Toxics Quality Assurance Project Plan (March 2025)
Spokane County Regional Wastewater Reclamation Facility
1004 North Freya Street
Spokane, Washington

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Toxics Quality Assurance Project Plan
Spokane County Regional Wastewater Reclamation Facility
1004 North Freya Street
Spokane, Washington

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2	Influent/Effluent Sampling Procedures
3	Laboratory Accreditation from Washington State Department of Ecology
4	Pacific Rim Analytical Method Summaries for Environmental Protection Agency Methods 1668 and 1614

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1.0 INTRODUCTION

The Washington State Department of Ecology (Ecology) issued Spokane County (County) a renewal National Pollutant Discharge Elimination System (NPDES) permit WA-0093317 (Permit), effective August 1, 2022, for the Spokane County Regional Water Reclamation Facility (Facility, SCRWRF) in Spokane County, Washington. The Permit requires an annual submittal of a Toxics Reduction Best Management Practices Plan (BMP Plan) and an associated Quality Assurance Project Plan (QAPP). This QAPP was prepared by Landau Associates, Inc. (Landau) on behalf of the County to describe the sampling design, data quality objectives, laboratory activities, and QA procedures that will be implemented for wastewater influent and effluent sampling in support of the BMP Plan. The goal of the project is to maintain compliance with the NPDES permit requirements. The objectives of this project are to assess toxics concentrations in the effluent that discharges to the Spokane River, assess the effectiveness of the annual BMP Plan, and conduct source tracking and identification within the collection system that delivers wastewater to the Facility as outlined in the BMP Plan. Sampling efforts conducted in compliance with other permit requirements (e.g. Receiving Water Studies, monitoring for priority pollutants, etc.) are not covered under this QAPP. These will be covered under separate QAPPs due to permit requirements and involvement of different personnel.

The County owns the SCRWRF, which provides treatment for wastewater before discharging to the Spokane River. The Facility is in the operations phase of a design-build-operate contract with Jacobs Engineering (Jacobs). The County, in collaboration with Landau and analytical laboratories, will perform all activities related to sampling and analysis of toxic parameters associated with the BMP Plan, which requires the County to identify and implement BMPs throughout the sewershed to reduce toxics loading to the Facility and the Spokane River. The first BMP Plan will be submitted to Ecology simultaneously with this QAPP by the Aug. 1, 2023 deadline.

The toxic parameters addressed in the BMP Plan and this QAPP are polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs). Section S16.A of the permit details the requirements relevant to this QAPP:

> NPDES PERMIT WA-0093317 Section S16.A
>
> *"The Permittee must submit an updated Quality Assurance Project Plan (QAPP) by **August 1, 2023**. All monitoring for BMP effectiveness must use appropriately sensitive test methods. All sampling and analysis for the BMP plan must be in accordance with the approved QAPP. All lab sheets and a spreadsheet of raw data should accompany submission of the annual BMP plan. Spokane County must upload data to the Environmental Information Management System (or other) database as it becomes available."*

To meet the goal and objectives of this study, required tasks include wastewater influent and effluent toxics sampling, sample analysis, data quality assurance/quality control (QA/QC), and annual reporting. These tasks are summarized here and are described in more detail in this QAPP as appropriate.

The SCRWRF wastewater influent and effluent will be sampled for PCBs and PBDEs quarterly. Influent samples will be collected from the North Valley Interceptor and the Spokane Valley Interceptor pump stations (NVIPS and the SVIPS, respectively), the two influent trunk lines for wastewater entering the headworks of the SCRWRF. The County may elect to sample influent at the headworks to capture influent after the two trunk lines have been combined. The headworks sampling location is used for influent monitoring of other required parameters. Effluent samples will be collected at the SCRWRF from wastewater existing from the last treatment process or operation. Samples will be analyzed at an accredited laboratory using sensitive test methods.

Data will undergo a QA/QC process before being reported. Concentrations of toxics in effluent will be compared to the permit-specified discharge limit and the data will be reported to Ecology in the annual BMP Plan. Note that effluent PCB concentrations resulting from the EPA Method 1668C analysis are not used for permit compliance purposes. Concentrations of toxics in influent will be used to perform source tracking and identification as outlined in the annual BMP Plan.

The County has been performing similar toxics monitoring under previous Ecology-approved QAPP's since 2012. No logistical problems or practical constraints in implementing the QAPP and associated project plans in support of the BMP Plan have been identified.

The following provides a brief overview of the history of the revisions and development of the QAPP to date:

- The County submitted a draft version of this QAPP on March 15, 2012. This March 2012 QAPP describes the procedures for monitoring influent at the SVIPS and NVIPS, as well as monitoring treated effluent from the Facility. The County revised the draft QAPP based on discussions with Ecology staff. Ecology approved the QAPP for toxics monitoring on October 1, 2012.
- Three rounds of sampling were conducted from October 2012 through February 2013. Ecology reviewed and commented on the draft version. The QAPP was revised based on Ecology's comments dated April 2, 2012; participation in the regional PCB Workshop at Gonzaga Law Center on June 5 and 6, 2012; correspondence from Arianne Fernandez of Ecology dated June 21, 2012, regarding establishing regional consistency of sampling, analysis, and reporting of PCBs; and a meeting with Ms. Fernandez, Diana Washington, and Lucy Peterschmidt of Ecology on August 7, 2012.
- In accordance with the Ecology-approved QAPP, the County reviewed the initial sampling results in order to (1) identify improvements in effluent and influent (i.e., SVIPS and NVIPS) monitoring procedures, and (2) develop a strategy for "track-down" sampling to help identify sources of toxics to the wastewater the collection system upstream of the NVIPS and SVIPS. The proposed track-down sampling approach was described in the County's April 15, 2013, Annual Report. The

QAPP was revised in June 2013 to include additional details on new track-down sampling locations, analytical methods, and SGS AXYS Analytical Services Ltd.'s (SGS AXYS's) laboratory certification. The Revision 1 – QAPP was sent to Ecology on June 13, 2013 and approved on April 22, 2014.

- The County's April 2014 Annual Report described the results of the influent, effluent, and track-down sampling conducted through 2013, and recommended the locations and methods to be used for track-down sampling from June 2014 through April 2015. Ecology approved the Annual Report on June 3, 2014. QAPP Revision 2 was completed in April 2014 to reflect the sampling methods and locations recommended in the County's April 2014 Annual Report.
- In April 2015, the County submitted its 2015 Annual Report, which described the results of the sampling conducted through 2014 and recommended track-down locations for 2015. QAPP Revision 3 was completed in September 2015 to include the revised track-down sampling locations and recommendations contained in the April 2015 Annual Report.
- The County's April 2016 Annual Report described the results of the toxics sampling conducted through 2015 and recommended track-down locations for 2016. QAPP Revision 4 was based on the findings and recommendations contained in the April 2016 Annual Report.
- In 2018, the County's Annual Report described the results of the toxics sampling conducted through 2017. QAPP Revision 5 is based on the findings and recommendations contained in the April 2017 and April 2018 Annual Reports.
- The County's 2019 through 2022 Annual Reports described the results of toxics sampling conducted from 2018 through 2022. No revisions to the QAPP were made during this time.
- In 2023, the QAPP was revised to reflect new requirements in the renewal Permit and to support the first BMP Plan and was approved by Ecology on February 27, 2024.
- In March 2025, an amended QAPP was provided to Ecology to accommodate the following changes: replacing Rob Lindsay with Ben Brattebo as the County Project Manager contact, moving the location of effluent sampling from a manhole to an existing sampling cabinet, changing the laboratory conducting the sample analysis from SGS AXYS to Pacific Rim Laboratories (Pacific Rim) including any changes associated with this, and removing the requirement to upload data into EIM per conversations with Ecology as the data will now be uploaded to PARIS with the annual BMP Plan.

2.0 PROJECT ORGANIZATION AND SCHEDULE

2.1 Project Organization and Responsibilities

The specific roles, activities, and responsibilities of project participants involved in this monitoring program at the time of this QAPP preparation are listed below in Table 1. The County has the primary responsibility for managing work done in support of the BMP Plan, as well the quality review for data associated with the BMP Plan. Landau is the primary consultant for wastewater sampling activities performed under this QAPP. All sampling personnel will be Hazardous Waste Operations and Emergency Response trained. All sampling activities will be performed in accordance with the project health and safety plan. No additional special training or certifications are required to perform influent and effluent sampling.

Pacific Rim Laboratories, Inc. (Pacific Rim) and Anatek Labs, Inc. (Anatek) will conduct the laboratory chemical analyses. Environmental laboratories performing work under this QAPP will maintain current accreditation through Ecology for applicable methods and analytes. Contact information for the primary consultant and laboratories is provided below.

The County reserves the right to utilize different consulting firms and analytical laboratories to perform sampling and analyses. In the instance that the County invokes this right, the County will ensure the qualifications and capabilities of the new firm or laboratory will be comparable to those listed herein. Ecology will be notified of any changes in project staff, consultants, and analytical laboratories.

Table 1 – Project Responsibilities

Title	Name	Responsibility	Contact Information
County Project Manager	Ben Brattebo, Spokane County	Project management	509-477-7521 bbrattebo@spokanecounty.org
County Monitoring Project Manager	Amy Sumner, Spokane County	Consultant team management	509-477-7678 asumner@spokanecounty.org
County Data Management	Amy Sumner, Spokane County	Data quality review and auditing Annual reporting	509-477-7678 asumner@spokanecounty.org
Field Sampling Leader	Shane Kostka, Landau Associates	Supervise field monitoring team Perform Sampling	509-327-9737 skostka@landauinc.com
Sampler	Dan Gray/ Weston Boardman, Landau Associates	Perform sampling	509-327-9737 dgray@landauinc.com
Contract Laboratory	Bjorn Hope, Pacific Rim Laboratories, Inc.	Chemical analyses	604-532-8711 bjorn@pacificrimlabs.com
Contract Laboratory	Kathy Sattler Anatek Labs, Inc.	TSS analysis	509-838-3999 Kathy@anateklabs.com

2.2 Project Schedule

The anticipated schedule for BMP activities is presented below. Deviations from this schedule will be addressed in each year's BMP Plan. No deviations from, or limitations on, the planned schedule are expected.

Table 2 -- Project Schedule

Milestone/Activity	Date/Timeline
Submit updated QAPP to Ecology	August 1, 2023
Submit first Annual BMP Plan	August 1, 2023
Receive Ecology comments on updated QAPP and BMP Plan	TBD
Finalize updated QAPP and submit to Ecology for approval	TBD
Influent (NVIPS & SVIPS) quarterly sampling	August 2022 – July 2027
Effluent quarterly sampling	August 2022 – July 2027
Lab data quality review	After each round of quarterly sampling
Submit Annual BMP Plans	Annually; August 2023 – August 2027

2.3 Budget and Funding

This project will be funded by the County's Water Reclamation budget.

3.0 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) reflect the overall degree of data quality or uncertainty that the decision-maker is willing to accept during decision-making. DQOs are used to specify the quality of the data, usually in terms of Data Quality Indicators (DQIs) precision, accuracy, representativeness, completeness, comparability, sensitivity, and bias. DQOs apply to the entire measurement system (e.g., sampling locations, methods of collection and handling, field analysis, laboratory analysis) and used to ensure that environmental data are scientifically valid, defensible, and of an appropriate level of quality given the intended use for the data (EPA 2000). DQOs are also established to achieve an acceptable level of confidence in decisions made from the collected data.

Process	Response
Step 1: State the problem	The County owns the SCRWRF, which provides treatment for wastewater before discharging to the Spokane River. The Permit requires a Toxics Reduction Best Management Practices Plan (BMP Plan) for wastewater influent and effluent sampling.
Step 2: Identify the goal of the study	The goals and objectives of the project are to: • Maintain compliance with permit conditions • Assess toxics concentrations in the effluent that discharges to the Spokane River • Perform source tracking and identification within the collection system that delivers wastewater to the Facility.
Step 3: Identify the inputs to the decision	Influent samples will be collected from NVIPS and SVIPS. Effluent samples will be collected from the SCRWRF. Influent and effluent samples will be analyzed for polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PDBEs). Influent samples will also be analyzed for total suspended solids.
Step 4: Define the study boundaries	Geographic: Influent, NVIPS and SVIPS; Effluent, SCWRF Time frame: Quarterly, through July 31, 2027 Sample type: Influent and Effluent Wastewater
Step 5: Develop the Analytic Approach	Concentrations of toxics in effluent will be compared to the permit-specified discharge limit and the data will be reported to Ecology in the Annual Report. However, effluent PCB concentrations resulting from EPA Method 1668C are not used for permit compliance purposes. Concentrations of toxics in influent will be used to perform source tracking and identification as identified in the annual BMP Plan.

Step 6: Specify performance or acceptance criteria	**Discharge limits are presented in Permit No. WA0093317** **Chemical analysis shall be performed by an accredited laboratory.** **Performance and acceptance criteria are presented in Table A-1, A-2, A-3 including the following quality control considerations:** • **Data quality indicators for laboratory analyses (precision, accuracy, representativeness, completeness, and comparability)** • **Laboratory quality control** • **Field quality control samples.**
Step 7: Develop the detailed plan for obtaining data	The sample design is presented in Section 4 of this QAPP.

3.1 Data Quality Indicators

DQIs are used to establish quality objectives and are discussed in detail below. A summary of DQIs and their associated measurement quality objectives (MQOs) is presented in Table A-1. The contract laboratory is expected to meet all quality control (QC) requirements of the analytical methods being used for this project. The data review approach for this project is provided in Section 10.0.

3.1.1 Precision

Precision is a measure of variability in the results of replicate measurements due to random error (Ecology 2016). Precision is best expressed in terms of the standard deviation or relative percent difference (RPD). QC sample types that can be used to evaluate precision include field and laboratory duplicates, matrix spike duplicates (MSDs), and laboratory control sample duplicates (LCSDs).

For the purposes of this study, field duplicates and MSDs (also called On-going Precision and Recovery (OPR) duplicates) are used to assess field and laboratory precision, respectively. One field duplicate is collected per sampling event and one MSD is analyzed per batch of samples at the lab.

The precision of duplicate measurements will be expressed as an RPD, which is calculated by dividing the absolute value of the difference of the two measurements by the average of the two measurements and expressing it as a percentage. The formula for RPD calculation is shown below:

$$\mathrm{RPD} = \left[\frac{|\mathrm{D1} - \mathrm{D2}|}{[(\mathrm{D1} + \mathrm{D2}) \div 2]}\right] \times 100\%$$

Where:

D1 = first measurement value
D2 = second measurement value (duplicate).

3.1.2 Accuracy

Accuracy is a combination of precision and bias (described in Section 3.1.7), in that it represents the degree to which a measured value represents the known value (Ecology 2016). Accuracy is expressed as the percent recovery of spiked samples (matrix spike [MS], laboratory control sample [LCS], and surrogate spike). For the purposes of this project, a matrix spike is analyzed with each batch of samples and surrogate spikes for 13C-labeled congeners are measured for each sample and blank within the batch. The general formula used to calculate percent recovery is shown below (for MS/MSD percent recovery, the result from the unspiked sample is taken into account in the formula):

$$\%R = \left[\frac{SSR}{C_s}\right] \times 100\%$$

Where:

%R = percent recovery
SSR = spiked sample result
C_s = concentration of the spike added.

3.1.3 Representativeness

Representativeness is an indicator of how accurately a result reflects the desired characteristic(s) of a defined population, accounting for both temporal and spatial variability (Ecology 2016). Representativeness qualitatively describes how well the analytical data characterize an area of concern. The sampling design was developed to obtain representative data on toxics being discharged to the Spokane River and within the collection system for the Facility. Representative samples will be collected by: using appropriate sampling and sample handling procedure; using composite samples; choosing sample locations and times that best represent the dynamic influent and effluent characteristics; and meeting method-specified sample containers, holding times, and preservation requirements. Samples containers, holding times, and preservation are presented in Table A-2.

3.1.4 Comparability

Comparability is the “degree of confidence with which one data set can be compared to another” (Ecology 2016). QC procedures and MQOs, as stated in this QAPP, will provide for measurements that are consistent and representative of the media and conditions measured, as well as the County’s previous sampling design.

Section S16.B of the Permit instructs the County to continue to work with the Spokane River Regional Toxics Task Force (SRRTTF) or equivalent citizen advisory organization or committee to identify strategies for reducing toxics in the Spokane River watershed.

The County recognizes that regional comparability of data among the various permittees will be important to the success of the regional toxics monitoring effort. To remain consistent with other Spokane River dischargers and to meet Ecology's preference, the County previously made three changes with regards to PCBs:

- switching from EPA Method 1668A to EPA Method 1668C for analysis of PCBs starting in June 2018;
- reporting total PCB data corrected using a 10x method blank censoring approach instead of the 10x all-blank approach starting with the 2019 Annual Report; and
- reporting on congener-specific and homolog-specific PCB data using a 3x method blank censoring approach starting with the 2019 Annual Report.

The County will maintain these practices for consistency. The County will upload the raw, uncorrected data for each sample with each annual report to Ecology after QA/QC has been completed per Section 10.

3.1.5 Completeness

Completeness is defined as the need to collect enough valid data to allow decisions to be made for which the study was designed. The goal for completeness is to collect and analyze 100 percent of the samples described in this QAPP. For PCB data, completeness is determined for each sample by the amount of lock-mass interference on a per congener basis.

3.1.6 Sensitivity

Sensitivity is the capability of a method or an instrument to discern the difference between very small amounts of a substance. For the purposes of this Project, sensitivity is the lowest concentration that can be accurately detected by the analytical method. Each toxic congener has its own method detection limit as specified by Pacific Rim. Typical method detection limits by toxic congener are listed Table A-3. The method detection limit is unique for each data analysis and depends upon the results of laboratory blank and standard analyses. Method detection limits for each sampling event are included in the data report from Pacific Rim, which will be included in each annual BMP report.

3.1.7 Bias

Bias is the systematic error due to contamination, sample preparation, calibration, or the analytical process. Most sources of bias are minimized by adherence to established protocols for the collection, preservation, transportation, storage, and analysis of samples. Check standards (also known as laboratory control standards) contain a known amount of an analyte and indicate bias due to sample preparation or calibration. Precleaned bottles are "proofed" by the analytical laboratory to quantify background contaminant levels. Rinsate blanks quantify the potential bias that could be introduced as a result of sample collection techniques or other contamination introduced by external sources. Method blank, or laboratory blank, contamination is a recognized issue in low level PCB analysis.

The laboratory selected to support the County's toxics monitoring program, Pacific Rim, has extensive experience working with protocols to mitigate blank contamination. These protocols are detailed in Section 10.2.8. Method and rinsate blanks not meeting the protocol criteria may trigger a reanalysis. Outlier tests are used for all samples to provide some context as to whether the result is unusually high or low.

4.0 SAMPLING PROCESS DESIGN

Sampling will be conducted as required in the NPDES permit and will include the following constituents:

- Total PCBs
- PBDEs.

In addition, influent samples will be analyzed for total suspended solids (TSS).

The Facility has two influent trunk lines where influent sampling will be conducted, NVIPS and SVIPS. The current Permit Condition S.2 does not specify that toxics sampling will occur in the influent trunk lines, as was previously required. However, their use maintains consistency in the monitoring program.

The County may elect to sample the influent at the headworks sampling location. The Headworks sampling location, which is used for compliance with most other influent monitoring requirements under the Permit, is allowable. It would provide an influent sampling location where the flows from the NVI and SVI pump stations have combined and would provide some efficiencies in monitoring activities.

Effluent sampling will be conducted at an access point to the effluent discharge line located after the last treatment process and prior to exiting the Facility grounds. In the past, this was done at a manhole on the SCRWRF road system. While the County may elect to use the manhole as an alternate effluent sampling location, effluent sampling will occur at an existing sampling cabinet just upstream of the manhole to get sampling out of the road for safety. Sampling locations, including alternates, are shown on Figure 1.

Tables 3 and 4, respectively, in Section S.2 of the Permit (Ecology 2022), summarize the frequencies and general process locations for the wastewater influent and final wastewater effluent sampling. Due to the expected influent and effluent volumes, no practical constraints with sample collection are expected.

Table 3 - Wastewater Influent Sampling

Location Description	NVIPS	SVIPS	Headworks
Latitude	47.675209	47.652954	47.667876
Longitude	-117.347067	-117.352053	-117.354554
Constituent	**Minimum Sampling Frequency**		**Sample Type**
Total PCBs	Quarterly (4/year)		24-hour time-weighted composite
PBDE	Quarterly (4/year)		24-hour time-weighted composite
TSS	Quarterly (4/year)		24-hour time-weighted composite

Table 4 - Wastewater Effluent Sampling

Location Description	After Last Treatment Process	
	Sampling Cabinet	Manhole
Latitude	47.66709	47.66708
Longitude	-117.354085	-117.353083
Constituent	**Minimum Sampling Frequency**	**Sample Type**
Total PCBs	Quarterly (4/year)	24-hour time-weighted composite
PBDE	Quarterly (4/year)	24-hour time-weighted composite

5.0 SAMPLING PROCEDURES

This section provides an overview of the sampling protocol that will be followed.

The Permit requires quarterly sampling of both water entering the headworks of the SCRWRF (influent) and of water leaving the last treatment process of the system (effluent). SOPs for influent and effluent sampling are included in Attachment 1.

5.1 Influent Sampling

Sampling locations for wastewater entering the headworks are the NVIPS and SVIPS, as described in Section 4.0 of this report. ISCO Model 3700 automated samplers will be used to collect 24-hour time-weighted composite samples from the NVIPS and SVIPS.

Composite samples will be collected in one 2.5-gallon (9.5 liters [L]) glass bottle. From the 2.5-gallon composite sample, the following aliquots will be made and sent to Pacific Rim for analysis with the exception of the TSS sample, which will be sent to Anatek.

- 1 L for analysis of PCB congeners by Method 1668C
- 1 L for analysis of PBDEs by Method 1614
- 1 L field duplicate (note: 1 field duplicate per sampling event; alternates between sites and toxics)
- Two (2) 1 L samples for backup from each location will be held in case the lab needs additional sample water for one or more of the above-listed analyses, or if a re-analysis is triggered during QA/QC. These backup samples will not be disposed until the QA/QC process has been completed.
- 1 L for analysis of TSS by Method 2540 (sent to Anatek).

5.2 Effluent Sampling

An ISCO Model 3700 automated sampler will be used to collect 24-hour time-weighted composite samples from the final effluent of the Facility. A 2.5-gallon (9.5 L) composite sample will be taken at the sampling location. The following aliquots will be made from the composite sample and sent to Pacific Rim for analysis:

- 1 L for analysis of PCB congeners by Method 1668C
- 1 L for analysis of PBDEs by Method 1614
- 1 L field duplicate (note: 1 field duplicate per sampling event; alternates between sites and toxics)
- Up to two (2)1 L samples for backup will be held in case the lab needs additional sample water for one or more of the above-listed analyses, or if a re-analysis is triggered during QA/QC. These backup samples will not be disposed until the QA/QC process has been completed.

5.3 Equipment Decontamination

Personnel and field equipment decontamination performed in the field will be completed as described in Attachment 1. Sampling equipment will be precleaned prior to and subsequent to each sampling event by Pacific Rim. Pacific Rim's precleaning/decontamination procedures can be transmitted upon request. For the purposes of this QAPP, "precleaned" will refer to equipment that has undergone Pacific Rim's decontamination process.

Equipment that is to be precleaned by Pacific Rim includes the 1 L amber sample bottles and the sampling equipment, such as the 2.5-gallon glass composite bottles, Teflon tubing, and strainers. Equipment is to be cleaned and returned prior to the start of each sampling event.

5.4 Sample Handling and Custody

5.4.1 Sample Containers

Samples containers are presented in Table A-2. The influent and effluent samples will be collected in precleaned, proofed, 2.5-gallon glass bottles. The samples will be transferred to precleaned and proofed 1 L amber glass bottles provided by the contract laboratory, Pacific Rim.

For influent sampling locations, a portion of the sample stored in the 2.5-gallon glass bottle will be transferred to a 1 L polyvinyl chloride (PVC) bottle for TSS analysis at Anatek.

Sample bottles will be sealed in plastic bags and stored in clean areas to prevent exposure to contaminants prior to transport to the laboratory for analyses.

5.4.2 Sample Handling and Custody

Procedures to confirm the custody and integrity of the samples begin at the time of sampling and continue through transport, sample receipt, preparation, analysis and storage, data generation and reporting, and sample disposal. Records concerning the custody and condition of the samples are maintained in field and laboratory records.

Field staff shall maintain chain-of-custody (COC) records for samples taken in the field. A sample is defined as being under a person's custody if any of the following conditions exist: (1) it is in their possession, (2) it is in their view, after being in their possession, (3) it was in their possession and was subsequently locked, or (4) it is in a designated secure area.

The following information concerning the sample shall be documented on the contract laboratory COC form:

- Sample identification
- Date and time of sample collection
- Source of sample (including name, location, and sample type)
- Preservative used (if any)

- Analyses required
- Name of sample collector(s).

Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory or laboratories

Samples shall be uniquely identified, labeled, and documented in the field at the time of collection. Samples collected in the field shall be transported to the laboratory or field-testing site as expeditiously as possible. When a less than 6-degree Celsius (°C) requirement for preserving the sample is indicated, the samples shall be packed in ice or chemical refrigerant to keep them cool during collection and transportation. If the temperature of the samples upon receipt exceeds the temperature requirements, the exceedance shall be documented in laboratory records and communicated to project personnel. The decision regarding the potentially affected samples shall also be documented.

5.4.3 Challenges and Contingencies

The County has been performing similar toxics monitoring under previous Ecology-approved QAPP's since 2012. The below table outlines the challenges and contingencies that have been identified during previous sampling events and the responsive actions implemented:

Challenge or Contingency	Potential Result	Responsive Action
Freezing conditions	Frozen sample collection containers or tubing.	Composite samplers are wrapped in thermal insulation and placed as close as practicable to the sampling location to minimize the length of tubing exposed to freezing conditions.
Daily maintenance of influent wet wells	Missing one or more of the time weighted composite samples	Landau coordinates each sampling event with County personnel and Jacobs. Prior to sampler setup at NVIPS and SVIPS, Landau confirms that the wet well auto-clean is off.
Limited access at effluent sampling location due to other samples being collected	Delaying the sampling event	Landau coordinates each sampling event with County personnel and Jacobs.
Analytical sample shipping delays	Samples arrive at analytical laboratory out of temperature hold	A minimum of 20 pounds of fresh ice is included with each sample cooler shipped. Samples are not shipped on a Thursday or Friday of any week to avoid potential weekend delivery issues.

Samples break during shipping	**Insufficient volume for requested analyses**	**Up to two backup samples are collected from each sampling location including rinsates and stored under refrigeration. One travel blank backup is also stored under refrigeration.**
Composite sampler failure	Delaying the sampling event	Backup composite samplers are stored at the NVIPS and SVIPS facilities. An additional backup sampler is stored with Landau.
Pump tubing failure/ broken composite containers	Delaying the sampling event	Backup tubing and composite containers are stored with Landau

6.0 MEASUREMENT PROCEDURES

6.1 Analytical Methods

Analytical methods are either specified or recommended for the constituents included in the NPDES permit monitoring requirements. The permit provisions related to the analytical portion of this monitoring effort are summarized below.

The permit outlines the methods for analyzing PCBs and PBDEs in effluent and effluent in Sections S2, Table 5 (footnote i) and S2 Table 6 (footnote q). Specifically, the requirements are to use high resolution EPA methods 1668C and 1614 for the analysis of PCBs and PDBEs, respectively. Table A-3 lists the methods to be used to analyze samples collected from the Facility influent and effluent, the target analyte list, and the associated method detection limit.

7.0 QUALITY CONTROL

7.1 Field Quality Control Samples

Each sample event will include at least one rinsate blank (aka, “equipment blank”) for each analyzed constituent. To create a rinsate blank, carbon-filtered water provided by the lab will be pumped through a sampling device after it has been cleaned but before it is used for sampling. The rinsate blank will indicate the extent to which contaminants are introduced through the sampling procedure, equipment, or exposure to ambient air during the sample collection. Three rinsate blanks were collected in the initial sampling event in October 2012 in order to verify the integrity of newly purchased sampling equipment. For subsequent sampling events under the previous QAPP, rinsate blanks were prepared at alternating sampling locations so that each sampling location (NVIPS, SVIPS and effluent) were equally represented. However, under this QAPP, one rinsate blank will be collected at the effluent sampling location prior to collecting effluent samples. Data analysis has shown that blank contamination can significantly affect the effluent concentrations, but do not significantly affect influent concentrations. The volume of the rinsate blanks will be 1 L for PCB analysis and 1L for PBDE analysis. Additionally, two (2) 1L backup rinsate samples will be saved for potential reanalysis.

One field duplicate will be collected during each sampling event. The field duplicate will be collected from alternating sampling locations and alternate between toxics (PCB and PBDE). Additional samples collected at each location will be retained as backup samples in case reanalysis is required.

7.2 Laboratory Quality Control Samples

Pacific Rim will provide analytical services for the sampling of toxics, Anatek will perform the TSS analysis. Pacific Rim and Anatek shall maintain current accreditation through Ecology for analytical services performed under this QAPP. Certificates of laboratory accreditation from Ecology and laboratory SOPs are included in Attachments 2 and 3, respectively. Laboratories shall follow QC criteria as presented in Table A-1 of this QAPP, laboratory SOPs, and appropriate US Environmental Protection Agency (EPA) methods. A laboratory QA Plan is available from Pacific Rim on request.

The data package from Pacific Rim will include a case narrative discussing any problems with the analyses, corrective actions taken, changes to the referenced method, and an explanation of laboratory data qualifiers. The data package will also include all associated QC results. This information is needed to evaluate the accuracy of the data and to determine whether the MQOs were met.

8.0 DATA MANAGEMENT

The field consultant and laboratories will provide field data and analytical results directly to the County.

Laboratory analytical results, including QC data, will be submitted electronically. The electronic formats will include a PDF file of the laboratory report, and electronic data deliverables (EDD) files that will be uploaded by the County with each annual report to Ecology. Laboratories will provide EDDs in Stage 2 reports.

Both the laboratory report PDF and EDD (in Excel format) will be stored on the County's network drives, which are backed up and archived on a regular basis. The County will check entries in the Excel spreadsheets against the PDF files to ensure accurate data transposition. Any errors or discrepancies will be noted and corrected.

The laboratory analytical reports for the year will be included in each annual submittal of the BMP Plan.

9.0 AUDITS AND REPORTS

9.1 Reports

A BMP Plan will be completed and submitted on an annual basis. Each plan will be submitted by August 1 of the corresponding year. As stated in section S16.A of the permit, the BMP Plan will:

- Identify actions to be taken
- Include a method for assessing efficacy of the identified action(s)
- Quantify toxic reductions as a result of the actions.

The BMP Plan report will include the following, as per Section S16.A of the permit:

- Sampling locations and methods
- Laboratory procedures
- QA/QC records
- Sampling results
- Application of BMPs as it pertains to the BMP's placement, use, and application.

9.2 Assessments and Response Actions

9.2.1 Assessment of Laboratories

Pacific Rim and Anatek are accredited by Ecology, whose Environmental Laboratory Accreditation Program evaluates a laboratory's quality systems, staff, facilities and equipment, test methods, records, and reports. The accreditation establishes the laboratory's capability to provide accurate, defensible data. Results of onsite assessment and proficiency testing studies are available on request. In the event a laboratory loses its accreditation for any of the analyses required by this sampling effort, the laboratory shall notify the County Project Manager and another laboratory will be selected.

9.2.2 Assessment of Project Activities

Field audits will include examination of field sampling records; field screening results; field instrument operating records; sample collection, handling, and packaging in compliance with the established procedures; maintenance of QA procedures; COC; etc. Follow-up audits will be conducted as needed to correct deficiencies and to verify that QA procedures are maintained throughout the project. The audits will involve reviewing field measurement records, instrumentation calibration records, and sample documentation. This will occur once during the year.

9.2.3 Reports to Management

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-limit QC performance that can affect data quality. Corrective action can occur during field activities, laboratory analyses, data review, and data assessment. All corrective action proposed and implemented should be documented in the QA sections of project reports. For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. Any nonconformance with the established QC procedures in the QAPP will be identified and corrected in accordance with the QAPP. The nonconformance and corrective action will be documented in project reports.

10.0 DATA REVIEW AND USABILITY

The following sections outline project data review and usability.

10.1 Data Review, Verification, and Reduction

The County will conduct a review of all laboratory data and provide summary reports of the QC assessment for each sampling event in the BMP Plan. It will verify that methods and protocols specified in this QAPP were followed; that all calibrations, checks on QC, and intermediate calculations were performed for all samples. Evaluation criteria will include the acceptability of holding times, instrument calibration, laboratory procedural blanks, spike sample analyses, precision data, laboratory control sample analyses, and appropriateness of data qualifiers assigned. A case narrative will meet the requirements for a data verification report.

To determine if project MQOs have been met, results for check standards/laboratory control samples, duplicate samples, and labeled compounds will be compared to QC limits; and detection limits reported by the laboratory will be compared to typical detection limits in Table A-3. Data qualifier flags and the convention for reporting coeluting congeners will follow the quality objections summarized in Section 3.

The County will evaluate method blank and rinsate blank contamination based on decision rules as outlined in this QAPP. The County will amend and adjust these rules as needed to be consistent with Ecology's toxic source tracking protocols. If the rules trigger the need for reanalysis, the sample will be re-analyzed if a sufficient quantity of duplicate sample is available; otherwise, the sample result will be qualified.

In the BMP Plan, data may be reported using standard blank correction methods to facilitate comparison with other Spokane River discharger data and maintain consistency with the County's previous Annual Reports. The County uses a method blank censoring approach at 3x or 10x the method blank concentrations on a per congener basis depending on the analysis. In this approach, the total PCB calculation for each sample will exclude any congeners with concentrations less than 3 or 10 times the associated method concentrations. Statistical analysis has shown that the method blank censoring approach does not significantly affect total influent PCB concentrations but does significantly affect effluent concentrations. Data presented in the BMP Plan will indicate the level (3x or 10x) of censoring, or state that it is uncorrected data.

The County will review the laboratory data packages and determine if QC criteria were met, and in cases where they were not met appropriate data qualifiers will be used. Based on these reviews, the data will be accepted, accepted with appropriate qualifications, or rejected and re-analysis will be considered.

10.2 QA/QC Procedures

The following sections present the specific data review and verification protocols developed for data collected in support of the BMP Plan.

10.2.1 Field Notes

For each sampling event, the sampling team (a County contractor) completes a sheet of field notes, describing the location, date and time, weather, pH, and other observations for each sample collected, also including the location of duplicate samples. County staff review the field notes and accompanying photos to confirm that all planned samples are accounted for.

The sampling team completes the COC sheets for the toxics analysis laboratory (Pacific Rim) and the total suspended solids analysis laboratory (Anatek). The County reviews the COCs to make sure that all samples are accounted for according to the sampling schedule. The County reviewer collects the COC copies from the sampling team and the laboratories (two copies for each COC, showing each signature line when the samples were relinquished).

The County should also review other field notes including the health and safety daily tailgate meeting form and shipping receipts.

10.2.2 Raw Data

Pacific Rim delivers raw data via a laboratory report Portable Document Format (PDF) file and an Excel EDD file for each toxic contaminant analyzed (PCBs and PBDEs). The PDF contains the Pacific Rim copy of the COC. The County reviewer imports the data from the EDD files into the project QA/QC spreadsheets used to facilitate and track data quality review.

10.2.3 QA/QC

The QA/QC process evaluates the quality of the analytical data and ensures DQIs/MQOs outlined in Section 3 are met based on the assessments listed below:

- Consistency check between EDD submittal and PDF report
- Detection limit benchmarking: check if the analysis meets laboratory-based benchmarks for detection limits
- Laboratory QA/QC benchmarking: check if laboratory-based benchmarks for 13C-labeled compounds and spiked matrix recovery are being met
- Duplicate sample comparison: check if duplicate samples meet target levels of reproducibility
- Evaluation of flagged results
- Blank assessment.

QA/QC files include the overall QA/QC Checklist for each sampling event and a Data Analysis spreadsheet for each contaminant (PCB and PBDE) sampled in the event.

The QA/QC Checklist documents the measurement quality objectives have been met and whether reanalysis is required for all samples in the sampling event.

The Data Analysis spreadsheet automates blank correction calculations and provides a comparison of multiple correction methods.

10.2.4 Consistency Check

The County reviewer will compare the official lab report (PDF) and corresponding EDD file to confirm consistency. If any discrepancies are observed, the reviewer will notify Pacific Rim of discrepancies to confirm and resolve the inconsistency.

10.2.5 Detection Limits and Data Flags

Pacific Rim provides method detection limits (MDLs) for all data. The MDL varies from one sample to the next and can vary from one congener to the next. Pacific Rim provides the benchmarks for MDLs. The QA/QC process compares the MDLs for each analyte against these benchmarks. Samples or batches with MDLs consistently higher than the corresponding benchmarks may indicate some problem with the sample, which may trigger reanalysis.

Data flags are routinely reported in the toxics laboratory reports. The table below shows the common data flags, definitions, and QA checks performed for flagged data. Data with U and K flags indicate results that are below the reporting limits (RLs). RLs are the limits below which data are not considered to be accurate enough to report. When Pacific Rim reports the "total PCB" (or other contaminant) concentration for a sample, it is the sum of the concentrations of all congeners with results above the RL. Congeners with U and K flags are not included in the total contaminant sum for a sample.

Table 5 – Laboratory Flags

Flag	Definition	QC Check
B	Analyte found in sample and the associated blank	None
C	Co-eluting congener	None
G	Lock-mass disturbance	Confirm that less than 5% of sample's total mass is G-flagged
J	Concentration less than lowest calibration equivalent	None
K	Peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration	None; excluded from sum of congeners in sample
U	Not detected at RL	None; excluded from sum of congeners in sample
V	13C-labeled congener recovery falls out of the acceptable percent recovery range	Confirm V-flagged congeners not more than 5% outside of recovery range

Periodically, Pacific Rim will flag data for other reasons. Pacific Rim will sometimes provide comments on these flags, often before submitting the final report. Pacific Rim will typically recommend whether the flagged data should be reported or whether the sample should be reanalyzed. When the lab recommends reanalysis, their recommendation is always followed provided there is sufficient back-up sample in storage.

The QA/QC process determines the degree to which the G-flagged (lock mass) data affect the totals (total contaminant mass). If the lab has reported the G-flagged data, and these flagged data represent less than 5 percent of the total mass, the G-flagged data have typically been accepted. If the G-flagged data represent more than 5 percent of the total mass, the County might consider reanalysis, particularly if other QA/QC checks are abnormal or if the sample result is unusual compared to previous results for that location.

10.2.6 Evaluation of Laboratory QA/QC Measures

Pacific Rim performs routine QA/QC on all samples. This includes measuring the recovery of 13C-labeled compounds from all samples and blanks (surrogate spikes), as well as testing for the recovery of spiked compounds in an aqueous matrix (matrix spike/OPR). The QA/QC process compares the recoveries against laboratory-set benchmarks. Samples or batches with recoveries consistently outside of the benchmark range may indicate some problem with the sample, which may trigger reanalysis. Specifically, V-flagged data (where the surrogate spikes are outside the recovery ranges) are checked to ensure that the reported recoveries are not more than 5 percent outside the benchmarks.

10.2.7 Duplicate Sample Analysis

Field duplicates and a matrix spike duplicate (MSD) are used to check field and laboratory precision, respectively. Duplicate results are assessed using the RPD as described in Section 3.1.1.

A field duplicate RPD less than 50 percent is considered acceptable. Samples with a duplicate RPD greater than 50 percent are typically reanalyzed.

An RPD for the MS/MSD less than 40 percent is considered acceptable. When the MS/MSD RPD is greater than 40 percent, the need for reanalysis is discussed with the lab and their recommendation is typically followed.

10.2.8 Blank Assessment

The following method blank protocol was determined for this project:

- PCBs 77, 81, 114, 123, 126, and 169 - < 2pg per congener per sample
- PCBs 156,157, 167,189 - < 10 pg per congener per sample
- No congener > 50 pg / sample except for PCB 11 which has a limit of 150 pg/L
- Total PCBs < 450 pg/sample

This is based on a statistical analysis of Pacific Rim method blank total PCB results. The rinsate protocol has not been modified.

If blanks exceed these values, the samples in the batch are compared to the blank concentrations to determine which samples may need to be reanalyzed based on the high blank values. Sample concentrations are considered acceptable if they are greater than 10x the blank value on a per congener basis.

For PBDE blanks, there are no criteria, but outlier tests can provide context. If blank PBDE levels are flagged as high outliers, the sample set should be reviewed for any other unusual results to gauge whether reanalyses may be warranted. For PBDE, the BDE 100/99 ratio is another outlier exclusion test. A BDE 100/99 ratio greater than 1 is a signal that the sample results are unusual and that those samples are excluded from analysis.

10.2.9 Sample Reanalysis

Analysis of backup samples is determined on a case-by-case basis. Typically, reanalysis is completed when recommended by the lab and is strongly considered if there is a confluence of multiple QA/QC issues or flags. Reanalysis may be more important for samples or issues that have a management or permit implication, such as a high total PCB concentration.

During laboratory review of the data, Pacific Rim may identify problems requiring a reanalysis and request that the County provide back-up samples for this purpose. In this case, the lab does not typically provide the data from the initial analysis.

However, when the County receives data from the lab, the following issues may contribute to a decision to reanalyze a sample:

- If a sample result is unusual compared to previous results for that location
- If G-flagged data represent more than 5 percent of the total mass
- If a sample or batch has 13C-labeled compounds recoveries (V-flagged data) consistently more than 5 percent outside of the benchmark range
- If the RPD between a sample and duplicate is greater than 50 percent
- If a sample has a constituent concentration far higher than typical samples at the same location
- If PBDE sample has a ratio of BDE 100/99 greater than 1
- If PCB blank concentrations exceed criteria as specified in this QAPP
- If PCB or PBDE blank concentrations appear as high outliers.

If reanalysis is completed, the results are compared to the original sample results, if available. The original or reanalysis results may be discarded if there is a strong reason to question their validity. If there is not a strong reason to question the validity of either the original or backup sample, then the

results from the two analyses have historically been averaged; however, the County now simply reports both results in annual reports. If the reason for reanalysis was related to a problem with a blank, then the original results (with the contaminated blank) have typically been discarded and replaced by the new results. Both the original results and the results of the reanalysis will be provided in the annual BMP Plan if both are found to be valid. Data with serious QC deficiencies will not be included in the annual BMP Plan but can be provided on request. The BMP Plan will be uploaded to PARIS by August 1 each year as required.

10.3 Data Usability

Once the data have been reviewed, verified, and validated, project staff will determine if the data can be used for project goals such as assessment of toxics concentrations in the effluent that discharges to the Spokane River, and source tracking and identification within the collection system that delivers wastewater to the Facility.

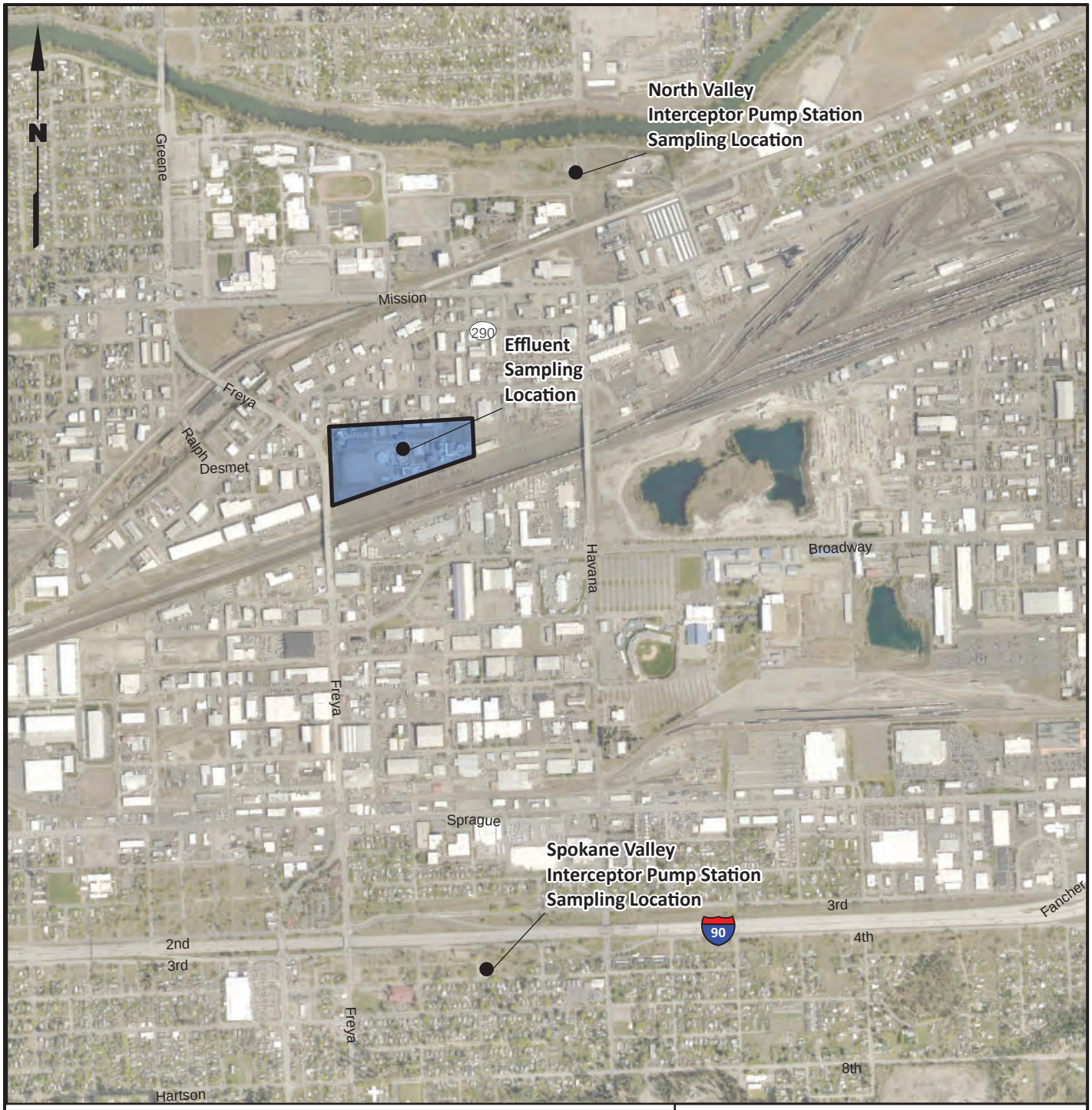
Throughout the sampling program, the County will evaluate the results to determine whether the sampling procedures should be adjusted. If the sampling procedures need substantial adjustment, the County will revise the QAPP accordingly. A revised QAPP will be submitted for Ecology review and approval prior to making significant changes in monitoring procedures.

11.0 REFERENCES

Ecology. 2022. National Pollutant Discharge Elimination System Waste Discharge Permit No. WA0093317. State of Washington Department of Ecology. August 1.

Ecology. 2016. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Publication No. 04-03-030. Washington State Department of Ecology. https://fortress.wa.gov/ecy/publications/summarypages/0403030.html. Revised December.

EPA. 2000. Final: Data Quality Objectives Process for Hazardous Waste Site Investigations. EPA QA/G-4 HW. EPA/600/R-00/007. US Environmental Protection Agency. https://www.epa.gov/sites/production/files/2015-07/documents/g4hw-final.pdf. January.



Legend

Spokane County Regional Wastewater Reclamation Facility

0 0.25 0.5

Miles

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery

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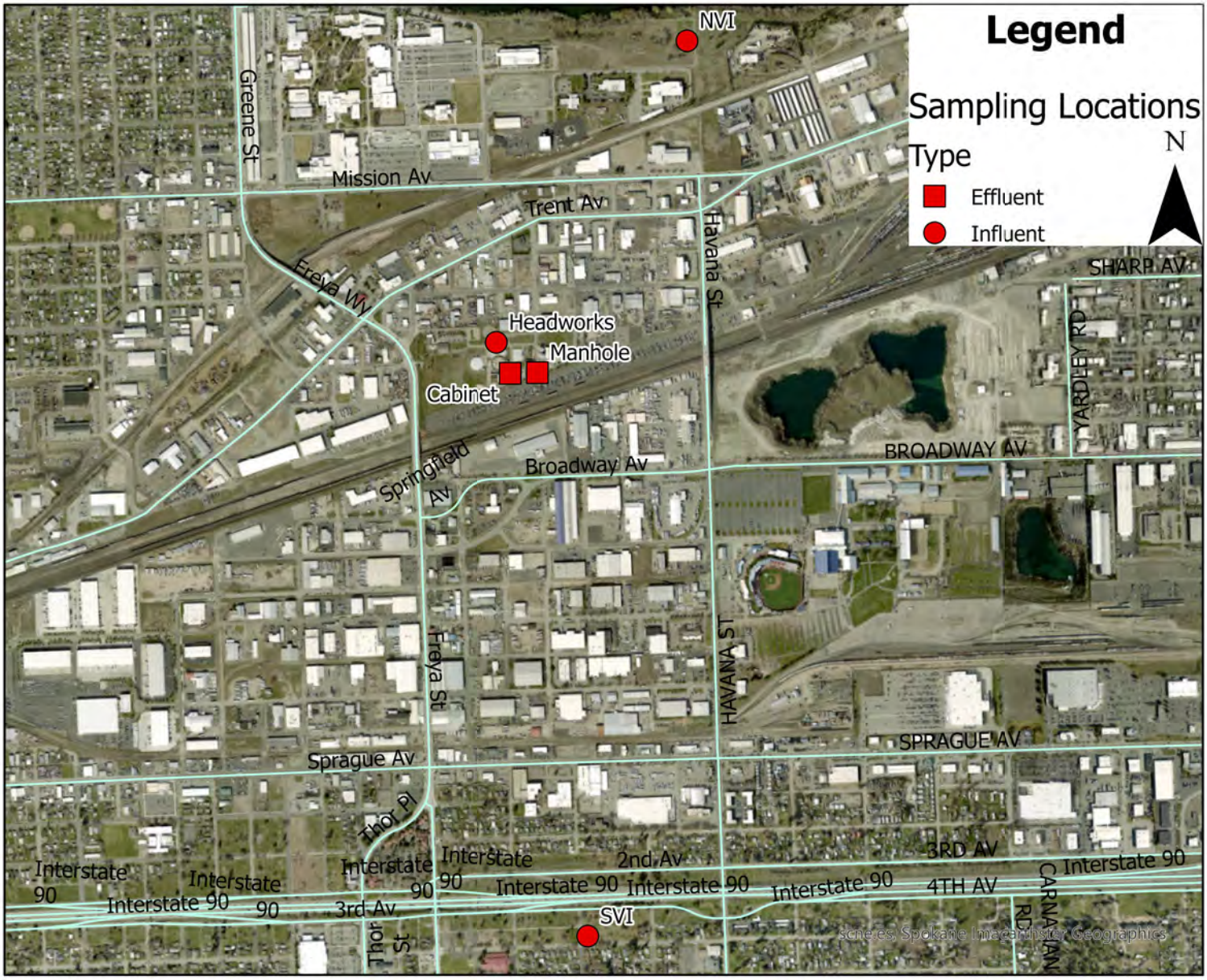
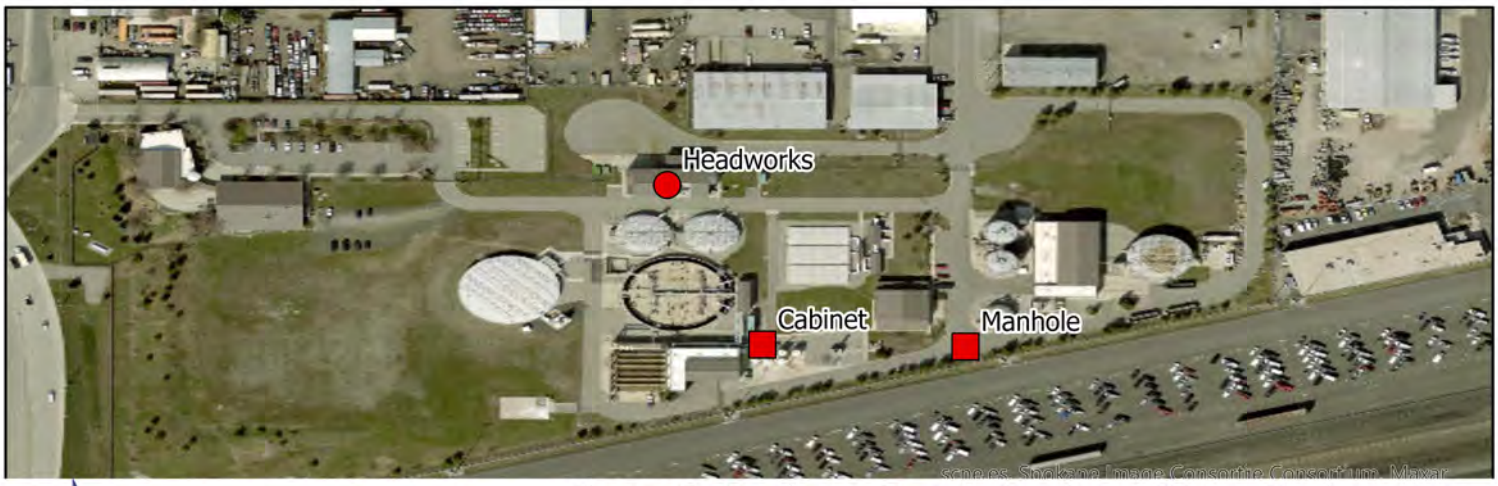
LANDAU ASSOCIATES

Spokane County Regional Wastewater Treatment Facilities Spokane, Washington	**Influent and Effluent Sampling Locations**	Figure 1





Spokane County
PUBLIC WORKS

Figure 2. Spokane County Regional Water Reclamation Facility Toxics Sampling
Updated Influent and Effluent Locations

Table A-1
Measurement Quality Objectives
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Frequency	Sampling or Analytical DQI
Aqueous Samples Analyzed for Polychlorinated Biphenyls by EPA 1668C				
Representativeness	Cooler Temperature	< 6°C	All project samples	S
Bias	Surrogates (13C-labeled compounds)	Recoveries within laboratory-specified control limits	All project and QA samples	A
Accuracy	MS/MSD	Recoveries within laboratory-specified control limits	One per analytical batch as required by method	A
Precision	MS/MSD	RPDs <40%	One per analytical batch as required by method	A
Method performance for matrix, bias	MS/MSD	Recoveries within laboratory-specified control limits	One per analytical batch as required by method	S&A
Precision	Field Duplicates	RPD <50%	One per sampling event for either 1668C or 1614	S&A
Bias/Contamination	Method Blank	See QAPP Section 10.0 Data Validation and Usability	One method blank per analytical batch	S&A
Completeness	Number of samples collected out of total number of planned samples	100%	NA	S&A
Completeness	Number of usable results out of total number of results	95%; more than 5% of a sample's total mass cannot have lock mass interference (G-flagged data)	NA	S&A

Table A-1
Measurement Quality Objectives
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Frequency	Sampling or Analytical DQI
Aqueous Samples Analyzed for Polybrominated Diphenyl Ethers by EPA 1614				
Representativeness	Cooler Temperature	< 6°C	All project samples	S
Bias	Surrogates (13C-labeled compounds)	Recoveries within laboratory-specified control limits	All project and QA samples	A
Accuracy	MS/MSD	Recoveries within laboratory-specified control limits	One per analytical batch as required by method	A
Precision	MS/MSD	RPDs <40%	One per analytical batch as required by method	A
Method performance for matrix, bias	MS/MSD	Recoveries within laboratory-specified control limits	One per analytical batch as required by method	S&A
Precision	Field Duplicates	RPD <50%	One per sampling event for either 1668C or 1614	S&A
Bias/Contamination	Method Blank	See QAPP Section 10.0 Data Validation and Usability	One method blank per analytical batch	S&A
Completeness	Number of samples collected out of total number of planned samples	100%	NA	S&A

Table A-1
Measurement Quality Objectives
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Frequency	Sampling or Analytical DQI
Aqueous Samples Analyzed for Total Suspended Solids by SM 2450				
Representativeness	Cooler Temperature	< 6°C	All project samples	S
Bias	LCS/LCSD	Recoveries within laboratory-specified control limits	All project and QA samples	A
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	One per analytical batch as required by method	A
Precision	LCS/LCSD and lab duplicate	RPDs within laboratory-specified control limits	One per analytical batch as required by method	A
Bias/Contamination	Method Blank	See QAPP Section 10.0 Data Validation and Usability	One method blank per analytical batch	S&A
Completeness	Number of samples collected out of total number of planned samples	100%	NA	S&A

Acronyms/Abbreviations:
A = Analytical
°C = degrees Celsius
DQI = data quality indicator
EPA = US Environmental Protection Agency
LCS = laboratory control spike
LCSD = laboratory control spike duplicate.
MS = matrix spike
MSD = matrix spike duplicate
NA = not applicable
RPD = relative percent difference
S = sampling
SM = Standard Methods

Table A-2
Sample Containers, Holding Times, and Preservatives
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

EPA/Laboratory Analytical Method	Sample Container	Minimum Volume	Preservative	Holding Time	Laboratory
Polychlorinated Biphenyls EPA 1668C/MLA-010 High Resolution GC/MS	Precleaned, proofed 1L glass bottle	1L for analysis plus 1L for backup volume	cool to <6 °C	One year	SGS AXYS
Brominated Diphenyl Ethers EPA 1614/MLA-033 High Resolution GC/MS	Precleaned, proofed 1L glass bottle	1L for analysis plus 1L for backup volume	cool to <6 °C	One year	SGS AXYS
Total Suspended Solids SM 2450	1L PVC bottle	1L for analysis	cool to <6 °C	7 days	Anatek

Acronyms/Abbreviations:
°C = degrees Celsius
GC/MS = gas chromatography/mass spectrometry
L = liter
SM = standard methods
EPA = US Environmental Protection Agency

Table A-3
Analytical Methods and Method Detection Limits
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

USEPA 1668C
TYPICAL DETECTION LIMITS, METHOD DETECTION LIMITS, LOW CALIBRATION LIMITS, AND REPORTING LIMITS for PCBs

EPA/SGS AXYS Method: US EPA 1668C/MLA-010
Instrument Type: High Resolution GC/MS
MDL Protocol: Federal Register 40 CFR Part 136, Appendix B Rev.1 (or * = MDLs determined according to Rev. 2, [2017])
Quantification: Multi-point calibration for toxic congeners and window defining compounds at each level of chlorination and single point calibration for other compounds, as per EPA Method 1668C protocol

Matrix	INFLUENT					WATER/EFFLUENT				
Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				
Analyte	Typical SDL	MDL *	LOQ	LMCL based on CS-1	RL[1]	Typical SDL	MDL *	LOQ	LMCL based on CS-1	RL[1]
CL1-PCB-1	1	15.7	30	20	0.5	0.4	6.28	10	8	0.2
CL1-PCB-2	1	9.3	30	20	0.5	0.4	3.7	10	8	0.2
CL1-PCB-3	1	12.0	30	20	0.5	0.4	4.78	10	8	0.2
CL2-PCB-4	2	25.6	30	20	0.5	0.8	10.2	10	8	0.2
CL2-PCB-5	2	11.3	30	20	0.5	0.8	4.50	10	8	0.2
CL2-PCB-6	2	9.0	30	20	0.5	0.8	3.6	10	8	0.2
CL2-PCB-7	2	132.3	146	20	0.5	0.8	52.92	58.2	8	0.2
CL2-PCB-8	2	31.4	35	20	0.5	0.8	12.5	14	8	0.2
CL2-PCB-9	2	5.5	30	20	0.5	0.8	2.2	10	8	0.2
CL2-PCB-10	2	7.6	30	20	0.5	0.8	3.0	10	8	0.2
CL2-PCB-11	2	55.8	61	20	0.5	0.8	22.3	25	8	0.2
CL2-PCB-12/13	2	12.8	30	20	0.5	0.8	5.12	10	8	0.2
CL2-PCB-14	2	9.8	30	20	0.5	0.8	3.9	10	8	0.2
CL2-PCB-15	2	12.8	30	20	0.5	0.8	5.12	10	8	0.2
CL3-PCB-16	1	11.2	30	20	0.5	0.4	4.49	10	8	0.2
CL3-PCB-17	1	12.7	30	20	0.5	0.4	5.06	10	8	0.2
CL3-PCB-19	1	11.6	30	20	0.5	0.4	4.63	10	8	0.2
CL3-PCB-21/33	1	13.4	30	20	0.5	0.4	5.38	10	8	0.2
CL3-PCB-22	1	9.7	30	20	0.5	0.4	3.9	10	8	0.2
CL3-PCB-23	1	8.3	30	20	0.5	0.4	3.3	10	8	0.2
Analyte	Typical SDL	MDL *	LOQ	LMCL based on CS-1	RL[1]	Typical SDL	MDL *	LOQ	LMCL based on CS-1	RL[1]
Matrix	INFLUENT					WATER/EFFLUENT				

Table A-3
Analytical Methods and Method Detection Limits
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				
CL3-PCB-24	1	7.2	30	20	0.5	0.4	2.9	10	8	0.2
CL3-PCB-25	1	6.3	30	20	0.5	0.4	2.5	10	8	0.2
CL3-PCB-26/29	1	6.3	30	20	0.5	0.4	2.5	10	8	0.2
CL3-PCB-27	1	6.6	30	20	0.5	0.4	2.6	10	8	0.2
CL3-PCB-28/20	1	30.8	34	20	0.5	0.4	12.3	14	8	0.2
CL3-PCB-30/18	1	32.3	35	20	0.5	0.4	12.9	14	8	0.2
CL3-PCB-31	1	19.0	30	20	0.5	0.4	7.58	10	8	0.2
CL3-PCB-32	1	7.1	30	20	0.5	0.4	2.8	10	8	0.2
CL3-PCB-34	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL3-PCB-35	1	6.7	30	20	0.5	0.4	2.7	10	8	0.2
CL3-PCB-36	1	5.8	30	20	0.5	0.4	2.3	10	8	0.2
CL3-PCB-37	1	8.6	30	20	0.5	0.4	3.4	10	8	0.2
CL3-PCB-38	1	4.3	30	20	0.5	0.4	1.7	10	8	0.2
CL3-PCB-39	1	5.0	30	20	0.5	0.4	2.0	10	8	0.2
CL4-PCB-41/40/71	1	13.9	30	20	0.5	0.4	5.55	10	8	0.2
CL4-PCB-42	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL4-PCB-43	1	12.4	30	20	0.5	0.4	4.97	10	8	0.2
CL4-PCB-44/47/65	1	67.5	74	20	0.5	0.4	27.0	30	8	0.2
CL4-PCB-45/51	1	12.2	30	20	0.5	0.4	4.86	10	8	0.2
CL4-PCB-46	1	5.6	30	20	0.5	0.4	2.3	10	8	0.2
CL4-PCB-48	1	6.9	30	20	0.5	0.4	2.8	10	8	0.2
CL4-PCB-50/53	1	5.6	30	20	0.5	0.4	2.3	10	8	0.2
CL4-PCB-52	1	23.9	30	20	0.5	0.4	9.56	10	8	0.2
CL4-PCB-54	1	8.8	30	20	0.5	0.4	3.5	10	8	0.2
CL4-PCB-55	1	6.1	30	20	0.5	0.4	2.4	10	8	0.2
CL4-PCB-56	1	7.6	30	20	0.5	0.4	3.0	10	8	0.2
CL4-PCB-57	1	5.0	30	20	0.5	0.4	2.0	10	8	0.2
CL4-PCB-58	1	7.3	30	20	0.5	0.4	2.9	10	8	0.2
Analyte	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**
Matrix	**INFLUENT**					**WATER/EFFLUENT**				
Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				

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CL4-PCB-59/62/75	1	5.9	30	20	0.5	0.4	2.3	10	8	0.2
CL4-PCB-60	1	5.5	30	20	0.5	0.4	2.2	10	8	0.2
CL4-PCB-61/70/74/76	1	18.8	30	20	0.5	0.4	7.54	10	8	0.2
CL4-PCB-63	1	6.1	30	20	0.5	0.4	2.4	10	8	0.2
CL4-PCB-64	1	10.3	30	20	0.5	0.4	4.10	10	8	0.2
CL4-PCB-66	1	10.4	30	20	0.5	0.4	4.16	10	8	0.2
CL4-PCB-67	1	8.8	30	20	0.5	0.4	3.5	10	8	0.2
CL4-PCB-68	1	10.6	30	20	0.5	0.4	4.23	10	8	0.2
CL4-PCB-69/49	1	10.7	30	20	0.5	0.4	4.27	10	8	0.2
CL4-PCB-72	1	5.9	30	20	0.5	0.4	2.4	10	8	0.2
CL4-PCB-73	1	6.3	30	20	0.5	0.4	2.5	10	8	0.2
CL4-PCB-77	1	6.1	30	20	0.5	0.4	2.4	10	8	0.2
CL4-PCB-78	1	5.9	30	20	0.5	0.4	2.4	10	8	0.2
CL4-PCB-79	1	4.7	30	20	0.5	0.4	1.9	10	8	0.2
CL4-PCB-80	1	5.2	30	20	0.5	0.4	2.1	10	8	0.2
CL4-PCB-81	1	6.2	30	20	0.5	0.4	2.5	10	8	0.2
CL5-PCB-82	1	6.3	30	20	0.5	0.4	2.5	10	8	0.2
CL5-PCB-83/99	1	18.6	30	20	0.5	0.4	7.45	10	8	0.2
CL5-PCB-84	1	5.6	30	20	0.5	0.4	2.2	10	8	0.2
CL5-PCB-88/91	1	5.6	30	20	0.5	0.4	2.2	10	8	0.2
CL5-PCB-89	1	4.2	30	20	0.5	0.4	1.7	10	8	0.2
CL5-PCB-92	1	7.9	30	20	0.5	0.4	3.2	10	8	0.2
CL5-PCB-94	1	5.8	30	20	0.5	0.4	2.3	10	8	0.2
CL5-PCB-95/100/93/102/98	1	21.9	30	20	0.5	0.4	8.77	10	8	0.2
CL5-PCB-96	1	5.0	30	20	0.5	0.4	2.0	10	8	0.2
CL5-PCB-103	1	4.0	30	20	0.5	0.4	1.6	10	8	0.2
CL5-PCB-104	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL5-PCB-105	1	9.8	30	20	0.5	0.4	3.9	10	8	0.2
Analyte	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**
Matrix	**INFLUENT**					**WATER/EFFLUENT**				
Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				
CL5-PCB-106	1	6.9	30	20	0.5	0.4	2.8	10	8	0.2
CL5-PCB-108/124	1	4.8	30	20	0.5	0.4	1.9	10	8	0.2

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CL5-PCB-109/119/86/97/125/87	1	19.0	30	20	0.5	0.4	7.62	10	8	0.2
CL5-PCB-107	1	4.8	30	20	0.5	0.4	1.9	10	8	0.2
CL5-PCB-110/115	1	23.4	30	20	0.5	0.4	9.36	10	8	0.2
CL5-PCB-111	1	8.0	30	20	0.5	0.4	3.2	10	8	0.2
CL5-PCB-112	1	5.8	30	20	0.5	0.4	2.3	10	8	0.2
CL5-PCB-113/90/101	1	15.0	30	20	0.5	0.4	6.01	10	8	0.2
CL5-PCB-114	1	7.6	30	20	0.5	0.4	3.0	10	8	0.2
CL5-PCB-117/116/85	1	9.3	30	20	0.5	0.4	3.7	10	8	0.2
CL5-PCB-118	1	25.1	30	20	0.5	0.4	10.1	10	8	0.2
CL5-PCB-120	1	6.2	30	20	0.5	0.4	2.5	10	8	0.2
CL5-PCB-121	1	4.2	30	20	0.5	0.4	1.7	10	8	0.2
CL5-PCB-122	1	13.0	30	20	0.5	0.4	5.20	10	8	0.2
CL5-PCB-123	1	7.6	30	20	0.5	0.4	3.0	10	8	0.2
CL5-PCB-126	1	7.8	30	20	0.5	0.4	3.1	10	8	0.2
CL5-PCB-127	1	7.0	30	20	0.5	0.4	2.8	10	8	0.2
CL6-PCB-128/166	1	5.7	30	20	0.5	0.4	2.3	10	8	0.2
CL6-PCB-130	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL6-PCB-131	1	5.6	30	20	0.5	0.4	2.2	10	8	0.2
CL6-PCB-132	1	8.7	30	20	0.5	0.4	3.5	10	8	0.2
CL6-PCB-133	1	12.9	30	20	0.5	0.4	5.14	10	8	0.2
CL6-PCB-134/143	1	7.3	30	20	0.5	0.4	2.9	10	8	0.2
CL6-PCB-136	1	5.6	30	20	0.5	0.4	2.2	10	8	0.2
CL6-PCB-137	1	8.0	30	20	0.5	0.4	3.2	10	8	0.2
CL6-PCB-138/163/129/160	1	17.5	59.459444	20	0.5	0.4	6.98	23.783778	8	0.2
CL6-PCB-139/140	1	5.6	30	20	0.5	0.4	2.2	10	8	0.2
CL6-PCB-141	1	8.0	30	20	0.5	0.4	3.2	10	8	0.2
Analyte	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**
Matrix	**INFLUENT**					**WATER/EFFLUENT**				
Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				
CL6-PCB-142	1	8.4	30	20	0.5	0.4	3.4	10	8	0.2
CL6-PCB-144	1	7.3	30	20	0.5	0.4	2.9	10	8	0.2
CL6-PCB-145	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL6-PCB-146	1	18.2	30	20	0.5	0.4	7.27	10	8	0.2

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CL6-PCB-147/149	1	11.8	30	20	0.5	0.4	4.73	10	8	0.2
CL6-PCB-148	1	6.0	30	20	0.5	0.4	2.4	10	8	0.2
CL6-PCB-150	1	6.6	30	20	0.5	0.4	2.7	10	8	0.2
CL6-PCB-151/135/154	1	8.1	30	20	0.5	0.4	3.2	10	8	0.2
CL6-PCB-152	1	6.2	30	20	0.5	0.4	2.5	10	8	0.2
CL6-PCB-153/168	1	15.4	60.0248	20	0.5	0.4	6.17	24.0099	8	0.2
CL6-PCB-155	1	8.4	30	20	0.5	0.4	3.4	10	8	0.2
CL6-PCB-156/157	1	7.8	30	40	0.5	0.4	3.1	10	16	0.2
CL6-PCB-158	1	5.4	30	20	0.5	0.4	2.2	10	8	0.2
CL6-PCB-159	1	6.1	30	20	0.5	0.4	2.5	10	8	0.2
CL6-PCB-161	1	7.5	30	20	0.5	0.4	3.0	10	8	0.2
CL6-PCB-162	1	6.0	30	20	0.5	0.4	2.4	10	8	0.2
CL6-PCB-164	1	9.1	30	20	0.5	0.4	3.6	10	8	0.2
CL6-PCB-165	1	7.3	30	20	0.5	0.4	2.9	10	8	0.2
CL6-PCB-167	z	8.1	30	20	0.5	0.4	3.2	10	8	0.2
CL6-PCB-169	1	10.3	30	20	0.5	0.4	4.11	10	8	0.2
CL7-PCB-170	1	16.2	30	20	0.5	0.4	6.47	10	8	0.2
CL7-PCB-171/173	1	8.0	30	20	0.5	0.4	3.2	10	8	0.2
CL7-PCB-172	1	9.9	30	20	0.5	0.4	4.0	10	8	0.2
CL7-PCB-174	1	7.7	30	20	0.5	0.4	3.1	10	8	0.2
CL7-PCB-175	1	7.3	30	20	0.5	0.4	2.9	10	8	0.2
CL7-PCB-176	1	6.8	30	20	0.5	0.4	2.7	10	8	0.2
CL7-PCB-177	1	10.7	30	20	0.5	0.4	4.27	10	8	0.2
CL7-PCB-178	1	7.0	30	20	0.5	0.4	2.8	10	8	0.2
Analyte	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**	**Typical SDL**	**MDL ***	**LOQ**	**LMCL based on CS-1**	**RL[1]**
Matrix	**INFLUENT**					**WATER/EFFLUENT**				
Units/Sample Size	pg/L based on 1 L sample					pg/g based on 2.5 L sample				
Default Extract Volume	20uL					20uL				
CL7-PCB-179	1	8.4	30	20	0.5	0.4	3.3	10	8	0.2
CL7-PCB-180/193	1	40.6	45	20	0.5	0.4	16.2	18	8	0.2
CL7-PCB-181	1	6.5	30	20	0.5	0.4	2.6	10	8	0.2
CL7-PCB-182	1	7.2	30	20	0.5	0.4	2.9	10	8	0.2
CL7-PCB-183/185	1	15.1	30	20	0.5	0.4	6.04	10	8	0.2
CL7-PCB-184	1	6.3	30	20	0.5	0.4	2.5	10	8	0.2

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CL7-PCB-186	1	8.5	30	20	0.5	0.4	3.4	10	8	0.2
CL7-PCB-187	1	13.3	30	20	0.5	0.4	5.33	10	8	0.2
CL7-PCB-188	1	7.5	30	20	0.5	0.4	3.0	10	8	0.2
CL7-PCB-189	1	5.5	30	20	0.5	0.4	2.2	10	8	0.2
CL7-PCB-190	1	7.2	30	20	0.5	0.4	2.9	10	8	0.2
CL7-PCB-191	1	5.9	30	20	0.5	0.4	2.3	10	8	0.2
CL7-PCB-192	1	6.2	30	20	0.5	0.4	2.5	10	8	0.2
CL8-PCB-194	1	15.2	30	20	0.5	0.4	6.10	10	8	0.2
CL8-PCB-195	1	7.1	30	20	0.5	0.4	2.8	10	8	0.2
CL8-PCB-196	1	8.2	30	20	0.5	0.4	3.3	10	8	0.2
CL8-PCB-197/200	1	5.2	30	20	0.5	0.4	2.1	10	8	0.2
CL8-PCB-198/199	1	9.0	30	20	0.5	0.4	3.6	10	8	0.2
CL8-PCB-201	1	7.7	30	20	0.5	0.4	3.1	10	8	0.2
CL8-PCB-202	1	15.2	30	20	0.5	0.4	6.09	10	8	0.2
CL8-PCB-203	1	16.5	30	20	0.5	0.4	6.60	10	8	0.2
CL8-PCB-204	1	4.7	30	20	0.5	0.4	1.9	10	8	0.2
CL8-PCB-205	1	5.2	30	20	0.5	0.4	2.1	10	8	0.2
CL9-PCB-206	1	6.7	30	20	0.5	0.4	2.7	10	8	0.2
CL9-PCB-207	1	8.0	30	20	0.5	0.4	3.2	10	8	0.2
CL9-PCB-208	1	5.1	30	20	0.5	0.4	2.0	10	8	0.2
CL10-PCB-209	1	7.7	30	20	0.5	0.4	3.1	10	8	0.2

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Aroclor Equivalent Values [2]

Matrix	**WATER/EFFLUENT**	**WATER/EFFLUENT**
Units/Sample Size	pg/L based on 1 L sample	pg/g based on 2.5 L sample
Analyte	**MDL*,**[3]	**MDL*,3**
Aroclor 1016	157	63.0
Aroclor 1221	68	27
Aroclor 1232	167	66.7
Aroclor 1242	175	70.0
Aroclor 1248	430	170
Aroclor 1254	261	104
Aroclor 1260	231	92.5
Aroclor 1262	245	98.0
Aroclor 1268	20	8

Notes: [1] Reporting Limit (RL) is the lowest concentration routinely reported for the method.
RLs are set to minimize potential for false positive detection or the requirement to qualify
results very close to detection limit and in some cases may exceed the sample specific detection limit (SDL) achieved.

[2] PCB Aroclor equivalent values are derived from a suite of PCB congener marker compounds.
These are summed and an empirical factor is applied.

[3] Arocolor MDLs determined statistically in accordance with EPA Fed. Reg. 40 CFR Part 136 Appendix B
from replicate low level spikes of PCB congeners.

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TYPICAL DETECTION LIMITS, METHOD DETECTION LIMITS, LOW CALIBRATION LIMITS, AND LOWER REPORTING LIMITS for PBDEs by GC/HRMS

EPA/SGS AXYS Method: US EPA 1614/MLA-033
Instrument Type: High Resolution GC/MS
MDL Protocol: Federal Register 40 CFR Part 136, Appendix B Rev.1
Quantification: Multi-point calibration for toxic congeners and window defining compounds at each level of chlorination and single point calibration for other compounds, as per EPA Method 1614A protocol.

Matrix	WATER/EFFLUENT				INFLUENT		
Units/Sample Size	pg/L based on 1L sample				pg/L based on 0.250L sample		
Default Extract Volume	50uL				50uL		
Analyte	Typical SDL	MDL	LMCL based on Low Cal.	RL[3]	Typical SDL	Estimated MDL	LMCL based on Low Cal.
BR2-DPE-7	10	8.8	50	1	40	35.2	200
BR2-DPE-8/11	10	10.5	50	1	40	41.9	200
BR2-DPE-10	10	5.4	50	1	40	21.6	200
BR2-DPE-12/13	10	17.0	50	1	40	67.9	200
BR2-DPE-15	10	5.5	50	1	40	22.2	200
BR3-DPE-17/25	10	12.7	50	1	40	50.7	200
BR3-DPE-28/33	10	9.2	50	1	40	36.9	200
BR3-DPE-30	10	9.6	50	1	40	38.4	200
BR3-DPE-32	10	5.5	50	1	40	21.9	200
BR3-DPE-35	10	9.7	50	1	40	38.8	200
BR3-DPE-37	10	5.5	50	1	40	21.9	200
BR4-DPE-47	10	16.5	50	1	40	66.1	200
BR4-DPE-49	10	7.3	50	1	40	29.2	200
BR4-DPE-51	10	4.8	50	1	40	19.2	200
BR4-DPE-66	10	4.7	50	1	40	19.0	200
BR4-DPE-71	10	6.2	50	1	40	24.6	200
BR4-DPE-75	10	7.8	50	1	40	31.1	200
BR4-DPE-77	10	5.6	50	1	40	22.6	200
BR4-DPE-79	10	6.7	50	1	40	26.9	200

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Matrix	WATER/EFFLUENT				INFLUENT		
Units/Sample Size	pg/L based on 1L sample				pg/L based on 0.250L sample		
Default Extract Volume	50uL				50uL		
Analyte	Typical SDL	MDL	LMCL based on Low Cal.	RL[3]	Typical SDL	Estimated MDL	LMCL based on Low Cal.
Matrix	WATER/EFFLUENT				INFLUENT		
Units/Sample Size	pg/L based on 1L sample				pg/L based on 0.250L sample		
Default Extract Volume	50uL				50uL		
Analyte	Typical SDL	MDL	LMCL based on Low Cal.	RL[3]	Typical SDL	Estimated MDL	LMCL based on Low Cal.
BR5-DPE-85	10	6.2	50	1	40	24.7	200
BR5-DPE-99	10	18.6	50	1	40	74.3	200
BR5-DPE-100	10	6.6	50	1	40	26.6	200
BR5-DPE-105	10	8.2	50	1	40	32.6	200
BR5-DPE-116	10	14.9	50	1	40	59.6	200
BR5-DPE-119/120	10	4.6	50	1	40	18.4	200
BR5-DPE-126	10	4.0	50	1	40	16.2	200
BR6-DPE-128	10	9.8	50	1	40	39.3	200
BR6-DPE-138/166	10	8.9	50	1	40	35.4	200
BR6-DPE-140	10	10.0	50	1	40	40.1	200
BR6-DPE-153	10	6.7	50	1	40	26.8	200
BR6-DPE-154	10	8.3	50	1	40	33.1	200
BR6-DPE-155	10	5.3	50	1	40	21.1	200
BR7-DPE-181	20	8.5	50	1	80	33.9	200
BR7-DPE-183	20	7.7	50	1	80	30.9	200
BR7-DPE-190	20	10.1	50	1	80	40.4	200
BR8-DPE-203	20	14.9	50	1	80	59.7	200
BR9-DPE-206 [2]	100	100 [1]	50	1	400	400 [1]	200
BR9-DPE-207 [2]	100	100 [1]	50	1	400	400 [1]	200
BR9-DPE-208 [2]	100	100 [1]	50	1	400	400 [1]	200
BR10-DPE-209	200	569	500	1	800	2276	2000

Table A-3
Analytical Methods and Method Detection Limits
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

Matrix	WATER/EFFLUENT				INFLUENT		
Units/Sample Size	pg/L based on 1L sample				pg/L based on 0.250L sample		
Default Extract Volume	50uL				50uL		
Analyte	Typical SDL	MDL	LMCL based on Low Cal.	RL[3]	Typical SDL	Estimated MDL	LMCL based on Low Cal.

Additional Brominated Flame Retardants

Matrix	WATER/EFFLUENT	INFLUENT
Units/Sample Size	pg/L based on 1L sample	pg/L based on 0.250L sample
Analyte	Typical SDL	Typical SDL
Pentabromoethylbenzene (PBEB)	3	12
Hexabromobenzene (HBB)	15	60
1,2-Bis(2,4,6-tribromophenoxy)ethane (BTBPE)	300	1200
Decabromodiphenylethane (DBDPE)	5000	20000

Notes: [1] MDLs are estimated based on comparable solids/tissue study data
[2] Concentration of compound is an estimated maximum value as it may originate from BR10-DPE-209 breakdown.
[3] Reporting Limit (RL) is the lowest concentration routinely reported for the method. RLs are set to minimize potential for false positive detection or the requirement to qualify results very close to detection limit and in some cases may exceed the sample specific detection limit (SDL) achieved.

Table A-3
Analytical Methods and Method Detection Limits
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

NOTES:

Sample Detection limits (SDL) provided are for demonstration purposes only.

1) This document is uncontrolled if printed

2) Controlled hardcopies may not be photocopied. Electronic copies anywhere other than the Q-Pulse Current Document Register are uncontrolled. Currency of uncontrolled documents must be verified against the controlled electronic copy.

DEFINITIONS:

Method Detection Limit (MDL) - determined as specified by EPA Fed. Reg. 40 CFR Part 136 Appendix B (Rev.1 or Rev.2, as documented for each method/matrix). MDL is determined as required based on accreditation, contract and workload requirements**. The MDL determination is a general demonstration of method detection limit. It is performed at a particular time, using a set of sample prepared using clean matrix, and may not account for all matrix effects encountered in environmental samples.**

Sample Detection Limit (SDL) – determined by converting the area equivalent of 3.0 times (2.5 times for EPA 1600 series methods) the estimated chromatographic noise height to a concentration in the same manner that target peak responses are converted to final concentrations. Determined individually for every sample analysis run. The SDL accounts for any effect of matrix on the detection system and for recovery achieved through the analytical work-up. It does not account for any lab background input.

US DoD Detection Limit (DL) (only applied to work under US DoD accreditation) - the detection limit applicable when target compounds are detected, must be greater than the method MDL

US DoD Limit of Detection (LOD) (only applied to work under US DoD accreditation) - the detection limit reported when target compounds are not detected, 2-4 times higher than the US DoD DL

Reporting Limit (RL) – the lowest concentration value that AXYS routinely reports for the method. AXYS defines RLs for LC analyses as equal to the greater of lowest calibration standard or the SDL. For GC methods, RLs are equal to the SDL, or a value greater than the SDL determined to meet client needs.

Lower Method Calibration Limit (LMCL) - determined by prorating the concentration of the lowest calibration limit for sample size and extract volume. The following equation is used. ((lowest level cal conc.) x (extract volume))/sample size

Quantification by Multi-level Calibration (Constant RRF or Regression)- A multi-point calibration series (linearity) is analyzed at a frequency that is determined by the method. Prior to analyzing samples, the mid-point calibration standard (CALVER) is analyzed. If the CALVER meets method acceptance criteria, demonstrating that the instrument is in a state of control, Relative Response Factors (RRFs) from the linearity are used for quantification. Quantification by linearity is appropriate for analyses where analytes are not comprised of mixtures or patterns and where there is not a large disparity in abundance of compounds.

Table A-3
Analytical Methods and Method Detection Limits
Toxics QAPP
Spokane County Regional Water Reclamation Facility
Spokane, Washington

Quantification by Single Level Bracketing Calibration - Bracketing calibration uses RRFs that are generated from analyzing a calibration standard immediately before the sample is run and confirmed immediately afterwards. These two must be within +/- 20% and the mean RRF of these two is used to quantify the analytes. A sensitivity calibration is also analyzed to ensure sensitivity of the instrument. Bracketing calibration quantification produces data with increased accuracy at a sample and batch level. Bracketing calibration quantification is appropriate for methods where analytes are comprised of patterns and for tests where there is a disparity in the abundance of compounds, such as sterols and hormones, as it allows for better control of analytes. A linearity has limited applicability for tests which are comprised of patterns or mixtures such as PAHs, Alkylphenols, Toxaphene and Naphthenic Acids, because the lower calibration standards will lose response of the minor peaks from the pattern.

Limit of Quantification (LOQ) - LOQ is the lowest concentration, at or above the LMCL, at which test accuracy (precision and bias) has been demonstrated. LOQs are established by analysis of replicate low level spiked samples of clean matrix. Alternatively, for tests not subject to NELAP/TNI or US DOD accreditation, LOQ may be defined as equal to the LMCL.

For NELAP/TNI and DoD accredited tests LOQs are verified quarterly or for each analysis batch on a schedule managed by the laboratory. The precision and bias of the method at the LOQ is included in data packages under DoD accreditation; for any other work the precision and bias at the LOQ is made available to clients and reported in data packages upon request.

Concentration results reported below the LOQ are flagged to denote increased quantitative uncertainty for work subject to NELAP/TNI or US DoD accreditation, or when requested by the client.

ATTACHMENT 1

List of Abbreviations and Acronyms, General Terms Glossary, Quality Assurance Glossary, and Units of Measure

LIST OF ABBREVIATIONS AND ACRONYMS

Anatek	Anatek Labs, Inc.
AXYS	SGS AXYS
BMP Plan	Best Management Practices Plan
°C	Celsius
COC	chain-of-custody
County	Spokane County
DQOs	data quality objectives
Ecology	Washington State Department of Ecology
EDD	electronic data deliverables
EIM	Environmental Information Management
Facility; SCRWRF	Spokane County Regional Water Reclamation Facility
Jacobs	Jacobs Engineering
L	liter
Landau	Landau Associates, Inc.
LCS	laboratory control sample
LCSDs	laboratory control sample duplicates
MDLs	method detection limits
MQOs	measurement quality objectives
MS	matrix spike
MSDs	matrix spike duplicates
NPDES	National Pollutant Discharge Elimination System
NVIPS	North Valley Interceptor pump stations
PBDEs	polybrominated diphenyl ethers
PCBs	polychlorinated biphenyls
PDF	Portable Document Format
pg/L	picograms per liter
PVC	polyvinyl chloride
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RLs	reporting limits
RPD	relative percent difference
SOPs	Standard Operating Procedures
SRRTTF	Spokane River Regional Toxics Task Force
SVIPS	Spokane Valley Interceptor pump stations
TSS	total suspended solids

GENERAL TERMS GLOSSARY

Aliquot: A portion of a time-weighted composite sample placed in a separate container after sample collection.

Headworks: The location where the two wastewater influent trunk lines (NVIPS and SVIPS) meet at the SCRWRF.

Interceptor Pump Station: Location where wastewater influent is pumped through trunk lines to the SCRWRF.

PCB Congener: Any single, unique, well-defined chemical compound in the PCB category as defined by the EPA.

Sewershed: The community area which discharges municipal wastewater to, and is served by, the SCRWRF.

Source Tracking: Locate the source of toxics entering wastewater influent.

Time-weighted Composite Sample: A sample which consists of equal volumes of discrete sample material collected at a constant time interval into a single container.

Toxics: Toxic substances; specifically, PCBs and PBDE in the context of this QAPP.

Wastewater Effluent (Effluent): Treated municipal wastewater flowing out from the SCRWRF which discharges to the Spokane River.

Wastewater Influent (Influent): Untreated municipal wastewater flowing into the SCRWRF.

Reference:

EPA. 2023. Web Page : Learn about Polychlorinated Biphenyls. US Environmental Protection Agency. https://www.epa.gov/pcbs/learn-about-polychlorinated-biphenyls#:~:text=A%20PCB%20congener%20is%20any,the%20position%20of%20each%20chlorine.

QUALITY ASSURANCE GLOSSARY

Accuracy: The degree to which a measured value agrees with the true value of the measured property. Accuracy is a combination of precision and bias in that it represents the degree to which a measured value represents the known value (Ecology 2016).

Analyte: An element, ion, compound, or chemical moiety (pH, alkalinity) which is to be determined. The definition can be expanded to include organisms (e.g., fecal coliform, Klebsiella) (Kammin 2010).

Bias: The difference between the population mean and the true value. Bias usually describes a systematic difference reproducible over time, and is characteristic of both the measurement system, and the analyte(s) being measured. Bias is a commonly used data quality indicator (DQI) (Kammin 2010; Ecology 2004).

Blank: A synthetic sample, free of the analyte(s) of interest. For example, in-water analysis pure water is used for the blank. In chemical analysis, a blank is used to estimate the analytical response to all factors other than the analyte in the sample. In general, blanks are used to assess possible contamination or inadvertent introduction of analyte during various stages of the sampling and analytical process (USGS 1998).

Calibration: The process of establishing the relationship between the response of a measurement system and the concentration of the parameter being measured (Ecology 2004).

Check standard: A substance or reference material obtained from a source independent from the source of the calibration standard; used to assess bias for an analytical method. Check standards (also known as laboratory control standards) contain a known amount of an analyte and indicate bias due to sample preparation or calibration. See Calibration Verification Standards, Lab Control Samples (LCS), Certified Reference Materials (CRM), and/or spiked blanks. These are all check standards but should be referred to by their actual designator (e.g., CRM, LCS). (Kammin 2010; Ecology 2004)

Comparability: The degree to which different methods, data sets, and/or decisions agree or can be represented as similar; a data quality indicator (USEPA 1997).

Completeness: The amount of valid data obtained from a project compared to the planned amount. Usually expressed as a percentage; a DQI (USEPA 1997).

Data Quality Indicators: Commonly used measures of acceptability for environmental data. The principal DQIs are precision, bias, representativeness, comparability, completeness, sensitivity, and integrity (USEPA 2006).

Data Quality Objectives (DQOs): Qualitative and quantitative statements derived from systematic planning processes that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions (USEPA 2006).

Data set: A grouping of samples organized by date, time, analyte, etc. (Kammin 2010).

Data verification: Examination of a data set for errors or omissions, and assessment of the DQIs related to that data set for compliance with acceptance criteria (Measurement Quality Objectives [MQOs]). Verification is a detailed quality review of a data set (Ecology 2004).

Detection limit (limit of detection): The concentration or amount of an analyte which can be determined to a specified level of certainty to be greater than zero (Ecology 2004).

Duplicate samples: Two samples taken from and representative of the same population and carried through the steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variability of all method activities including sampling and analysis (USEPA 1997).

Laboratory Control Sample (LCS): A sample of known composition prepared using contaminant-free water or an inert solid that is spiked with analytes of interest at the midpoint of the calibration curve or at the level of concern. It is prepared and analyzed in the same batch of regular samples using the same sample preparation method, reagents, and analytical methods employed for regular samples (USEPA 1997).

Matrix spike: A Quality Control (QC) sample prepared by adding a known amount of the target analyte(s) to an aliquot of a sample to check for bias due to interference or matrix effects (Ecology 2004).

Measurement Quality Objectives (MQOs): Performance or acceptance criteria for individual DQIs, usually including precision, bias, sensitivity, completeness, comparability, and representativeness (USEPA 2006).

Measurement result: A value obtained by performing the procedure described in a method (Ecology, 2004).

Method: A formalized group of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, and data analysis), systematically presented in the order in which they are to be executed (EPA 1997).

Method blank: A blank prepared to represent the sample matrix, prepared and analyzed with a batch of samples. A method blank will contain all reagents used in the preparation of a sample; the same preparation process is used for the method blank and samples (Ecology 2004; Kammin 2010).

Method Detection Limit (MDL): This definition for detection was first formally advanced in 40 Code of Federal Regulations (CFR) 136, October 26, 1984 edition. MDL is defined there as the minimum concentration of an analyte that, in a given matrix and with a specific method, has a 99 percent probability of being identified and reported to be greater than zero (Federal Register, October 26, 1984).

Parameter: A specified characteristic of a population or sample. Also, an analyte or grouping of analytes. Benzene and nitrate + nitrite are all “parameters” (Kammin 2010; Ecology 2004).

Population: The hypothetical set of all possible observations of the type being investigated (Ecology 2004).

Precision: The extent of random variability among replicate measurements of the same property; a DQI (USGS 1998).

Quality Assurance (QA): A set of activities designed to establish and document the reliability and usability of measurement data (Kammin 2010).

Quality Assurance Project Plan (QAPP): A document that describes the objectives of a project and the processes and activities necessary to develop data that will support those objectives (Kammin 2010; Ecology 2004).

Quality Control (QC): The routine application of measurement and statistical procedures to assess the accuracy of measurement data (Ecology 2004).

Relative Percent Difference (RPD): RPD is commonly used to evaluate precision. The following formula is used:

$$[Abs(a-b)/((a + b)/2)] * 100$$

where "Abs()" is absolute value and a and b are results for the two replicate samples. RPD can be used only with two values.

Representativeness: The degree to which a sample reflects the population from which it is taken; a DQI (USGS 1998).

Sample (field): A portion of a population (environmental entity) that is measured and assumed to represent the entire population (USGS 1998).

Sensitivity: In general, denotes the rate at which the analytical response (e.g., absorbance, volume, and meter reading) varies with the concentration of the parameter being determined. In a specialized sense, it has the same meaning as the detection limit (Ecology 2004).

Spiked sample: A sample prepared by adding a known mass of target analyte(s) to a specified amount of matrix sample for which an independent estimate of target analyte(s) concentration is available. Spiked samples can be used to determine the effect of the matrix on a method's recovery efficiency (USEPA 1997).

Standard Operating Procedure (SOP): A document which describes in detail a reproducible and repeatable organized activity (Kammin 2010).

Surrogate: For environmental chemistry, a surrogate is a substance with properties similar to those of the target analyte(s). Surrogates are unlikely to be native to environmental samples. They are added to environmental samples for QC purposes, to track extraction efficiency, and/or measure analyte recovery. Deuterated organic compounds are examples of surrogates commonly used in organic compound analysis (Kammin 2010).

References:

Ecology, 2004. Guidance for the Preparation of Quality Assurance Project Plans for Environmental Studies. https://fortress.wa.gov/ecy/publications/SummaryPages/0403030.html

Kammin, B., 2010. Definition developed or extensively edited by William Kammin, 2010. Washington State Department of Ecology, Olympia, WA.

USEPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4. U.S. Environmental Protection Agency. http://www.epa.gov/quality/qs-docs/g4-final.pdf

USEPA, 1997. Glossary of Quality Assurance Terms and Related Acronyms. U.S. Environmental Protection Agency. http://www.ecy.wa.gov/programs/eap/quality.html

USGS, 1998. Principles and Practices for Quality Assurance and Quality Control. Open-File Report 98-636. U.S. Geological Survey. http://ma.water.usgs.gov/fhwa/products/ofr98-636.pdf

UNITS OF MEASURE

^{o}C: Degrees Celsius

L: Liter

pg/L: picograms per liter

ATTACHMENT 2

Influent/Effluent Sampling Procedures

SPOKANE COUNTY INFLUENT/EFFLUENT SAMPLING PROCEDURES

Spokane County Regional Water Reclamation Facility
Spokane, Washington

February 25, 2025

Prepared for

Spokane County
1004 North Freya Street
Spokane, Washington

SPOKANE

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ATTACHMENT

Attachment	Title
1	Work Location Personnel Protection and Safety Evaluation Form

LIST OF ABBREVIATIONS AND ACRONYMS

Anatek	Anatek Laboratories
County	Spokane County
ft	feet/foot
HASP	Health and Safety Plan
ID	identification
Jacobs	Jacobs Engineering Group Inc.
L	liter
Landau	Landau Associates, Inc.
NPDES	National Pollutant Discharge Elimination System
NVIPS	North Valley Interceptor Pump Station
Pacific Rim	Pacific Rim Laboratories, Inc.
PBDEs	polybrominated diphenyl ethers
PCBs	polychlorinated biphenyls
Permit	Permit WA-0093317
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
SOP	standard operating procedures
SRRTTF	Spokane River Regional Toxics Task Force
SVIPS	Spokane Valley Interceptor Pump Station
TSS	total suspended solids

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1.0 INTRODUCTION

On behalf of Spokane County (County), Landau Associates, Inc. (Landau) prepared this standard operating procedures document (SOP; Appendix A of the project Quality Assurance Project Plan [QAPP]), which describes the procedures for conducting field activities in support of automated influent and effluent sampling performed in accordance with the County's National Pollutant Discharge Elimination System (NPDES) permit WA-0093317 (Permit), effective August 1, 2022 and due to expire on July 31, 2027. This SOP was updated in February 2025 from the December 2023 version to account for changes in the sampling locations as described in the March 2025 QAPP.

2.0 SAMPLING PROCEDURE OVERVIEW

In accordance with the County NPDES Permit, 24-hour time-weighted composite samples of wastewater influent and final wastewater effluent are collected for analysis of polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) analysis on a quarterly basis.

3.0 SAMPLING NOTIFICATION

Influent sampling will be coordinated with the County. Sampling at the Spokane County Regional Water Reclamation Facility (SCRWRF) effluent location will be coordinated with Jacobs Engineering Group Inc. (Jacobs) and the County. Coordination is important to confirm that no other maintenance, testing, or sampling activities will be occurring during the proposed sampling period.

The County and Jacobs should be contacted at least 1 week prior to influent (County only) and effluent (County and Jacobs) sampling. Jason Hardin and Chris Walker from Spokane County should be contacted via email with cc to include Amy Sumner, Robert Lindsay, Gene Repp, Brandi Andrews (Jacobs), and Bryan Petersen; contact information for sampling notifications is listed below:

Chris Walker, Wastewater Operations Manager
509-477-1984
cdwalker@spokanecounty.org

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509-477-7545
rmorehouse@spokanecounty.org

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bpetersen@spokanecounty.org

Brett Lefor
503-xxx-xxx
blefor@spokanecounty.org

Brandi Andrews, Jacobs Engineering Group Inc.
509-953-2759
brandi.andrews@jacobs.com

4.0 SAMPLING EQUIPMENT CHECKLIST (QUANTITY SHOWN IN PARENTHESES)

The list below outlines the equipment required for each sampling event. Sample bottles for PCBs and PBDEs and pre-cleaned sampling equipment will be provided by Pacific Rim Laboratories, Inc. (Pacific Rim). Sample bottles for total suspended solids (TSS) will be provided by Anatek Laboratories (Anatek). Samples and used sampling equipment will be shipped to Pacific Rim following each sampling event. Composite samplers are generally stored in County facilities. The shipment of sample bottles will be coordinated with Pacific Rim and Anatek while other sampling equipment will be gathered by the sampler prior to each event.

- Teledyne ISCO® 3700 automated composite sampler (3)
- Extension cord (3)
- ISCO 3700 Power pack (3)
- 9.5-liter pre-cleaned glass composite sampling bottles. Bottles should have a tinfoil covering beneath the lid, which should be wrapped in Teflon tape when received from the laboratory (4)
- Empty 1-liter (L) amber glass sample bottles (varies; pre-cleaned and provided by Pacific Rim) for:
  - Influent and effluent samples
  - Field duplicates
  - Rinsate blanks
  - Backup samples
- 1-L amber glass bottles containing carbon-filtered water (varies; provided by Pacific Rim) for:
  - Rinsate blank preparation
- Pre-cleaned float assembly (3)
- 30-foot (ft) segments of pre-cleaned, 3/8-inch, Teflon-lined polyethylene tubing. Tubing ends should be wrapped in Teflon tape and tubing should be sealed in individual plastic bags when received from the laboratory (4)
- Pre-cleaned silicone pump tubing segments. Tubing ends should be wrapped in Teflon tape and tubing should be sealed in individual plastic bags when received from the laboratory (approx. 3-ft segments) (4)
- Pre-cleaned, Teflon-coated, stainless-steel strainers and strainer caps. Strainers and caps should be wrapped in tinfoil and sealed in individual plastic bags when received from the laboratory (2)
- Powder-free nitrile gloves (2 boxes)
- 2-ft-by-3-ft board for covering the Effluent manhole (1; if the manhole sampling location is to be used)

- Ice (varies)
- Plastic Ziploc bags (1 box)
- Polyethylene 1-L graduated cylinder for pump calibration (1)
- First aid kit (1)
- Garbage bags (5)
- Paper towels (1)
- Strapping tape (1)
- Clipboard (1)
- Flashlight and headlamp (1 of each)
- Calculator (1)
- Sample coolers (varies)
- Camera (1)
- C-clamps (2)
- Stainless steel garden clamp (1)
- Traffic control cones (3; if the manhole sampling location is to be used)
- Alconox and tap water (for field decontamination)
- Zip ties
- Reflective insulation for ISCO samplers
- Copy of Work Location Personnel Protection and Safety Evaluation Form (Attachment 1).

5.0 SAMPLING LOCATIONS

Composite samples will be collected from the following influent and effluent locations, also shown on Figure 1 of the QAPP. A detailed description of the sample collection setup and associated procedures is given in Section 7.0 below.

5.1 Influent Sampling Locations

- North Valley Interceptor Pump Station (NVIPS)
  - The photograph below shows the sampling locations at the NVIPS. Samples are collected from one of two wet wells (east and west) at the pump station depending on which is in operation at the time of sample collection. The wet wells are accessed via access hatches in the outdoor courtyard area within the pump station gates. Fall protection netting beneath the access hatch is present at both wet wells. Samples are collected from the wet wells through a strainer attached to suction tubing. Care should be taken so that the strainer does not contact the walls of the channel as it is lowered into the flow stream. The suction tubing will be threaded through a C-clamp and the small keyhole in the hatch and connected to pump tubing that runs through an automated sampler positioned on the surface near the access hatch. The wet wells at the NVIPS are cleaned on a weekly basis and the County will coordinate for the wet wellbeing sampled to be cleaned the day before sample collection to avoid sample contamination from foam, grease, and/or other floating debris.

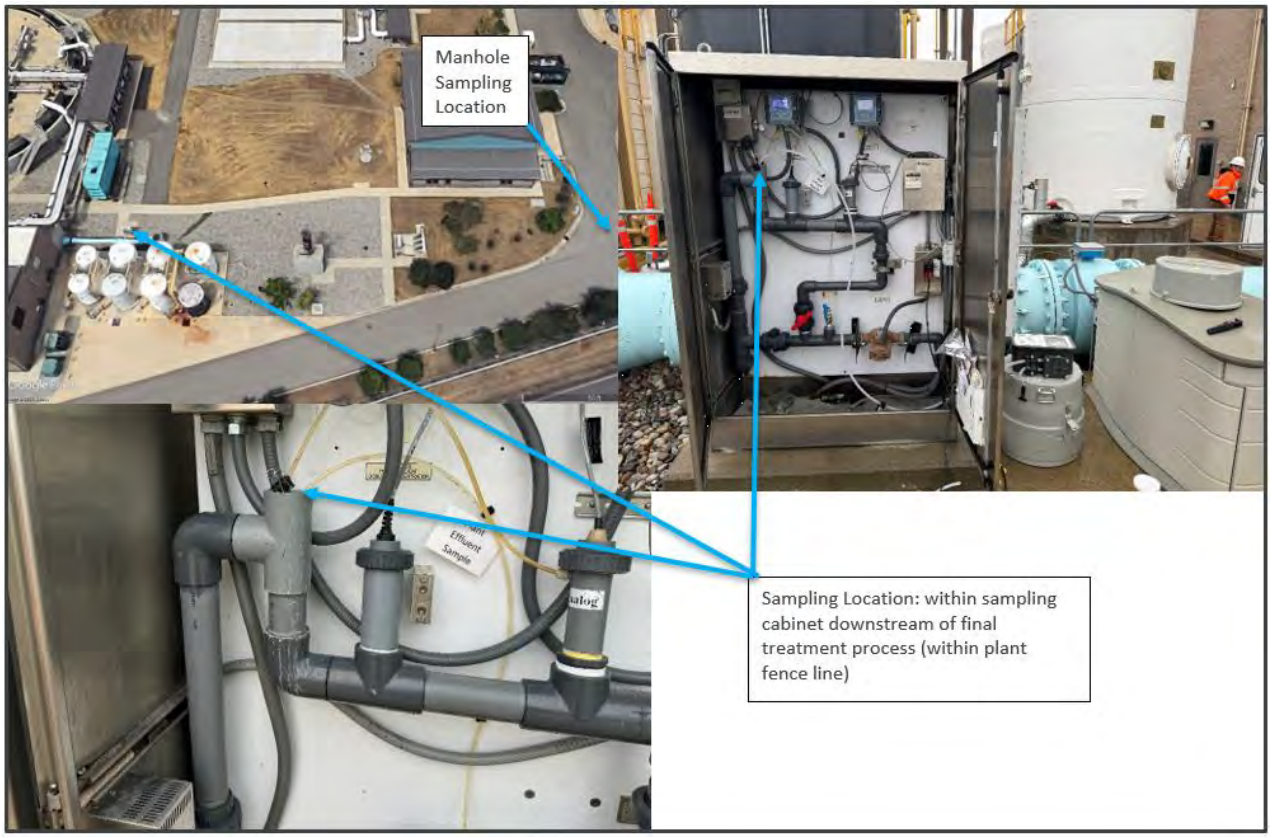
- Spokane Valley Interceptor Pump Station (SVIPS)
  - The photograph below shows the sampling locations at the SVIPS. Sample collection at the SVIPS location is similar to the NVIPS location: samples are collected from one of two wet wells (east and west) at the pump station depending on which is in operation at the time of sample collection. The wet wells are accessed via access hatches and samples are collected from the wet wells using a strainer, suction and pump tubing, and composite sampler configuration like that at the NVIPS. Fall protection netting beneath the access hatch is present at both wet wells. The wet wells at the SVIPS are cleaned on a weekly basis and the County will coordinate for the wet well where samples will be collected to be cleaned the day before sample collection.

5.2 Effluent Sampling Location

- SCRWRF Effluent Sampling Location
  - The SCRWRF effluent sampling location is shown in the photographs below. The effluent sampling location is accessed via a sampling cabinet located in the south central portion of the facility and is located downstream of the final treatment process. An electrical outlet is located inside the sampling cabinet. The sampling location is a 2-inch schedule 80 polyvinyl chloride (PVC) “tee” fitting with one arm of the tee facing upward and uncovered, allowing access to effluent water flowing through plumbing within the sampling cabinet. The sampling location is accessed by opening the doors on the northern side of the sampling cabinet. Access holes have been drilled through the lower portion of the western wall of the sampling cabinet to allow the suction tubing and an extension cord to be run between the automated sampler, which is set outside of the sampling

cabinet, and the sampling location/electrical outlet. The suction tubing is lowered into the "tee" fitting such that the end is submerged. A stainless-steel garden clamp is used to position the suction tubing and prevent the tubing from coming into contact with the PVC piping. The suction tubing is connected to pump tubing that runs through an automated sampler positioned on the west side of the sampling cabinet.

- Alternate SCRWRF Effluent Sampling Location
  - An alternate effluent sampling location is accessed via a manhole cover in the roadway within the southern portion of the facility and is located downstream of the final treatment process. To access the alternate sampling location, the manhole cover is removed and a board is placed over the opening, leaving room to place the strainer in the effluent stream. The manhole cover is placed on top of the board to secure the board in place. A strainer attached to suction tubing is lowered into the manhole and said tubing is connected to pump tubing that runs through an automated sampler on the side of the roadway, northwest of the manhole. Cones are used for traffic control around the sampler and manhole during setup and calibration of the sampler, during collection of rinsate samples, and for the duration of the sample collection period.



6.0 SAMPLE BOTTLE LABELING

Bottle labels for composite samples, field duplicates, rinsate blanks, backup samples, and trip blanks will be provided by Pacific Rim. All sample bottles will be labeled with a unique sample identification (ID). Sample bottles will be labeled as follows:

- Composite sample labels will include the sampling location, the analysis to be performed, and

the start date of the 24-hour composite. For example, a sample collected from a composite that was started on May 24, 2023 for PCB analysis from SVIPS would be named SVIPS-PCB-052423.

- Field duplicate sample labels will indicate the sample is a duplicate and will include both the analysis to be performed and the start date of the 24-hour composite. For example, a duplicate sample collected from a composite that was started on May 24, 2023 for PBDE analysis would be named Duplicate-PBDE-052423. The location the duplicate sample that is collected will be recorded in the field and provided to the County.
- Rinsate blank sample labels will indicate that the sample is a rinsate blank and will include the location the rinsate sample is collected from, the analysis to be performed, and the date the rinsate sample is prepared. For example, a rinsate sample prepared on May 24, 2023 at Effluent for PCB analysis would be named Rinsate Effluent-PCB-052423.
- Backup samples will be collected from each sampling location. Backup sample labels will indicate the sample is a backup and will include the sampling location, the analysis to be performed, and the start date of the 24-hour composite. For example, a backup sample collected from a composite that was started on May 24, 2023 for PCB analysis from SVIPS would be named SVIPS-Backup-PCB-052423.
- TSS sample labels will include the sampling location, indicate the sample will be analyzed for TSS, and include the start date of the 24-hour composite. For example, a sample collected from a composite that was started on May 24, 2023 for TSS analysis from NVIPS would be named NVIPS-TSS-052423.
- All sample bottle labels will note the client (Spokane County) as well as the date and time of sample collection. The time of sample collection for composite samples will be noted as the time the first aliquot is collected during the 24-hour composite.

7.0 SAMPLING PROTOCOL

Field personnel will be trained on automated sampler operation and maintenance as well as sampler programming and calibration, field-cleaning procedures, rinsate preparation methods, sample collection, and filling out field forms. Field personnel will review the HASP prior to sampling events. A health and safety report will be completed at the beginning of each day of sampling. Sampling equipment must be cleaned by Pacific Rim prior to use (See Section 11 below [Decontamination Procedures]). Powder-free nitrile gloves will be worn during all sampling activities. Gloves will be changed prior to and following handling all sampling equipment, making any tubing connections, and collecting samples.

The following are general protocols that apply to all sampling locations:

- Inspect the sampling location
- Assemble tools and supplies
- Photograph the sampling location
- Set up, program, and calibrate the automated sampler.

Protocols that apply to NVIPS and SVIPS sampling locations:

- Confirm fall protection netting beneath access hatch is in place.

8.0 AUTOMATED SAMPLER SETUP AND CALIBRATION FOR COMPOSITE SAMPLING

The automated sampler will be programmed to collect 24 individual samples over approximately 24 hours for each time-weighted composite. Individual samples at each sampling location will be combined in a 9.5-L glass composite sample bottle. Automated sampling equipment should be calibrated prior to the start of composite sample collection to confirm that the sampler is collecting the correct volume for each individual sample. The condition of the sampler pump and intake tubing, the vertical distance over which the sample is pumped, and other factors can affect the volume drawn. Rinsate blank samples will be collected prior to setting up the sampler for composite sampling (See Section 9.2 below [Rinsate Blank Sample Collection]).

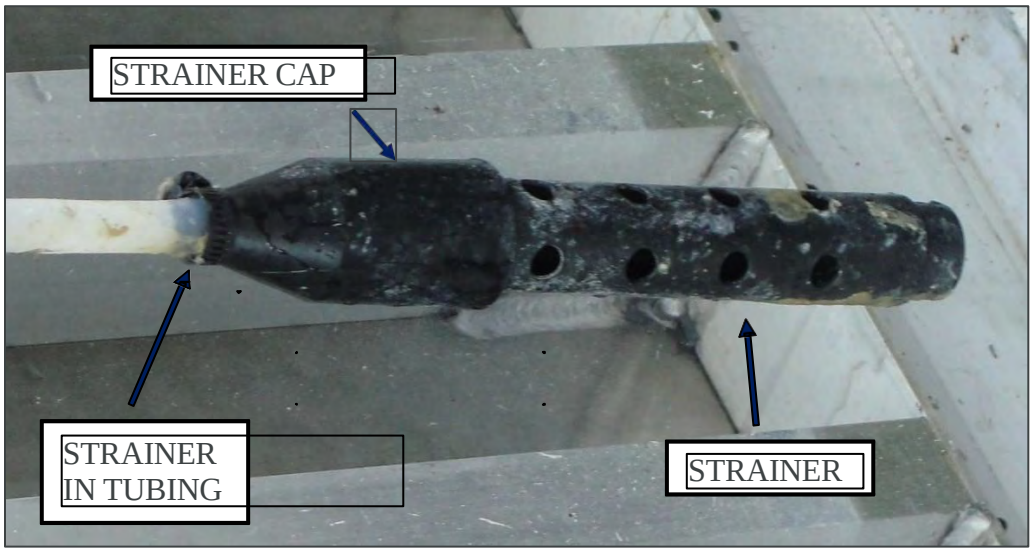
The following outlines the procedure for setting up and calibrating the automated samplers for composite sample collection:

1) Place the sampler in a secure location.

2) Check power sources and confirm the sampler is operable by pressing the “ON/STANDBY” button.

3) Remove the end of the pre-cleaned pump tubing from the laboratory-provided plastic bag and, with Teflon tape still covering the end, thread through the peristaltic roller. With Teflon tape still attached, thread tubing end through the opening in the pump head and through the float mechanism in the underside of the pump head. Keep the remainder of the tubing in the laboratory-provided plastic bag. Pre-cleaned pump tubing will be connected to suction tubing when received from the laboratory. See photograph below for view of inside of sampler lid with tubing in correct position.

4) At influent sampling locations, a pre-cleaned strainer and strainer cap are placed on the suction end of the tubing using the following methodology: With Teflon tape still attached to the suction tubing, unwrap the tinfoil from the pre-cleaned strainer cap and slide the strainer cap over the suction tubing. Remove the Teflon tape from the suction tubing and the tinfoil from the pre-cleaned strainer, then connect the strainer to the suction tubing. The portion of the strainer that is smaller in diameter should be inserted entirely into the tubing. Keep the strainer and tubing inside the laboratory-provided plastic tubing bag and slide the strainer cap over the strainer. The photograph below shows a completed strainer assembly (following sample collection).



5) Remove the strainer from the plastic bag and slowly lower the strainer and tubing to the sample collection location. The strainer should not come into contact with the walls of the sampling location.

6) For influent and effluent sampling locations, the suction tubing placement during sampling is slightly different:

   - NVIPS and SVIPS: Suction tubing is threaded through a C-clamp affixed to the underside of the access hatch and routed through an opening where the access hatch-locking mechanism is located. See photos below:

   - Effluent: Tubing is set within the PVC "tee" fitting using a stainless-steel garden clip to position the suction end of the tubing such that it is submerged but does not contact any surface within the plumbing of the sampling cabinet.

7) Program the pump for calibration.

   a) Check the configuration

      i) Select "PROGRAM"

      ii) Select "CONFIGURE"

      iii) Set the clock if the displayed time does not match the current time (pages 3-23 of ISCO 3700 product manual)

      iv) Select "PORTABLE" for the type of sampler

      v) Select 1 bottle

      vi) Enter bottle volume of 9,500 milliliters

      vii) Enter the size of the suction line, "3/8 inch"

      viii) Enter the material of the suction line, "TEFLON"

      ix) Enter the suction line length, enter the maximum (20 ft) at the influent sampling locations and the minimum (1 ft) at the effluent sampling location.

      x) Select liquid detector

      xi) For rinse cycles, enter 3

xii) Enter head manually, “YES”

xiii) Enter 3 for amount of retries for sampling

xiv) Continue to scroll through the configure options with the right arrow key. When you have checked the settings for the options described above, press the “EXIT PROGRAM” key to return to standby.

b) Enter TIME-Paced Composite sampling

i) Select “ENTER PROGRAM”

ii) Select “PROGRAM” to select the sampling parameters

iii) Choose “TIMED SAMPLING”

iv) Choose sample every 60 minutes or 1 hour

v) Choose 24 for number of samples to be collected

vi) For Multiplex samples, choose “NO”

vii) Enter sample volume. The sample volume will be the volume collected for each of the 24 individual samples. The total volume collected should be at least 1 L more than the volume required to fill the necessary 1-L sample bottles (including backup samples)

viii) Enter the suction head and enter the maximum value allowed by the sampler being used (20 ft) at the influent sampling locations, and at the effluent sampling location enter the minimum value allowed by the sampler (1 ft)

ix) Enter “YES” to calibrate the sampler

x) With pump tubing threaded through the pump head rollers and float mechanism, elevate pump head on two clean, side-by-side buckets with tubing discharge aligned directly above a graduated cylinder. Confirm the pump tubing end will not come into contact with the graduated cylinder. Remove Teflon tape from pump tubing

xi) Select “MANUAL SAMPLE” key when ready to calibrate

xii) The sampler should go through purging and rinsing cycles and then take the sample at the designated time

xiii) Enter the actual volume measured in the graduated cylinder

xiv) Repeat this calibration process until the calibration volume matches the programmed volume

xv) Pour the liquid collected into the graduated cylinder back into the sampling cabinet plumbing or the SVIPS/NVIPS wet well, avoiding pouring onto sample suction tubing or strainer.

8) Composite sample collection setup procedures are outlined below. They should be performed following setup and calibration of the automated sampler for composite sampling.

a) Place a pre-cleaned, 9.5-L glass composite bottle into the ISCO sampler base

b) If ambient temperature is above freezing, place crushed ice sealed in plastic bags around the composite bottle

c) Remove the Teflon tape from the glass composite bottle lid. Remove the lid and the tinfoil covering beneath the lid. Place lid in a clean plastic bag

d) Place pump head over ISCO sampler base

e) Choose the sample based on “TIME”

f) Enter the start time, typically choosing 1 or 2 minutes from current time. Start the sampling by selecting “START SAMPLING” and observe the tubing to verify that the sample was being collected

g) Once the first sample has been collected, take the pump head off the sampler base to confirm there is liquid in the composite bottle. Verify that the pump tubing is still in the correct position. If there is liquid in the composite bottle, replace the lid and secure the pump head to the sampler base. Put the cover lid on the pump head and secure all exterior latches on the sampler

h) If liquid is not observed within the composite bottle after the initial pump cycle:

i) Check the position of the tubing to ensure that water is directed into the composite bottle

ii) At the influent sampling locations, check the strainer for obstructions not allowing for water to be pumped up into the suction tubing

iii) Check the placement of the tubing within the pump assembly to ensure that the pump is functioning properly

iv) Confirm suction tubing is not kinked and is intact.

9.0 SAMPLE COLLECTION

The following outlines the procedures for collecting composite and rinsate samples. Field duplicate samples will be collected from the composite sample volume at alternating sampling locations. Backup samples will be collected from the composite sample volume at each location.

9.1 Composite Sample Collection

Composite sample collection procedures are outlined below. Composite samples will be collected following completion of the 24-hour automated sampler program. Powder-free nitrile gloves should be worn during all sampling activities. Nitrile gloves should be changed prior to and following handling all sample jars and sampling equipment and collecting all samples.

1. Inspect all components of the automatic sampling system to confirm that the sample was properly collected. The automated sampler will display a warning if an error was encountered during the 24-hour program. Select “DISPLAY STATUS” followed by “REVIEW RESULTS” to see a log of any errors encountered during the program. Record any unsatisfactory conditions.
2. Remove the pump head and remove the composite bottle lid from the plastic bag. Secure the lid on the composite bottle.
3. Swirl the water in the composite bottle gently to homogenize the water. After swirling, take a photo of the water in the composite sample bottle.
4. Remove the composite sample bottle lid and pour the composite sample directly into one precleaned amber glass sample bottle provided by Pacific Rim. Place the lid on the sample bottle. Continue pouring from the composite bottle into one sample bottle at a time until all sample bottles are filled. Replace the lid on the composite bottle when not transferring water to sample bottles. Fill the TSS bottle provided by Anatek following PCB, PBDE, duplicate, and backup sample collection.
5. Place each sample bottle inside a sealed Ziploc bag.
6. Place the sample bottles into iced coolers for transport and shipping. Maintain a temperature inside of each cooler between 0ºC and 6ºC.

Following sample collection, rinse suction tubing, pump tubing, strainer, and 9.5-L glass composite sampling container with soapy water.

9.2 Rinsate Blank Sample Collection

Rinsate blank samples for PCBs and PBDEs will be collected during each sampling event. Rinsate blank samples are generally collected from the effluent sampling location and will be collected prior to setting up the effluent sampler for composite sample collection. The steps below outline rinsate blank sample collection procedures:

1. Follow steps 1 through 3 of Section 8.0 above.

2. Place a pre-cleaned, 9.5-L glass composite bottle into the ISCO sampler base.
3. Remove the Teflon tape from the glass composite bottle lid. Remove the lid and the tinfoil covering beneath the lid.
4. Place pump head over ISCO sampler base.
5. Turn on the ISCO automated sampler by selecting “ON/Standby.” Next, select “PUMP FORWARD.”
6. Open one bottle of carbon-filtered water and insert the end of the suction tubing into the bottle. The end of the suction tubing should be no more than 1/4 inch beneath the water surface in the bottle.
7. The automated sampler will begin pumping carbon-filtered water from the carbon-filtered water bottle into the composite bottle. The automated sampler will pump continuously until you press “STOP” to stop it.
8. One 1-L carbon-filtered water bottle will be required for each rinsate analysis and backup sample. To ensure that sufficient volume is available, one extra 1-L bottle of carbon-filtered water will be pumped into the composite bottle. Additional bottles of carbon-filtered water should only be opened immediately prior to pumping into the composite bottle.
9. Remove the suction tubing from the last carbon-filtered water bottle and wrap the end of the tubing in a clean plastic bag.
10. Remove the foil-covered strainer and strainer cap from its plastic bag and slide the strainer cap onto the end of the suction tubing. Connect the strainer to the pump tubing and slide the strainer cap over the top of the strainer.
11. Insert tubing end with strainer into composite bottle and swirl the water around in the composite bottle to increase contact with the carbon-filtered water. Place the strainer in the sapling location.

12. Pour the water collected from the composite bottle directly into the rinsate blank sample bottles. Fill one bottle for each analyte to be tested. (See photo below.)

13. Avoid contacting the outside of the composite bottle with the inside of the "Rinsate Blank" bottle. Fill the bottles so that there is no air when the lid is placed on the bottle. See photos below.

14. Place each sample bottle inside a sealed Ziploc bag.

15. Place the sample bottles in iced coolers for transport and shipping. Maintain a temperature inside each cooler of between 0ºC and 6ºC.

10.0 SAMPLE CUSTODY AND SHIPPING

Samples collected for laboratory analysis will be submitted on ice and under standard chain-of-custody procedures.

Samples to be analyzed for PCBs and PBDEs will be shipped overnight to Pacific Rim. Sampling equipment will be shipped ground to Pacific Rim to be pre-cleaned prior to the next sampling event. Samples to be analyzed for TSS will be hand-delivered to Anatek. Backup samples for PCBs and PBDEs will be stored under refrigeration by Landau.

11.0 DECONTAMINATION PROCEDURES

The following decontamination procedures may be revised based on the rinsate blank analytical results.

Prior to each sampling event, all sampling equipment that comes into contact with the sample water will be sent to Pacific Rim to be cleaned using its standard procedures for ultra-low level organic analytes. Pacific Rim's laboratory decontamination procedures can be provided upon request. The following equipment will be cleaned by Pacific Rim:

- Suction tubing
- Pump tubing
- 9.5-L glass composite sample container and lid
- 1-L amber glass sample bottles and lids
- Strainers and strainer caps.

The following equipment will not be cleaned by Pacific Rim; it should be cleaned in the field following each sampling event if contacted by fluid in the composite sample container, or if otherwise contaminated:

- Float assemblies.

ATTACHMENT 1

Work Location Personnel Protection and Safety Evaluation Form

Work Location Personnel Protection and Safety Evaluation Form

Attach Pertinent Documents/Data
Fill in Blanks As Appropriate

Project Number:	0124017	Reviewed by:	Christine Kimmel
Prepared by:	Dan Gray	Date:	March 30, 2023
Date:	March 29, 2023		

A. Work Location Description

1.	**Project Name:**	Spokane County (County) NPDES Influent and Effluent Toxicity Sampling
2.	**Locations:**	1004 N Freya Street; 1701 North Havana Street; 4005 East 4th Avenue, Spokane, Washington
3.	**Anticipated Activities**	Influent and effluent wastewater sampling
4.	**Size:**	19.91 acres; 0.84 acre; 0.25 acre
5.	**Surrounding Population:**	The sites are located within the city limits of Spokane, Washington, which has a population of approximately 229,071 (2021). The sites are bordered by light industrial properties, residential properties, and the Spokane Burlington Northern Santa Fe (BNSF) intermodal yard.
6.	**Buildings/Homes/Industry:**	The sites are an active wastewater treatment facility and two wastewater pump stations.
7.	**Topography:**	Relatively flat
8.	**Anticipated Weather:**	Variable and seasonal weather; Rain, snow, sun; 10°F - 90°F
9.	**Unusual Features:**	Wastewater treatment facility; wastewater pump stations
10.	**Site History:**	The Spokane County Regional Water Reclamation Facility (SCRWRF) began treating wastewater on December 11, 2011. The SCRWRF is in the operations phase of a design-build-operate contract with Jacobs Engineering. The SCRWRF uses step-feed nitrification/denitrification membrane bioreactor with chlorine disinfection treatment. The Spokane Valley Interceptor (SVIPS) and the North Valley Interceptor (NVIPS) pump stations redirect the flow that cannot be served directly by gravity through force mains to the SCRWRF.

B. Hazard Description

1.	**Background Review:**	☒ Complete ☐ Partial
	If partial, why?	Click here to enter text.
2.	**Hazardous Level:**	☐ B ☐ C ☒ D ☐ Unknown

Justification: Influent and effluent sampling are conducted using automated composite samplers. Composite samples are transferred from the composite carboys to sample jars by hand. Effluent is monitored in accordance with National Pollutant Discharge Elimination System (NPDES) water quality standards and limited exposure to wastewater influent will occur. All sampling equipment will be laboratory-cleaned prior to use. All sampling activities will take place outdoors. Rinsate samples will be collected using laboratory-certified Ultra-Pure water provided by the analytical laboratory.

3. Types of Hazards: (Attach additional sheets as necessary)

A. ☒ Chemical ☒ Inhalation ☐ Explosive
☒ Biological ☒ Ingestion ☐ O_2 Def. ☒ Skin Contact

Describe: Exposure to chemical and biological hazards associated with raw wastewater. Nitrile gloves will be worn at all times and changed out regularly and immediately if contacted with wastewater influent. Safety glasses will be worn at all times and care will be taken to minimize splashes and spills during the sampling process. All used sampling equipment will be stored in sealed plastic bags. All used disposables will be immediately transferred to plastic trash bags that will be sealed when not in use. The SCRWRF receives deliveries of chemicals used for wastewater treatment. Personnel will not enter areas where chemical transfers are occurring.

B. ☒ Physical ☒ Cold Stress ☐ Noise ☒ Heat Stress ☐ Other

Describe: Work will be conducted quarterly year round. Potential for exposure to weather extremes while working outside during various months of the year. Potential trip and fall hazards. The sites include an active wastewater treatment facility and wastewater pump stations. Reflective orange vests, hard hats, and steel toe boots will be worn at all times. Provide right-of-way to Spokane County (County) vehicle traffic and only enter areas of the facilities required to complete sampling activities.

C. ☐ Radiation

Describe: Click here to enter text.

4. Nature of Hazards:

☐ Air Describe: Click here to enter text.

☐ Soil Describe: Click here to enter text.

☐ Surface Water Describe: Click here to enter text.

☐ Groundwater Describe:

☒ Other Describe: Exposure to chemical and biological hazards associated with wastewater is possible. Nitrile gloves and safety glasses will be worn at all times.

5. Chemical Contaminants of Concern ☐ N/A

Contaminant	PEL (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Metals (protective to arsenic)	0.01 mg/m^3	5.0 mg/m^3	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Abdominal pain, dehydration, nausea, skin irritation.	Dust control
Total Residual Chlorine	1 ppm	10 ppm	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Redness of skin, burning sensation, difficulty breathing.	NA
PCBs	0.5 mg/m^3	5 mg/m^3	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Skin irritation and redness, nausea.	Dust control
Total Ammonia	50 ppm	NA	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Eye, nose, and threat irritation.	NA
Total Phosphorus	0.1 mg/m^3	NA	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Nausea, vomiting, skin burning and irritation.	Dust control
Fecal Coliform Bacteria/E. coli	NA	NA	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Nausea, vomiting, diarrhea.	NA
Nitrate / Nitrite	NA	NA	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Increased heart rate, nausea, blueness of skin in severe cases.	NA

Petroleum Hydrocarbons	100 ppm	400 ppm	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Skin irritation and dryness, nausea.	PID meter
VOCs (protective to benzene)	0.1 ppm	500 ppm	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Eye, skin, and threat irritation, nausea (benzene is a known carcinogen).	PID meter
Cyanide	5 ppm	25 ppm	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Asphyxiation, vomiting, irritant to eyes and skin.	PID meter
Pesticides	10 mg/m^3	100 mg/m^3	Unknown levels present in the influent streams.	Inhalation, ingestion, and dermal contact.	Headache, dizziness, nausea, vomiting, skin irritation.	Dust control
SVOCs (protective to Benzo(a)pyrene)	0.1 mg/m3	80 mg/m3	Unknown levels are present in the influent streams.	Inhalation, ingestion, dermal contact	Eye, nose, and throat irritation; dizziness, nausea; chemical pneumonia	Dust control
PBDEs	NA	NA	Unknown levels are present in the influent streams.	Inhalation, ingestion, and dermal contact.	Impaired cognitive development, impaired motor skills, increased impulsivity, and decreased attention.	NA
Phenolic Compounds	5 ppm	250 ppm	Unknown levels are present in the influent streams.	Inhalation, ingestion, and dermal contact.	Skin irritation, weight loss, muscle aches, liver, kidney damage, convulsions.	NA
Chlorine	1 ppm	10 ppm	Unknown levels are present in the influent streams. Storage	Inhalation, ingestion, and dermal contact.	Burning of eyes, nose, mouth; lacrimation, couch, choking, nausea, vomiting, dizziness, hypoxemia.	NA

			of bulk chlorine at the SCRWRF.			
Methane	NA	NA	Methane storage at the SCRWRF	Inhalation	Mood changes, slurred speech, vision problems, memory loss, nausea, vomiting, facial flushing and headache.	LEL meter

Abbreviations and Acronyms:
LEL = lower explosive limit
mg/m3 = milligrams per cubic meter
NA = not applicable
PBDE = polybrominated diphenyl ethers
PCBs = polychlorinated biphenyls
PID = photoionization detector
ppm = parts per million
SCRWRF = Spokane County Regional Water Reclamation Facility
SVOCs = semi volatile organic compounds
VOCs = volatile organic compounds

6. Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Slip, trip, fall	Working on an industrial facility around influent and effluent wastewater flows, including manholes/vaults.	Sampling locations.	Stay alert and be aware of your surroundings. Watch out for trip hazardous and take precaution when sampling and walking on uneven or wet surfaces. Ensure safety netting is in place in any open vaults. Close vaults after setting up samplers at NVIPS and SVIPS. Place board over and safety cones/flagging near any open manholes. Close vaults or manholes when sampling is complete.
pH	Influent wastewater flows may be acidic or basic depending on conditions.	Sampling locations.	Wear nitrile gloves and safety glasses with side shields, avoid splashing of wastewater.
On Site Vehicle traffic	Vehicle traffic traveling along facility roads	Facility roads.	Alert observation of surroundings. Use of reflective vest and traffic cones, as necessary, to increase visibility when parked on facility roads.
Moving parts of automated sampler and within the SCRWRF and NVIPS and SVIPS pump stations	Automated sampler has moving parts that can pinch or crush and cause injury. The SCRWRF is an active wastewater treatment facility; NVIPS and SVIPS are active wastewater pump stations. Moving parts within the facilities can pinch or crush and cause injury.	Near automated sampler or when working in the SCRWRF and NVIPS and SVIPS pump station facilities.	Alert observation when setting up and programming automated sampler. Avoid pinch points. Stay alert and be aware of your surroundings when working in the SCRWRF and NVIPS and SVIPS pump stations. Stay clear of all moving parts while in the SCRWRF and NVIPS and SVIPS pump stations.
Wastewater sampling	Lifting, slip/trip, loud noises, overhead hazards, and pinch points	Work Area.	Use proper lifting techniques. Be aware of surroundings. Keep fingers out of tight areas that could result in pinch points. Wear appropriate PPE (nitrile gloves, safety glasses, reflective safety vest, hard hat, steel toed boots, ear plugs)
Weather/Wildfire Illnesses	Heat, cold, or smoke related illnesses	Work Area.	Have drinking water accessible, wear appropriate clothing (light for heat, warm for cold), wear sunscreen protection, avoid caffeine, and take short breaks as needed. Wear mask during unhealthy smoke conditions. Take breaks as needed and go indoors if conditions become unhealthy.

Travel to and from site	Operating motor vehicle in traffic on highways and rural roads	To and from sites and Landau Associates office	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection, all vehicles to be maintained and in good working order. Obey all traffic laws, including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time for travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish planned route prior to departure.
Methane/ gas storage	Mixtures of methane and air, with the methane content between 5 and 14 percent by volume, are explosive.	SCRWRF sampling locations	The lower explosive limit (LEL) for methane is 5%. An LEL meter will be used to monitor ambient air.

Abbreviations and Acronyms:
NVIPS = North Valley Interceptor Pump Station
pH = potential hydrogen
PPE = personal protective equipment
SVIPS = South Valley Interceptor Pump Station

7. Work Location Instrument Readings ☒ N/A

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
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Other:	Click here to enter text.	Other:	Click here to enter text.

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
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Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

8. Hazards Expected in Preparation for Work Assignment ☒ N/A

Describe: Click here to enter text.

C. Personal Protective Equipment

1. Level of Protection

☐ A ☐ B ☐ C ☒ D

Location/Activity: Wastewater sampling activities; wear appropriate personal protective equipment (PPE) (nitrile gloves, safety glasses, safety vests, hard hats, and steel toe boots)

☐ A ☐ B ☒ C ☐ D

Location/Activity: Upgrade to Level C based on ambient air monitoring results (see Attachment A)

2. Protective Equipment (specify probable quantity required)

Respirator ☒ N/A
- ☐ SCBA, Airline
- ☐ Full-Face Respirator
- ☒ Half-Face Respirator (Cart. organic vapor) (Only if upgrade to Level C)
- ☐ Escape mask
- ☐ None
- ☐ Other:
- ☐ Other:

Clothing ☐ N/A
- ☐ Fully Encapsulating Suit
- ☐ Chemically Resistant Splash Suit
- ☐ Apron, Specify:
- ☒ Tyvek Coverall (Only if upgrade to Level C)
- ☐ Saranex Coverall
- ☐ Coverall, Specify
- ☒ Other: High-Visibility Vest

Head, Ear & Eye ☐ N/A
- ☒ Hard Hat
- ☐ Goggles
- ☐ Face Shield
- ☒ Safety Eyeglasses
- ☒ Other: Ear Plugs

Hand Protection ☐ N/A
- ☐ Undergloves; Type:
- ☒ Gloves; Type: Nitrile gloves
- ☐ Overgloves; Type:
- ☐ None
- ☐ Other:

Foot Protection ☐ N/A
- ☐ Neoprene Safety Boots with Steel Toe/Shank
- ☐ Disposable Overboots
- ☒ Other: Steel toe boots

3. Monitoring Equipment ☐ N/A

X CGI
0 O2 Meter
0 Rad Survey
0 Detector Tubes (optional)
Type:

X PID
0 FID
0 Other

D. Decontamination

Personal Decontamination ☒ Required ☐ Not Required

If required, describe: Personnel should decontaminate by washing with soap and water prior to eating and departing from the site. Disposal gloves will be discarded regularly and immediately after contact with influent wastewater and used sampling equipment. Disposable PPE will be discarded as solid waste.

Equipment Decontamination ☒ Required ☐ Not Required

If required, describe:

All non-disposable sampling equipment will be decontaminated using wet decontamination procedures:

- Wash and scrub equipment with Alconox/tap water solution
- Rinse with tap water
- Rinse with de-ionized water
- Repeat entire procedure or any parts of the procedure as necessary.

In addition to the wet decontamination procedures, other measures will be taken to prevent cross-contamination and contamination of samples from ambient air and any sampling equipment not cleaned by the analytical laboratory. These measures include changing out disposable gloves regularly, using fresh paper towels, maintaining a clean work area, minimizing the time sample jars and wastewater samples that are exposed to ambient air, and ensuring all samples only contact laboratory-cleaned sampling equipment.

Prevent the spread of COVID-19 by washing hands thoroughly, using hand sanitizer when possible, and wiping down high touch areas in vehicles before allowing others to use vehicle.

E. Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
1	Wastewater sampling	July 2023- April 2024
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
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Click here to enter text.	Click here to enter text.	Click here to enter text.

F. Subcontractor's Health and Safety Program Evaluation

☒ **N/A**

Name and Address of Subcontractor: Click here to enter text.

Item	Evaluation Criteria: Adequate	Evaluation Criteria: Inadequate	Comments
Medical Surveillance Program	☐	☐	Click here to enter text.
Personal Protective Equipment Availability	☐	☐	Click here to enter text.
Onsite Monitoring Equipment Availability	☐	☐	Click here to enter text.
Safe Working Procedures Specification	☐	☐	Click here to enter text.
Training Protocols	☐	☐	Click here to enter text.
Ancillary Support Procedures (if any)	☐	☐	Click here to enter text.
Emergency Procedures	☐	☐	Click here to enter text.
Evacuation Procedures Contingency Plan	☐	☐	Click here to enter text.
Decontamination Procedures Equipment	☐	☐	Click here to enter text.
Decontamination Procedures Personnel	☐	☐	Click here to enter text.

General Health and Safety Program Evaluation: ☐ Adequate ☐ Inadequate

Additional Comments: Click here to enter text.

Evaluation Conducted by: Click here to enter text. Date: Click here to enter text.

Emergency Facilities and Numbers

Hospital: MultiCare Deaconess Hospital
800 W 5th Avenue
Spokane, WA

Directions: See Attachment B

Telephone: (509) 473-5800

Emergency Transportation Systems (Fire, Police, Ambulance) -- 911

Emergency Routes – Map (Attachment B)

Emergency Contacts:

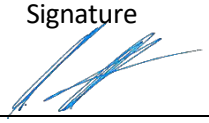
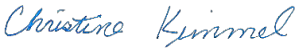
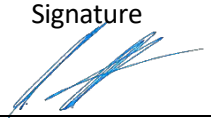
Name	Office	Mobile
Shane Kostka	(509) 444-9428	(208) 819-1965
Chris Kimmel	(425) 329-0254	(206) 786-3801
Click here to enter text.	Click here to enter text.	Click here to enter text.

In the event of an emergency, do the following:

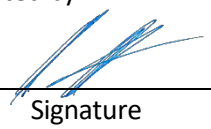
1. Call for help as soon as possible. Call 911. Give the following information:
    - WHERE the emergency is – use cross streets or landmarks
    - PHONE NUMBER you are calling from
    - WHAT HAPPENED – type of injury
    - WHAT is being done for the victim(s)
    - YOU HANG UP LAST – let the person you called hang up first.
2. If the victim can be moved, paramedics will transport them to the hospital. If the injury or exposure is not life-threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.

Health and Safety Plan
Approval/Sign Off Form

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Dan Gray		March 30, 2023
Name	Signature	Date
Click here to enter text.		Click here to enter text.
Name	Signature	Date
Click here to enter text.		Click here to enter text.
Name	Signature	Date
Click here to enter text.		Click here to enter text.
Name	Signature	Date
Shane Kostka		March 30, 2023
Site Safety Coordinator	Signature	Date
Christine Kimmel		March 30, 2023
LAI Health and Safety Manager	Signature	Date
Shane Kostka		March 30, 2023
Project Manager	Signature	Date

Personnel Health and Safety Briefing Conducted by:

Shane Kostka		March 30, 2023
Name	Signature	Date

Attachment A
Action Levels for Respiratory Protection

Monitoring Parameter	Reading	Level of Protection
VOCs	PID reading >10 ppm in breathing zone for more than 15 minutes or >35 ppm for momentary peak.	Evacuate the area or upgrade to Level C - half-face respirator with organic vapor / HEPA cartridge and tyvex suit.
VOCs	PID reading >10 ppm and <100 ppm	Upgrade to Level C and temporarily stop work to allow vapors to decrease to below background before proceeding work in Level C
VOCs	PID reading >100 ppm	Stop Work, contact Health & Safety Manager
Explosivity	LEL <5% or >14% or <19.5% Oxygen >23%	Stop Work and contact Landau Health & Safety Manager
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
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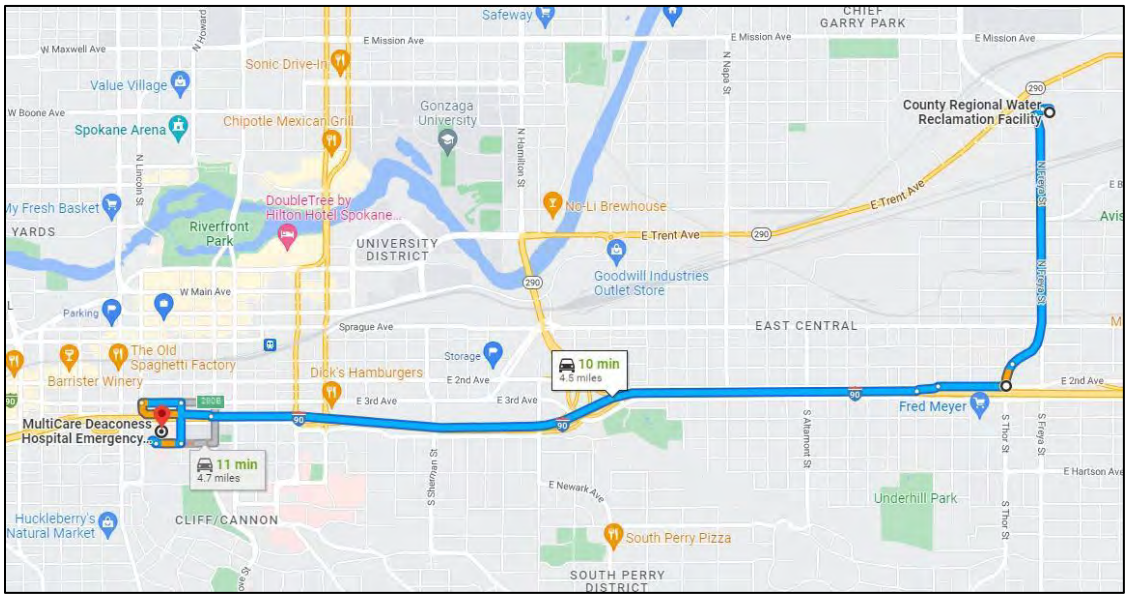
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Abbreviations and Acronyms:
HEPA = high-efficiency particle air [filter]
LEL = lower explosive limit
PID = photoionization detector
ppm = parts per million
VOCs = volatile organic compounds

Attachment B



Directions

Head south on N Freya Street
1.1 miles

Turn right on E 2nd Avenue
0.2 mile

Merge onto I-90 West
2.4 miles

Take exit 280B to Lincoln Street
0.3 mile

Turn right on W 3rd Avenue
0.2 mile

Turn right on S Wall Street
0.2 mile

Turn right on W 5th Avenue
0.1 mile

Turn right

MultiCare Deaconess Hospital
800 W 5th Avenue
Spokane, WA 99204

ATTACHMENT 3

Laboratory Accreditation from Washington State Department of Ecology

The State of Washington Department of Ecology

Pacific Rim Laboratories, Inc.
Surrey, BC

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective February 5, 2024 and shall expire February 4, 2025.

Witnessed under my hand on April 3, 2024

Rebecca Wood
Lab Accreditation Unit Supervisor

Laboratory ID
C864

WASHINGTON STATE DEPARTMENT OF ECOLOGY

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

SCOPE OF ACCREDITATION

Pacific Rim Laboratories, Inc.

Surrey, BC

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. EPA is the U.S. Environmental Protection Agency. SM is "Standard Methods for the Examination of Water and Wastewater." SM refers to EPA approved method versions. ASTM is the American Society for Testing and Materials. USGS is the U.S. Geological Survey. AOAC is the Association of Official Analytical Chemists. Other references are described in notes.

Matrix/Analyte	Method	Notes
Non-Potable Water		
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	EPA 1613B_1994	1
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	EPA 1613B_1994	1
1,2,3,4,6,7,8-Hpcdd	EPA 1613B_1994	1
1,2,3,4,6,7,8-Hpcdf	EPA 1613B_1994	1
1,2,3,4,7,8,9-Hpcdf	EPA 1613B_1994	1
1,2,3,4,7,8-Hxcdd	EPA 1613B_1994	1
1,2,3,4,7,8-Hxcdf	EPA 1613B_1994	1
1,2,3,6,7,8-Hxcdd	EPA 1613B_1994	1
1,2,3,6,7,8-Hxcdf	EPA 1613B_1994	1
1,2,3,7,8,9-Hxcdd	EPA 1613B_1994	1
1,2,3,7,8,9-Hxcdf	EPA 1613B_1994	1
1,2,3,7,8-Pecdd	EPA 1613B_1994	1
1,2,3,7,8-Pecdf	EPA 1613B_1994	1
2,3,4,6,7,8-Hxcdf	EPA 1613B_1994	1
2,3,4,7,8-Pecdf	EPA 1613B_1994	1
2,3,7,8-TCDD	EPA 1613B_1994	1
2,3,7,8-TCDF	EPA 1613B_1994	1
Hpcdd, total	EPA 1613B_1994	1
Hpcdf, total	EPA 1613B_1994	1
Hxcdd, total	EPA 1613B_1994	1
Hxcdf, total	EPA 1613B_1994	1
Pecdd, total	EPA 1613B_1994	1
Pecdf, total	EPA 1613B_1994	1
TCDD, total	EPA 1613B_1994	1
TCDF, total	EPA 1613B_1994	1
2,2',3,3',4,4',5,5',6-Nonabromodiphenylether (BDE-206)	EPA 1614A_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
2,2',3,3',4,4',5,6,6'-Nonabromodiphenylether (BDE-207)	EPA 1614A_2010	1
2,2',3,3',4,4',5,6'-Octabromodiphenylether (BDE-196)	EPA 1614A_2010	1
2,2',3,3',4,4',6-Heptabromodiphenylether (BDE-171)	EPA 1614A_2010	1
2,2',3,3',4,5,5',6,6'-Nonabromodiphenylether (BDE-208)	EPA 1614A_2010	1
2,2',3,3',4,5',6,6'-Octabromodiphenylether (BDE-201)	EPA 1614A_2010	1
2,2',3,4,4',5,5',6-Octabromodiphenylether (BDE-203)	EPA 1614A_2010	1
2,2',3,4,4',5,5'-Heptabromodiphenylether (BDE-180)	EPA 1614A_2010	1
2,2',3,4,4',5',6-Heptabromodiphenylether (BDE-183)	EPA 1614A_2010	1
2,2',3,4,4',5'-Hexabromodiphenylether (BDE-138)	EPA 1614A_2010	1
2,2',3,4,4',6,6'-Heptabromodiphenylether (BDE-184)	EPA 1614A_2010	1
2,2',3,4,4',6-Hexabromodiphenylether (BDE-139)	EPA 1614A_2010	1
2,2',3,4,4',6'-Hexabromodiphenylether (BDE-140)	EPA 1614A_2010	1
2,2',3,4,4'-Pentabromodiphenylether (BDE-85)	EPA 1614A_2010	1
2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE-153)	EPA 1614A_2010	1
2,2',4,4',5',6-Hexabromodiphenylether (BDE-154)	EPA 1614A_2010	1
2,2',4,4',5-Pentabromodiphenyl ether (BDE-99)	EPA 1614A_2010	1
2,2',4,4',6-Pentabromodiphenyl ether (BDE-100)	EPA 1614A_2010	1
2,2',4,4'-Tetrabromodiphenyl ether (BDE-47)	EPA 1614A_2010	1
2,2',4,5'-Tetrabromodiphenylether (BDE-49)	EPA 1614A_2010	1
2,2',4-Tribromodiphenylether (BDE-17)	EPA 1614A_2010	1
2,3,3',4,4',5,5',6-Octabromodiphenylether (BDE-205)	EPA 1614A_2010	1
2,3,3',4,4',5',6-Heptabromodiphenylether (BDE-191)	EPA 1614A_2010	1
2,3',4,4',6-Pentabromodiphenylether (BDE-119)	EPA 1614A_2010	1
2,3',4,4'-Tetrabromodiphenylether (BDE-66)	EPA 1614A_2010	1
2,3',4',6-Tetrabromodiphenylether (BDE-71)	EPA 1614A_2010	1
2,4,4'-Tribromodiphenylether (BDE-28)	EPA 1614A_2010	1
2,4,6-Tribromodiphenylether (BDE-30)	EPA 1614A_2010	1
2,4-Dibromodiphenylether (BDE-7)	EPA 1614A_2010	1
2,6-Dibromodiphenylether (BDE-10)	EPA 1614A_2010	1
3,3',4,4',5-Pentabromodiphenylether (BDE-126)	EPA 1614A_2010	1
3,3',4,4'-Tetrabromodiphenylether (BDE-77)	EPA 1614A_2010	1
4,4'-Dibromodiphenylether (BDE-15)	EPA 1614A_2010	1
Coelution-Hexabromodiphenylethers (BDE-156+BDE-169)	EPA 1614A_2010	1
Coelution-Octabromodiphenylethers (BDE-197+BDE-204)	EPA 1614A_2010	1
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ-206)	EPA 1668C_2010	1
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (BZ-194)	EPA 1668C_2010	1
2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (BZ-207)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ-195)	EPA 1668C_2010	1
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (BZ-196)	EPA 1668C_2010	1
2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ-170)	EPA 1668C_2010	1
2,2',3,3',4,4',6,6'-Octachlorobiphenyl (BZ-197)	EPA 1668C_2010	1
2,2',3,3',4,4',6-Heptachlorobiphenyl (BZ-171)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (BZ-208)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6-Octachlorobiphenyl (BZ-198)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6'-Octachlorobiphenyl (BZ-199)	EPA 1668C_2010	1
2,2',3,3',4,5,5'-Heptachlorobiphenyl (BZ-172)	EPA 1668C_2010	1
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (BZ-200)	EPA 1668C_2010	1
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (BZ-201)	EPA 1668C_2010	1
2,2',3,3',4,5,6-Heptachlorobiphenyl (BZ-173)	EPA 1668C_2010	1
2,2',3,3',4,5,6'-Heptachlorobiphenyl (BZ-174)	EPA 1668C_2010	1
2,2',3,3',4,5',6-Heptachlorobiphenyl (BZ-175)	EPA 1668C_2010	1
2,2',3,3',4,5',6'-Heptachlorobiphenyl (BZ-177)	EPA 1668C_2010	1
2,2',3,3',4,5-Hexachlorobiphenyl (BZ-129)	EPA 1668C_2010	1
2,2',3,3',4,5'-Hexachlorobiphenyl (BZ-130)	EPA 1668C_2010	1
2,2',3,3',4,6,6'-Heptachlorobiphenyl (BZ-176)	EPA 1668C_2010	1
2,2',3,3',4-Pentachlorobiphenyl (BZ-82)	EPA 1668C_2010	1
2,2',3,3',5,5',6,6'-Octachlorobiphenyl (BZ-202)	EPA 1668C_2010	1
2,2',3,3',5,5',6-Heptachlorobiphenyl (BZ-178)	EPA 1668C_2010	1
2,2',3,3',5,6,6'-Heptachlorobiphenyl (BZ-179)	EPA 1668C_2010	1
2,2',3,3',5,6-Hexachlorobiphenyl (BZ-134)	EPA 1668C_2010	1
2,2',3,3',5,6'-Hexachlorobiphenyl (BZ-135)	EPA 1668C_2010	1
2,2',3,3',5-Pentachlorobiphenyl (BZ-83)	EPA 1668C_2010	1
2,2',3,3'-Tetrachlorobiphenyl (BZ-40)	EPA 1668C_2010	1
2,2',3,4,4',5,5',6-Octachlorobiphenyl (BZ-203)	EPA 1668C_2010	1
2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ-180)	EPA 1668C_2010	1
2,2',3,4,4',5,6,6'-Octachlorobiphenyl (BZ-204)	EPA 1668C_2010	1
2,2',3,4,4',5,6-Heptachlorobiphenyl (BZ-181)	EPA 1668C_2010	1
2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ-183)	EPA 1668C_2010	1
2,2',3,4,4',5-Hexachlorobiphenyl (BZ-137)	EPA 1668C_2010	1
2,2',3,4,4',5'-Hexachlorobiphenyl (BZ-138)	EPA 1668C_2010	1
2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ-184)	EPA 1668C_2010	1
2,2',3,4,4',6'-Hexachlorobiphenyl (BZ-140)	EPA 1668C_2010	1
2,2',3,4,4'-Pentachlorobiphenyl (BZ-85)	EPA 1668C_2010	1
2,2',3,4,5,5',6-Heptachlorobiphenyl (BZ-185)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
2,2',3,4,5,5'-Hexachlorobiphenyl (BZ-141)	EPA 1668C_2010	1
2,2',3,4',5,5'-Hexachlorobiphenyl (BZ-146)	EPA 1668C_2010	1
2,2',3,4,5,6,6'-Heptachlorobiphenyl (BZ-186)	EPA 1668C_2010	1
2,2',3,4',5,6,6'-Heptachlorobiphenyl (BZ-188)	EPA 1668C_2010	1
2,2',3,4,5,6-Hexachlorobiphenyl (BZ-142)	EPA 1668C_2010	1
2,2',3,4,5,6'-Hexachlorobiphenyl (BZ-143)	EPA 1668C_2010	1
2,2',3,4,5',6-Hexachlorobiphenyl (BZ-144)	EPA 1668C_2010	1
2,2',3,4',5,6-Hexachlorobiphenyl (BZ-147)	EPA 1668C_2010	1
2,2',3,4',5-Pentachlorobiphenyl (BZ-90)	EPA 1668C_2010	1
2,2',3,4,6,6'-Hexachlorobiphenyl (BZ-145)	EPA 1668C_2010	1
2,2',3,4',6,6'-Hexachlorobiphenyl (BZ-150)	EPA 1668C_2010	1
2,2',3,4,6-Pentachlorobiphenyl (BZ-88)	EPA 1668C_2010	1
2,2',3,4,6'-Pentachlorobiphenyl (BZ-89)	EPA 1668C_2010	1
2,2',3,4',6-Pentachlorobiphenyl (BZ-91)	EPA 1668C_2010	1
2,2',3,4-Tetrachlorobiphenyl (BZ-41)	EPA 1668C_2010	1
2,2',3,4'-Tetrachlorobiphenyl (BZ-42)	EPA 1668C_2010	1
2,2',3,5,5',6-Hexachlorobiphenyl (BZ-151)	EPA 1668C_2010	1
2,2',3,5,5'-Pentachlorobiphenyl (BZ-92)	EPA 1668C_2010	1
2,2',3,5,6,6'-Hexachlorobiphenyl (BZ-152)	EPA 1668C_2010	1
2,2',3,5,6'-Pentachlorobiphenyl (BZ-94)	EPA 1668C_2010	1
2,2',3,5',6-Pentachlorobiphenyl (BZ-95)	EPA 1668C_2010	1
2,2',3,5-Tetrachlorobiphenyl (BZ-43)	EPA 1668C_2010	1
2,2',3,5'-Tetrachlorobiphenyl (BZ-44)	EPA 1668C_2010	1
2,2',3,6,6'-Pentachlorobiphenyl (BZ-96)	EPA 1668C_2010	1
2,2',3,6-Tetrachlorobiphenyl (BZ-45)	EPA 1668C_2010	1
2,2',3,6'-Tetrachlorobiphenyl (BZ-46)	EPA 1668C_2010	1
2,2',3-Trichlorobiphenyl (BZ-16)	EPA 1668C_2010	1
2,2',4,4',5,5'-Hexachlorobiphenyl (BZ-153)	EPA 1668C_2010	1
2,2',4,4',5,6'-Hexachlorobiphenyl (BZ-154)	EPA 1668C_2010	1
2,2',4,4',5-Pentachlorobiphenyl (BZ-99)	EPA 1668C_2010	1
2,2',4,4',6,6'-Hexachlorobiphenyl (BZ-155)	EPA 1668C_2010	1
2,2',4,4',6-Pentachlorobiphenyl (BZ-100)	EPA 1668C_2010	1
2,2',4,5,5'-Pentachlorobiphenyl (BZ-101)	EPA 1668C_2010	1
2,2',4,5',6-Pentachlorobiphenyl (BZ-103)	EPA 1668C_2010	1
2,2',4,5'-Tetrachlorobiphenyl (BZ-49)	EPA 1668C_2010	1
2,2',4,6,6'-Pentachlorobiphenyl (BZ-104)	EPA 1668C_2010	1
2,2',4,6-Tetrachlorobiphenyl (BZ-50)	EPA 1668C_2010	1

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Pacific Rim Laboratories, Inc.

Matrix/Analyte	Method	Notes
Non-Potable Water		
2,2',4,6'-Tetrachlorobiphenyl (BZ-51)	EPA 1668C_2010	1
2,2',4-Trichlorobiphenyl (BZ-17)	EPA 1668C_2010	1
2,2',5,6'-Tetrachlorobiphenyl (BZ-53)	EPA 1668C_2010	1
2,2',5-Trichlorobiphenyl (BZ-18)	EPA 1668C_2010	1
2,2',6,6'-Tetrachlorobiphenyl (BZ-54)	EPA 1668C_2010	1
2,2',6-Trichlorobiphenyl (BZ-19)	EPA 1668C_2010	1
2,2'-Dichlorobiphenyl (BZ-4)	EPA 1668C_2010	1
2,3,3',4,4',5,5',6-Octachlorobiphenyl (BZ-205)	EPA 1668C_2010	1
2,3,3',4,4',5,5'-Heptachlorobiphenyl (BZ-189)	EPA 1668C_2010	1
2,3,3',4,4',5,6-Heptachlorobiphenyl (BZ-190)	EPA 1668C_2010	1
2,3,3',4,4',5',6-Heptachlorobiphenyl (BZ-191)	EPA 1668C_2010	1
2,3,3',4,4',5-Hexachlorobiphenyl (BZ-156)	EPA 1668C_2010	1
2,3,3',4,4',5'-Hexachlorobiphenyl (BZ-157)	EPA 1668C_2010	1
2,3,3',4,4',6-Hexachlorobiphenyl (BZ-158)	EPA 1668C_2010	1
2,3,3',4,5,5',6-Heptachlorobiphenyl (BZ-192)	EPA 1668C_2010	1
2,3,3',4',5,5',6-Heptachlorobiphenyl (BZ-193)	EPA 1668C_2010	1
2,3,3',4,5,5'-Hexachlorobiphenyl (BZ-159)	EPA 1668C_2010	1
2,3,3',4,5,6-Hexachlorobiphenyl (BZ-160)	EPA 1668C_2010	1
2,3,3',4,5-Pentachlorobiphenyl (BZ-106)	EPA 1668C_2010	1
2,3,3',4',5'-Pentachlorobiphenyl (BZ-122)	EPA 1668C_2010	1
2,3,3',4,6-Pentachlorobiphenyl (BZ-109)	EPA 1668C_2010	1
2,3,3',4',6-Pentachlorobiphenyl (BZ-110)	EPA 1668C_2010	1
2,3,3',4-Tetrachlorobiphenyl (BZ-55)	EPA 1668C_2010	1
2,3,3',4'-Tetrachlorobiphenyl (BZ-56)	EPA 1668C_2010	1
2,3,3',5,5',6-Hexachlorobiphenyl (BZ-165)	EPA 1668C_2010	1
2,3,3',5,5'-Pentachlorobiphenyl (BZ-111)	EPA 1668C_2010	1
2,3,3',5',6-Pentachlorobiphenyl (BZ-113)	EPA 1668C_2010	1
2,3,3',5-Tetrachlorobiphenyl (BZ-57)	EPA 1668C_2010	1
2,3,3',5'-Tetrachlorobiphenyl (BZ-58)	EPA 1668C_2010	1
2,3,3',6-Tetrachlorobiphenyl (BZ-59)	EPA 1668C_2010	1
2,3',4,4',5,5'-Hexachlorobiphenyl (BZ-167)	EPA 1668C_2010	1
2,3,4,4',5,6-Hexachlorobiphenyl (BZ-166)	EPA 1668C_2010	1
2,3',4,4',5',6-Hexachlorobiphenyl (BZ-168)	EPA 1668C_2010	1
2,3,4,4',5-Pentachlorobiphenyl (BZ-114)	EPA 1668C_2010	1
2,3',4,4',5-Pentachlorobiphenyl (BZ-118)	EPA 1668C_2010	1
2,3',4,4',5'-Pentachlorobiphenyl (BZ-123)	EPA 1668C_2010	1
2,3,4,4'-Tetrachlorobiphenyl (BZ-60)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
2,3',4,4'-Tetrachlorobiphenyl (BZ-66)	EPA 1668C_2010	1
2,3',4,5,5'-Pentachlorobiphenyl (BZ-120)	EPA 1668C_2010	1
2,3',4',5,5'-Pentachlorobiphenyl (BZ-124)	EPA 1668C_2010	1
2,3,4,5-Tetrachlorobiphenyl (BZ-61)	EPA 1668C_2010	1
2,3,4',5-Tetrachlorobiphenyl (BZ-63)	EPA 1668C_2010	1
2,3',4,5'-Tetrachlorobiphenyl (BZ-68)	EPA 1668C_2010	1
2,3',4',5-Tetrachlorobiphenyl (BZ-70)	EPA 1668C_2010	1
2,3',4',5'-Tetrachlorobiphenyl (BZ-76)	EPA 1668C_2010	1
2,3',4,5-Tetrachlorobiphenyl (BZ-67)	EPA 1668C_2010	1
2,3,4,6-Tetrachlorobiphenyl (BZ-62)	EPA 1668C_2010	1
2,3',4',6-Tetrachlorobiphenyl (BZ-71)	EPA 1668C_2010	1
2,3,4-Trichlorobiphenyl (BZ-21)	EPA 1668C_2010	1
2,3,4'-Trichlorobiphenyl (BZ-22)	EPA 1668C_2010	1
2,3',4-Trichlorobiphenyl (BZ-25)	EPA 1668C_2010	1
2,3',5',6-Tetrachlorobiphenyl (BZ-73)	EPA 1668C_2010	1
2,3,5-Trichlorobiphenyl (BZ-23)	EPA 1668C_2010	1
2,3',5-Trichlorobiphenyl (BZ-26)	EPA 1668C_2010	1
2,3',5'-Trichlorobiphenyl (BZ-34)	EPA 1668C_2010	1
2,3,6-Trichlorobiphenyl (BZ-24)	EPA 1668C_2010	1
2,3',6-Trichlorobiphenyl (BZ-27)	EPA 1668C_2010	1
2,3'-Dichlorobiphenyl (BZ-6)	EPA 1668C_2010	1
2,4,4',5-Tetrachlorobiphenyl (BZ-74)	EPA 1668C_2010	1
2,4,4'-Trichlorobiphenyl (BZ-28)	EPA 1668C_2010	1
2,4,5-Trichlorobiphenyl (BZ-29)	EPA 1668C_2010	1
2,4',5-Trichlorobiphenyl (BZ-31)	EPA 1668C_2010	1
2,4,6-Trichlorobiphenyl (BZ-30)	EPA 1668C_2010	1
2,4',6-Trichlorobiphenyl (BZ-32)	EPA 1668C_2010	1
2,4-Dichlorobiphenyl (BZ-7)	EPA 1668C_2010	1
2,5-Dichlorobiphenyl (BZ-9)	EPA 1668C_2010	1
2,6-Dichlorobiphenyl (BZ-10)	EPA 1668C_2010	1
2-Chlorobiphenyl (BZ-1)	EPA 1668C_2010	1
3,3',4,4',5,5'-Hexachlorobiphenyl (BZ-169)	EPA 1668C_2010	1
3,3',4,4',5-Pentachlorobiphenyl (BZ-126)	EPA 1668C_2010	1
3,3',4,4'-Tetrachlorobiphenyl (BZ-77)	EPA 1668C_2010	1
3,3',4,5-Tetrachlorobiphenyl (BZ-78)	EPA 1668C_2010	1
3,3',4,5'-Tetrachlorobiphenyl (BZ-79)	EPA 1668C_2010	1
3,3',4-Trichlorobiphenyl (BZ-35)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
3,3',5,5'-Tetrachlorobiphenyl (BZ-80)	EPA 1668C_2010	1
3,3',5-Trichlorobiphenyl (BZ-36)	EPA 1668C_2010	1
3,3'-Dichlorobiphenyl (BZ-11)	EPA 1668C_2010	1
3,4,4',5-Tetrachlorobiphenyl (BZ-81)	EPA 1668C_2010	1
3,4,4'-Trichlorobiphenyl (BZ-37)	EPA 1668C_2010	1
3,4,5-Trichlorobiphenyl (BZ-38)	EPA 1668C_2010	1
3,4',5-Trichlorobiphenyl (BZ-39)	EPA 1668C_2010	1
3,5-Dichlorobiphenyl (BZ-14)	EPA 1668C_2010	1
3-Chlorobiphenyl (BZ-2)	EPA 1668C_2010	1
4,4'-Dichlorobiphenyl (BZ-15)	EPA 1668C_2010	1
4-Chlorobiphenyl (BZ-3)	EPA 1668C_2010	1
Coelution - Dichlorobiphenyls (BZ-12-+13)	EPA 1668C_2010	1
Coelution-Dichlorobiphenyl (BZ-5 + BZ-8)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-128+BZ-162)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-131+BZ-133)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-132+161)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-136+BZ-148)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-139+BZ-149)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-163+BZ-164)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyl (BZ-105 + BZ-127)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-107+BZ-108)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-112+BZ-119)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-116+BZ-125)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-84+BZ-121)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-86+BZ-97+BZ-117)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-87+BZ-115)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-93+BZ-98+BZ-102)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-47+BZ-48)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-52+BZ-69)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-64+BZ-72)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-65+BZ-75)	EPA 1668C_2010	1
Coelution-Trichlorobiphenyls (BZ-20+BZ-33)	EPA 1668C_2010	1
Decachlorobiphenyl (BZ-209)	EPA 1668C_2010	1
Total Dichlorobiphenyls	EPA 1668C_2010	1
Total Heptachlorobiphenyls	EPA 1668C_2010	1
Total Hexachlorobiphenyls	EPA 1668C_2010	1
Total Monochlorobiphenyls	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Non-Potable Water		
Total Nonachlorobiphenyls	EPA 1668C_2010	1
Total Octachlorobiphenyls	EPA 1668C_2010	1
Total Pentachlorobiphenyls	EPA 1668C_2010	1
Total Tetrachlorobiphenyls	EPA 1668C_2010	1
Total Trichlorobiphenyls	EPA 1668C_2010	1
Tributyltin	PRL SOP LAB04	1
Solid and Chemical Materials		
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	EPA 1613B_1994	1
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	EPA 1613B_1994	1
1,2,3,4,6,7,8-Hpcdd	EPA 1613B_1994	1
1,2,3,4,6,7,8-Hpcdf	EPA 1613B_1994	1
1,2,3,4,7,8,9-Hpcdf	EPA 1613B_1994	1
1,2,3,4,7,8-Hxcdd	EPA 1613B_1994	1
1,2,3,4,7,8-Hxcdf	EPA 1613B_1994	1
1,2,3,6,7,8-Hxcdd	EPA 1613B_1994	1
1,2,3,6,7,8-Hxcdf	EPA 1613B_1994	1
1,2,3,7,8,9-Hxcdd	EPA 1613B_1994	1
1,2,3,7,8,9-Hxcdf	EPA 1613B_1994	1
1,2,3,7,8-Pecdd	EPA 1613B_1994	1
1,2,3,7,8-Pecdf	EPA 1613B_1994	1
2,3,4,6,7,8-Hxcdf	EPA 1613B_1994	1
2,3,4,7,8-Pecdf	EPA 1613B_1994	1
2,3,7,8-TCDD	EPA 1613B_1994	1
2,3,7,8-TCDF	EPA 1613B_1994	1
Hpcdd, total	EPA 1613B_1994	1
Hpcdf, total	EPA 1613B_1994	1
Hxcdd, total	EPA 1613B_1994	1
Hxcdf, total	EPA 1613B_1994	1
Pecdd, total	EPA 1613B_1994	1
Pecdf, total	EPA 1613B_1994	1
TCDD, total	EPA 1613B_1994	1
TCDF, total	EPA 1613B_1994	1
2,2',3,3',4,4',5,5',6-Nonabromodiphenylether (BDE-206)	EPA 1614A_2010	1
2,2',3,3',4,4',5,6,6'-Nonabromodiphenylether (BDE-207)	EPA 1614A_2010	1
2,2',3,3',4,4',5,6'-Octabromodiphenylether (BDE-196)	EPA 1614A_2010	1
2,2',3,3',4,4',6-Heptabromodiphenylether (BDE-171)	EPA 1614A_2010	1
2,2',3,3',4,5,5',6,6'-Nonabromodiphenylether (BDE-208)	EPA 1614A_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,2',3,3',4,5',6,6'-Octabromodiphenylether (BDE-201)	EPA 1614A_2010	1
2,2',3,4,4',5,5',6-Octabromodiphenylether (BDE-203)	EPA 1614A_2010	1
2,2',3,4,4',5,5'-Heptabromodiphenylether (BDE-180)	EPA 1614A_2010	1
2,2',3,4,4',5',6-Heptabromodiphenylether (BDE-183)	EPA 1614A_2010	1
2,2',3,4,4',5'-Hexabromodiphenylether (BDE-138)	EPA 1614A_2010	1
2,2',3,4,4',6,6'-Heptabromodiphenylether (BDE-184)	EPA 1614A_2010	1
2,2',3,4,4',6-Hexabromodiphenylether (BDE-139)	EPA 1614A_2010	1
2,2',3,4,4',6'-Hexabromodiphenylether (BDE-140)	EPA 1614A_2010	1
2,2',3,4,4'-Pentabromodiphenylether (BDE-85)	EPA 1614A_2010	1
2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE-153)	EPA 1614A_2010	1
2,2',4,4',5',6-Hexabromodiphenylether (BDE-154)	EPA 1614A_2010	1
2,2',4,4',5-Pentabromodiphenyl ether (BDE-99)	EPA 1614A_2010	1
2,2',4,4',6-Pentabromodiphenyl ether (BDE-100)	EPA 1614A_2010	1
2,2',4,4'-Tetrabromodiphenyl ether (BDE-47)	EPA 1614A_2010	1
2,2',4,5'-Tetrabromodiphenylether (BDE-49)	EPA 1614A_2010	1
2,2',4-Tribromodiphenylether (BDE-17)	EPA 1614A_2010	1
2,3,3',4,4',5,5',6-Octabromodiphenylether (BDE-205)	EPA 1614A_2010	1
2,3,3',4,4',5',6-Heptabromodiphenylether (BDE-191)	EPA 1614A_2010	1
2,3',4,4',6-Pentabromodiphenylether (BDE-119)	EPA 1614A_2010	1
2,3',4,4'-Tetrabromodiphenylether (BDE-66)	EPA 1614A_2010	1
2,3',4',6-Tetrabromodiphenylether (BDE-71)	EPA 1614A_2010	1
2,4,4'-Tribromodiphenylether (BDE-28)	EPA 1614A_2010	1
2,4,6-Tribromodiphenylether (BDE-30)	EPA 1614A_2010	1
2,4-Dibromodiphenylether (BDE-7)	EPA 1614A_2010	1
2,6-Dibromodiphenylether (BDE-10)	EPA 1614A_2010	1
3,3',4,4',5-Pentabromodiphenylether (BDE-126)	EPA 1614A_2010	1
3,3',4,4'-Tetrabromodiphenylether (BDE-77)	EPA 1614A_2010	1
4,4'-Dibromodiphenylether (BDE-15)	EPA 1614A_2010	1
Coelution-Hexabromodiphenylethers (BDE-156+BDE-169)	EPA 1614A_2010	1
Coelution-Octabromodiphenylethers (BDE-197+BDE-204)	EPA 1614A_2010	1
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ-206)	EPA 1668C_2010	1
2,2',3,3',4,4',5,5'-Octachlorobiphenyl (BZ-194)	EPA 1668C_2010	1
2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (BZ-207)	EPA 1668C_2010	1
2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ-195)	EPA 1668C_2010	1
2,2',3,3',4,4',5,6'-Octachlorobiphenyl (BZ-196)	EPA 1668C_2010	1
2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ-170)	EPA 1668C_2010	1
2,2',3,3',4,4',6,6'-Octachlorobiphenyl (BZ-197)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,2',3,3',4,4',6-Heptachlorobiphenyl (BZ-171)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (BZ-208)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6-Octachlorobiphenyl (BZ-198)	EPA 1668C_2010	1
2,2',3,3',4,5,5',6'-Octachlorobiphenyl (BZ-199)	EPA 1668C_2010	1
2,2',3,3',4,5,5'-Heptachlorobiphenyl (BZ-172)	EPA 1668C_2010	1
2,2',3,3',4,5,6,6'-Octachlorobiphenyl (BZ-200)	EPA 1668C_2010	1
2,2',3,3',4,5',6,6'-Octachlorobiphenyl (BZ-201)	EPA 1668C_2010	1
2,2',3,3',4,5,6-Heptachlorobiphenyl (BZ-173)	EPA 1668C_2010	1
2,2',3,3',4,5,6'-Heptachlorobiphenyl (BZ-174)	EPA 1668C_2010	1
2,2',3,3',4,5',6-Heptachlorobiphenyl (BZ-175)	EPA 1668C_2010	1
2,2',3,3',4,5',6'-Heptachlorobiphenyl (BZ-177)	EPA 1668C_2010	1
2,2',3,3',4,5-Hexachlorobiphenyl (BZ-129)	EPA 1668C_2010	1
2,2',3,3',4,5'-Hexachlorobiphenyl (BZ-130)	EPA 1668C_2010	1
2,2',3,3',4,6,6'-Heptachlorobiphenyl (BZ-176)	EPA 1668C_2010	1
2,2',3,3',4-Pentachlorobiphenyl (BZ-82)	EPA 1668C_2010	1
2,2',3,3',5,5',6,6'-Octachlorobiphenyl (BZ-202)	EPA 1668C_2010	1
2,2',3,3',5,5',6-Heptachlorobiphenyl (BZ-178)	EPA 1668C_2010	1
2,2',3,3',5,6,6'-Heptachlorobiphenyl (BZ-179)	EPA 1668C_2010	1
2,2',3,3',5,6-Hexachlorobiphenyl (BZ-134)	EPA 1668C_2010	1
2,2',3,3',5,6'-Hexachlorobiphenyl (BZ-135)	EPA 1668C_2010	1
2,2',3,3',5-Pentachlorobiphenyl (BZ-83)	EPA 1668C_2010	1
2,2',3,3'-Tetrachlorobiphenyl (BZ-40)	EPA 1668C_2010	1
2,2',3,4,4',5,5',6-Octachlorobiphenyl (BZ-203)	EPA 1668C_2010	1
2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ-180)	EPA 1668C_2010	1
2,2',3,4,4',5,6,6'-Octachlorobiphenyl (BZ-204)	EPA 1668C_2010	1
2,2',3,4,4',5,6-Heptachlorobiphenyl (BZ-181)	EPA 1668C_2010	1
2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ-183)	EPA 1668C_2010	1
2,2',3,4,4',5-Hexachlorobiphenyl (BZ-137)	EPA 1668C_2010	1
2,2',3,4,4',5'-Hexachlorobiphenyl (BZ-138)	EPA 1668C_2010	1
2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ-184)	EPA 1668C_2010	1
2,2',3,4,4',6'-Hexachlorobiphenyl (BZ-140)	EPA 1668C_2010	1
2,2',3,4,4'-Pentachlorobiphenyl (BZ-85)	EPA 1668C_2010	1
2,2',3,4,5,5',6-Heptachlorobiphenyl (BZ-185)	EPA 1668C_2010	1
2,2',3,4,5,5'-Hexachlorobiphenyl (BZ-141)	EPA 1668C_2010	1
2,2',3,4',5,5'-Hexachlorobiphenyl (BZ-146)	EPA 1668C_2010	1
2,2',3,4,5,6,6'-Heptachlorobiphenyl (BZ-186)	EPA 1668C_2010	1
2,2',3,4',5,6,6'-Heptachlorobiphenyl (BZ-188)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,2',3,4,5,6-Hexachlorobiphenyl (BZ-142)	EPA 1668C_2010	1
2,2',3,4,5,6'-Hexachlorobiphenyl (BZ-143)	EPA 1668C_2010	1
2,2',3,4,5',6-Hexachlorobiphenyl (BZ-144)	EPA 1668C_2010	1
2,2',3,4',5,6-Hexachlorobiphenyl (BZ-147)	EPA 1668C_2010	1
2,2',3,4',5-Pentachlorobiphenyl (BZ-90)	EPA 1668C_2010	1
2,2',3,4,6,6'-Hexachlorobiphenyl (BZ-145)	EPA 1668C_2010	1
2,2',3,4',6,6'-Hexachlorobiphenyl (BZ-150)	EPA 1668C_2010	1
2,2',3,4,6-Pentachlorobiphenyl (BZ-88)	EPA 1668C_2010	1
2,2',3,4,6'-Pentachlorobiphenyl (BZ-89)	EPA 1668C_2010	1
2,2',3,4',6-Pentachlorobiphenyl (BZ-91)	EPA 1668C_2010	1
2,2',3,4-Tetrachlorobiphenyl (BZ-41)	EPA 1668C_2010	1
2,2',3,4'-Tetrachlorobiphenyl (BZ-42)	EPA 1668C_2010	1
2,2',3,5,5',6-Hexachlorobiphenyl (BZ-151)	EPA 1668C_2010	1
2,2',3,5,5'-Pentachlorobiphenyl (BZ-92)	EPA 1668C_2010	1
2,2',3,5,6,6'-Hexachlorobiphenyl (BZ-152)	EPA 1668C_2010	1
2,2',3,5,6'-Pentachlorobiphenyl (BZ-94)	EPA 1668C_2010	1
2,2',3,5',6-Pentachlorobiphenyl (BZ-95)	EPA 1668C_2010	1
2,2',3,5-Tetrachlorobiphenyl (BZ-43)	EPA 1668C_2010	1
2,2',3,5'-Tetrachlorobiphenyl (BZ-44)	EPA 1668C_2010	1
2,2',3,6,6'-Pentachlorobiphenyl (BZ-96)	EPA 1668C_2010	1
2,2',3,6-Tetrachlorobiphenyl (BZ-45)	EPA 1668C_2010	1
2,2',3,6'-Tetrachlorobiphenyl (BZ-46)	EPA 1668C_2010	1
2,2',3-Trichlorobiphenyl (BZ-16)	EPA 1668C_2010	1
2,2',4,4',5,5'-Hexachlorobiphenyl (BZ-153)	EPA 1668C_2010	1
2,2',4,4',5,6'-Hexachlorobiphenyl (BZ-154)	EPA 1668C_2010	1
2,2',4,4',5-Pentachlorobiphenyl (BZ-99)	EPA 1668C_2010	1
2,2',4,4',6,6'-Hexachlorobiphenyl (BZ-155)	EPA 1668C_2010	1
2,2',4,4',6-Pentachlorobiphenyl (BZ-100)	EPA 1668C_2010	1
2,2',4,5,5'-Pentachlorobiphenyl (BZ-101)	EPA 1668C_2010	1
2,2',4,5',6-Pentachlorobiphenyl (BZ-103)	EPA 1668C_2010	1
2,2',4,5'-Tetrachlorobiphenyl (BZ-49)	EPA 1668C_2010	1
2,2',4,6,6'-Pentachlorobiphenyl (BZ-104)	EPA 1668C_2010	1
2,2',4,6-Tetrachlorobiphenyl (BZ-50)	EPA 1668C_2010	1
2,2',4,6'-Tetrachlorobiphenyl (BZ-51)	EPA 1668C_2010	1
2,2',4-Trichlorobiphenyl (BZ-17)	EPA 1668C_2010	1
2,2',5,6'-Tetrachlorobiphenyl (BZ-53)	EPA 1668C_2010	1
2,2',5-Trichlorobiphenyl (BZ-18)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,2',6,6'-Tetrachlorobiphenyl (BZ-54)	EPA 1668C_2010	1
2,2',6-Trichlorobiphenyl (BZ-19)	EPA 1668C_2010	1
2,2'-Dichlorobiphenyl (BZ-4)	EPA 1668C_2010	1
2,3,3',4,4',5,5',6-Octachlorobiphenyl (BZ-205)	EPA 1668C_2010	1
2,3,3',4,4',5,5'-Heptachlorobiphenyl (BZ-189)	EPA 1668C_2010	1
2,3,3',4,4',5,6-Heptachlorobiphenyl (BZ-190)	EPA 1668C_2010	1
2,3,3',4,4',5',6-Heptachlorobiphenyl (BZ-191)	EPA 1668C_2010	1
2,3,3',4,4',5-Hexachlorobiphenyl (BZ-156)	EPA 1668C_2010	1
2,3,3',4,4',5'-Hexachlorobiphenyl (BZ-157)	EPA 1668C_2010	1
2,3,3',4,4',6-Hexachlorobiphenyl (BZ-158)	EPA 1668C_2010	1
2,3,3',4,5,5',6-Heptachlorobiphenyl (BZ-192)	EPA 1668C_2010	1
2,3,3',4',5,5',6-Heptachlorobiphenyl (BZ-193)	EPA 1668C_2010	1
2,3,3',4,5,5'-Hexachlorobiphenyl (BZ-159)	EPA 1668C_2010	1
2,3,3',4,5,6-Hexachlorobiphenyl (BZ-160)	EPA 1668C_2010	1
2,3,3',4,5-Pentachlorobiphenyl (BZ-106)	EPA 1668C_2010	1
2,3,3',4',5'-Pentachlorobiphenyl (BZ-122)	EPA 1668C_2010	1
2,3,3',4,6-Pentachlorobiphenyl (BZ-109)	EPA 1668C_2010	1
2,3,3',4',6-Pentachlorobiphenyl (BZ-110)	EPA 1668C_2010	1
2,3,3',4-Tetrachlorobiphenyl (BZ-55)	EPA 1668C_2010	1
2,3,3',4'-Tetrachlorobiphenyl (BZ-56)	EPA 1668C_2010	1
2,3,3',5,5',6-Hexachlorobiphenyl (BZ-165)	EPA 1668C_2010	1
2,3,3',5,5'-Pentachlorobiphenyl (BZ-111)	EPA 1668C_2010	1
2,3,3',5',6-Pentachlorobiphenyl (BZ-113)	EPA 1668C_2010	1
2,3,3',5-Tetrachlorobiphenyl (BZ-57)	EPA 1668C_2010	1
2,3,3',5'-Tetrachlorobiphenyl (BZ-58)	EPA 1668C_2010	1
2,3,3',6-Tetrachlorobiphenyl (BZ-59)	EPA 1668C_2010	1
2,3',4,4',5,5'-Hexachlorobiphenyl (BZ-167)	EPA 1668C_2010	1
2,3,4,4',5,6-Hexachlorobiphenyl (BZ-166)	EPA 1668C_2010	1
2,3',4,4',5',6-Hexachlorobiphenyl (BZ-168)	EPA 1668C_2010	1
2,3,4,4',5-Pentachlorobiphenyl (BZ-114)	EPA 1668C_2010	1
2,3',4,4',5-Pentachlorobiphenyl (BZ-118)	EPA 1668C_2010	1
2,3',4,4',5'-Pentachlorobiphenyl (BZ-123)	EPA 1668C_2010	1
2,3,4,4'-Tetrachlorobiphenyl (BZ-60)	EPA 1668C_2010	1
2,3',4,4'-Tetrachlorobiphenyl (BZ-66)	EPA 1668C_2010	1
2,3',4,5,5'-Pentachlorobiphenyl (BZ-120)	EPA 1668C_2010	1
2,3',4',5,5'-Pentachlorobiphenyl (BZ-124)	EPA 1668C_2010	1
2,3,4,5-Tetrachlorobiphenyl (BZ-61)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,3,4',5-Tetrachlorobiphenyl (BZ-63)	EPA 1668C_2010	1
2,3',4,5'-Tetrachlorobiphenyl (BZ-68)	EPA 1668C_2010	1
2,3',4',5-Tetrachlorobiphenyl (BZ-70)	EPA 1668C_2010	1
2,3',4',5'-Tetrachlorobiphenyl (BZ-76)	EPA 1668C_2010	1
2,3',4,5-Tetrachlorobiphenyl (BZ-67)	EPA 1668C_2010	1
2,3,4,6-Tetrachlorobiphenyl (BZ-62)	EPA 1668C_2010	1
2,3',4',6-Tetrachlorobiphenyl (BZ-71)	EPA 1668C_2010	1
2,3,4-Trichlorobiphenyl (BZ-21)	EPA 1668C_2010	1
2,3,4'-Trichlorobiphenyl (BZ-22)	EPA 1668C_2010	1
2,3',4-Trichlorobiphenyl (BZ-25)	EPA 1668C_2010	1
2,3',5',6-Tetrachlorobiphenyl (BZ-73)	EPA 1668C_2010	1
2,3,5-Trichlorobiphenyl (BZ-23)	EPA 1668C_2010	1
2,3',5-Trichlorobiphenyl (BZ-26)	EPA 1668C_2010	1
2,3',5'-Trichlorobiphenyl (BZ-34)	EPA 1668C_2010	1
2,3,6-Trichlorobiphenyl (BZ-24)	EPA 1668C_2010	1
2,3',6-Trichlorobiphenyl (BZ-27)	EPA 1668C_2010	1
2,3'-Dichlorobiphenyl (BZ-6)	EPA 1668C_2010	1
2,4,4',5-Tetrachlorobiphenyl (BZ-74)	EPA 1668C_2010	1
2,4,4'-Trichlorobiphenyl (BZ-28)	EPA 1668C_2010	1
2,4,5-Trichlorobiphenyl (BZ-29)	EPA 1668C_2010	1
2,4',5-Trichlorobiphenyl (BZ-31)	EPA 1668C_2010	1
2,4,6-Trichlorobiphenyl (BZ-30)	EPA 1668C_2010	1
2,4',6-Trichlorobiphenyl (BZ-32)	EPA 1668C_2010	1
2,4-Dichlorobiphenyl (BZ-7)	EPA 1668C_2010	1
2,5-Dichlorobiphenyl (BZ-9)	EPA 1668C_2010	1
2,6-Dichlorobiphenyl (BZ-10)	EPA 1668C_2010	1
2-Chlorobiphenyl (BZ-1)	EPA 1668C_2010	1
3,3',4,4',5,5'-Hexachlorobiphenyl (BZ-169)	EPA 1668C_2010	1
3,3',4,4',5-Pentachlorobiphenyl (BZ-126)	EPA 1668C_2010	1
3,3',4,4'-Tetrachlorobiphenyl (BZ-77)	EPA 1668C_2010	1
3,3',4,5-Tetrachlorobiphenyl (BZ-78)	EPA 1668C_2010	1
3,3',4,5'-Tetrachlorobiphenyl (BZ-79)	EPA 1668C_2010	1
3,3',4-Trichlorobiphenyl (BZ-35)	EPA 1668C_2010	1
3,3',5,5'-Tetrachlorobiphenyl (BZ-80)	EPA 1668C_2010	1
3,3',5-Trichlorobiphenyl (BZ-36)	EPA 1668C_2010	1
3,3'-Dichlorobiphenyl (BZ-11)	EPA 1668C_2010	1
3,4,4',5-Tetrachlorobiphenyl (BZ-81)	EPA 1668C_2010	1

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Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
3,4,4'-Trichlorobiphenyl (BZ-37)	EPA 1668C_2010	1
3,4,5-Trichlorobiphenyl (BZ-38)	EPA 1668C_2010	1
3,4',5-Trichlorobiphenyl (BZ-39)	EPA 1668C_2010	1
3,5-Dichlorobiphenyl (BZ-14)	EPA 1668C_2010	1
3-Chlorobiphenyl (BZ-2)	EPA 1668C_2010	1
4,4'-Dichlorobiphenyl (BZ-15)	EPA 1668C_2010	1
4-Chlorobiphenyl (BZ-3)	EPA 1668C_2010	1
Coelution - Dichlorobiphenyls (BZ-12-+13)	EPA 1668C_2010	1
Coelution-Dichlorobiphenyl (BZ-5 + BZ-8)	EPA 1668C_2010	1
Coelution-Heptachlorobiphenyls (BZ-182+BZ-187)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-128+BZ-162)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-131+BZ-133)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-132+161)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-136+BZ-148)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-139+BZ-149)	EPA 1668C_2010	1
Coelution-Hexachlorobiphenyls (BZ-163+BZ-164)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyl (BZ-105 + BZ-127)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-107+BZ-108)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-112+BZ-119)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-116+BZ-125)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-84+BZ-121)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-86+BZ-97+BZ-117)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-87+BZ-115)	EPA 1668C_2010	1
Coelution-Pentachlorobiphenyls (BZ-93+BZ-98+BZ-102)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-47+BZ-48)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-52+BZ-69)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-64+BZ-72)	EPA 1668C_2010	1
Coelution-Tetrachlorobiphenyls (BZ-65+BZ-75)	EPA 1668C_2010	1
Coelution-Trichlorobiphenyls (BZ-20+BZ-33)	EPA 1668C_2010	1
Decachlorobiphenyl (BZ-209)	EPA 1668C_2010	1
Total Dichlorobiphenyls	EPA 1668C_2010	1
Total Heptachlorobiphenyls	EPA 1668C_2010	1
Total Hexachlorobiphenyls	EPA 1668C_2010	1
Total Monochlorobiphenyls	EPA 1668C_2010	1
Total Nonachlorobiphenyls	EPA 1668C_2010	1
Total Octachlorobiphenyls	EPA 1668C_2010	1
Total Pentachlorobiphenyls	EPA 1668C_2010	1

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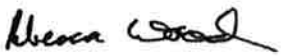
Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Total Tetrachlorobiphenyls	EPA 1668C_2010	1
Total Trichlorobiphenyls	EPA 1668C_2010	1
Tributyltin	PRL SOP LAB04	1,2

Accredited Parameter Note Detail

(1) Accreditation based in part on recognition of Canadian Association for Laboratory Accreditation. (2) Accrediltation is limited to liquid matrix only.



Authentication Signature
Rebecca Wood, Lab Accreditation Unit Supervisor

04/03/2024

Date

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ATTACHMENT 4

Pacific Rim Laboratories Analytical Method Summaries for Environmental Protection Agency Methods 1668 and 1614

MDL Study

Method	PCB
SOP	LAB-02
Matrix	Water
Analysts:	Catrin Jones (Sample extraction steps 13.4, 13.8.1-13.8.2, 13.9)
	Matt Wright (Instrumental analysis steps 13.10)
Date:	12-Jul-25

Method: Three sets of eight/nine 1 L water samples were spiked in varying combinations with 20 picograms each of 209 individual PCBs. The spiked samples plus one matrix blank was carried through the extraction procedure as documented in the SOP.

Desired Results:

- To validate an MDL of for each individual PCB.

Data

Analyte	PCB #	n	t	Average	Stdev (s)	MDL (ts)
				pg/L	pg/L	pg/L
2-MoCB	1	8	2.996	25.1	2.00	**6.0**
3-MoCB	2	8	2.996	22.1	3.41	**10**
4-MoCB	3	8	2.996	21.8	3.01	**9.0**
2,2'-DiCB	4	8	2.996	24.7	3.22	**9.6**
2,3-DiCB	5	8	2.996	21.3	2.46	**7.1**
2,3'-DiCB	6	8	2.996	20.0	2.63	**7.9**
2,4-DiCB	7	8	2.996	17.6	1.63	**4.7**
2,4'-DiCB	8	8	2.996	21.2	2.97	**8.9**
2,5-DiCB	9	8	2.996	23.2	4.13	**12**
2,6-DiCB	10	8	2.996	22.9	3.30	**9.6**
3,3'-DiCB	11	8	2.996	27.9	5.89	**18**
3,4-DiCB	12	8	2.996	20.8	2.72	**7.9**
3,4'-DiCB	13	9	2.896	21.9	1.59	**4.6**
3,5-DiCB	14	9	2.896	21.5	1.69	**4.9**
4,4'-DiCB	15	9	2.896	21.8	2.24	**6.5**
2,2',3-TriCB	16	8	2.996	13.9	1.90	**5.7**
2,2',4-TriCB	17	8	2.996	15.3	3.07	**9.2**
2,2',5-TriCB	18	8	2.996	21.4	1.98	**5.9**
2,2',6-TriCB	19	9	2.896	19.7	1.46	**4.2**
2,3,3'-TriCB	20	8	2.996	16.3	3.48	**10**
2,3,4-TriCB	21	8	2.996	17.5	2.55	**7.6**
2,3,4'-TriCB	22	9	2.896	19.1	2.11	**6.1**
2,3,5-TriCB	23	8	2.996	14.8	1.94	**5.6**
2,3,6-TriCB	24	8	2.996	14.7	2.52	**7.5**

2,3',4-TriCB	25	8	2.996	18.1	2.24	**6.5**
2,3',5-TriCB	26	8	2.996	15.8	2.21	**6.4**
2,3',6-TriCB	27	9	2.896	19.6	2.76	**8.0**
3,4',5-TriCB	28	8	2.996	14.9	2.72	**8.2**
2,4,5-TriCB	29	9	2.896	17.1	1.87	**5.4**
2,4,6-TriCB	30	8	2.996	15.9	1.94	**5.6**
2,4',5-TriCB	31	8	2.996	19.1	3.02	**8.7**
2,4',6-TriCB	32	8	2.996	19.2	3.25	**9.4**
2,3',4'-TriCB	33	8	2.996	19.2	2.36	**6.8**
2,3',5'-TriCB	34	9	2.896	19.8	2.78	**8.1**
3,3',4-TriCB	35	9	2.896	19.9	2.37	**6.9**
3,3',5-TriCB	36	8	2.996	16.1	1.79	**5.4**
3,4,4'-TriCB	37	8	2.996	18.0	2.06	**6.0**
3,4,5-TriCB	38	8	2.996	17.3	2.34	**7.0**
2,4,4'-TriCB	39	9	2.896	20.1	1.55	**4.5**
2,2',3,3'-TeCB	40	9	2.896	21.6	2.90	**8.4**
2,2',3,4-TeCB	41	8	2.996	18.9	2.80	**8.1**
2,2',3,4'-TeCB	42	9	2.896	19.8	2.78	**8.1**
2,2',3,5-TeCB*	43	8	2.996	25.6	2.60	**7.5**
2,2',3,5'-TeCB	44	8	2.996	20.4	3.49	**10**
2,2',3,6-TeCB	45	8	2.996	19.9	2.23	**6.5**
2,2',3,6'-TeCB	46	8	2.996	17.7	1.74	**5.1**
2,2',4,4'-TeCB	47	9	2.896	23.9	1.77	**5.1**
2,2',4,5-TeCB	48	8	2.996	17.9	2.03	**5.9**
2,2',4,5'-TeCB*	49	8	2.996	25.6	2.60	**7.5**
2,2',4,6-TeCB	50	8	2.996	17.8	2.05	**6.1**
2,2',4,6'-TeCB	51	9	2.896	20.9	2.59	**7.5**
2,2',5,5'-TeCB	52	8	2.996	19.6	2.03	**6.1**
2,2',5,6'-TeCB	53	9	2.896	18.9	2.66	**7.7**
2,2',6,6'-TeCB	54	9	2.896	21.7	1.49	**4.3**
2,3,3',4-TeCB	55	8	2.996	22.0	2.94	**8.5**
2,3,3',4'-TeCB	56	8	2.996	18.8	2.31	**6.9**
2,3,3',5-TeCB	57	8	2.996	18.7	2.56	**7.7**
2,3,3',5'-TeCB*	58	8	2.996	27.4	4.31	**12**
2,3,3',6-TeCB	59	8	2.996	15.1	1.61	**4.7**
2,3,4,4'-TeCB	60	8	2.996	24.3	2.35	**6.8**
2,3,4,5-TeCB	61	8	2.996	17.8	2.59	**7.8**
2,3,4,6-TeCB	62	9	2.896	21.7	3.17	**9.2**
2,3,4',5-TeCB*	63	8	2.996	27.4	4.31	**12**
2,3,4',6-TeCB	64	8	2.996	19.0	2.56	**7.4**
2,3,5,6-TeCB	65	8	2.996	19.3	3.52	**10**
2,3',4,4'-TeCB	66	8	2.996	20.7	2.41	**7.2**
2,3',4,5-TeCB	67	8	2.996	16.5	1.42	**4.2**
2,3',4,5'-TeCB	68	9	2.896	21.5	2.33	**6.8**

2,3',4,6-TeCB	69	9	2.896	24.1	2.77	**8.0**
2,3',4',5-TeCB	70	8	2.996	23.1	3.14	**9.1**
2,3',4',6-TeCB	71	8	2.996	20.4	2.09	**6.2**
2,3',5,5'-TeCB	72	8	2.996	22.8	3.12	**9.4**
2,3',5',6-TeCB	73	9	2.896	22.2	2.55	**7.4**
2,4,4',5-TeCB	74	8	2.996	22.9	1.86	**5.6**
2,4,4',6-TeCB	75	9	2.896	22.3	2.01	**5.8**
2,3',4',5'-TeCB	76	8	2.996	19.6	2.29	**6.6**
3,3',4,4'-TeCB	77	8	2.996	19.2	2.01	**5.8**
3,3',4,5-TeCB	78	8	2.996	22.9	2.97	**8.9**
3,3',4,5'-TeCB	79	8	2.996	20.3	2.53	**7.6**
3,3',5,5'-TeCB	80	9	2.896	23.9	1.99	**5.8**
3,4,4',5-TeCB	81	9	2.896	18.9	2.49	**7.2**
2,2',3,3',4-PeCB	82	8	2.996	21.6	2.92	**8.8**
2,2',3,3',5-PeCB	83	8	2.996	18.5	2.92	**8.5**
2,2',3,3',6-PeCB	84	8	2.996	24.7	2.10	**6.1**
2,2',3,4,4'-PeCB	85	8	2.996	24.7	3.70	**11**
2,2',3,4,5-PeCB	86	8	2.996	21.7	2.97	**8.9**
2,2',3,4,5'-PeCB	87	8	2.996	20.0	3.31	**9.9**
2,2',3,4,6-PeCB	88	9	2.896	22.3	2.85	**8.2**
2,2',3,4,6'-PeCB	89	8	2.996	22.9	4.09	**12**
2,2',3,4',5-PeCB	90	9	2.896	17.7	1.87	**5.4**
2,2',3,4',6-PeCB	91	8	2.996	20.6	2.00	**5.8**
2,2',3,5,5'-PeCB	92	9	2.896	19.5	2.71	**7.9**
2,2',3,5,6-PeCB	93	9	2.896	19.2	2.55	**7.4**
2,2',3,5,6'-PeCB	94	9	2.896	19.0	2.26	**6.6**
2,2',3,5',6-PeCB	95	8	2.996	25.5	2.26	**6.5**
2,2',3,6,6'-PeCB	96	8	2.996	18.1	2.81	**8.4**
2,2',3,4',5'-PeCB	97	8	2.996	19.9	2.31	**6.7**
2,2',3,4',6'-PeCB*	98	8	2.996	42.0	2.79	**8.4**
2,2',4,4',5-PeCB	99	8	2.996	19.4	2.77	**8.3**
2,2',4,4',6-PeCB	100	9	2.896	17.0	2.17	**6.3**
2,2',4,5,5'-PeCB	101	9	2.896	16.9	2.05	**5.9**
2,2',4,5,6'-PeCB*	102	8	2.996	42.0	2.79	**8.4**
2,2',4,5',6-PeCB	103	8	2.996	21.0	2.78	**8.1**
2,2',4,6,6'-PeCB	104	8	2.996	18.2	2.23	**6.5**
2,3,3',4,4'-PeCB	105	9	2.896	22.5	2.66	**7.7**
2,3,3',4,5-PeCB	106	8	2.996	23.3	1.79	**5.4**
2,3,3',4',5-PeCB	107	8	2.996	21.0	2.44	**7.1**
2,3,3',4,5'-PeCB	108	8	2.996	20.0	3.40	**10**
2,3,3',4,6-PeCB	109	8	2.996	21.9	3.17	**9.2**
2,3,3',4',6-PeCB	110	8	2.996	24.8	1.74	**5.2**
2,3,3',5,5'-PeCB	111	9	2.896	18.2	2.69	**7.8**
2,3,3',5,6-PeCB	112	8	2.996	21.5	3.63	**10**

2,3,3',5',6-PeCB	113	8	2.996	20.5	2.27	**6.6**
2,3,4,4',5-PeCB	114	8	2.996	21.8	2.39	**6.9**
2,3,4,4',6-PeCB	115	9	2.896	21.4	2.55	**7.4**
2,3,4,5,6-PeCB	116	9	2.896	22.3	2.24	**6.5**
2,3,4',5,6-PeCB	117	9	2.896	23.7	1.73	**5.0**
2,3',4,4',5-PeCB	118	8	2.996	18.7	2.86	**8.6**
2,3',4,4',6-PeCB	119	9	2.896	18.4	1.91	**5.5**
2,3',4,5,5'-PeCB	120	8	2.996	26.3	4.04	**12**
2,3',4,5',6-PeCB	121	9	2.896	17.3	2.15	**6.2**
2,3,3',4',5'-PeCB	122	9	2.896	22.0	2.14	**6.2**
2,3',4,4',5'-PeCB	123	8	2.996	19.6	2.63	**7.6**
2,3',4',5,5'-PeCB	124	9	2.896	21.8	2.48	**7.2**
2,3',4',5',6-PeCB	125	9	2.896	21.4	2.55	**7.4**
3,3',4,4',5-PeCB	126	8	2.996	20.0	1.62	**4.9**
3,3',4,5,5'-PeCB	127	8	2.996	17.6	1.83	**5.5**
2,2',3,3',4,4'-HxCB	128	9	2.896	22.5	2.95	**8.5**
2,2',3,3',4,5-HxCB	129	8	2.996	16.9	1.63	**4.7**
2,2',3,3',4,5'-HxCB	130	9	2.896	21.4	2.04	**5.9**
2,2',3,3',4,6-HxCB	131	8	2.996	19.7	2.00	**5.8**
2,2',3,3',4,6'-HxCB	132	8	2.996	17.3	2.00	**5.8**
2,2',3,3',5,5'-HxCB	133	8	2.996	19.6	2.93	**8.8**
2,2',3,3',5,6-HxCB	134	9	2.896	23.5	1.88	**5.4**
2,2',3,3',5,6'-HxCB	135	8	2.996	18.2	3.13	**9.1**
2,2',3,3',6,6'-HxCB	136	9	2.896	17.5	3.30	**9.6**
2,2',3,4,4',5-HxCB	137	8	2.996	16.3	1.22	**3.5**
2,2',3,4,4',5'-HxCB	138	8	2.996	25.1	2.18	**6.5**
2,2',3,4,4',6-HxCB	139	8	2.996	20.5	2.52	**7.6**
2,2',3,4,4',6'-HxCB	140	9	2.896	21.2	3.04	**8.8**
2,2',3,4,5,5'-HxCB	141	8	2.996	15.2	1.69	**4.9**
2,2',3,4,5,6-HxCB	142	9	2.896	22.6	2.25	**6.5**
2,2',3,4,5,6'-HxCB	143	9	2.896	24.4	2.64	**7.6**
2,2',3,4,5',6-HxCB	144	9	2.896	17.5	2.21	**6.4**
2,2',3,4,6,6'-HxCB	145	8	2.996	16.5	1.84	**5.5**
2,2',3,4',5,5'-HxCB	146	8	2.996	20.9	2.28	**6.8**
2,2',3,4',5,6-HxCB	147	8	2.996	14.7	3.09	**9.3**
2,2',3,4',5,6'-HxCB	148	9	2.896	19.7	2.66	**7.7**
2,2',3,4',5',6-HxCB	149	8	2.996	17.1	3.11	**9.0**
2,2',3,4',6,6'-HxCB	150	9	2.896	18.7	1.88	**5.4**
2,2',3,5,5',6-HxCB	151	9	2.896	18.8	2.68	**7.8**
2,2',3,5,6,6'-HxCB	152	8	2.996	17.7	2.70	**8.1**
2,2',4,4',5,5'-HxCB	153	8	2.996	16.1	2.48	**7.4**
2,2',4,4',5,6'-HxCB	154	9	2.896	15.0	1.13	**3.3**
2,2',4,4',6,6'-HxCB	155	9	2.896	17.2	1.74	**5.0**
2,3,3',4,4',5-HxCB	156	8	2.996	22.2	2.28	**6.6**

2,3,3',4,4',5'-HxCB	157	9	2.896	23.7	2.42	**7.0**
2,3,3',4,4',6-HxCB	158	9	2.896	21.9	2.31	**6.7**
2,3,3',4,5,5'-HxCB	159	8	2.996	18.7	2.20	**6.4**
2,3,3',4,5,6-HxCB	160	9	2.896	24.6	2.71	**7.8**
2,3,3',4,5',6-HxCB	161	8	2.996	19.0	2.66	**8.0**
2,3,3',4',5,5'-HxCB	162	9	2.896	22.4	2.29	**6.6**
2,3,3',4',5,6-HxCB	163	9	2.896	21.3	2.22	**6.4**
2,3,3',4',5',6-HxCB	164	8	2.996	18.2	2.09	**6.1**
2,3,3',5,5',6-HxCB	165	9	2.896	23.5	2.71	**7.9**
2,3,4,4',5,6-HxCB	166	8	2.996	20.5	2.77	**8.3**
2,3',4,4',5,5'-HxCB	167	8	2.996	20.8	1.80	**5.2**
2,3',4,4',5',6-HxCB	168	9	2.896	24.6	1.71	**5.0**
3,3',4,4',5,5'-HxCB	169	8	2.996	23.2	2.72	**8.1**
2,2',3,3',4,4',5-HpCB	170	8	2.996	21.2	2.49	**7.2**
2,2',3,3',4,4',6-HpCB	171	8	2.996	19.8	2.23	**6.5**
2,2',3,3',4,5,5'-HpCB	172	8	2.996	19.5	3.04	**8.8**
2,2',3,3',4,5,6-HpCB	173	8	2.996	17.6	3.17	**9.5**
2,2',3,3',4,5,6'-HpCB	174	8	2.996	16.9	2.19	**6.6**
2,2',3,3',4,5',6-HpCB	175	9	2.896	16.8	2.33	**6.7**
2,2',3,3',4,6,6'-HpCB	176	8	2.996	16.7	1.80	**5.2**
2,2',3,3',4,5',6'-HpCB	177	8	2.996	18.0	4.12	**12**
2,2',3,3',5,5',6-HpCB	178	8	2.996	19.0	2.30	**6.7**
2,2',3,3',5,6,6'-HpCB	179	8	2.996	15.7	2.58	**7.7**
2,2',3,4,4',5,5'-HpCB	180	8	2.996	23.6	2.91	**8.7**
2,2',3,4,4',5,6-HpCB	181	8	2.996	18.0	1.95	**5.8**
2,2',3,4,4',5,6'-HpCB*	182	8	2.996	35.9	5.60	**17**
2,2',3,4,4',5',6-HpCB	183	8	2.996	17.3	2.05	**5.9**
2,2',3,4,4',6,6'-HpCB	184	8	2.996	15.8	2.75	**8.2**
2,2',3,4,5,5',6-HpCB	185	8	2.996	18.1	2.47	**7.1**
2,2',3,4,5,6,6'-HpCB	186	8	2.996	16.8	3.28	**9.5**
2,2',3,4',5,5',6-HpCB*	187	8	2.996	35.9	5.60	**17**
2,2',3,4',5,6,6'-HpCB	188	9	2.896	19.0	2.64	**7.6**
2,3,3',4,4',5,5'-HpCB	189	8	2.996	19.4	2.71	**7.8**
2,3,3',4,4',5,6-HpCB	190	9	2.896	15.8	1.94	**5.6**
2,3,3',4,4',5',6-HpCB	191	9	2.896	16.4	2.05	**5.9**
2,3,3',4,5,5',6-HpCB	192	8	2.996	18.0	2.62	**7.6**
2,3,3',4',5,5',6-HpCB	193	8	2.996	17.2	2.15	**6.2**
2,2',3,3',4,4',5,5'-OcCB	194	8	2.996	23.6	2.70	**8.1**
2,2',3,3',4,4',5,6-OcCB	195	8	2.996	19.1	2.50	**7.3**
2,2',3,3',4,4',5,6'-OcCB	196	8	2.996	18.0	2.64	**7.6**
2,2',3,3',4,4',6,6'-OcCB	197	8	2.996	23.0	1.60	**4.6**
2,2',3,3',4,5,5',6-OcCB	198	8	2.996	17.6	2.86	**8.6**
2,2',3,3',4,5,5',6'-OcCB	199	9	2.896	15.2	2.52	**7.3**
2,2',3,3',4,5,6,6'-OcCB	200	9	2.896	16.5	2.28	**6.6**

2,2',3,3',4,5',6,6'-OcCB	201	9	2.896	17.3	2.13	**6.2**
2,2',3,3',5,5',6,6'-OcCB	202	8	2.996	17.2	2.25	**6.7**
2,2',3,4,4',5,5',6-OcCB	203	8	2.996	15.6	3.12	**9.4**
2,2',3,4,4',5,6,6'-OcCB	204	8	2.996	22.7	2.71	**7.8**
2,3,3',4,4',5,5',6-OcCB	205	8	2.996	22.0	1.62	**4.9**
2,2',3,3',4,4',5,5',6-NoCB	206	9	2.896	23.3	2.03	**5.9**
2,2',3,3',4,4',5,6,6'-NoCB	207	9	2.896	22.4	2.20	**6.4**
2,2',3,3',4,5,5',6,6'-NoCB	208	9	2.896	18.3	2.37	**6.9**
2,2',3,3',4,4',5,5',6,6'-DeCB	209	8	2.996	22.9	2.01	**6.0**

- * - co-elution

Conclusions: An MDL of 10 pg/L or better has been achieved for all analytes except PCB009, 011, 058, 063, 085, 089, 120, 177, 182, and PCB187. This data meets criteria for an acceptable MDL.

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Authorized

MDL Study

Method	PCB
SOP	LAB-02
Matrix	Water
Analysts:	Catrin Jones (Sample extraction steps 13.4, 13.8.1-13.8.2, 13.9)
	Matt Wright (Instrumental analysis steps 13.10)
Date:	12-Jul-25

Method: Three sets of eight/nine 1 L water samples were spiked in varying combinations with 20 picograms each of 209 individual PCBs. The spiked samples plus one matrix blank was carried through the extraction procedure as documented in the SOP.

Desired Results:

- To validate an MDL of for each individual PCB.

Data

Analyte	PCB #	Average	Stdev (s)	MDL (ts)	LOQ
		pg/L	pg/L	pg/L	pg/L
2-MoCB	1	25.1	2.00	**6.0**	**20**
3-MoCB	2	22.1	3.41	**10**	**20**
4-MoCB	3	21.8	3.01	**9.0**	**20**
2,2'-DiCB	4	24.7	3.22	**9.6**	**20**
2,3-DiCB	5	21.3	2.46	**7.1**	**20**
2,3'-DiCB	6	20.0	2.63	**7.9**	**20**
2,4-DiCB	7	17.6	1.63	**4.7**	**20**
2,4'-DiCB	8	21.2	2.97	**8.9**	**20**
2,5-DiCB	9	23.2	4.13	**12**	**20**
2,6-DiCB	10	22.9	3.30	**9.6**	**20**
3,3'-DiCB	11	27.9	5.89	**18**	**20**
3,4-DiCB	12	20.8	2.72	**7.9**	**20**
3,4'-DiCB	13	21.9	1.59	**4.6**	**20**
3,5-DiCB	14	21.5	1.69	**4.9**	**20**
4,4'-DiCB	15	21.8	2.24	**6.5**	**20**
2,2',3-TriCB	16	13.9	1.90	**5.7**	**20**
2,2',4-TriCB	17	15.3	3.07	**9.2**	**20**
2,2',5-TriCB	18	21.4	1.98	**5.9**	**20**
2,2',6-TriCB	19	19.7	1.46	**4.2**	**20**
2,3,3'-TriCB	20	16.3	3.48	**10**	**20**
2,3,4-TriCB	21	17.5	2.55	**7.6**	**20**
2,3,4'-TriCB	22	19.1	2.11	**6.1**	**20**
2,3,5-TriCB	23	14.8	1.94	**5.6**	**20**
2,3,6-TriCB	24	14.7	2.52	**7.5**	**20**

2,3',4-TriCB	25	18.1	2.24	**6.5**	**20**
2,3',5-TriCB	26	15.8	2.21	**6.4**	**20**
2,3',6-TriCB	27	19.6	2.76	**8.0**	**20**
3,4',5-TriCB	28	14.9	2.72	**8.2**	**20**
2,4,5-TriCB	29	17.1	1.87	**5.4**	**20**
2,4,6-TriCB	30	15.9	1.94	**5.6**	**20**
2,4',5-TriCB	31	19.1	3.02	**8.7**	**20**
2,4',6-TriCB	32	19.2	3.25	**9.4**	**20**
2,3',4'-TriCB	33	19.2	2.36	**6.8**	**20**
2,3',5'-TriCB	34	19.8	2.78	**8.1**	**20**
3,3',4-TriCB	35	19.9	2.37	**6.9**	**20**
3,3',5-TriCB	36	16.1	1.79	**5.4**	**20**
3,4,4'-TriCB	37	18.0	2.06	**6.0**	**20**
3,4,5-TriCB	38	17.3	2.34	**7.0**	**20**
2,4,4'-TriCB	39	20.1	1.55	**4.5**	**20**
2,2',3,3'-TeCB	40	21.6	2.90	**8.4**	**20**
2,2',3,4-TeCB	41	18.9	2.80	**8.1**	**20**
2,2',3,4'-TeCB	42	19.8	2.78	**8.1**	**20**
2,2',3,5-TeCB*	43	25.6	2.60	**7.5**	**20**
2,2',3,5'-TeCB	44	20.4	3.49	**10**	**20**
2,2',3,6-TeCB	45	19.9	2.23	**6.5**	**20**
2,2',3,6'-TeCB	46	17.7	1.74	**5.1**	**20**
2,2',4,4'-TeCB	47	23.9	1.77	**5.1**	**20**
2,2',4,5-TeCB	48	17.9	2.03	**5.9**	**20**
2,2',4,5'-TeCB*	49	25.6	2.60	**7.5**	**20**
2,2',4,6-TeCB	50	17.8	2.05	**6.1**	**20**
2,2',4,6'-TeCB	51	20.9	2.59	**7.5**	**20**
2,2',5,5'-TeCB	52	19.6	2.03	**6.1**	**20**
2,2',5,6'-TeCB	53	18.9	2.66	**7.7**	**20**
2,2',6,6'-TeCB	54	21.7	1.49	**4.3**	**20**
2,3,3',4-TeCB	55	22.0	2.94	**8.5**	**20**
2,3,3',4'-TeCB	56	18.8	2.31	**6.9**	**20**
2,3,3',5-TeCB	57	18.7	2.56	**7.7**	**20**
2,3,3',5'-TeCB*	58	27.4	4.31	**12**	**20**
2,3,3',6-TeCB	59	15.1	1.61	**4.7**	**20**
2,3,4,4'-TeCB	60	24.3	2.35	**6.8**	**20**
2,3,4,5-TeCB	61	17.8	2.59	**7.8**	**20**
2,3,4,6-TeCB	62	21.7	3.17	**9.2**	**20**
2,3,4',5-TeCB*	63	27.4	4.31	**12**	**20**
2,3,4',6-TeCB	64	19.0	2.56	**7.4**	**20**
2,3,5,6-TeCB	65	19.3	3.52	**10**	**20**
2,3',4,4'-TeCB	66	20.7	2.41	**7.2**	**20**
2,3',4,5-TeCB	67	16.5	1.42	**4.2**	**20**
2,3',4,5'-TeCB	68	21.5	2.33	**6.8**	**20**

2,3',4,6-TeCB	69	24.1	2.77	**8.0**	**20**
2,3',4',5-TeCB	70	23.1	3.14	**9.1**	**20**
2,3',4',6-TeCB	71	20.4	2.09	**6.2**	**20**
2,3',5,5'-TeCB	72	22.8	3.12	**9.4**	**20**
2,3',5',6-TeCB	73	22.2	2.55	**7.4**	**20**
2,4,4',5-TeCB	74	22.9	1.86	**5.6**	**20**
2,4,4',6-TeCB	75	22.3	2.01	**5.8**	**20**
2,3',4',5'-TeCB	76	19.6	2.29	**6.6**	**20**
3,3',4,4'-TeCB	77	19.2	2.01	**5.8**	**20**
3,3',4,5-TeCB	78	22.9	2.97	**8.9**	**20**
3,3',4,5'-TeCB	79	20.3	2.53	**7.6**	**20**
3,3',5,5'-TeCB	80	23.9	1.99	**5.8**	**20**
3,4,4',5-TeCB	81	18.9	2.49	**7.2**	**20**
2,2',3,3',4-PeCB	82	21.6	2.92	**8.8**	**20**
2,2',3,3',5-PeCB	83	18.5	2.92	**8.5**	**20**
2,2',3,3',6-PeCB	84	24.7	2.10	**6.1**	**20**
2,2',3,4,4'-PeCB	85	24.7	3.70	**11**	**20**
2,2',3,4,5-PeCB	86	21.7	2.97	**8.9**	**20**
2,2',3,4,5'-PeCB	87	20.0	3.31	**9.9**	**20**
2,2',3,4,6-PeCB	88	22.3	2.85	**8.2**	**20**
2,2',3,4,6'-PeCB	89	22.9	4.09	**12**	**20**
2,2',3,4',5-PeCB	90	17.7	1.87	**5.4**	**20**
2,2',3,4',6-PeCB	91	20.6	2.00	**5.8**	**20**
2,2',3,5,5'-PeCB	92	19.5	2.71	**7.9**	**20**
2,2',3,5,6-PeCB	93	19.2	2.55	**7.4**	**20**
2,2',3,5,6'-PeCB	94	19.0	2.26	**6.6**	**20**
2,2',3,5',6-PeCB	95	25.5	2.26	**6.5**	**20**
2,2',3,6,6'-PeCB	96	18.1	2.81	**8.4**	**20**
2,2',3,4',5'-PeCB	97	19.9	2.31	**6.7**	**20**
2,2',3,4',6'-PeCB*	98	42.0	2.79	**8.4**	**20**
2,2',4,4',5-PeCB	99	19.4	2.77	**8.3**	**20**
2,2',4,4',6-PeCB	100	17.0	2.17	**6.3**	**20**
2,2',4,5,5'-PeCB	101	16.9	2.05	**5.9**	**20**
2,2',4,5,6'-PeCB*	102	42.0	2.79	**8.4**	**20**
2,2',4,5',6-PeCB	103	21.0	2.78	**8.1**	**20**
2,2',4,6,6'-PeCB	104	18.2	2.23	**6.5**	**20**
2,3,3',4,4'-PeCB	105	22.5	2.66	**7.7**	**20**
2,3,3',4,5-PeCB	106	23.3	1.79	**5.4**	**20**
2,3,3',4',5-PeCB	107	21.0	2.44	**7.1**	**20**
2,3,3',4,5'-PeCB	108	20.0	3.40	**10**	**20**
2,3,3',4,6-PeCB	109	21.9	3.17	**9.2**	**20**
2,3,3',4',6-PeCB	110	24.8	1.74	**5.2**	**20**
2,3,3',5,5'-PeCB	111	18.2	2.69	**7.8**	**20**
2,3,3',5,6-PeCB	112	21.5	3.63	**10**	**20**

2,3,3',5',6-PeCB	113	20.5	2.27	**6.6**	**20**
2,3,4,4',5-PeCB	114	21.8	2.39	**6.9**	**20**
2,3,4,4',6-PeCB	115	21.4	2.55	**7.4**	**20**
2,3,4,5,6-PeCB	116	22.3	2.24	**6.5**	**20**
2,3,4',5,6-PeCB	117	23.7	1.73	**5.0**	**20**
2,3',4,4',5-PeCB	118	18.7	2.86	**8.6**	**20**
2,3',4,4',6-PeCB	119	18.4	1.91	**5.5**	**20**
2,3',4,5,5'-PeCB	120	26.3	4.04	**12**	**20**
2,3',4,5',6-PeCB	121	17.3	2.15	**6.2**	**20**
2,3,3',4',5'-PeCB	122	22.0	2.14	**6.2**	**20**
2,3',4,4',5'-PeCB	123	19.6	2.63	**7.6**	**20**
2,3',4',5,5'-PeCB	124	21.8	2.48	**7.2**	**20**
2,3',4',5',6-PeCB	125	21.4	2.55	**7.4**	**20**
3,3',4,4',5-PeCB	126	20.0	1.62	**4.9**	**20**
3,3',4,5,5'-PeCB	127	17.6	1.83	**5.5**	**20**
2,2',3,3',4,4'-HxCB	128	22.5	2.95	**8.5**	**20**
2,2',3,3',4,5-HxCB	129	16.9	1.63	**4.7**	**20**
2,2',3,3',4,5'-HxCB	130	21.4	2.04	**5.9**	**20**
2,2',3,3',4,6-HxCB	131	19.7	2.00	**5.8**	**20**
2,2',3,3',4,6'-HxCB	132	17.3	2.00	**5.8**	**20**
2,2',3,3',5,5'-HxCB	133	19.6	2.93	**8.8**	**20**
2,2',3,3',5,6-HxCB	134	23.5	1.88	**5.4**	**20**
2,2',3,3',5,6'-HxCB	135	18.2	3.13	**9.1**	**20**
2,2',3,3',6,6'-HxCB	136	17.5	3.30	**9.6**	**20**
2,2',3,4,4',5-HxCB	137	16.3	1.22	**3.5**	**20**
2,2',3,4,4',5'-HxCB	138	25.1	2.18	**6.5**	**20**
2,2',3,4,4',6-HxCB	139	20.5	2.52	**7.6**	**20**
2,2',3,4,4',6'-HxCB	140	21.2	3.04	**8.8**	**20**
2,2',3,4,5,5'-HxCB	141	15.2	1.69	**4.9**	**20**
2,2',3,4,5,6-HxCB	142	22.6	2.25	**6.5**	**20**
2,2',3,4,5,6'-HxCB	143	24.4	2.64	**7.6**	**20**
2,2',3,4,5',6-HxCB	144	17.5	2.21	**6.4**	**20**
2,2',3,4,6,6'-HxCB	145	16.5	1.84	**5.5**	**20**
2,2',3,4',5,5'-HxCB	146	20.9	2.28	**6.8**	**20**
2,2',3,4',5,6-HxCB	147	14.7	3.09	**9.3**	**20**
2,2',3,4',5,6'-HxCB	148	19.7	2.66	**7.7**	**20**
2,2',3,4',5',6-HxCB	149	17.1	3.11	**9.0**	**20**
2,2',3,4',6,6'-HxCB	150	18.7	1.88	**5.4**	**20**
2,2',3,5,5',6-HxCB	151	18.8	2.68	**7.8**	**20**
2,2',3,5,6,6'-HxCB	152	17.7	2.70	**8.1**	**20**
2,2',4,4',5,5'-HxCB	153	16.1	2.48	**7.4**	**20**
2,2',4,4',5,6'-HxCB	154	15.0	1.13	**3.3**	**20**
2,2',4,4',6,6'-HxCB	155	17.2	1.74	**5.0**	**20**
2,3,3',4,4',5-HxCB	156	22.2	2.28	**6.6**	**20**

2,3,3',4,4',5'-HxCB	157	23.7	2.42	**7.0**	**20**
2,3,3',4,4',6-HxCB	158	21.9	2.31	**6.7**	**20**
2,3,3',4,5,5'-HxCB	159	18.7	2.20	**6.4**	**20**
2,3,3',4,5,6-HxCB	160	24.6	2.71	**7.8**	**20**
2,3,3',4,5',6-HxCB	161	19.0	2.66	**8.0**	**20**
2,3,3',4',5,5'-HxCB	162	22.4	2.29	**6.6**	**20**
2,3,3',4',5,6-HxCB	163	21.3	2.22	**6.4**	**20**
2,3,3',4',5',6-HxCB	164	18.2	2.09	**6.1**	**20**
2,3,3',5,5',6-HxCB	165	23.5	2.71	**7.9**	**20**
2,3,4,4',5,6-HxCB	166	20.5	2.77	**8.3**	**20**
2,3',4,4',5,5'-HxCB	167	20.8	1.80	**5.2**	**20**
2,3',4,4',5',6-HxCB	168	24.6	1.71	**5.0**	**20**
3,3',4,4',5,5'-HxCB	169	23.2	2.72	**8.1**	**20**
2,2',3,3',4,4',5-HpCB	170	21.2	2.49	**7.2**	**20**
2,2',3,3',4,4',6-HpCB	171	19.8	2.23	**6.5**	**20**
2,2',3,3',4,5,5'-HpCB	172	19.5	3.04	**8.8**	**20**
2,2',3,3',4,5,6-HpCB	173	17.6	3.17	**9.5**	**20**
2,2',3,3',4,5,6'-HpCB	174	16.9	2.19	**6.6**	**20**
2,2',3,3',4,5',6-HpCB	175	16.8	2.33	**6.7**	**20**
2,2',3,3',4,6,6'-HpCB	176	16.7	1.80	**5.2**	**20**
2,2',3,3',4,5',6'-HpCB	177	18.0	4.12	**12**	**20**
2,2',3,3',5,5',6-HpCB	178	19.0	2.30	**6.7**	**20**
2,2',3,3',5,6,6'-HpCB	179	15.7	2.58	**7.7**	**20**
2,2',3,4,4',5,5'-HpCB	180	23.6	2.91	**8.7**	**20**
2,2',3,4,4',5,6-HpCB	181	18.0	1.95	**5.8**	**20**
2,2',3,4,4',5,6'-HpCB*	182	35.9	5.60	**17**	**20**
2,2',3,4,4',5',6-HpCB	183	17.3	2.05	**5.9**	**20**
2,2',3,4,4',6,6'-HpCB	184	15.8	2.75	**8.2**	**20**
2,2',3,4,5,5',6-HpCB	185	18.1	2.47	**7.1**	**20**
2,2',3,4,5,6,6'-HpCB	186	16.8	3.28	**9.5**	**20**
2,2',3,4',5,5',6-HpCB*	187	35.9	5.60	**17**	**20**
2,2',3,4',5,6,6'-HpCB	188	19.0	2.64	**7.6**	**20**
2,3,3',4,4',5,5'-HpCB	189	19.4	2.71	**7.8**	**20**
2,3,3',4,4',5,6-HpCB	190	15.8	1.94	**5.6**	**20**
2,3,3',4,4',5',6-HpCB	191	16.4	2.05	**5.9**	**20**
2,3,3',4,5,5',6-HpCB	192	18.0	2.62	**7.6**	**20**
2,3,3',4',5,5',6-HpCB	193	17.2	2.15	**6.2**	**20**
2,2',3,3',4,4',5,5'-OcCB	194	23.6	2.70	**8.1**	**20**
2,2',3,3',4,4',5,6-OcCB	195	19.1	2.50	**7.3**	**20**
2,2',3,3',4,4',5,6'-OcCB	196	18.0	2.64	**7.6**	**20**
2,2',3,3',4,4',6,6'-OcCB	197	23.0	1.60	**4.6**	**20**
2,2',3,3',4,5,5',6-OcCB	198	17.6	2.86	**8.6**	**20**
2,2',3,3',4,5,5',6'-OcCB	199	15.2	2.52	**7.3**	**20**
2,2',3,3',4,5,6,6'-OcCB	200	16.5	2.28	**6.6**	**20**

2,2',3,3',4,5',6,6'-OcCB	201	17.3	2.13	**6.2**	**20**
2,2',3,3',5,5',6,6'-OcCB	202	17.2	2.25	**6.7**	**20**
2,2',3,4,4',5,5',6-OcCB	203	15.6	3.12	**9.4**	**20**
2,2',3,4,4',5,6,6'-OcCB	204	22.7	2.71	**7.8**	**20**
2,3,3',4,4',5,5',6-OcCB	205	22.0	1.62	**4.9**	**20**
2,2',3,3',4,4',5,5',6-NoCB	206	23.3	2.03	**5.9**	**20**
2,2',3,3',4,4',5,6,6'-NoCB	207	22.4	2.20	**6.4**	**20**
2,2',3,3',4,5,5',6,6'-NoCB	208	18.3	2.37	**6.9**	**20**
2,2',3,3',4,4',5,5',6,6'-DeCB	209	22.9	2.01	**6.0**	**20**

- * - co-elution

Conclusions: An MDL of 10 pg/L or better has been achieved for all analytes except PCB009, 011, 058, 063, 085, 089, 120, 177, 182, and PCB187. This data meets criteria for an acceptable MDL.

Authorized

Acronyms used in reporting Polychlorinated Biphenyls (PCBs)

MoCB = Monochlorobiphenyl
DiCB = Dichlorobiphenyl
TrCB = Trichlorobiphenyl
TeCB = Tetrachlorobiphenyl
PeCB = Pentachlorobiphenyl
HxCB = Hexachlorobiphenyl
HpCB = Heptachlorobiphenyl
OcCB = Octachlorobiphenyl
NoCB = Nonachlorobiphenyl
DeCB = Decachlorobiphenyl

Acceptable recoveries for PCB Internal Standards - EPA 1668C

Chemical Name	IUPAC #	Min	Max
$^{13}C_{12}$-2-MoCB	1L	5	145
$^{13}C_{12}$-4-MoCB	3L	5	145
$^{13}C_{12}$-2,2'-DiCB	4L	5	145
$^{13}C_{12}$-4,4'-DiCB	15L	5	145
$^{13}C_{12}$-2,2',6'-TrCB	19L	5	145
$^{13}C_{12}$-3,4,4'-TrCB	37L	5	145
$^{13}C_{12}$-2,2',6,6'-TeCB	54L	5	145
$^{13}C_{12}$-3,4,4',5-TeCB	81L	10	145
$^{13}C_{12}$-3,3',4,4'-TeCB	77L	10	145
$^{13}C_{12}$-2,2',4,6,6'-PeCB	104L	10	145
$^{13}C_{12}$-2',3,4,4',5-PeCB	123L	10	145
$^{13}C_{12}$-2,3',4,4',5-PeCB	118L	10	145
$^{13}C_{12}$-2,3,4,4',5-PeCB	114L	10	145
$^{13}C_{12}$-2,3,3',4,4'-PeCB	105L	10	145
$^{13}C_{12}$-3,3',4,4',5-PeCB	126L	10	145
$^{13}C_{12}$-2,2',4,4',6,6'-HxCB	155L	10	145
$^{13}C_{12}$-2,3',4,4',5,5'-HxCB	167L	10	145
$^{13}C_{12}$-2,3,3',4,4',5-HxCB	156L	10	145
$^{13}C_{12}$-2,3,3',4,4',5'-HxCB	157L	10	145
$^{13}C_{12}$-3,3',4,4',5,5'-HxCB	169L	10	145
$^{13}C_{12}$-2,2',3,4',5,6,6'-HpCB	188L	10	145
$^{13}C_{12}$-2,3,3',4,4',5,5'-HpCB	189L	10	145
$^{13}C_{12}$-2,2',3,3',5,5',6,6'-OcCB	202L	10	145
$^{13}C_{12}$-2,3,3',4,4',5,5',6-OcCB	205L	10	145
$^{13}C_{12}$-2,2',3,3',4',5,5',6,6'-NoCB	208L	10	145
$^{13}C_{12}$-2,2',3,3',4,4',5,5',6-NoCB	206L	10	145
$^{13}C_{12}$-DeCB	209L	10	145
$^{13}C_{12}$-2,4,4'-TrCB	28L	5	145
$^{13}C_{12}$-2,3,3',5,5'-PeCB	111L	10	145
$^{13}C_{12}$-2,2',3,3',5,5',6-HpCB	178L	10	145

MDL Study

Method	PBDE
SOP	PRL-LAB06/GC-HRMS
Matrix	Water
Analysts:	Perla Pond (Sample extraction steps 13.4, 13.8 - 13.9)
	Jack Byrne (Instrumental analysis steps 13.10)
Date:	03-Jul-24

Method: Nine 1 L water samples were spiked with 10-100 picograms each of individual PBDEs, from monobromo to decabromodiphenyl ether. The spiked samples plus one matrix blank was carried through the extraction procedure as documented in the SOP.

Desired Results:

- To validate an MDL of <50 pg/L for each individual PBDE except BDE209.

Data

Analyte	PBDE #	n	t	Average	Stdev (s)	RSD	Recovery	MDL (ts)
				pg/L	pg/L			pg/L
2,6-DiBDE	10	9	2.898	7.51	1.37	18.3%	75%	4.0
2,4,-DiBDE	7	9	2.898	9.09	1.49	16.4%	91%	4.3
4,4'-DiBDE	15	9	2.898	10.3	1.73	16.8%	103%	5.0
2,4,6-TrBDE	30	9	2.898	9.05	0.99	10.9%	90%	2.9
2,2',4-TrBDE	17	9	2.898	10.2	0.76	7.4%	102%	2.2
2,4,4'-TrBDE	28	9	2.898	11.9	0.94	8.0%	119%	2.7
2,2',4,5'-TeBDE	49	9	2.898	16.3	2.21	13.6%	81%	6.4
2,3',4',6-TeBDE	71	9	2.898	21.3	1.57	7.4%	106%	4.5
2,2',4,4'-TeBDE	47	9	2.898	24.8	2.56	10.3%	124%	7.4
2,3',4,4'-TeBDE	66	9	2.898	21.4	1.70	7.9%	107%	4.9
3,3',4,4'-TeBDE	77	9	2.898	18.1	1.52	8.4%	90%	4.4
2,2',4,4',6-PeBDE	100	9	2.898	24.1	1.89	7.9%	120%	5.5
2,3',4,4',6-PeBDE	119	9	2.898	20.6	2.15	10.4%	103%	6.2
2,2',4,4',5-PeBDE	99	9	2.898	23.2	1.98	8.5%	116%	5.7
2,2',3,4,4'-PeBDE	85	9	2.898	22.7	1.93	8.5%	114%	5.6
3,3',4,4',5-PeBDE	126	9	2.898	22.7	3.11	13.7%	114%	9.0
2,2',4,4',5',6-HxBDE	154	9	2.898	20.0	2.30	11.5%	100%	6.6
2,2',4,4',5,5'-HxBDE	153	9	2.898	20.7	2.09	10.1%	104%	6.0
2,2',3,4,4',6-HxBDE	139	9	2.898	22.9	2.21	9.6%	115%	6.4
2,2',3,4,4',6'-HxBDE	140	9	2.898	21.5	3.02	14.0%	107%	8.7
2,2',3,4,4',5'-HxBDE	138	9	2.898	26.2	4.81	18.4%	131%	14
2,3,3',4,4',5,/3,3',4,4',5,5'-HxBDE	156/169	9	2.898	43.2	4.47	10.3%	108%	13
2,2',3,4,4',6,6'-HpBDE	184	9	2.898	46.3	2.58	5.6%	116%	7.5
2,2',3,4,4',5',6-HpBDE	183	9	2.898	51.3	4.53	8.8%	128%	13
2,3,3',4,4',5',6-HpBDE	191	9	2.898	47.9	6.36	13.3%	120%	18

2,2',3,4,4',5,5'-HpBDE	180	9	2.898	48.3	2.76	5.7%	121%	8.0
2,2',3,3',4,4',6-HpBDE	171	9	2.898	49.8	3.54	7.1%	125%	10
2,2',3,3',4,5',6,6'-OcBDE	201	9	2.898	36.1	4.91	13.6%	90%	14
2,2',3,3',4,4',6,6'/2,2',3,4,4',5,6,6'-OcBDE	197/204	9	2.898	80.4	6.12	7.6%	100%	18
2,2',3,4,4',5,5',6-OcBDE	203	9	2.898	48.5	6.04	12.5%	121%	17
2,2',3,3',4,4',5,6'-OcBDE	196	9	2.898	39.5	4.87	12.3%	99%	14
2,3,3',4,4',5,5',6-OcBDE	205	9	2.898	33.2	4.83	14.5%	83%	14
2,2',3,3',4,5,5',6,6'-NoBDE	208	9	2.898	98.4	10.8	11.0%	98%	31
2,2',3,3',4,4',5,6,6'-NoBDE	207	9	2.898	89.2	13.6	15.2%	89%	39
2,2',3,3',4,4',5,5',6-NoBDE	206	9	2.898	94.1	10.5	11.1%	94%	30
DeBDE	209	9	2.898	109.5	34.0	31.1%	109%	98

Conclusions: An MDL of 50 pg/L or better has been achieved for all analytes except DeBDE. This data meets criteria for an acceptable MDL.

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Authorized

MDL Study

Method	PBDE
SOP	PRL-LAB06/GC-HRMS
Matrix	Water
Analysts:	Perla Pond (Sample extraction steps 13.4, 13.8 - 13.9)
	Jack Byrne (Instrumental analysis steps 13.10)
Date:	03-Jul-24

Method: Nine 1 L water samples were spiked with 10-100 picograms each of individual PBDEs, from monobromo to decabromodiphenyl ether. The spiked samples plus one matrix blank was carried through the extraction procedure as documented in the SOP.

Desired Results:

- To validate an MDL of <50 pg/L for each individual PBDE except BDE209.

Data

Analyte	PBDE #	Average	Stdev (s)	RSD	Recovery	MDL (ts)	LOQ
		pg/L	pg/L			pg/L	pg/L
2,6-DiBDE	10	7.51	1.37	18.3%	75%	4.0	10
2,4,-DiBDE	7	9.09	1.49	16.4%	91%	4.3	10
4,4'-DiBDE	15	10.3	1.73	16.8%	103%	5.0	10
2,4,6-TrBDE	30	9.05	0.99	10.9%	90%	2.9	10
2,2',4-TrBDE	17	10.2	0.76	7.4%	102%	2.2	10
2,4,4'-TrBDE	28	11.9	0.94	8.0%	119%	2.7	10
2,2',4,5'-TeBDE	49	16.3	2.21	13.6%	81%	6.4	20
2,3',4',6-TeBDE	71	21.3	1.57	7.4%	106%	4.5	20
2,2',4,4'-TeBDE	47	24.8	2.56	10.3%	124%	7.4	20
2,3',4,4'-TeBDE	66	21.4	1.70	7.9%	107%	4.9	20
3,3',4,4'-TeBDE	77	18.1	1.52	8.4%	90%	4.4	20
2,2',4,4',6-PeBDE	100	24.1	1.89	7.9%	120%	5.5	20
2,3',4,4',6-PeBDE	119	20.6	2.15	10.4%	103%	6.2	20
2,2',4,4',5-PeBDE	99	23.2	1.98	8.5%	116%	5.7	20
2,2',3,4,4'-PeBDE	85	22.7	1.93	8.5%	114%	5.6	20
3,3',4,4',5-PeBDE	126	22.7	3.11	13.7%	114%	9.0	20
2,2',4,4',5',6-HxBDE	154	20.0	2.30	11.5%	100%	6.6	20
2,2',4,4',5,5'-HxBDE	153	20.7	2.09	10.1%	104%	6.0	20
2,2',3,4,4',6-HxBDE	139	22.9	2.21	9.6%	115%	6.4	20
2,2',3,4,4',6'-HxBDE	140	21.5	3.02	14.0%	107%	8.7	20
2,2',3,4,4',5'-HxBDE	138	26.2	4.81	18.4%	131%	14	20
2,3,3',4,4',5,/3,3',4,4',5,5'-HxBDE	156/169	43.2	4.47	10.3%	108%	13	40
2,2',3,4,4',6,6'-HpBDE	184	46.3	2.58	5.6%	116%	7.5	40
2,2',3,4,4',5',6-HpBDE	183	51.3	4.53	8.8%	128%	13	40
2,3,3',4,4',5',6-HpBDE	191	47.9	6.36	13.3%	120%	18	40

2,2',3,4,4',5,5'-HpBDE	180	48.3	2.76	5.7%	121%	8.0	40
2,2',3,3',4,4',6-HpBDE	171	49.8	3.54	7.1%	125%	10	40
2,2',3,3',4,5',6,6'-OcBDE	201	36.1	4.91	13.6%	90%	14	40
2,2',3,3',4,4',6,6'/2,2',3,4,4',5,6,6'-OcBDE	197/204	80.4	6.12	7.6%	100%	18	80
2,2',3,4,4',5,5',6-OcBDE	203	48.5	6.04	12.5%	121%	17	40
2,2',3,3',4,4',5,6'-OcBDE	196	39.5	4.87	12.3%	99%	14	40
2,3,3',4,4',5,5',6-OcBDE	205	33.2	4.83	14.5%	83%	14	40
2,2',3,3',4,5,5',6,6'-NoBDE	208	98.4	10.8	11.0%	98%	31	100
2,2',3,3',4,4',5,6,6'-NoBDE	207	89.2	13.6	15.2%	89%	39	100
2,2',3,3',4,4',5,5',6-NoBDE	206	94.1	10.5	11.1%	94%	30	100
DeBDE	209	109.5	34.0	31.1%	109%	98	200

Conclusions: An MDL of 50 pg/L or better has been achieved for all analytes except DeBDE. This data meets criteria for an acceptable MDL.

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Authorized

Acronyms used in reporting Polybrominated Diphenylethers (PBDEs)

MoBDE = Monobromodiphenylether	HxBDE = Hexabromodiphenylether
DiBDE = Dibromodiphenylether	HpBDE = Heptabromodiphenylether
TrBDE = Tribromodiphenylether	OcBDE = Octabromodiphenylether
TeBDE = Tetrabromodiphenylether	NoBDE = Nonabromodiphenylether
PeBDE = Pentabromodiphenylether	DeBDE = Decabromodiphenylether

Acceptable recoveries for PBDE Internal Standards

	Min (%)	**Max (%)**
$^{13}C_{12}$-TriBDE-NoBDE	25%	150%
$^{13}C_{12}$-DeBDE	10%	200%

ATTACHMENT 5

Washington State Department of Ecology Comments and Responsiveness Summary

QAPP Checklist, Version 2.0 **Chris Dudenhoeffer, WQP QAC**
QAPP Name: Spokane County Regional Water Reclamation Facility - Toxics

Element	Acceptable as written? Y / N / NA	Comments
1.0 Title Page, Table of Contents, and Distribution List		
Title, author, organization	Y	
Date prepared or revised	Y	
Approval signatures of key individuals	N	Add signoff for me. Chris Dudenhoeffer, Water Quality Program QAC, Washington Department of Ecology COUNTY RESPONSE: Added on signature page
Table of Contents	Y	
Distribution List	Y	
2.0 Abstract (Introduction)	Y	
3.0 Background (Historical Receiving water…)	Y	
3.1 Introduction and problem statement	Y	
3.1.1 Logistical problems	N	Any potential logistical problems with the project plan as written? COUNTY RESPONSE: Addressed in Sect. 1 Introduction, pg. 1-2, third paragraph.
3.2 Study area and surroundings	Y	
3.2.1 History of study area	Y	
3.2.3 Parameters of interest and potential sources	Y	
3.2.2 Results of previous studies	Y	
3.2.4 Regulatory criteria or standards	Y	
3.3 Water quality impairment studies	NA	
4.0 Project		
4.1 Project goals	N	Summarize specific project goals in a brief statement section COUNTY RESPONSE: Addressed in Sect. 1 Introduction, pg. 1-1, first paragraph as well as in Sect. 3 Data Quality Objectives, pg. 3-1, Table 3 Process and Response.

Element	Acceptable as written? Y / N / NA	Comments
4.2 Project objectives	N	Please add project objective statement to QAPP COUNTY RESPONSE: Addressed in Sect. 1 Introduction, pg. 1-1, first paragraph as well as in Sect. 3 Data Quality Objectives, pg. 3-1, Table 3 Process and Response.
4.3 Information needed and sources	NA	
4.4 Tasks required	N	Add section COUNTY RESPONSE: Addressed in Sect. 1 Introduction, pg. 1-1, last paragraph (cont. to pg. 1-2) as well as in Sect. 3 Data Quality Objectives, pg. 3-1, Table 3 Process and Response.
4.5 Study boundaries	Y	
4.6 Practical constraints	N	Please add section with any practical constraints? COUNTY RESPONSE: Addressed in Sect. 1 Introduction, pg. 1-2, third paragraph as well as Sect. 4.0 Sampling Process Design, pg. 4-1, fourth paragraph.
4.7 Systematic planning process	NA	
5.0 Organization and Schedule	Y	
5.1 Key individuals and their responsibilities (E.g., project team, decision-makers, stake-holders, field and laboratory personnel)	Y	
5.2 Special training and certifications	N	Any special training or certifications needed for project. If so, please add a section. COUNTY RESPONSE: Addressed in Sect. 2.1 Project Organization and Responsibilities, pg. 2-1, first paragraph.
5.3 Organization chart	Y	
5.4 Project schedule	Y	
5.5 Limitations on schedule	N	Any limitations on the planned schedule? COUNTY RESPONSE: Addressed in Sect. 2.2 Project Schedule, pg. 2-2, first paragraph.
5.6 Budget and funding	N	Add short section on budget and funding. COUNTY RESPONSE: Added Section 2.3 Budget and Funding on pg. 2-2.
6.0 Quality Objectives		
6.2 Measurement Quality Objectives (MQOs) Data Quality Objectives	Y	
6.2.1 Targets for Precision, Bias and Sensitivity	Y	
6.2.2 Targets for Comparability,	Y	

Element	Acceptable as written? Y / N / NA	Comments
Representativeness, and Completeness		
6.3 Acceptance criteria for quality of existing data	NA	
6.4 Model Quality objectives	NA	
7.0 Study Design	Y	
7.1 Study Boundaries	Y	
7.2 Field data collection	Y	
7.2.1 Sampling location and frequency	Y	
7.2.2 Parameters to be determined	Y	
7.1.3 Field measurements	Y	
7.2 Maps or diagrams	Y	
7.3 Modeling and analysis design	NA	
7.4 Assumptions underlying design	NA	
7.4 Relation to objectives and site characteristics	NA	
7.5 Possible challenges and contingencies	N	Please add section with any challenges or contingencies that might arise in the project. COUNTY RESPONSE: Added Section 5.4.3 Challenges and Contingencies, pgs. 5-3 and 5-4.
8.0 Sampling Procedures	Y	
8.1 Field measurement and field sampling SOPs	Y	
8.2 Containers, preservation, holding times	Y	
8.3 Invasive species evaluation	NA	
8.4 Equipment decontamination	Y	
8.5 Sample ID	Y	
8.6 Chain-of-custody, if required	Y	
8.7 Field log requirements	Y	

Element	Acceptable as written? Y / N / NA	Comments
8.8 Other activities	N/A	
9.0 Measurement Methods		
Field procedures/field analysis table	Y	
9.1 Laboratory procedures table, including:	Y	
Analytes	Y	
Matrix	Y	
Number of samples		
Expected range of results	Y	
Analytical methods	Y	
Sensitivity/method detection limit (MDL)	Y	
9.2 Sample preparation method	Y	
9.3 Special method requirements	Y	
9.4 Lab(s) accredited for method(s)	Y	
10.0 Quality Control		
10.1 Table of lab and field QC required	Y	
10.2 Corrective action	Y	
11.0 Data Management Procedures	Y	
11.1 Data	Y	
11.2 Lab data package requirements	Y	
11.3 Electronic transfer requirements	Y	
11.4 Acceptance criteria for existing data	Y	
11.5 EIM/STORET data upload procedures	Y	
12.0 Audits and Reports	Y	
12.1 Audit number, frequency, type, and schedule	Y	

Element	Acceptable as written? Y / N / NA	Comments
12.2 Responsible personnel	N	Who is specifically responsible for auditing data? COUNTY RESPONSE: Addressed in Sect. 2.1 Project Organization and Responsibilities, pg. 2-1, Table 1.
12.3 Frequency and distribution of reports	Y	
12.4 Responsibility for reports	Y	
13.0 Data Verification	Y	
13.1 Field data verification, requirements, and responsibilities	Y	
13.2 Lab data verification	Y	
13.3 Validation requirements, if necessary	Y	
14.0 Data Quality (Usability) Assessment	Y	
14.1 Process for	Y	
14.2 Data analysis and presentation methods	Y	
14.3 Treatment of non-detects	Y	
14.4 Sampling design evaluation	Y	
14.5 Documentation of assessment	Y	
15.0 References	Y	
16.0 Figures	Y	
17.0 Tables		
Table 1 Measurement Quality Objectives	Y	