

# Laboratory QA Summary

## CW4CB Task 5, Phase I

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**Submitted to:**

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## 1. Introduction

The Bay Area Stormwater Agencies Association (BASMAA) contracted with Applied Marine Sciences, Inc. (AMS) to support implementation of CW4CB Task 5. As part of its contract with BASMAA, AMS is providing project quality assurance for all Task 5 activities. Don Yee at SFEI is the Project QA Officer (QAO), and has completed data review of Task 5 Phase 1 (T5P1) analytes. Task 5 Phase II is anticipated to be implemented in calendar year 2014. Below are narrative summaries of reviews of QA/QC samples analyzed with reported field samples for T5P1 activities. QA/QC samples were evaluated using the procedures and measurement quality objectives (MQOs) described in the project QAPP (BASMAA 2013).

## 2. Task 5 Phase 1

Task 5 Phase 1 field monitoring was conducted in April, July, and August, 2013. ALS Global / Columbia Analytical Services (ALS) analyzed water runoff and sediment samples for conventional analytes, Hg, and PCB. Soil Control Lab (SCL) analyzed water samples for several conventional analytes.

QC results generally met project MQOs, with some minor deviations, particularly for PCBs. Contamination was found in PCB blanks, likely affecting results for some of the lowest concentration congeners reported, which were censored (not reported) in samples as a result. Samples also showed moderate to large variation in replicates, particularly for fractionated samples, where subsampling heterogeneity and small fractions sizes may contribute to measurement uncertainty. For analytes showing large variation (>50% RPD), results were flagged as estimated. Details on the individual data submittals by various labs are provided below. All data should be considered preliminary until release of final data submittal by BASMAA.

### 2.1. Water Conventional Analytes – SCL

Particle size fractions, total and volatile suspended solids, settleable solids, SSC, and turbidity in some runoff samples collected for Task 5 Phase 1 were analyzed by SCL. Samples were collected April 4, 5, & 10, 2013 and were analyzed April 5 & 10, 2013.

#### 2.1.1. Sensitivity

Most analytes were measurable with exception of some analyte/matrix/fraction combinations.. such as settleable solids in a <25 um runoff matrix, not detected in any samples.

#### 2.1.2. Blanks

These conventional analytes were not detected in blanks.

#### 2.1.3. Recovery

Recovery samples are not typically run for these conventional analytes.

#### 2.1.4. Precision

Precision was within the 25% MQO (QAPP Table 26-7) when analytes could be detected sufficiently above the MDL in both lab replicates, although for many analytes precision could not be evaluated due to low concentrations or non-detects.

## **2.2. Water Conventional Analytes (SSC) – ALS**

SSC in water samples collected for Task 5 Phase 1 was analyzed by ALS. Samples were collected August 3 & 21, 2013 and were analyzed August 15 & 26, 2013. SSC was reported for 2 samples. Blank and (duplicate) LCS samples were also reported.

### ***2.2.1. Sensitivity***

Sensitivity was sufficient so no non-detects were reported.

### ***2.2.2. Blanks***

SSC was not detected in blanks.

### ***2.2.3. Recovery***

Recovery for LCSs averaged 6.0% error. Although no recovery targets for SSC are provided in the project QAPP, results were within the QAPP Table 26-6 target 80-120% recovery (20% error) for other water quality conventional analytes.

### ***2.2.4. Precision***

Precision on LCS lab replicates was acceptable, averaging 4.1% RPD, within the 25% MQO (QAPP Table 26-7).

## **2.3. Water PCBs – ALS**

PCBs in water samples collected for Task 5 Phase 1 were analyzed by ALS. Samples were collected April 4, August 3 & 21, 2013 and were analyzed May 1 to 6, and September 5, 2013. PCBs in whole water, <25um, and dissolved fraction were reported for 6 sites (including a set of field replicates), with the August samples reported unfractionated for 2 sites. Blank, lab duplicate, LCS, and MS samples were reported.

### ***2.3.1. Sensitivity***

Around 70 to 80% of the target analytes had non-detects for PCBs, ranging from around 10 to 100% of the samples (depending on the PCB, and the fraction it was sought in). Dissolved fraction samples had the highest proportion of non-detects (likely due to lower concentrations).

### ***2.3.2. Blanks***

A number of PCBs were detected in blanks, with some censored for exceeding 10% of field concentrations in all samples (20% of the PCB analytes in the dissolved fraction). The <25 um fraction had 10% of the analytes censored in all samples, and the unfractionated water samples had no PCBs censored completely, but several PCBs with half or more of the results censored..

### ***2.3.3. Recovery***

Recovery for LCSs averaged <30% error (within the QAPP Table 26-9 target 70-130% recovery for CRMs). One of the 3 analytes in the MS was slightly outside of the QAPP 50-150% target and was flagged but not censored.

### ***2.3.4. Precision***

Precision on lab replicates was variable, with RPD >50% for around 4/5 of the analytes in whole water samples (lab replicates), 1/3 of the analytes in the dissolved fraction (field replicates), but mostly within

the 25% MQO (QAPP Table 26-1) for the <25 um fraction.. The RPDs over 50% in whole water samples may represent subsampling issues, and in dissolved fractions, lower concentrations. For any given analyte, the field replicate RPD was generally larger than for lab replicates, supporting the notion that part of the variation arises from sampling or subsampling heterogeneity in the particulate phases. Analytes with RPDs over the MQO 25% were flagged, and analytes in fractions with RPDs >50% were additionally flagged as estimated due to the large uncertainty.

## **2.4. Water Mercury – ALS**

Mercury in water samples collected for Task 5 Phase 1 was analyzed by ALS. Samples were collected April 4, 2013 and were analyzed April 8, 2013. Mercury in whole water was reported for 6 samples (including 1 field replicate). Blank, LCS, and MS/MSD samples were also reported.

### ***2.4.1. Sensitivity***

Sensitivity was sufficient so no non-detects were reported.

### ***2.4.2. Blanks***

Blank concentrations averaged below the detection limit.

### ***2.4.3. Recovery***

Recovery for LCS and MS/MSD samples averaged 13 and 23% error respectively (within the QAPP Table 26-8 target 75-125% recovery (25% error) for mercury.

### ***2.4.4. Precision***

Precision on field replicates was 59 % RPD, outside the 25% MQO (QAPP Table 26-1), so results were flagged for marginal precision.

## **2.5. Sediment Grainsize and Total Solids – ALS**

Conventional analytes in sediment samples collected for Task 5 Phase 1 were analyzed by ALS. Samples were collected July 25, 2013 and were analyzed August 6, 2013. Sediment grainsizes were reported in 5 field samples, with 1 lab and 1 field replicate, and total solids reported for 17 samples, with 3 field replicates and 3 lab replicates.

### ***2.5.1. Sensitivity***

Sensitivity was sufficient so no non-detects were reported.

### ***2.5.2. Blanks***

Blanks are typically not reported for these conventional analytes.

### ***2.5.3. Recovery***

Recovery samples are typically not run or reported for these conventional analytes.

### ***2.5.4. Precision***

Precision on lab replicates was within the 25% MQO target (QAPP Table 26-1) for the grainsize fractions, except for various sand fractions, all with lab RPDs > 50%, so results were flagged for marginal precision and noted as estimated values due to the large precision uncertainty.

## 2.6. Sediment PCBs – ALS

PCBs in sediment samples collected for Task 5 Phase 1 were analyzed by ALS. Samples were collected July 25, 2013 and were analyzed August 17 to 29, 2013. PCBs in <2mm sediment were reported for 8 samples (including 1 lab and 1 blind field replicate). Blank, LCS, and MS/MSD samples were also reported.

### 2.6.1. Sensitivity

Only 4 congeners had non-detects reported in one sample.

### 2.6.2. Blanks

Concentrations of several congeners were detected in the blank above 2x the MDL, and PCBs 128/166, 141, and 158 were above 10% of the concentration in one sample, which was censored.

### 2.6.3. Recovery

Recovery for MS/MSD samples was not calculated because the spiking level was not sufficiently above (at least double) the native concentration to be quantified reliably. LCS recoveries errors were all 16% or better, well within the QAPP Table 26-2 target 70-130% recovery (30% error) for CRMs.

### 2.6.4. Precision

Precision on lab replicates was above the 25% RPD MQO (QAPP Table 26-1) for about half the analytes and flagged, with PCB 8 and 95 above 50% RPD, so those congeners were flagged as estimated due to large precision uncertainty.

## 2.7. Sediment Mercury – ALS

Mercury in sediment samples collected for Task 5 Phase 1 was analyzed by ALS. Samples were collected July 25, 2013 and were analyzed August 9, 2013. Mercury was reported for 8 samples (including 1 lab and 1 blind field replicate). Blank, LCS, and MS/MSD samples were also reported.

### 2.7.1. Sensitivity

Sensitivity was sufficient so no non-detects were reported.

### 2.7.2. Blanks

The blank concentration was below the detection limit.

### 2.7.3. Recovery

Recovery for LCS and MS/MSD samples averaged 5% error or better (within the QAPP Table 26-4 target 75-125% recovery (25% error) for mercury).

### 2.7.4. Precision

Precision on lab and field replicates was 2% and 23% RPD respectively, within the 25% MQO (QAPP Table 26-4).

## 3. References

BASMAA, 2013. *Quality Assurance Project Plan: Clean Watersheds for a Clean Bay – Implementing the San Francisco Bay's PCBs and Mercury TMDLs with a Focus on Urban Runoff, EPA San Francisco Bay Water Quality Improvement Fund Grant # CFDA 66.202, Revision 1*. Prepared by Applied Marine

Sciences, Inc. August 15, 2013.