Comments on February 14, 2014 draft SRRTTF QAPP and SAP

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Prepared by Robert Steed,

Surface Water Ecologist

Coeur d' Alene Regional Office

Idaho Department of Environmental Quality

Idaho QMS

Idaho DEQ doesn't have a QAPP or SOP for sampling PCB's although DEQ does have a Quality Management System (QMS) described in Idaho DEQ's Quality Management Plan (QMP, March 2012).

The QMP describes DEQ's Quality Management Policy and communicates quality management procedures within DEQ.

DEQ is responsible for assessing the quality of data prior to using it in the decision-making process.

Data used by DEQ must be of known and adequate quality to fulfill the needs of the primary data user. Data used by DEQ shall be accurate, precise, complete, representative, comparable and when required, legally defensible.

DEQ must ensure that the intended use(s) of the data and level of data quality needed for any specific purpose will be established through a planning process prior to the start of data collection activities. Intended use(s) of the data need to be clearly identified. Different intended uses may have different levels of quality. For example: data collected for reconnaissance of PCB concentrations may have different quality requirements than PCB concentration data collected in order to determine compliance or for listing purposes.

DEQ must ensure that environmental data generated and used by DEQ will be of known and documented quality through the use of approved QAPPs. DEQ must be part of the QAPP organizational structure in order for the monitoring to be conducted by DEQ and data to be considered DEQ data. DEQ may approve external project QAPP and associated FSPs if signed by DEQ regional/program manager. External data not generated or gathered under a DEQ approved QAPP prior to conducting work shall be considered existing data. DEQ must develop an internal QAPP that clearly defines the problem statement, data quality needs, and criteria that will be used to assess the quality of that data for existing data.

QAPP General Comments

- It is suggested that the QAPP be submitted for EPA and peer review (as suggested in EPA QA/G-5)
- It has not been demonstrated that the intended measurements, data generation or acquisition methods are appropriate for achieving project objectives (as suggested in QA/R-5)
- The technical issues and quality objectives must be clearly identified and agreed upon (as suggested in QA/R-5)
- It is important that the limitations on the use of data are identified and documented (as suggested in QA/R-5)
- The QAPP is not appropriate for monitoring for permit compliance or for listing decisions. It seems there are members who expect it to be there.
- It is important to document how samples will be composited. It seems that having the lab composite the samples, or to poor directly into the condenser should be considered to avoid air contamination.
- QA samples are not suggested for composite samples.
- This project must take all actions to prevent introduction of invasive into Idaho (Idaho Statute Title 22, Chapter 19). Idaho's invasive species fund (IISF) stickers will be required for boats being used in Idaho. Decontamination of monitoring equipment (boats, waders …) must be performed before monitoring in Idaho, or between sites within Idaho. Please see attached document "DEQ Procedures for Decontamination of Monitoring Equipment".
- The process of batching needs to be better described and included in all relevant sections.
- This QAPP only covers synoptic and seasonal monitoring projects described. This QAPP is not appropriate for use of dischargers for required monitoring.

QAPP Comments by section

QAPP A1 Title and Approval Sheet

- Title page should include effective date of plan
- Approval page incomplete
- Approval page should include names, titles, signatures, and approval dates of approving officials.

QAPP A3 Distribution List

- Distribution list incomplete

QAPP A4 Project/Task Organization

- EPA QA/G-5 and EPA QA/R-5 seem to be the guidance documents for the development of this QAPP. These need to be specifically identified and cited correctly.
- Section 1 uses term "LAB" without the number as used later in the document. Which Lab?
- It is outside my jurisdiction to evaluate whether the QAPP has been prepared in compliance with U.S. EPA and Ecology requirements. This version of the QAPP does not meet the Idaho DEQ

QMS requirements. Please see included "DEQ Standard QAPP and/or FSP Review/Approval Checklist".

- Table 1 needs to include data users and decision makers
- QAO must be independent of the unit generating data (EPA QA/G-5)
- Responsibilities and team organization is incomplete
- Project Manager is not identified.

QAPP A5 Problem Definition/Background

- Please mention that PCB's are not listed in Idaho
- PCB's exceed criteria instead of violating standards. To me violation of standards include a demonstration that beneficial uses are no longer attainable.
- "The Washington State PCB human health water quality criterion for PCB is 170 pg/L for each congener". It is my understanding that the criteria is for total PCBs.
- Little Spokane River is also listed for PCBs. Why isn't it in the study area?
- Table 2. Missing information in some columns for Latah Creek to Ninemile Dam. I think formatting split cells.
- A clear concise "Problem Definition" (as required in QA/G-5) is missing from this section. This section does a good job of establishing a background but seems to be missing the specific problem to be solved, decisions to be made and outcome to be achieved. Parts of the problem definition can be found in following chapters (i.e. "more data will be needed to support development of a management plan with control actions", and "The objective of this project is to collect the necessary data to eliminate the data gaps in order to conduct a PCB mass balance assessment of the Spokane River"). As important as what the data is being collected for is to identify what the data is not being collected for. The QAPP seems to be developed for the development of a mass balance assessment, but not for; permit compliance, comparing to criteria, and for waterbody assessment … These activities would require DQO that are more stringent than those outlined in this QAPP.
- What existing data may be included in the development of a PCB mass balance assessment. SPMD?

QAPP A6 Project/Task Description

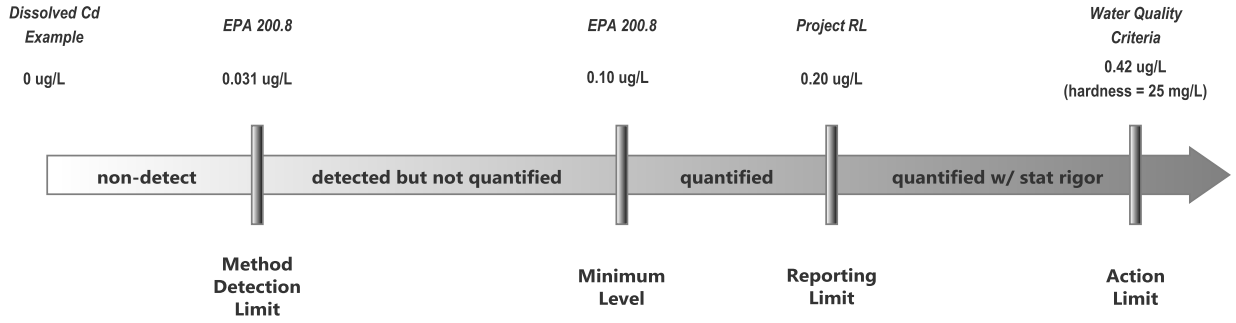
- It is debatable whether the current PCB monitoring database provides a good estimate of the amount of PCBs … It is my opinion that previous monitoring is a poor estimate. Poor quality therefore poor estimate.
- "Robust" ≠ "more data are needed to support…"
- "The magnitude of true sources …", When using terms like true like this, and understanding that heterogeneity is the rule, aren't we getting statistically in the realm of having n's of 50 to 60 at a minimum?
- Synoptic Study: It's agreed that the summer is the most stable time period, and the best for a study as proposed, but how do we know if the results are representative of the entire year, or other time periods. How do we vet the summer period?

- Seasonal Integrated Sampling: The flow regimes for the upper Spokane River are controlled both by meteorological events and how Avista operates dams. Probably should clearly identify the flow regimes that are being targeted. What is the discharge during Spring high flow, Summer low flow, and especially the Winter moderate flow?
- Why is Little Spokane missing from the synoptic survey?
- While there are advantages to compositing samples it increases the opportunity for contamination bias. Low levels in the PPQ range is a new area for me to consideration. It's hard for me to understand how this project will minimize sample contamination.
- What two week period is being proposed? Is the selected two week period representative?
- Schedule is incomplete
- The purpose of each analyte or physical property in table 4 should be discussed.

QAPP A7 Quality Objectives and Criteria

- The statement "The analytical methods discussed in this QAPP provide a level of quality that allows the data to be used in the decision making process" is true if the problem description is complete. There are many decision making process that these data will not be of a level of quality that is acceptable (e.g. permit compliance, comparison to criteria, waterbody assessment…).
- How can one insure that the data collected will meet the DQI? The data that is used for the mass balance evaluation will have met the DQI, It is my opinion that all the data collected will not meet DQI.
- It is very important to explain the batching process and clearly identify which QA sample represent which samples. If for example the DQI for a rinsate blank is to have no quantifiable concentrations of PCB, and it ends up having extremely high concentrations, then the batch of samples that the rinsate blank represents must be suspect because they all share the same decontamination methods.
- Accuracy in field cannot be evaluated by through the use of rinsate blanks. Rinsate blanks are a measure of contamination bias. A field spike would be the way of evaluating field accuracy.
- LCS standards, what concentrations do the manufactures certify to, especially in the case of PCBs. Laboratory Control Samples should be in the range that is being evaluated (10 to 100 pg/L). It seems unlikely that LCS standards are available in those ranges.
- Method blanks are not for evaluating accuracy, method blanks are for contamination bias.
- What is the source of PCB free water?
- Field accuracy cannot be accessed through the use of equipment blanks. Equipment blanks are useful in tracking down contamination bias, but offer no evaluation of how close results are to a true value. It is my opinion that samples should be collected directly into sample containers and never exposed to air. There will be no need for equipment blanks if collecting directly into sample containers. Field blanks are lacking from QAPP. According to QA/R-5 field blanks should be conducted a minimum of one in every 10 samples.
- Field precision should also be evaluated for the composites. I'm not sure how to do it but the composites are subject to additional contamination and need precision DQI.

- How does the QAPP address the spatial and temporal variability as far as representativeness for PCBs? Are PCBs homogenous in the Spokane River? Are concentrations from the left bank the same as the right bank, or the center? Are concentrations near the bottom the same as the top. Are the concentrations taken 30 seconds after the same? What about 30 minutes, hours, days? Representativeness is not achieved by following SAP or proper sampling techniques.
- Field completeness seems unobtainable, especially if the goals are to 95% of all measurements and samples are to meet DQI and be un-qualified.
- Method Detection Limits is mentioned in the comparability section. The QAPP uses a bunch of different "Limits" descriptions. The QAPP needs to define and stick to "limits" terms. I suggest Method Detection Limits, Minimum Level, Reporting Limits, and Action Level. I suppose PQL may be appropriate. Please see example diagram for Idaho Cadmium limits.



- Are the results being generated comparable to SPMD results?
- Equipment blanks are not an indicator of representativeness as suggested in Table 5. Field blanks are missing and required in section 2.3 of EPA 1669. QL is not defined. The corrective actions do not go into enough detail to implement. RPDs of 30% for these analytes are too high for decision making, 20% is more typical. Frequency of 1/20 samples for a batch is dangerous, in that more of the data set will be qualified, or not used when QC samples do not meet DQI. Most guidance EPA 1669, QA/G-5, and QA/R-5 typically batch 1/10.
- Table 6a does not include field QC limits. The table does not explain what is done with data that is JB flagged. Table 6a avoids the hard discussion of what are the MDL, ML, and what reporting limits are going to be used for this project. The fact that quantification at the action limit (esp. 1.3 pg/L) is not yet possible needs to be discussed. I do not have much experience with ppq analytes, but it seems that we are asking for quantification results much lower than we report with any statistical rigor. Hearing that blanks are coming back at 100 pg/L worries me. I suggest that we are straight forward with our limits and ask for bench sheets to get values less than the reporting limit.
- Table 6b. Units are incorrect for conductivity, pH, dissolved oxygen, and turbidity. Final DQI must agree with DQI in Table 5. For dissolved oxygen, it is suggested to perform the calibration that is recommended by the manufacture. Most modern equipment recommends a saturated water calibration.

- Table 7. is titled sample numbers, but temperature down to turbidity are not samples, they are each a measure.
- Table 8. Would help me as a field person to know the expected number of significant figures for each parameter.

QAPP A8 Special Training/Certification

- It is not clear how many people it will take to make up field staff. It is suggested to perform field audits if multiple crews are.

QAPP A9 Document and Records

- The QAPP needs to identify other records and documents applicable to the project that will be produced: field log book, COC forms, audit reports, interim progress reports… (QA/R-5)
- The QAPP must specify the level of detail for: field sampling, lab analysis, literature, modeling … (QA/R-5)
- The QAPP needs to itemize info and records which must be included in data report package (QQ/R-5)

QAPP B1 Sampling Process Design

- The QAPP defers to a sampling process design in the SAP. The sampling process design is not a section in the SAP. This discussion is required in QA/R-5

QAPP B2 Sampling Methods

- The QAPP refers to SOP in the SAP which is incomplete
- The sampling methods rely on procedures identified in EPA method 1669. This ultra clean sampling technique is the best I am aware of to prevent contamination of samples. EPA 1669 was designed to prevent contamination bias for metals at low PPT and low PPB. The PCB monitoring proposed is seeking low PPQ results; a thousand times lower than EPA method 1669 was designed. It is important to not dismiss the stringency identified in EPA method 1669, and to clearly identify what modifications are acceptable, or what procedures are mandatory for this sampling.
- EPA method 1669 (2.3) requires 1 field blank per site or per ten sites
- EPA method 1669 (8.2.4) suggests whenever possible the sample bottle should be opened, filled and closed while submerged. It seems that all measures should be taken to avoid atmospheric exposure and potential contamination.
- Please review EPA method 1669 (6.13) on boat use. The methods are extreme but expected unless the QAPP specifies a different process to follow.
- EPA method 1669 call for the use of wind suits for mercury. What about for PCBs at 1000 times lower concentrations?
- Discussion should address what to do when a failure in sampling or measuring system occurs, who is responsible (QA/R-5)
- "Samples will be collected from the middle of the river…" Does middle = equidistant between both banks or from the center of the thalweg portion of the river? How is cross-sectional homogeneity evaluated (EPA 1669 sec 8.1.2)

- How is it demonstrated that each event begins with collecting at the suspected lowest concentration stations to the highest concentration stations as required in EPA method 1669 section 8.1.4.
- How is contamination of the composites being avoided? There is no churn splitter clean enough. Should compositing be handled in the lab's clean room?
- According to QA/R-5 this section should include:
    - Description of disposal of decontaminated by-products
    - Selection and preparation of sample containers
    - Decontamination Procedures
    - Preservation
- Field variances, does the crew notify PM and QAO, PM or QAO? Is logbook another logbook or is it referring to the field logbook?
- Table 9 belongs in this section. What kinds of plastic are appropriate? Fluoropolymer, conventional or linear polyethylene, polycarbonate, polypropylene? Why is the TOC and DOC in separate bottles? They can be combined into a single 500 mL bottle.

QAPP B3 Sample Handling and Custody

- Samples must be double bagged to avoid sample contamination (EPA method 1669, 4.2.2.4.3)
- How is it ensured that samples remain at 4C during the handling and custody? Temperature loggers should accompany samples. Coolers that do not meet temperatures upon arrival should not be analyzed. Results from coolers that did not remain at 4C during handling and custody should be qualified.
- Section should include an example of the bottle labels and COC logs (QA/R-5)
- The QAPP is where it is determined whether custody seals are to be utilized. Avoid "if required" language.
- "…bills of lading" , landing?

QAPP B4 Analytical Methods

- How much and of what concentration sulphuric acid is used for the preservation for TOC and DOC samples.
- QAPP says "Appendix B contains all relevant laboratory SOP's for the project." That is a lot of attached material that has not been included in this QAPP. You may consider reference information and a link to the document.
    - LabA
        - SOP for receipt and maintenance of custody
        - SOP for sample storage
        - SOP for sample tracking
        - SOP for laboratory safety
        - SOP for cleaning of analytical glassware
        - SOP for traceability of standards used in sample analysis
        - SOP for analysis each method (PCB)
        - SOP for concentration of samples

- LabB
  - SOP for receipt and maintenance of custody
  - SOP for sample storage
  - SOP for sample tracking
  - SOP for laboratory safety
  - SOP for cleaning of analytical glassware
  - SOP for traceability of standards used in sample analysis
  - SOP for analysis each method (DOC, TOC, TSS, TDS)
  - SOP for concentration of samples

QAPP B5 Quality Control

- Field blanks should be considered and are required in both the sampling EPA method 1669 and the QAPP development guidance EPA QA/R-5.
- What is to be done if field instruments do not calibrate?
- Having frequency of QA samples at 5% seems low, potential for lots of wasted data if QA samples greatly exceeded DQI, represent batches, and are culled from the data set.
- The reference to Table 8. Should probably be Table 6a?

QAPP B6 Instrument/Equipment Testing, Inspection and Maintenance

- The type of DO meter is not really identified. Some DO meters are easier to work with. I suggest a LDO meter rather than one with a gland that requires inspection and repair. I'd also suggest validating calibration with 100% saturation samples.

QAPP B10 Data Management

- Between the QAPP and the SAP there needs to be consistency in the names of what the data are being recorded on. (i.e. log books, field logs, field log books or labels, tags, …)
- Please include examples of original data sheets mentioned in section "Field On-Site measurements (Data Sheets)
- Please include examples of labels

QAPP C1 Assessments and Response Actions

- Field blanks need to be included in QA/QC samples
- This section talks about the field manager in plural. Table 1 of the QAPP only indicates that there will be one. I am a little confused how many field managers are intended.
- The QAPP states "At the conclusion of each monitoring event, all calibration sheets will be reviewed by the Field Manager…" it seems like the field crew should have guidelines for each instrument alerting them that the measurement they are collecting may be suspect. Waiting to the conclusion of each monitoring event, may be too long.
- The field manager is an assessor for field work. Please include a description of the scope of authority, including stop work orders, and when assessors are authorized to act as described in QA/R-5
- The independent technical reviewer mentioned in section 3.1.3. should be identified and part of Table 1 and org chart

- The Project Manager should not designate who will perform the field system audits. Field system audits should be performed by Project Manager.
- Field contamination, detected from field blanks, and equipment blanks, should be included in the list of possible problems requiring corrective actions.
- All corrective actions should be provided to the QAO as well as the PM. The QAO should be included in discussions of what to do with qualifying, or dismissing data.

QAPP C2 Reports to Management

- Who is the LimnoTech Project Manager? Is the PM going to be Limnotech?

QAPP D1 Data Review, Verification, and Validation

- Please expand on what is meant by a review of the data at the bench level?
- What is never really discussed in this section and is what really needed to be completed in the QAPP is determining what is done with data that do not meet DQI (situations that we can imagine), and how are batches handled in these cases. The message I get from the QAPP is that when things go wrong, the PM will make a decision on what to do. How about imagining some of these situations and identify actions now. Below is an example of what I am thinking:

QA issue	Insignificant	Moderate	Significant
Field Blank conc. exceeds MDL	<1.5X MDL, No action required	<10X MDL, batch that sample represents analyte must be qualified with J flag	>100X MDL, if possible batch should be resampled. Batch data for analyte should not be included in data base.
Field Replicates RPD exceeds DQI for analyte	3% > RPD DQI, No action required, Sample crews audited	10% > RPD DQI, batch that replicate represents must be qualified with J flag, crew must be audited, and blank replicate taken.	25% > RPD DQI, if possible batch should be resampled. Batch data for analyte should not be included in data base. Crew must be audited, and side by side sampling with another crew should be conducted.
Too few of a QA Sample.	-na-	Missing one, field blank, replicate, or equipment blank, data must be qualified with _ flag, crew notified of missing sample	Missing more than one, field blank, replicate, or equipment blank, batch data for that analyte should not be included in data base, field manager should be admonished.
Other QA Issues: More than 95% of data qualified with QC issues, Equipment Blank exceeds MDL, Samples delivered to Lab too warm …			

- Expected ranges are needed to be added to the Field Data Sheet Reviews section. Also describe what to do when values are not reasonable. For example temperature readings should be between 10C and 30C for instream temperatures during synoptic study.
- Items 1,2,3 on the Laboratory Data Sheet Reviews are the responsibility of the PM. The samples are to be submitted to the laboratory blind and the contract laboratory will not know this information.

- Table 11 belongs in this section
- I believe the QAO should be from outside LimnoTech, according to QA/G-5 The QA Officer must be independent of those generating project data.

QAPP D2 Verification and Validation Methods

- A third party is mentioned but not identified and/or included in Table 1 of QAPP
- This section includes the plural version of Field Manager. How do multiple field managers fit into the missing organization chart?
- Has the use of a multi-parameter instruments only been determined?
- Table 11 could use an additional column that listed the issues that warranted a data qualifier. For example a "J" flag is used when: Field QA samples did not exceed DQI criteria.
- Discussion is missing with what to do with data that are unusable. The flag is available in table 11, but what to do with a batch, or a sample that is flagged "R" has not been covered. Is "R" flagged data going to be part of the final data set? How do we prevent the propagation of these data?

QAPP References

- References need to be reviewed. It appears that at least EPA method 1669 is missing.

QAPP Discussion

It is understood that low concentrations and low criteria related to the collection of PCB samples are challenging. Limnotech has done a good job outlining a monitoring program that helps SRRTTF get a handle on where PCBs are likely to be coming from within the project area (the mass balance approach). I believe there are folks out there effected by PCB monitoring requirements, enforcing PCB regulation, or consumption of fish from the study area that are expecting more certainty that we are scientifically able to provide. To me, it doesn't appear that the science is there yet. We don't know with rigorous statistical certainty what concentrations we have in the low parts-per-quadrillion range. Pieces of science are there, but holistically, pulling it all together we are missing something. In my opinion, we really haven't passed the scientific hurdle of collecting PPQ data in a reproducible manner. From what I have observed in the existing low PPQ range is that the field blanks commonly exceed detection limits, replicate samples vary significantly, and the contamination of samples is likely. We need to be straight up with our decision makers and tell them that we cannot quantify with statistical rigor down to the concentrations of our action limits (numeric criteria). The data we are able to collect is useful for taking actions to improving the situation.

I suggest that the QAPP may want to consider laying out what level of certainty is being sought, and what level would be needed for decision making. It is my understanding that we are shooting for consistent methods within the watershed. The methods shared in this QAPP have their limits. See table below for an example of differing DQI.

	Fundamental Research Program	**Regulatory Compliance Program**
Intended Use of Data	**Reconnaissance level**: tracking sources, collection method evaluation, source	**DEQ decision making**: compliance, trend analysis, listing decisions, allocations, data

	control program evaluation, mass balance evaluation…	validation …
Method	1668 A + C	1668 A + C
Monitoring, Precision	Duplicates and blanks must be taken and can guide quality control measures. Data should be qualified if batch exceeds DQO.	Sampling method must avoid cross media samples (no sediment in WQ samples) Sampling method must demonstrate samples can be collected that are representative and repeatable. Field blanks, splits and duplicates must represent each batch (10 or less) of samples submitted to the laboratory. Blanks shall be less than MDLs, and Precision measures (i.e. RPD ≤ 20%) shall be applied to field blanks and splits. Batches with field QC samples not exceeding DQO need corrective action plans that establish how to avoid future contamination and what to the batch's data.
Reporting Limits (RL)	Data that is used may approach method limit (ML). Data should be qualified.	Reporting limits (RL) should be 3 to 10 times method limits (ML). ML less than the estimated method limits (EML) of the method must be demonstrated to be no less than 2 standard deviations above the mean level in the minimum of 10 blanks over the same period that samples were analyzed. Qualified data should not be considered.
Blank Correction	Blank correction may be utilized.	Blank correction should be limited to a few (2-3) and only those congeners chronically found at the laboratory performing analysis.
DQO	Qualified data may be considered depending on the magnitude of accuracy and precision errors. Chronic use of qualified data indicates need for corrective action plan.	Laboratory control results must accompany each batch of sample results. Laboratory must meet accuracy (75% to 125% R) and precision (±20% RPD). Field blanks and equipment blanks should be below reporting limit and field duplicates/splits should meet precision DQO (±20% RPD). Qualified data should not be considered

SAP General Comments

- QAPP states that duplicate samples will be collected at each sample location. Stored and used if sample container breaks. The SAP does not share these steps.
- The process of batching has not been included in the shipping and handing of samples.
- There is some incompletes in the descriptions of who's doing what. "LAB" should specify which lab or both labs, "CONTRACTOR" should be described. Project Manager needs to be identified.
- Table 1 is incomplete.

SAP Specific Comments

SAP 2.2 Quality Assurance Project Plan

- Incomplete, not included as Appendix A

SAP 2.3 Health and Safety Plan

- Incomplete, not included as Appendix B

SAP 3.1 Synoptic Survey

- The minimum flows in the Spokane River have been affected by the recent re-licensure of Post Falls Dam. Assessment of historic flows may be misleading.
- It is strongly recommended that the sampling at Coeur d' Alene Lake outlet be conducted early in the morning during a weekday other than Friday. The Coeur d' Alene Lake outlet are is very busy with boating traffic during most of the summer. Contamination potential increased throughout the day and the weekends.

SAP 3.2 Seasonally Integrated Sampling

- Coeur d' Alene Lake has a lot of Ponderosa pines around the shoreline that can shed pollen from early spring to early summer. Sometimes there can be quite an accumulation visibly floating on the surface at the outlet. It is likely that this pollen contains lipids (Lobolly pine pollen was found to contain about 7.5 to 9 percent lipids. R.W Scott, M. Strohl 1962). Sample collectors need to be instructed on how to sample when surface is covered with pollen.

SAP Table 5

- Station Numbers are missing.

SAP 4.1 Sample Collection Methods

- As in the QAPP a consistent name for field log books is needed. The QAPP (2.10.1.) states that results from measurements will be recorded in a field form instead of a field log book.
- Step 2, cleaning sampling equipment is described in EPA method 1669 as being performed in a level 100 cleanroom.
- It is my understanding that plastics absorb PCBs, with the exception of Teflon™ and Tedlar™. What kinds of non-talc gloves are appropriate? EPA method 1669 section 8.2.5 describes manual collection of surface samples directly into a sample bottle. Shoulder length gloves would be needed in order to submerge sample bottles 0.15m deep. What manufacturer and model should a sampler use? Polyethylene gloves may absorb PCBs.
- Bottle caps must be Teflon™ or Teflon™ lined.
- Appendix D is incomplete
- Step 10 is for samples requiring filtering. Please review method, because TDS does not usually require field filtration.
- Sections 4.1.1. and 4.1.2. need to include all variances from methods listed in EPA method 1669.

- According to "gas tank, boat plug, and anchor" sampling may be conducted from a boat. A section 4.1.3. needs to be added that includes methods to be followed when sampling from a boat and all variances from EPA method 1669.

SAP 4.2 Sampling Equipment

- Table 6. Decontamination Equipment needs to describe each item,
- Pumps and filters need to be described.
- Is pH being calibrated with a 2 point or 3 point calibration?
- pH and conductivity standards concentration need to be determined and included in documentation.
- What are lab sheets and tags; these are not terms in the QAPP.
- What is Lugol's solution, and HNO3 to be used for?

SAP 4.3 Calibration of Field Equipment

- The statement "The main concern will be …transfer to the project files" does not appear to belong here.
- "Checked again at the end of each day" is inconsistent with the QAPP
- Appendix D is supposed to be a field label. Appendix D is incomplete.

SAP 4.4 Equipment Decontamination

- Buckets are not in the sampling equipment list.
- Procedures for equipment decontamination cannot be evaluated. Appendix C is incomplete.

SAP 5.1 Sample Handling

- Appendix E is incomplete
- Example of site identification code does not match the given information.
- Identification of Replicate samples and Blank samples should be blind according to QAPP section 2.10.1.
- I prefer securing caps with Parafilm in order to reduce VOC exposure.
- PCB sample caps must be Teflon™ or Teflon™ lined.
- "Samples will be stored at 4 degrees Celsius", plus or minus what amount. It appears that samples are to be put on ice. My experience is that it is hard to control temperature with ice.
- Table 7 includes a column for field filtration. My experience is that TDS can be filtered by the lab within 7 days. I don't believe field filtration is necessary.
- Table 7 suggests that PCB bottles are 2 liter. Is that the agreed upon size? PCB bottles must have Teflon™ or Tedlar™ lids or be Teflon™ or Tedlar™ lined.

SAP 5.2 Shipping

- The term companies should replace agencies when referring to labs
- Sample containers for PCB should be double bagged for the clean hands dirty hands procedure in EPA method 1669.
- Step 6, please consider including a temperature logger.
- Custody seals on each cooler are missing.

SAP 6.1 Field Data Collection Forms

- Include shipping info and time cooler was sealed
- Appendix D is incomplete, cannot review field documentation log sheets

SAP 6.2. Photographs

- Most field data is collected with digital cameras now days. This section seems to be written for film cameras.
- Appendix D is incomplete, cannot review COC forms

SAP 6.4. Data Submittal

- "appropriate"? How may field managers are there going to be?

SAP 7 Quality Control

- I suggest replacing "support the toxics reduction strategy for the Spokane River will meet" with develop a load mass balance".
- Table 9
    - Missing Field Blanks
    - Will we have Equipment Blanks on stations where sample is collected directly into the bottle?
    - Equipment Blanks do not indicate representativeness. Equipment blanks indicate decontamination bias.
    - QL is not defined
- Table 10
    - Missing Field Blanks
    - Will we have Equipment Blanks on stations where sample is collected directly into the bottle?
    - Equipment Blanks do not indicate representativeness. Equipment blanks indicate decontamination bias.
    - QL is not defined
    - RPD is higher than is typical. From my experience typical RPD for field dups is 20%
    - As described before 1/20 samples is a large amount to represent with a single QA sample. 1669 does
- Field accuracy is not assessed through the use of equipment blanks. Please see earlier comments on this.

SAP 8.0 References

- Missing at least EPA Method 1669

SAP Appendices

- Appendix A is incomplete
- Appendix B is incomplete
- Appendix C is incomplete, review on Standard Operation Procedures could not be completed.
- Appendix D is both missing and incomplete.