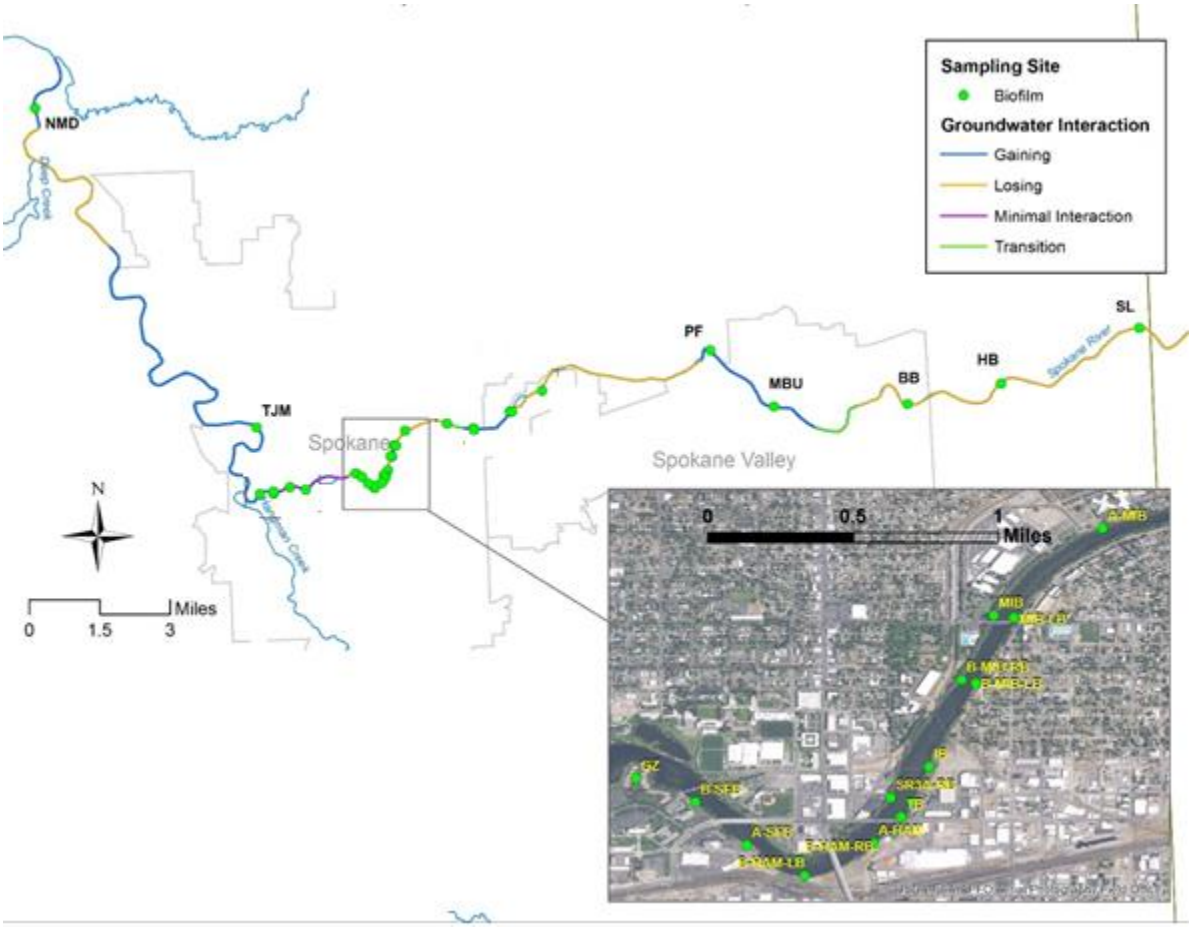

Figure 5. Map showing boundary of project study area (inset) relative to historical biofilm sampling locations (adapted from Ecology, 2020).

7.2 Field data collection

7.2.1 Sampling locations and frequency

Artificial fill sampling will be conducted at up to ten unique locations within the study area. Specifically, five samples will be collected from areas containing brick as the artificial fill and five samples will be collected from areas containing concrete. Specific sampling locations are not predefined (other than being collected from within the Mission Reach) because the locations are contingent on where concrete and brick fill material is located. Sampling frequency will consist of a single two-day event.

7.2.2 Field parameters and laboratory analytes to be measured

All artificial fill samples will be analyzed for the 209 PCB congeners.

7.4 Assumptions underlying design

This study will use the measurement of PCBs in artificial fill material as a method for identifying whether this fill material is a direct cause of elevated biofilm PCB concentrations in the Mission

Reach. One underlying assumption is that the PCBs contained in the artificial fill material are available for uptake by the biofilm. This will be addressed via sampling the surface layer (defined as outer ½") of the fill and not deeper core sections. This will restrict the analysis to the portion of the fill material most likely to contribute to biofilm contamination.

7.5 Possible challenges and contingencies

7.5.1 Logistical problems

The challenges impacting the study design are limited to the logistics of sample collection relative to seasonal increases in river flow that may make access to the river unsafe. To alleviate this issue, sampling is planned to be conducted no later than the end of March 2021.

7.5.2 Practical constraints

The one known practical constraint corresponds to potential travel and enterprise restrictions related to COVID-19. We will monitor applicable guidelines and adjust our activities accordingly.

8.0 Field Procedures

8.2 Measurement and sampling procedures

Artificial fill will be removed from the river bottom at each sampling location using a decontaminated power grab sampler deployed via watercraft. Samples will be transferred to shore and processed following the SOP provided by EPA (2011).

8.3 Containers, preservation methods, holding times

Sample containers, preservation, and holding times are identical to those used for sediment analysis as provided in the original QAPP and are listed in Table 5.

Table 5. Sample containers, preservation and holding times.

Parameter	Matrix	Minimum Quantity Required	Container	Preservative	Holding Time
PCB congeners	Brick, concrete	10 g dw	8 oz certified clean glass jar w/Teflon lid	Cool to < 4°C; store at < -10°C	1 year if frozen

8.5 Sample ID

Laboratory sample IDs will be assigned by Gravity and SGS AXYS.

9.0 Laboratory Procedures

9.1 Lab procedures table

Table 6 summarizes the number of samples, sample matrices, expected range of results, reporting limits, and analytical methods for collection and analysis of PCB congeners.

Table 6. Laboratory measurement methods

Analyte	Sample Matrix	Samples (Number/ Arrival Date)	Expected Range of Results	Detection or Reporting Limit	Analytical (Instrumental) Method
PCBs Congeners	Brick, concrete	12 (March, 2021)	0.5 – 10,000 pg/g	0.5 pg/g dw per congener	EPA 1668C

9.4 Laboratories accredited for methods

SGS AXYS, an Ecology-accredited laboratory, will analyze all PCB samples.

10.0 Quality Control Procedures

10.1 Table of field and laboratory quality control

The number and type of QC samples to be collected in the field and analyzed in the lab are summarized in Table 7.

Table 7. Quality control samples, types, and frequency.

Parameter	Field	Laboratory		
	Duplicates	Method Blanks	Matrix Spikes	OPR Standards
PCB congeners	2	1/batch	1/batch	1/batch

11.0 Data Management Procedures

11.3 Electronic transfer requirements

Laboratory data will be delivered in the form of an Electronic Data Deliverable that meets LimnoTech's formatting requirements.

11.4 EIM/STORET data upload procedures

Data for this project will be loaded into the Task Force data base and EIM.

12.0 Audits and Reports

12.3 Frequency and distribution of reports

After all data have been received, reviewed, and analyzed, the results of this project will be presented in the form of a draft final report summarizing the study and describing the assessment of PCB concentrations in Spokane River artificial fill. The draft will be distributed to the Task Force and Ecology for review and revised in response to comments.

12.4 Responsibility for reports

The report will be authored by the project manager.

13.0 Data Verification

13.1 Field data verification, requirements, and responsibilities

The field assistant will review field notes once they are entered into Excel spreadsheets. Oversight will be provided by the project manager.

13.2 Laboratory data verification

The laboratory conducting the analyses will review laboratory results prior to submitting the data package. The LimnoTech Quality Assurance Coordinator will serve as an independent third party validator and will review the complete PCB congener data package submitted by the external lab following EPA guidelines (EPA, 2016), and this QAPP. The LimnoTech Quality Assurance Coordinator will prepare a report of the Level III data validation, which includes an overall assessment of data quality, usability, and whether project MQOs were met.

14.0 Data Quality (Usability) Assessment

14.3 Data analysis and presentation methods

Data collected as part of this addendum will be analyzed and presented similarly as stated in the original QAPP, including calculations and graphic analyses of total PCBs and homologs. We will also compare PCB concentrations observed in the artificial fill to historical PCB concentrations measured in naturally occurring bottom sediments.

14.4 Sampling design evaluation

The main goal of the data analysis is to determine whether artificial fill material is serving as a source of the elevated PCBs observed in biofilm in the Mission Reach. The number and type of artificial fill sample locations is expected to be adequate to draw conclusions from the study.

15.0 References

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