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MEMORANDUM

From: Dave Dilks

Date: June 21, 2023

Project: SRRTTF10

To: Spokane River Regional Toxics Task Force

CC:

SUBJECT: **Documentation of 2023 Spring High Flow Regime SPMD Deployment**

SUMMARY

The Spokane River Regional Toxics Task Force authorized long term monitoring of PCBs in the water column of the Spokane River starting in 2020, with the intent of monitoring each of the three seasonal flow regimes (summer low-, winter moderate-, and spring high-flow) every two years. All three regimes were monitored during the 2020-2021 biennium, and the Task Force previously authorized monitoring of the low flow and moderate flow regimes of 2022-2023. This project consists of completion of the 2022-2023 water column monitoring program for trend assessment, by conducting monitoring during the spring high flow regime. Semipermeable membrane devices were deployed to monitor PCB concentrations at four locations ranging from the WA/ID State Line down to Nine Mile Dam. SPMDs were deployed for one month starting April 24. SPMDs were retrieved and delivered to the Washington State Department of Ecology for storage and subsequent laboratory analysis. The data collected under this study can be used to characterize annual average Spokane River water column PCB concentrations for the period Summer, 2022 through Spring, 2023, and serve as a reference point for comparison to monitoring data in past and future years.

This memorandum describes the details of the SPMD deployment and presents laboratory results for the concurrently sampled conventional parameters of total organic carbon, dissolved organic carbon, and total suspended solids.

DETAILS OF THE SPMD DEPLOYMENT

The field monitoring program for this project consisted of a single deployment of semi-permeable membrane devices at four locations in the Spokane River during spring high flow conditions. Details of the SPMD deployment are provided below, divided into sections corresponding to:

- Sampling locations
- Monitoring dates
- Field sampling activities

Sampling Locations

Sampling was conducted at the same four locations in the Spokane River used for prior Task Force water column trend assessment monitoring. Location descriptions and geographic coordinates are provided in Table 1.

Table 1. 2022-2023 High Flow SPMD Locations

Description	Latitude	Longitude
WA/ID State Line	N 47° 41.666’	W 117° 00.597’
Downstream of Upriver Dam	N 47° 41.101’	W 117° 19.698’
Upstream of E. Trent Avenue	N 47° 39.769’	W 117° 23.608’
Nine Mile Dam	N 47° 46.477’	W 117° 32.700’

Monitoring Dates

SPMDs were deployed for an approximately one-month long period. SPMDs were deployed at all locations on April 24, 2023. SPMDs for all stations except State Line were retrieved on May 23, 2023. The State Line SPMD was retrieved on June 5, 2023 due to high river flows present on May 23. A mid-deployment check was conducted on all SPMDs on May 8, 2023. Daily average river flows at the Spokane USGS gage ranged from 9573 to 23869 cfs during the high flow deployment.

Field Sampling Activities

The field sampling activities as planned and implemented are detailed in the project QAPP addendum (LimnoTech, 2023). This section summarizes those activities. SPMD sampling methods were based upon field SOPs provided in Hobbs (2020). SPMDs were deployed in secure areas to minimize vandalism and avoid strong currents, using stainless steel canisters and spindle devices provided by Environmental Sampling Technologies (EST). Each site canister/SPMD contained five membranes preloaded onto spindles by EST and shipped in solvent-rinsed metal cans under argon gas. Prior to deployment, performance reference compounds (PRCs) were spiked into the membranes by EST in order to assess biofouling and the non-equilibrium uptake of the compounds of interest (Huckins et al., 2006). Continuous temperature loggers were deployed concurrent with the SPMDs to confirm that they remained submerged during the period of deployment.

Water grab samples were taken to measure, total and dissolved organic carbon (TOC/DOC) and total suspended solids concentrations at each site during the time the SPMDs were exposed. Water grab samples were collected three times across the duration of each SPMD exposure to get an integrated measure of the conditions. Grab samples were collected using Ecology standard operating procedures (Joy, 2019). Additional field parameters were measured in situ at the time of water sampling using a multiprobe sonde. Parameters included temperature, pH, dissolved oxygen, and conductivity.

LABORATORY RESULTS FOR CONVENTIONAL PARAMETERS

Grab samples were collected at each SPMD station during deployment, the mid-deployment check, and retrieval. Samples were shipped to SVL Analytical for subsequent analysis of total organic carbon (TOC), dissolved organic carbon (DOC), and total suspended solids (TSS). Analytical results are provided in Table 2.

Table 2. Laboratory Results for Conventional Parameters

Location/Parameter	April 24, 2023	May 8, 2023	May 23, 2023
WA/ID State Line			
Dissolved Organic Carbon (mg/l)	1.85	1.98	1.69
Total Organic Carbon (mg/l)	1.85	2.01	1.72
Total Suspended Solids (mg/l)	1	4	3
Downstream of Upriver Dam			
Dissolved Organic Carbon (mg/l)	1.72	1.81	1.72
Total Organic Carbon (mg/l)	1.72	1.74	1.63
Total Suspended Solids (mg/l)	1.2	4.2	3.2
Upstream of E. Trent Avenue			
Dissolved Organic Carbon (mg/l)	1.82	2.34	1.72
Total Organic Carbon (mg/l)	1.82	2.33	1.69
Total Suspended Solids (mg/l)	1.4	6.2	3
Nine Mile Dam			
Dissolved Organic Carbon (mg/l)	1.78	2.3	1.75
Total Organic Carbon (mg/l)	1.78	2.14	1.75
Total Suspended Solids (mg/l)	3	5.2	4.4

REFERENCES

Hobbs, W. 2020. Standard Operating Procedures for Conducting Studies using Semi-Permeable Membrane Devices (SPMDs). Version 4.1. Washington State Department of Ecology, Olympia. SOP Number EAP001.

Huckins, J.N., Petty, J.D., and Booij, K. 2006. Monitors of organic chemicals in the environment: Semipermeable membrane devices. Springer, New York, USA. 223p.

Joy, J. 2019. Standard Operating Procedure EAP015, Version 1.4: Manually Obtaining Surface Water Samples. Washington State Department of Ecology, Olympia.

LimnoTech, 2023. Addendum 2 to Quality Assurance Project Plan Spokane River Regional Toxics Task Force 2020-2021 Water Column PCB Monitoring. Prepared for Spokane River Regional Toxics Task Force, April 20, 2023.