CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 5/24/2007 and 9/4/2007

Prepared by: Colin Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by: Fritz Grothkopp Dec 1, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L42798-1 and L43790-1
Date Collected (by King County Staff):	May 24, 2007 and Sept. 4, 2007
Date Received by Axys Analytical:	Sept. 6, 2007
Axys Analysis Batch ID#s:	WG23202
Extraction Dates:	Sept. 20, 2007
Initial Calibration Dates:	July 5, 2007, October 10, 2007
Instrument Analysis Date(s):	October 1, 2007, October 16-17, 2007

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

Note: Sample L42798-1 represents an equipment blank collected May 24, 2007 during installation of an autosampler at the Duwamish Forebay station.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:

The initial calibration done on July 5, 2007 applies to the undiluted sample analyses. The initial calibration done on October 10, 2007 applies to the analysis of the dilution for L43790-1 performed on October 17. For both initial calibrations, the following apply: GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (for each of the three12-hour sequences – September 28, 2007, October 1, 2007 and October 16, 2007):

Mass resolution of the verification standard (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the recovery limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC:

4.1 Method Blanks: A method blank was prepared and processed with this single batch of samples (WG23202). A total of 67 of the 175 reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and only one (PCB 209) was above the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: An OPR sample was prepared and processed with this batch of samples (WG23202). All recovery values for each spiked congener and labeled compound met the acceptance limits (section 15.5.3).

4.3 Lab Duplicates/ Field Duplicates: No lab duplicate or field replicate was analyzed with this batch of samples thus method precision was not evaluated. Lab duplicates are not required by the reference method. As defined in the SAP, field replicates will be collected only at locations where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared

to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were less than 5 times the blank response have been qualified with a "B" in the table in Attachment A. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L42798-1	L43790-1
AXYS ID	L10318-1	L10318-2
WORKGROUP	WG23202	WG23202
Sample Size	0.823	0.872
UNITS	pg/L	pg/L
CL1-PCB-1		
CL1-PCB-2		
CL1-PCB-3		
CL2-PCB-4		
CL2-PCB-5		
CL2-PCB-6		
CL2-PCB-7		
CL2-PCB-8		
CL2-PCB-9		
CL2-PCB-10		
CL2-PCB-11	B	
CL2-PCB-12/13		
CL2-PCB-14		
CL2-PCB-15		
CL3-PCB-16		
CL3-PCB-17	B	
CL3-PCB-18/30	B	
CL3-PCB-19		
CL3-PCB-20/28	B	
CL3-PCB-21/33	B	
CL3-PCB-22	B	
CL3-PCB-23		
CL3-PCB-24		
CL3-PCB-25		
CL3-PCB-26/29	B	
CL3-PCB-27		
CL3-PCB-31	B	
CL3-PCB-32	B	
CL3-PCB-34		
CL3-PCB-35		
CL3-PCB-36		
CL3-PCB-37	B	
CL3-PCB-38		
CL3-PCB-39		
CL4-PCB-40/41/71	B	
CL4-PCB-42	B	
CL4-PCB-43		
CL4-PCB-44/47/65	B	
CL4-PCB-45/51	B	
CL4-PCB-46		
CL4-PCB-48	B	
CL4-PCB-49/69	B	
CL4-PCB-50/53	B	

CL4-PCB-52	B	
CL4-PCB-54		
CL4-PCB-55		
CL4-PCB-56	B	
CL4-PCB-57		
CL4-PCB-58		
CL4-PCB-59/62/75		
CL4-PCB-60		
CL4-PCB-61/70/74/76	B	
CL4-PCB-63		
CL4-PCB-64		
CL4-PCB-66	B	
CL4-PCB-67		
CL4-PCB-68		
CL4-PCB-72		
CL4-PCB-73		
CL4-PCB-77		
CL4-PCB-78		
CL4-PCB-79		
CL4-PCB-80		
CL4-PCB-81		
CL5-PCB-82		
CL5-PCB-83/99	B	
CL5-PCB-84	B	
CL5-PCB-85/116/117	B	
CB-86/87/97/108/119/125	B	
CL5-PCB-88/91		
CL5-PCB-89		
CL5-PCB-90/101/113	B	
CL5-PCB-92		
CL5-PCB-93/95/98/100/102	B	
CL5-PCB-94		
CL5-PCB-96		
CL5-PCB-103		
CL5-PCB-104		
CL5-PCB-105	B	
CL5-PCB-106		
CL5-PCB-107/124		
CL5-PCB-109		
CL5-PCB-110/115	B	
CL5-PCB-111		
CL5-PCB-112		
CL5-PCB-114		
CL5-PCB-118	B	
CL5-PCB-120		
CL5-PCB-121		
CL5-PCB-122		
CL5-PCB-123		

CL5-PCB-126		
CL5-PCB-127		
CL6-PCB-128/166	B	
CL6-PCB-129/138/160/163	B	
CL6-PCB-130		
CL6-PCB-131		
CL6-PCB-132	B	
CL6-PCB-133		
CL6-PCB-134/143		
CL6-PCB-135/151/154		
CL6-PCB-136		
CL6-PCB-137		
CL6-PCB-139/140		
CL6-PCB-141		
CL6-PCB-142		
CL6-PCB-144		
CL6-PCB-145		
CL6-PCB-146		
CL6-PCB-147/149	B	
CL6-PCB-148		
CL6-PCB-150		
CL6-PCB-152		
CL6-PCB-153/168	B	
CL6-PCB-155		
CL6-PCB-156/157		
CL6-PCB-158		
CL6-PCB-159		
CL6-PCB-161		
CL6-PCB-162		
CL6-PCB-164		
CL6-PCB-165		
CL6-PCB-167		
CL6-PCB-169		
CL7-PCB-170	B	
CL7-PCB-171/173	B	
CL7-PCB-172		
CL7-PCB-174	B	
CL7-PCB-175		
CL7-PCB-176		
CL7-PCB-177	B	
CL7-PCB-178		
CL7-PCB-179		
CL7-PCB-180/193	B	
CL7-PCB-181		
CL7-PCB-182		
CL7-PCB-183/185	B	
CL7-PCB-184		
CL7-PCB-186		
CL7-PCB-187	B	

CL7-PCB-188		
CL7-PCB-189		
CL7-PCB-190		
CL7-PCB-191		
CL7-PCB-192		
CL8-PCB-194	B	
CL8-PCB-195		
CL8-PCB-196	B	
CL8-PCB-197/200	B	
CL8-PCB-198/199	B	
CL8-PCB-201		
CL8-PCB-202		
CL8-PCB-203	B	
CL8-PCB-204		
CL8-PCB-205		
CL9-PCB-206		
CL9-PCB-207		
CL9-PCB-208		
CL10-PCB-209	B	
Total Monochloro Biphenyl		
Total Dichloro Biphenyl		
Total Trichloro Biphenyl	B	
Total Tetrachloro Biphenyl	B	
Total Pentachloro Biphenyl	B	
Total Hexachloro Biphenyl	B	
Total Heptachloro Biphenyl	B	
Total Octachloro Biphenyl	B	
Total Nonachloro Biphenyl		
Decachloro Biphenyl	B	
TOTAL PCBs	B	

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 9/13, 30/2007

Prepared by:
Colin Elliott Nov. 16, 2009
Colin Elliott
QA Officer

Reviewed by:
Fritz Grothkopp Dec 1, 2009
Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L43912-1 and L43913-1, -2
Date Collected (by King County Staff):	Sept. 13, 2007 and Sept. 30, 2007
Date Received by Axys Analytical:	October 3, 2007
Axys Analysis Batch ID#s:	WG23448
Extraction Dates:	October 19, 2007
Initial Calibration Dates:	October 10, 2007
Instrument Analysis Date(s):	October 29, 2007 and November 1, 2007

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

Note: Sample L43912-1 represents an equipment blank collected September 13, 2007 during installation of an autosampler at the S. Michigan station.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:

The initial calibration done on October 10, 2007 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (for each of the two12-hour sequences – October 29, 2007 and November 1, 2007):

Mass resolution of the verification standards (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blanks: A method blank was prepared and processed with this single batch of samples (WG23448-101). In the method blank, the recoveries of labeled

compounds PCB 4, 15 and 19 were slightly below the recovery acceptance limit. It is not expected that this impacted the values measured above the reporting limit of the associated parameters since they are recovery corrected. The low recoveries may have adversely impacted the reporting limits for the associated parameters that were not detected (see Attachment A). The reporting limits for parameters listed in Attachment A should be considered as estimates (UJ qualified). A total of 67 of the 175 reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and the MDL value listed in Table 5 of the SAP, therefore are considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: An OPR sample was prepared and processed with this batch of samples (WG23448-102). All recovery values for each spiked congener and labeled compound met the acceptance limits (section 15.5.3) except for labeled compounds PCB 4, 15 and 19 and the cleanup standard PCB 28 which showed slightly low recoveries. Since the measured recoveries of the spiked congeners associated with these were acceptable, the recovery correction is considered appropriate and no data qualification is necessary.

4.3 Lab Duplicates/ Field Duplicates: No lab duplicate or field replicate was analyzed with this batch of samples thus method precision was not evaluated. Lab duplicates are not required by the reference method. As defined in the SAP, field replicates will be collected only at locations where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples had acceptable recovery values for all labeled compound and cleanup standards. Acceptable recovery indicates the sample results have not been significantly biased by matrix effects.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-

specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were less than 5 times the blank response have been qualified with a "B" in the table in Attachment B. According to CLP guidance, all results associated with a B should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a UJ qualifier in Attachment A and the B qualifier in Attachment B. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Data Qualification of Reporting Limit due to Low Labeled Compound Recovery

CLIENT ID	Method Blank
AXYS ID	WG23448-101
WORKGROUP	WG23448
CL2-PCB-4	UJ
CL2-PCB-5	UJ
CL2-PCB-6	UJ
CL2-PCB-9	UJ
CL2-PCB-10	UJ
CL2-PCB-12/13	UJ
CL2-PCB-14	UJ
CL2-PCB-15	UJ
CL3-PCB-23	UJ
CL3-PCB-24	UJ
CL3-PCB-25	UJ
CL3-PCB-27	UJ
CL3-PCB-34	UJ
CL3-PCB-35	UJ
CL3-PCB-36	UJ
CL3-PCB-38	UJ
CL3-PCB-39	UJ

Attachment B. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L43912-1	L43913-1	L43913-2
AXYS ID	L10445-1	L10445-2	L10445-3
WORKGROUP	WG23448	WG23448	WG23448
Sample Size	0.929 L	0.916 L	0.821 L
UNITS	pg/L	pg/L	pg/L
CL1-PCB-1			
CL1-PCB-2			
CL1-PCB-3	B		
CL2-PCB-4			
CL2-PCB-5			
CL2-PCB-6			
CL2-PCB-7	B	B	B
CL2-PCB-8	B		
CL2-PCB-9			
CL2-PCB-10			
CL2-PCB-11	B		
CL2-PCB-12/13			
CL2-PCB-14			
CL2-PCB-15			
CL3-PCB-16	B		
CL3-PCB-17	B		
CL3-PCB-18/30	B		
CL3-PCB-19	B		
CL3-PCB-20/28	B		
CL3-PCB-21/33	B		
CL3-PCB-22	B		
CL3-PCB-23			
CL3-PCB-24			
CL3-PCB-25			
CL3-PCB-26/29	B		
CL3-PCB-27			
CL3-PCB-31	B		
CL3-PCB-32	B		
CL3-PCB-34			
CL3-PCB-35			
CL3-PCB-36			
CL3-PCB-37	B		
CL3-PCB-38			
CL3-PCB-39			
CL4-PCB-40/41/71	B		
CL4-PCB-42	B		
CL4-PCB-43			
CL4-PCB-44/47/65			
CL4-PCB-45/51			
CL4-PCB-46			
CL4-PCB-48			
CL4-PCB-49/69	B		
CL4-PCB-50/53	B		

CL4-PCB-52	B		
CL4-PCB-54			
CL4-PCB-55			
CL4-PCB-56	B		
CL4-PCB-57			
CL4-PCB-58			
CL4-PCB-59/62/75	B		
CL4-PCB-60			
CL4-PCB-61/70/74/76	B		
CL4-PCB-63			
CL4-PCB-64	B		
CL4-PCB-66	B		
CL4-PCB-67			
CL4-PCB-68			
CL4-PCB-72			
CL4-PCB-73			
CL4-PCB-77	B		
CL4-PCB-78			
CL4-PCB-79			
CL4-PCB-80			
CL4-PCB-81			
CL5-PCB-82			
CL5-PCB-83/99	B		
CL5-PCB-84			
CL5-PCB-85/116/117	B		
CB-86/87/97/108/119/125	B		
CL5-PCB-88/91			
CL5-PCB-89			
CL5-PCB-90/101/113	B		
CL5-PCB-92			
CL5-PCB-93/95/98/100/102	B		
CL5-PCB-94			
CL5-PCB-96			
CL5-PCB-103			
CL5-PCB-104			
CL5-PCB-105	B		
CL5-PCB-106			
CL5-PCB-107/124			
CL5-PCB-109			
CL5-PCB-110/115	B		
CL5-PCB-111			
CL5-PCB-112			
CL5-PCB-114			
CL5-PCB-118	B		
CL5-PCB-120			
CL5-PCB-121			
CL5-PCB-122			
CL5-PCB-123			

CL5-PCB-126			
CL5-PCB-127			
CL6-PCB-128/166			
CL6-PCB-129/138/160/163	B		
CL6-PCB-130			
CL6-PCB-131			
CL6-PCB-132			
CL6-PCB-133			
CL6-PCB-134/143			
CL6-PCB-135/151/154	B		
CL6-PCB-136			
CL6-PCB-137			
CL6-PCB-139/140			
CL6-PCB-141			
CL6-PCB-142			
CL6-PCB-144			
CL6-PCB-145			
CL6-PCB-146	B		
CL6-PCB-147/149	B		
CL6-PCB-148			
CL6-PCB-150			
CL6-PCB-152			
CL6-PCB-153/168	B		
CL6-PCB-155			
CL6-PCB-156/157	B		
CL6-PCB-158			
CL6-PCB-159			
CL6-PCB-161			
CL6-PCB-162			
CL6-PCB-164			
CL6-PCB-165			
CL6-PCB-167			
CL6-PCB-169			
CL7-PCB-170	B		
CL7-PCB-171/173			
CL7-PCB-172			
CL7-PCB-174			
CL7-PCB-175			
CL7-PCB-176			
CL7-PCB-177			
CL7-PCB-178			
CL7-PCB-179			
CL7-PCB-180/193	B		
CL7-PCB-181			
CL7-PCB-182			
CL7-PCB-183/185	B		
CL7-PCB-184			
CL7-PCB-186			

CL7-PCB-187	B		
CL7-PCB-188			
CL7-PCB-189			
CL7-PCB-190			
CL7-PCB-191			
CL7-PCB-192			
CL8-PCB-194			
CL8-PCB-195			
CL8-PCB-196			
CL8-PCB-197/200			
CL8-PCB-198/199			
CL8-PCB-201			
CL8-PCB-202			
CL8-PCB-203			
CL8-PCB-204			
CL8-PCB-205			
CL9-PCB-206			
CL9-PCB-207			
CL9-PCB-208			
CL10-PCB-209			
Total Monochloro Biphenyl			
Total Dichloro Biphenyl			
Total Trichloro Biphenyl	B		
Total Tetrachloro Biphenyl			
Total Pentachloro Biphenyl			
Total Hexachloro Biphenyl	B		
Total Heptachloro Biphenyl	B		
Total Octachloro Biphenyl			
Total Nonachloro Biphenyl			
Decachloro Biphenyl			
TOTAL PCBs			

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 10/19/2007 and 12/2/2007

Prepared by: Colin Elliott nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by: Fritz Grothkopp dec 1, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November, 2009

King County Sample IDs:	L44132-1 and L44133-1, -2, -3, -4
Date Collected (by King County Staff):	Oct. 19, 2007 and Dec 2, 2007
Date Received by Axys Analytical:	December 18, 2007
Axys Analysis Batch ID#s:	WG24297
Extraction Dates:	January 25, 2008
Initial Calibration Dates:	January 30, 2008
Instrument Analysis Date(s):	February 3 and 4, 2008

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

Note: Sample L44132-1 represents an equipment blank collected October 19, 2007 during installation of an autosampler at the Duwamish Forebay station.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:
The initial calibration done on January 30, 2008 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (for the12-hour sequence – Feb 3, 2008):
Mass resolution of the verification standards (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blanks: A method blank was prepared and processed with this single batch of samples (WG24297-101). A total of 66 of the 175 reported parameters showed measured concentrations above the reporting limit for the method blank.

Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and only one (PCB 204) was above the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: An OPR sample was prepared and processed with this batch of samples (WG24297-102). All recovery values for each spiked congener and labeled compound met the acceptance limits (section 15.5.3) except for labeled compound PCB 4 which showed a slightly low recovery. Since the measured recoveries of the associated spiked congeners were all acceptable, there was no apparent impact.

4.3 Lab Duplicates/Field Replicates: No lab duplicate was extracted with this set but a field replicate (L44133-4) was submitted for the Hanford CSO station. The SAP states that the relative percent difference (RPD) is expected to be within +/- 50% for field replicates. The RPD values for the individual compounds in the sample and field replicate are shown in Attachment C. Only those RPD values which were determined from unqualified data are shown in the table. Of the 155 RPD values listed, 63 of these values exceed the expected limit.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards except for Sample L44132-1 which had a recovery for labeled compounds PCB 1L below the method acceptance limit. For Sample L44132-1, the measured concentration for PCB 1 and PCB 2, which are calculated using this compound, are to be qualified with a J flag indicating they are estimated values. See Attachment A.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP except for Sample L44133-4 which had reporting limits for several congeners

above the SAP MDL values. All of these had measured concentrations above the reporting limit except for PCB 78 which was undetected at a reporting limit of 6.15 pg/L. The MDL value from Table 5 of the SAP is 5.28 pg/L.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were less than 5 times the blank response have been qualified with a "B" in the table in Attachment B. According to CLP guidance, all results associated with a B in Attachment B should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment B and the J qualifier in Attachment A. All results qualified with the K or B flags should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Note: The "G" qualifier was reported for selected congeners where an observed instrumental interference occurred (lock mass disturbance). Acceptable ion ratios and relative retention times were obtained for all reported concentrations for each of these occurrences. It is therefore not expected this interference has biased the reported concentrations.

Attachment A. Additional Data Qualification due to Low Labeled Compound Recovery

CLIENT ID	L44132-1
AXYS ID	L10719-1
WORKGROUP	WG23448
CL1-PCB-1	J
CL1-PCB-2	J

Attachment B. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L44132-1	L44133-1	L44133-2	L44133-3	L44133-4
AXYS ID	L10719-1	L10719-2	L10719-3	L10719-4	L10719-5
WORKGROUP	WG24297	WG24297	WG24297	WG24297	WG24297
Sample Size	0.934 L	0.919 L	0.919 L	0.926 L	0.889 L
UNITS	pg/L	pg/L	pg/L	pg/L	pg/L
CL1-PCB-1	B				
CL1-PCB-2	B			B	
CL1-PCB-3	B				
CL2-PCB-4					
CL2-PCB-5					
CL2-PCB-6					
CL2-PCB-7	B		B	B	B
CL2-PCB-8					
CL2-PCB-9					
CL2-PCB-10					
CL2-PCB-11	B				
CL2-PCB-12/13					
CL2-PCB-14					
CL2-PCB-15					
CL3-PCB-16					
CL3-PCB-17	B				
CL3-PCB-18/30	B				
CL3-PCB-19					
CL3-PCB-20/28	B				
CL3-PCB-21/33					
CL3-PCB-22	B				
CL3-PCB-23					
CL3-PCB-24					
CL3-PCB-25					
CL3-PCB-26/29	B				
CL3-PCB-27					
CL3-PCB-31	B				
CL3-PCB-32					
CL3-PCB-34					
CL3-PCB-35					
CL3-PCB-36					
CL3-PCB-37					
CL3-PCB-38					

CL3-PCB-39					
CL4-PCB-40/41/71	B				
CL4-PCB-42					
CL4-PCB-43					
CL4-PCB-44/47/65					
CL4-PCB-45/51					
CL4-PCB-46					
CL4-PCB-48					
CL4-PCB-49/69	B				
CL4-PCB-50/53					
CL4-PCB-52	B				
CL4-PCB-54					
CL4-PCB-55					
CL4-PCB-56					
CL4-PCB-57					
CL4-PCB-58					
CL4-PCB-59/62/75					
CL4-PCB-60					
CL4-PCB-61/70/74/76	B				
CL4-PCB-63					
CL4-PCB-64	B				
CL4-PCB-66	B				
CL4-PCB-67					
CL4-PCB-68					
CL4-PCB-72					
CL4-PCB-73					
CL4-PCB-77					
CL4-PCB-78					
CL4-PCB-79					
CL4-PCB-80					
CL4-PCB-81					
CL5-PCB-82	B				
CL5-PCB-83/99	B				
CL5-PCB-84	B				
CL5-PCB-85/116/117	B				
CB-86/87/97/108/119/125	B				
CL5-PCB-88/91	B				
CL5-PCB-89					
CL5-PCB-90/101/113	B				
CL5-PCB-92	B				
CL5-PCB-93/95/98/100/102	B				
CL5-PCB-94					
CL5-PCB-96					
CL5-PCB-103					
CL5-PCB-104					
CL5-PCB-105	B				
CL5-PCB-106					
CL5-PCB-107/124					
CL5-PCB-109					
CL5-PCB-110/115	B				

CL5-PCB-111					
CL5-PCB-112					
CL5-PCB-114					
CL5-PCB-118	B				
CL5-PCB-120					
CL5-PCB-121					
CL5-PCB-122					
CL5-PCB-123					
CL5-PCB-126					
CL5-PCB-127					
CL6-PCB-128/166	B				
CL6-PCB-129/138/160/163	B				
CL6-PCB-130					
CL6-PCB-131					
CL6-PCB-132	B				
CL6-PCB-133					
CL6-PCB-134/143					
CL6-PCB-135/151/154	B				
CL6-PCB-136					
CL6-PCB-137					
CL6-PCB-139/140					
CL6-PCB-141	B				
CL6-PCB-142					
CL6-PCB-144					
CL6-PCB-145					
CL6-PCB-146	B				
CL6-PCB-147/149	B				
CL6-PCB-148					
CL6-PCB-150					
CL6-PCB-152					
CL6-PCB-153/168	B				
CL6-PCB-155					
CL6-PCB-156/157	B				
CL6-PCB-158	B				
CL6-PCB-159					
CL6-PCB-161					
CL6-PCB-162					
CL6-PCB-164					
CL6-PCB-165					
CL6-PCB-167					
CL6-PCB-169					
CL7-PCB-170	B				
CL7-PCB-171/173					
CL7-PCB-172					
CL7-PCB-174	B				
CL7-PCB-175					
CL7-PCB-176					
CL7-PCB-177	B				
CL7-PCB-178					
CL7-PCB-179	B				

CL7-PCB-180/193	B				
CL7-PCB-181					
CL7-PCB-182					
CL7-PCB-183/185	B				
CL7-PCB-184					
CL7-PCB-186					
CL7-PCB-187					
CL7-PCB-188					
CL7-PCB-189					
CL7-PCB-190					
CL7-PCB-191					
CL7-PCB-192					
CL8-PCB-194	B				
CL8-PCB-195					
CL8-PCB-196					
CL8-PCB-197/200					
CL8-PCB-198/199	B				
CL8-PCB-201					
CL8-PCB-202					
CL8-PCB-203					
CL8-PCB-204	B	B	B	B	B
CL8-PCB-205					
CL9-PCB-206					
CL9-PCB-207					
CL9-PCB-208					
CL10-PCB-209	B				
Total Monochloro Biphenyl	B				
Total Dichloro Biphenyl	B				
Total Trichloro Biphenyl					
Total Tetrachloro Biphenyl					
Total Pentachloro Biphenyl	B				
Total Hexachloro Biphenyl	B				
Total Heptachloro Biphenyl	B				
Total Octachloro Biphenyl	B				
Total Nonachloro Biphenyl					
Decachloro Biphenyl					
TOTAL PCBs	B				

Attachment C: Relative Percent Differences for Sample and Field Replicate

CLIENT ID	L44133-3	L44133-4 (field replicate)	Relative Percent Difference
AXYS ID	L10719-4	L10719-5	
WORKGROUP	WG24297	WG24297	
Sample Size	0.926 L	0.889 L	
UNITS	pg/L	pg/L	
CL1-PCB-1	46.9	66.3	-34
CL1-PCB-2	7.84	10.9	-33
CL1-PCB-3	21.2	34.2	-47
CL2-PCB-4	99.4	146	-38
CL2-PCB-5	3.61	4.38	-19

CL2-PCB-6	51.7	76.9	-39
CL2-PCB-7	6.53	10.3	-45
CL2-PCB-8	129	190	-38
CL2-PCB-9	12.7	17.1	-30
CL2-PCB-10	3.75	5.39	-36
CL2-PCB-11	235	357	-41
CL2-PCB-12/13	19.5	27.5	-34
CL2-PCB-14	< 1.27	< 1.27	NA
CL2-PCB-15	88.6	125	-34
CL3-PCB-16	89.6	125	-33
CL3-PCB-17	94.1	135	-36
CL3-PCB-18/30	189	272	-36
CL3-PCB-19	41.1	61.2	-39
CL3-PCB-20/28	383	500	-27
CL3-PCB-21/33	184	251	-31
CL3-PCB-22	154	191	-21
CL3-PCB-23	0.642	0.992	-43
CL3-PCB-24	3.28	4.36	-28
CL3-PCB-25	35.3	51.6	-38
CL3-PCB-26/29	67	90.6	-30
CL3-PCB-27	20	28.5	-35
CL3-PCB-31	485	650	-29
CL3-PCB-32	129	181	-34
CL3-PCB-34	1.51	2.62	-54
CL3-PCB-35	14	19.1	-31
CL3-PCB-36	1.57	2.72	-54
CL3-PCB-37	162	190	-16
CL3-PCB-38	K 0.571	K 0.587	NA
CL3-PCB-39	2.83	4.29	-41
CL4-PCB-40/41/71	306	428	-33
CL4-PCB-42	120	160	-29
CL4-PCB-43	17	26.1	-42
CL4-PCB-44/47/65	1140	1970	-53
CL4-PCB-45/51	388	650	-50
CL4-PCB-46	36.7	51	-33
CL4-PCB-48	82.8	107	-26
CL4-PCB-49/69	531	936	-55
CL4-PCB-50/53	286	480	-51
CL4-PCB-52	1240	2300	-60
CL4-PCB-54	49.9	84.9	-52
CL4-PCB-55	23.6	32.2	-31
CL4-PCB-56	242	334	-32
CL4-PCB-57	< 2.47	< 6.05	NA
CL4-PCB-58	3.51	< 6.27	NA
CL4-PCB-59/62/75	53.6	76.5	-35
CL4-PCB-60	129	166	-25
CL4-PCB-61/70/74/76	1410	2430	-53
CL4-PCB-63	23.7	36.9	-44
CL4-PCB-64	242	364	-40
CL4-PCB-66	477	730	-42

CL4-PCB-67	15.8	23	-37
CL4-PCB-68	23.3	29.8	-24
CL4-PCB-72	5.37	9.14	-52
CL4-PCB-73	29.9	53.8	-57
CL4-PCB-77	95.6	130	-30
CL4-PCB-78	< 2.51	< 6.15	NA
CL4-PCB-79	24.9	46.2	-60
CL4-PCB-80	< 2.22	< 5.44	NA
CL4-PCB-81	4.4	6.5	-39
CL5-PCB-82	281	521	-60
CL5-PCB-83/99	1110	2200	-66
CL5-PCB-84	566	1090	-63
CL5-PCB-85/116/117	386	733	-62
CB-86/87/97/108/119/125	1710	3310	-64
CL5-PCB-88/91	345	714	-70
CL5-PCB-89	17.4	29.7	-52
CL5-PCB-90/101/113	2530	4950	-65
CL5-PCB-92	451	904	-67
CL5-PCB-93/95/98/100/102	1870	3650	-64
CL5-PCB-94	33.3	73.5	-75
CL5-PCB-96	19.3	44.7	-79
CL5-PCB-103	31.6	69.8	-75
CL5-PCB-104	7.22	15.8	-75
CL5-PCB-105	994	1840	-60
CL5-PCB-106	3.66	5.47	-40
CL5-PCB-107/124	108	197	-58
CL5-PCB-109	163	300	-59
CL5-PCB-110/115	2800	5440	-64
CL5-PCB-111	1.94	4.07	-71
CL5-PCB-112	< 0.774	< 1.67	NA
CL5-PCB-114	56.2	104	-60
CL5-PCB-118	2350	4450	-62
CL5-PCB-120	K 3.60	K 7.14	NA
CL5-PCB-121	2.91	5.83	-67
CL5-PCB-122	29.3	55	-61
CL5-PCB-123	39.1	79.4	-68
CL5-PCB-126	19.7	26.1	-28
CL5-PCB-127	5.46	8.8	-47
CL6-PCB-128/166	524	910	-54
CL6-PCB-129/138/160/163	3600	6060	-51
CL6-PCB-130	215	376	-54
CL6-PCB-131	47	89.3	-62
CL6-PCB-132	1200	2070	-53
CL6-PCB-133	54.2	102	-61
CL6-PCB-134/143	196	328	-50
CL6-PCB-135/151/154	1020	1720	-51
CL6-PCB-136	373	640	-53
CL6-PCB-137	180	311	-53
CL6-PCB-139/140	61.7	113	-59

CL6-PCB-141	687	1070	-44
CL6-PCB-142	< 4.65	< 4.71	NA
CL6-PCB-144	152	246	-47
CL6-PCB-145	1.54	3.07	-66
CL6-PCB-146	478	792	-49
CL6-PCB-147/149	2530	4260	-51
CL6-PCB-148	8.71	17.8	-69
CL6-PCB-150	11.4	24.6	-73
CL6-PCB-152	6.08	13.8	-78
CL6-PCB-153/168	2760	4460	-47
CL6-PCB-155	K 2.01	4.41	NA
CL6-PCB-156/157	442	764	-53
CL6-PCB-158	373	631	-51
CL6-PCB-159	34.9	49.5	-35
CL6-PCB-161	4.39	6.91	-45
CL6-PCB-162	11.2	19.8	-55
CL6-PCB-164	251	419	-50
CL6-PCB-165	< 3.67	7.2	NA
CL6-PCB-167	153	257	-51
CL6-PCB-169	< 3.43	< 3.51	NA
CL7-PCB-170	844	1200	-35
CL7-PCB-171/173	273	391	-36
CL7-PCB-172	155	212	-31
CL7-PCB-174	821	1120	-31
CL7-PCB-175	37.6	54.5	-37
CL7-PCB-176	104	151	-37
CL7-PCB-177	483	673	-33
CL7-PCB-178	170	242	-35
CL7-PCB-179	328	472	-36
CL7-PCB-180/193	1810	2470	-31
CL7-PCB-181	8.79	14.8	-51
CL7-PCB-182	8.79	12.5	-35
CL7-PCB-183/185	598	856	-35
CL7-PCB-184	4	6.1	-42
CL7-PCB-186	< 0.540	< 0.562	NA
CL7-PCB-187	1020	1410	-32
CL7-PCB-188	3.55	7	-65
CL7-PCB-189	41.2	56.6	-31
CL7-PCB-190	173	239	-32
CL7-PCB-191	36.7	53.1	-37
CL7-PCB-192	< 0.540	< 0.562	NA
CL8-PCB-194	449	590	-27
CL8-PCB-195	165	234	-35
CL8-PCB-196	239	318	-28
CL8-PCB-197/200	71.7	81.7	-13
CL8-PCB-198/199	562	724	-25
CL8-PCB-201	67.9	89.7	-28
CL8-PCB-202	121	143	-17
CL8-PCB-203	346	458	-28
CL8-PCB-204	K 0.936	1.34	NA

CL8-PCB-205	23	33.5	-37
CL9-PCB-206	273	319	-16
CL9-PCB-207	37.9	41	-8
CL9-PCB-208	83.5	98	-16
CL10-PCB-209	66.3	98.8	-39
Total Monochloro Biphenyl	75.9	111	-38
Total Dichloro Biphenyl	650	960	-39
Total Trichloro Biphenyl	2060	2760	-29
Total Tetrachloro Biphenyl	7000	11700	-50
Total Pentachloro Biphenyl	15900	30800	-64
Total Hexachloro Biphenyl	15400	25800	-50
Total Heptachloro Biphenyl	6920	9640	-33
Total Octachloro Biphenyl	2040	2670	-27
Total Nonachloro Biphenyl	394	458	-15
Decachloro Biphenyl	66.3	98.8	-39
TOTAL PCBs	50500	85000	-51

N/A = Not applicable if the one or more results were "K" qualified or are <MDL.

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 1/28/2008 and 6/3/2008

Prepared by: Colin Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by: Fritz Grothkopp Dec 2, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L44913-1 and L44912-6
Date Collected (by King County Staff):	Jan 28, 2008 and June 3, 2008
Date Received by Axys Analytical:	June 10, 2008
Axys Analysis Batch ID#s:	WG25565
Extraction Dates:	June 13, 2008
Initial Calibration Dates:	April 23, 2008
Instrument Analysis Date(s):	July 3, 2008.

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

Note: Sample L44913-1 represents an equipment blank collected January 28, 2008 during installation of an autosampler at the Hanford station.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:
The initial calibration done on April 23, 2008 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (for the12-hour sequence – July 2-3, 2008):
Mass resolution of the verification standards (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blanks: A method blank was prepared and processed with this single batch of samples (WG25565-101). A total of 21 of the reported parameters showed measured concentrations above the reporting limit for the method blank.

Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: An OPR sample was prepared and processed with this batch of samples (WG25565-102). All recovery values for each spiked congener and labeled compound met the acceptance limits in Table 6 (section 15.5.3).

4.3 Lab Duplicates/Field Replicates: The lab duplicate extracted with this batch of samples was not a sample submitted by our lab so no data was supplied in this data package. Lab duplicates are not required by the reference method. As defined in the SAP, field replicates will be collected only at locations where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias.

Sample results which were ≤ 5 times the blank response have been qualified with a "B" in the table in Attachment A. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

All samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L44912-6	L44913-1
AXYS ID	L11268-1	L11268-2
WORKGROUP	WG25565	WG25565
CL1-PCB-1		
CL1-PCB-2		
CL1-PCB-3		
CL2-PCB-4		
CL2-PCB-5		
CL2-PCB-6		
CL2-PCB-7		
CL2-PCB-8		
CL2-PCB-9		
CL2-PCB-10		
CL2-PCB-11		B
CL2-PCB-12/13		
CL2-PCB-14		
CL2-PCB-15		
CL3-PCB-16		
CL3-PCB-17		
CL3-PCB-18/30		B
CL3-PCB-19		
CL3-PCB-20/28		B
CL3-PCB-21/33		
CL3-PCB-22		
CL3-PCB-23		
CL3-PCB-24		
CL3-PCB-25		
CL3-PCB-26/29		
CL3-PCB-27		
CL3-PCB-31		B
CL3-PCB-32		
CL3-PCB-34		
CL3-PCB-35		
CL3-PCB-36		
CL3-PCB-37		
CL3-PCB-38		
CL3-PCB-39		
CL4-PCB-40/41/71		
CL4-PCB-42		
CL4-PCB-43		
CL4-PCB-44/47/65		
CL4-PCB-45/51		
CL4-PCB-46		

CL4-PCB-48		
CL4-PCB-49/69		
CL4-PCB-50/53		
CL4-PCB-52		
CL4-PCB-54		
CL4-PCB-55		
CL4-PCB-56		
CL4-PCB-57		
CL4-PCB-58		
CL4-PCB-59/62/75		
CL4-PCB-60		
CL4-PCB-61/70/74/76		B
CL4-PCB-63		
CL4-PCB-64		
CL4-PCB-66		B
CL4-PCB-67		
CL4-PCB-68		
CL4-PCB-72		
CL4-PCB-73		
CL4-PCB-77		
CL4-PCB-78		
CL4-PCB-79		
CL4-PCB-80		
CL4-PCB-81		
CL5-PCB-82		
CL5-PCB-83/99		B
CL5-PCB-84		
CL5-PCB-85/116/117		
CB-86/87/97/108/119/125		B
CL5-PCB-88/91		
CL5-PCB-89		
CL5-PCB-90/101/113		B
CL5-PCB-92		
CL5-PCB-93/95/98/100/102		B
CL5-PCB-94		
CL5-PCB-96		
CL5-PCB-103		
CL5-PCB-104		
CL5-PCB-105		B
CL5-PCB-106		
CL5-PCB-107/124		
CL5-PCB-109		
CL5-PCB-110/115		
CL5-PCB-111		
CL5-PCB-112		
CL5-PCB-114		
CL5-PCB-118		B
CL5-PCB-120		

CL5-PCB-121		
CL5-PCB-122		
CL5-PCB-123		
CL5-PCB-126		
CL5-PCB-127		
CL6-PCB-128/166		
CL6-PCB-129/138/160/163		
CL6-PCB-130		
CL6-PCB-131		
CL6-PCB-132		
CL6-PCB-133		
CL6-PCB-134/143		
CL6-PCB-135/151/154		
CL6-PCB-136		
CL6-PCB-137		
CL6-PCB-139/140		
CL6-PCB-141		
CL6-PCB-142		
CL6-PCB-144		
CL6-PCB-145		
CL6-PCB-146		
CL6-PCB-147/149		B
CL6-PCB-148		
CL6-PCB-150		
CL6-PCB-152		
CL6-PCB-153/168		B
CL6-PCB-155		
CL6-PCB-156/157		
CL6-PCB-158		
CL6-PCB-159		
CL6-PCB-161		
CL6-PCB-162		
CL6-PCB-164		
CL6-PCB-165		
CL6-PCB-167		
CL6-PCB-169		
CL7-PCB-170		
CL7-PCB-171/173		
CL7-PCB-172		
CL7-PCB-174		
CL7-PCB-175		
CL7-PCB-176		
CL7-PCB-177		
CL7-PCB-178		
CL7-PCB-179		
CL7-PCB-180/193		B
CL7-PCB-181		
CL7-PCB-182		

CL7-PCB-183/185		
CL7-PCB-184		
CL7-PCB-186		
CL7-PCB-187		
CL7-PCB-188		
CL7-PCB-189		
CL7-PCB-190		
CL7-PCB-191		
CL7-PCB-192		
CL8-PCB-194		
CL8-PCB-195		
CL8-PCB-196		
CL8-PCB-197/200		
CL8-PCB-198/199		
CL8-PCB-201		
CL8-PCB-202		
CL8-PCB-203		
CL8-PCB-204		
CL8-PCB-205		
CL9-PCB-206		
CL9-PCB-207		
CL9-PCB-208		
CL10-PCB-209		B
Total Monochloro Biphenyl		
Total Dichloro Biphenyl		
Total Trichloro Biphenyl		
Total Tetrachloro Biphenyl		
Total Pentachloro Biphenyl		B
Total Hexachloro Biphenyl		
Total Heptachloro Biphenyl		
Total Octachloro Biphenyl		
Total Nonachloro Biphenyl		
Decachloro Biphenyl		
TOTAL PCBs		

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 6/5/2008 and 8/19-20/2008

Prepared by:

Colin Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by:

Fritz Grothkopp Dec 1, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L45805-1, L45811-1, -3, -6
Date Collected (by King County Staff):	June 5, 2008 and August 19-20, 2008
Date Received by Axys Analytical:	August 29, 2008
Axys Analysis Batch ID#:	WG26133
Extraction Date:	September 12, 2008
Initial Calibration Date:	September 11, 2008
Instrument Analysis Date(s):	September 24, 27, 2008.

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

Note: Sample L45805-1 represents an equipment blank collected June 5, 2008 during installation of an autosampler at the Lander station.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.
Note: the sample collection date for Samples L45811-3, -6 is listed in the Axys documentation as August 19, 2008 but the correct date was August 20, 2008.

2. GC/MS Instrument Performance Checks and Initial Calibration:
The initial calibration done on September 11, 2008 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (four 12-hour sequences were needed to complete all analysis):
Mass resolution of the verification standards (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blanks: A method blank (WG26133-101) was prepared and processed with this single batch of samples. A re-analysis of the method blank extract was required due to problems with the original instrumental analysis. All data are reported from the successful re-analysis. A total of 34 of the reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: An OPR sample (WG26133-102) was prepared and processed with this batch of samples. A re-analysis of the OPR extract was required due to problems with the original instrumental analysis. All data are reported from the successful re-analysis. All recovery values for each spiked congener and labeled compound met the acceptance limits in Table 6 (section 15.5.3).

4.3 Lab Duplicates/ Field Duplicates: No lab duplicate or field replicate were analyzed with this batch of samples thus method precision was not evaluated. Lab duplicates are not required by the reference method. As defined in the SAP, field replicates will be collected only at locations where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

Samples L45811-1, -3 and -6 all exhibited interferences for selected parameters within the Cl8, Cl9 and Cl10 range of congeners during the first analysis of the extracts. All three samples were therefore diluted and re-analyzed. Results for individual parameters are reported from the original analysis unless interferences were observed.

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the

observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP except for sample L45811-1. For this sample, the reporting limit for PCB 189, 206, 207 and 208 exceeded the MDL values listed in the SAP. This was due to the 10-fold dilution required to eliminate the matrix interferences. Since there were detected levels of these 4 parameters in this sample, project goals were not compromised.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were ≤ 5 times the blank response have been qualified with a "B" in the table in Attachment A. Only Sample L45805-1 had measured levels ≤ 5 times the blank response. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination (For values reported >MDL)

CLIENT ID	L45805-1	L45811-1	L45811-3	L45811-6
AXYS ID	L11659-1	L11659-2	L11659-3	L11659-4
WORKGROUP	WG26133	WG26133	WG26133	WG26133
CL1-PCB-1				
CL1-PCB-2				
CL1-PCB-3				
CL2-PCB-4				
CL2-PCB-5				
CL2-PCB-6				
CL2-PCB-7				
CL2-PCB-8	B			
CL2-PCB-9				
CL2-PCB-10				
CL2-PCB-11	B			
CL2-PCB-12/13				
CL2-PCB-14				
CL2-PCB-15	B			
CL3-PCB-16				
CL3-PCB-17				
CL3-PCB-18/30	B			
CL3-PCB-19				
CL3-PCB-20/28	B			
CL3-PCB-21/33	B			
CL3-PCB-22	B			
CL3-PCB-23				
CL3-PCB-24				
CL3-PCB-25				
CL3-PCB-26/29				
CL3-PCB-27				
CL3-PCB-31	B			
CL3-PCB-32				
CL3-PCB-34				
CL3-PCB-35				
CL3-PCB-36				
CL3-PCB-37	B			
CL3-PCB-38				
CL3-PCB-39				
CL4-PCB-40/41/71	B			
CL4-PCB-42	B			
CL4-PCB-43				
CL4-PCB-44/47/65				
CL4-PCB-45/51				
CL4-PCB-46				

CL4-PCB-48	B			
CL4-PCB-49/69				
CL4-PCB-50/53				
CL4-PCB-52				
CL4-PCB-54				
CL4-PCB-55				
CL4-PCB-56				
CL4-PCB-57				
CL4-PCB-58				
CL4-PCB-59/62/75				
CL4-PCB-60	B			
CL4-PCB-61/70/74/76				
CL4-PCB-63				
CL4-PCB-64				
CL4-PCB-66	B			
CL4-PCB-67				
CL4-PCB-68				
CL4-PCB-72				
CL4-PCB-73				
CL4-PCB-77	B			
CL4-PCB-78				
CL4-PCB-79				
CL4-PCB-80				
CL4-PCB-81				
CL5-PCB-82				
CL5-PCB-83/99				
CL5-PCB-84				
CL5-PCB-85/116/117				
CB-86/87/97/108/119/125				
CL5-PCB-88/91				
CL5-PCB-89				
CL5-PCB-90/101/113				
CL5-PCB-92				
CL5-PCB-93/95/98/100/102				
CL5-PCB-94				
CL5-PCB-96				
CL5-PCB-103				
CL5-PCB-104				
CL5-PCB-105				
CL5-PCB-106				
CL5-PCB-107/124				
CL5-PCB-109				
CL5-PCB-110/115				
CL5-PCB-111				
CL5-PCB-112				
CL5-PCB-114				

CL5-PCB-118				
CL5-PCB-120				
CL5-PCB-121				
CL5-PCB-122				
CL5-PCB-123				
CL5-PCB-126				
CL5-PCB-127				
CL6-PCB-128/166				
CL6-PCB-129/138/160/163				
CL6-PCB-130				
CL6-PCB-131				
CL6-PCB-132				
CL6-PCB-133				
CL6-PCB-134/143				
CL6-PCB-135/151/154				
CL6-PCB-136				
CL6-PCB-137				
CL6-PCB-139/140				
CL6-PCB-141				
CL6-PCB-142				
CL6-PCB-144				
CL6-PCB-145				
CL6-PCB-146				
CL6-PCB-147/149				
CL6-PCB-148				
CL6-PCB-150				
CL6-PCB-152				
CL6-PCB-153/168				
CL6-PCB-155				
CL6-PCB-156/157				
CL6-PCB-158				
CL6-PCB-159				
CL6-PCB-161				
CL6-PCB-162				
CL6-PCB-164				
CL6-PCB-165				
CL6-PCB-167				
CL6-PCB-169				
CL7-PCB-170				
CL7-PCB-171/173				
CL7-PCB-172				
CL7-PCB-174				
CL7-PCB-175				
CL7-PCB-176				
CL7-PCB-177				
CL7-PCB-178				
CL7-PCB-179				

CL7-PCB-180/193				
CL7-PCB-181				
CL7-PCB-182				
CL7-PCB-183/185				
CL7-PCB-184				
CL7-PCB-186				
CL7-PCB-187				
CL7-PCB-188				
CL7-PCB-189				
CL7-PCB-190				
CL7-PCB-191				
CL7-PCB-192				
CL8-PCB-194				
CL8-PCB-195				
CL8-PCB-196				
CL8-PCB-197/200				
CL8-PCB-198/199				
CL8-PCB-201				
CL8-PCB-202				
CL8-PCB-203				
CL8-PCB-204				
CL8-PCB-205				
CL9-PCB-206				
CL9-PCB-207				
CL9-PCB-208				
CL10-PCB-209	B			
Total Monochloro Biphenyl				
Total Dichloro Biphenyl	B			
Total Trichloro Biphenyl	B			
Total Tetrachloro Biphenyl				
Total Pentachloro Biphenyl				
Total Hexachloro Biphenyl				
Total Heptachloro Biphenyl				
Total Octachloro Biphenyl				
Total Nonachloro Biphenyl				
Decachloro Biphenyl				
TOTAL PCBs				

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 11/4/2008 and 11/6/2008

Prepared by:

Colin Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by:

Fritz Grothkopp Dec 2, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L46418-3, -6 and L46918-1, -3, -5, -6, -8
Date Collected (by King County Staff):	November 4 and 6, 2008
Date Received by Axys Analytical:	December 2, 2008
Axys Analysis Batch ID#:	WG27304
Extraction Date:	December 5, 2008
Initial Calibration Date:	December 5, 2008
Instrument Analysis Date(s):	December 16-17, 30, 2008 and January 21, 2009.

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:

The initial calibration done on December 5, 2008 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (five 12-hour sequences used):

Mass resolution of the verification standards (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blank: A method blank (WG27304-101) was prepared and processed with this single batch of samples. A total of 33 of the reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Sample: An OPR sample (WG27304-102) was prepared and processed with this batch of samples. All recovery values for each spiked congener and labeled compound met the acceptance limits in Table 6 (section 15.5.3).

4.3 Lab Duplicates/ Field Duplicates: No lab duplicate or field replicate was analyzed with this batch of samples thus method precision was not evaluated. Lab duplicates are not required by the reference method. As defined in the SAP, field replicates will be collected only at locations

where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spike: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

Sample L46918-8 exhibited instrument QC interferences during the first analysis of the extract. The extract was re-analyzed on January 21, 2009 and all results are reported from the second analysis.

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. All sample-specific detection limits for all congeners were below the Minimum Level in Table 2 (section 17.6.1.4.1) and below the MDL values required by the SAP except for samples L46418-3, L46918-3 and -6. For Sample L46418-3, the reporting limit for PCB 114 exceeded the MDL values listed in the SAP but a result well above this level was reported. Since there were detected levels of this parameter, project goals were not compromised. For Sample L46918-3, the reporting limits for PCB 81 and PCB 169 slightly exceeded the MDL values listed in the SAP and these parameters were not detected in this sample. For Sample L46918-6, the reporting limit for PCB 81 also exceeded the MDL value listed in the SAP and this parameter was not detected in this sample.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were ≤ 5 times the blank response have been qualified with a "B" in the table in Attachment A. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L46418-3	L46418-6	L46918-1	L46918-3	L46918-5	L46918-6	L46918-8
AXYS ID	L12064-1	L12064-2	L12064-3	L12064-4	L12064-5	L12064-6	L12064-7
CL1-PCB-1		B					
CL1-PCB-2							
CL1-PCB-3							
CL2-PCB-4							
CL2-PCB-5							
CL2-PCB-6							
CL2-PCB-7							
CL2-PCB-8							
CL2-PCB-9							
CL2-PCB-10							
CL2-PCB-11							
CL2-PCB-12/13							
CL2-PCB-14							
CL2-PCB-15							
CL3-PCB-16							
CL3-PCB-17							
CL3-PCB-18/30							
CL3-PCB-19							
CL3-PCB-20/28							
CL3-PCB-21/33							
CL3-PCB-22							
CL3-PCB-23							
CL3-PCB-24							
CL3-PCB-25							
CL3-PCB-26/29							
CL3-PCB-27							
CL3-PCB-31							
CL3-PCB-32							
CL3-PCB-34							
CL3-PCB-35							
CL3-PCB-36							
CL3-PCB-37							
CL3-PCB-38							
CL3-PCB-39							
CL4-PCB-40/41/71							
CL4-PCB-42							
CL4-PCB-43							
CL4-PCB-44/47/65							
CL4-PCB-45/51							
CL4-PCB-46							
CL4-PCB-48							
CL4-PCB-49/69							

CL4-PCB-50/53							
CL4-PCB-52							
CL4-PCB-54							B
CL4-PCB-55							
CL4-PCB-56							
CL4-PCB-57							
CL4-PCB-58							
CL4-PCB-59/62/75							
CL4-PCB-60							
CL4-PCB-61/70/74/76							
CL4-PCB-63							
CL4-PCB-64							
CL4-PCB-66							
CL4-PCB-67							
CL4-PCB-68							
CL4-PCB-72							
CL4-PCB-73							
CL4-PCB-77							
CL4-PCB-78							
CL4-PCB-79							
CL4-PCB-80							
CL4-PCB-81							
CL5-PCB-82							
CL5-PCB-83/99							
CL5-PCB-84							
CL5-PCB-85/116/117							
CB-86/87/97/108/119/125							
CL5-PCB-88/91							
CL5-PCB-89							
CL5-PCB-90/101/113							
CL5-PCB-92							
CL5-PCB-93/95/98/100/102							
CL5-PCB-94							
CL5-PCB-96							
CL5-PCB-103							
CL5-PCB-104							
CL5-PCB-105							
CL5-PCB-106							
CL5-PCB-107/124							
CL5-PCB-109							
CL5-PCB-110/115							
CL5-PCB-111							
CL5-PCB-112							
CL5-PCB-114							
CL5-PCB-118							
CL5-PCB-120							
CL5-PCB-121							
CL5-PCB-122							
CL5-PCB-123							
CL5-PCB-126							

CL5-PCB-127							
CL6-PCB-128/166							
CL6-PCB-129/138/160/163							
CL6-PCB-130							
CL6-PCB-131							
CL6-PCB-132							
CL6-PCB-133							
CL6-PCB-134/143							
CL6-PCB-135/151/154							
CL6-PCB-136							
CL6-PCB-137							
CL6-PCB-139/140							
CL6-PCB-141							
CL6-PCB-142							
CL6-PCB-144							
CL6-PCB-145							
CL6-PCB-146							
CL6-PCB-147/149							
CL6-PCB-148							
CL6-PCB-150							
CL6-PCB-152							
CL6-PCB-153/168							
CL6-PCB-155	B	B	B			B	B
CL6-PCB-156/157							
CL6-PCB-158							
CL6-PCB-159							
CL6-PCB-161							
CL6-PCB-162							
CL6-PCB-164							
CL6-PCB-165							
CL6-PCB-167							
CL6-PCB-169							
CL7-PCB-170							
CL7-PCB-171/173							
CL7-PCB-172							
CL7-PCB-174							
CL7-PCB-175							
CL7-PCB-176							
CL7-PCB-177							
CL7-PCB-178							
CL7-PCB-179							
CL7-PCB-180/193							
CL7-PCB-181							
CL7-PCB-182							
CL7-PCB-183/185							
CL7-PCB-184							
CL7-PCB-186							
CL7-PCB-187							
CL7-PCB-188		B	B				B
CL7-PCB-189							
CL7-PCB-190							

CL7-PCB-191							
CL7-PCB-192							
CL8-PCB-194							
CL8-PCB-195							
CL8-PCB-196							
CL8-PCB-197/200							
CL8-PCB-198/199							
CL8-PCB-201							
CL8-PCB-202							
CL8-PCB-203							
CL8-PCB-204							
CL8-PCB-205							
CL9-PCB-206							
CL9-PCB-207							
CL9-PCB-208							
CL10-PCB-209							
Total Monochloro Biphenyl							
Total Dichloro Biphenyl							
Total Trichloro Biphenyl							
Total Tetrachloro Biphenyl							
Total Pentachloro Biphenyl							
Total Hexachloro Biphenyl							
Total Heptachloro Biphenyl							
Total Octachloro Biphenyl							
Total Nonachloro Biphenyl							
Decachloro Biphenyl							
TOTAL PCBs							

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 1/7/2009

Prepared by:

Colin Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by:

Fritz Grothkopp Dec 2, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L47190-2, -4
Date Collected (by King County Staff):	January 7, 2009
Date Received by Axys Analytical:	January 13, 2009
Axys Analysis Batch ID#:	WG27635
Extraction Date:	January 16, 2009
Initial Calibration Date:	January 27, 2009
Instrument Analysis Date(s):	January 29, 2009.

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the Project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and holding time criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:

The initial calibration done on January 27, 2009 applies to all sample and QC analyses. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the relative responses of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (January 28, 2009 12-hour sequence):

Mass resolution of the verification standard (CS-1) met the method requirements (section 10.2.1). Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC

4.1 Method Blank: A method blank (WG27635-101) was prepared and processed with this single batch of samples. A total of 33 of the reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A and the MDL value listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Sample: An OPR sample (WG27635-102) was prepared and processed with this batch of samples. All recovery values for each spiked congener and labeled compound met the acceptance limits in Table 6 (section 15.5.3).

4.3 Lab Duplicates/ Field Duplicates: No lab duplicate or field replicate was analyzed with this batch of samples thus method precision was not evaluated. Lab duplicates are not required by

the reference method. As defined in the SAP, field replicates will be collected only at locations where 2 autosamplers can be installed simultaneously. This was not possible for this sampling event.

4.4 Matrix Spike: No matrix spikes were performed with this set of samples. They were not required in the SAP or in the reference method.

5. Sample Data:

5.1 Target Compound Identification: For each reportable value, the ion abundance ratios met the limits in Table 8 or the reported result was qualified with a K flag. Relative retention times were all within the lab-defined limits. The method criteria requiring the target masses for each reported parameter to be maximized within the same 2 scans could not be verified with the raw data supplied but this criterion is automatically applied by the data reduction system. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: All samples and QC had acceptable recovery values for all labeled compound and cleanup standards.

5.3 Reported Detection Limits: A unique reporting limit is determined for each congener in each individual sample using the measured signal to noise ratio. Values are reported for a particular congener if the relative retention time of the observed peak is within the lab-defined relative retention time limits and the measured value is at or above the sample-specific detection limit. For Sample L47190-4, all sample-specific MDL values were below the values required by the SAP. For Sample L47190-2, the sample-specific detection limits for some congeners were above the MDL values required by the SAP. The elevated detection limits were due to the relatively high levels of congeners in this sample. For a majority of these congeners, the reported concentration was much higher than the MDL value so there was no impact on data quality. For selected congeners (PCB 78, 80, 106, 112, 127, 142, 161, 162, 164, and 165), a response was not detected above the elevated MDL.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample and QC results are reported down to a sample-specific reporting limit (see 5.3 above) rather than reporting only data that is at or above a detection limit based on recent method blank responses (section 17.6.1.4.1). Because the reporting limits are not based on historical method blank data, the reported values for some congeners are likely biased by lab contamination. Sample data have therefore been compared to the levels detected in the associated method blank to evaluate the potential bias. Sample results which were ≤ 5 times the blank response have been qualified with a "B" in the table in Attachment A. Only Sample L47190-4 had measured levels ≤ 5 times the blank response. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID		L47190-4
AXYS ID		L12162-2
CL2-PCB-7		B
CL4-PCB-54		B
CL4-PCB-81		B
CL5-PCB-104		B
CL6-PCB-155		B

CSO Survey for PCB Congeners

Data Validation Narrative
Method 1668A
Samples Collected 4/2, 12/2009

Prepared by: Col. Elliott Nov. 16, 2009

Colin Elliott
QA Officer

Reviewed by: Fritz Grothkopp Nov 1, 2009

Fritz Grothkopp
Lab Project Manager

King County Environmental Laboratory
King County Department of Natural Resources and Parks
322 West Ewing Street
Seattle, Washington 98119

Revised November 2009

King County Sample IDs:	L47597-2, -3, -4 and -5
	L47834-1, -2, -3 and -4
Date Collected (by King County Staff):	April 2, 2009
	April 12, 2009
Date Received by Axys Analytical:	April 16, 2009
Axys Analysis Batch ID#s:	WG28538
Extraction Dates:	April 21, 2009
Initial Calibration Date:	March 11, 2009
Instrument Analysis Date(s):	April 28-29, 2009.

Introduction: This validation follows the approach in the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review, EPA 540-R-00-006, June 2001, but using the criteria and acceptance limits defined in Method 1668A – Revision A (August 2003) and the project SAP. The section(s) of Method 1668A where the criterion and limits are defined are shown in brackets.

1. Sample Preservation, Storage and Holding Time Compliance (section 8.0):

Preservation	Storage	Hold Time
None	refrigerate in the dark at < 6°C	1 year

All sample storage and preservation criteria in method 1668A were met.

2. GC/MS Instrument Performance Checks and Initial Calibration:

The same initial calibration, done on March 11, 2009 applies to all sample analyses reviewed in this narrative. GC Column Performance Check criteria (section 6.9.1.1) were met. A resolving power of at least 10,000 (section 10.2.1) was achieved and deviation between the exact and the theoretical m/z for each mass were < 5 ppm (section 10.2.2). Ion abundance ratios for the CS-1 standard met acceptance limits in Table 8 (section 10.3.2). The signal to noise ratios (S/N) for each calibration congener (CB) and labeled compound peak in the CS-1 standard were > 10 and system sensitivity met the limits listed in Table 2 (section 10.3.3). The %RSD of the Relative Responses (RR) of the 5-point curve were <20% for each calibration congener and labeled compound (section 10.4.4).

3. Continuing Calibration Verification (two12-hour sequences):

Mass resolution of both verification standards (CS-1) met requirements in section 10.2.1. Mass abundance ratios met the limits in Table 8 (section 15.3.2). Each calibration congener and labeled compound met the calibration verification limits in Table 6 (section 15.3.5). Absolute retention times of the window-defining congeners were within +/- 15 seconds of the initial calibration retention times (section 15.4.1.1). Relative retention times were within lab-defined limits, which is an allowable option to the limits in Table 2 (section 6.9.1.2). Column performance met the requirements in section 6.9.1.1 (section 15.4.2).

4. Batch QC:

4.1 Method Blanks: A method blank (WG28538-101) was prepared and processed with this single batch of samples. A total of 58 of the reported parameters showed measured concentrations above the reporting limit for the method blank. Of the target compounds detected in the blank, all were below the minimum levels listed in Table 2 of Method 1668A but 8 were above the MDL values listed in Table 5 of the SAP. Because all responses were well below the minimum levels of the reference method (Table 2), the method blank is considered acceptable but selected sample data must be used with caution. See 5.4 below for a discussion of the method blank responses relative to the associated sample data.

4.2 Ongoing Precision and Recovery (OPR) Samples: For the OPR sample prepared with these samples (WG28538-102), all recovery values for all the spiked congeners and labeled compounds met the acceptance limits (section 15.5.3).

4.3 Lab Duplicates/Field Replicates: No lab duplicate was extracted with this set but field replicates were collected for the Hanford CSO station during each of the 2 sampling events. The SAP states that the relative percent difference (RPD) is expected to be within +/-50% for field replicates. The RPD values for the individual compounds for both sets of sample and field replicate are shown in Attachment B. Only those RPD values which were determined from unqualified data are shown in the table. All RPD values were within the expected limit.

4.4 Matrix Spikes: No matrix spikes were performed with this set of samples. They were not required in the reference method.

5. Sample Data:

5.1 Target Compound Identification: The abundance ratio of the two exact m/z's met the limits in Table 8 or the reported result was qualified with a K flag. Relative Retention Times were within the lab-defined limits. Note: Section 16.6 of Method 1668A states that only if **all** compound identification criteria are met, should the result be used for regulatory compliance purposes. It is therefore recommended that any data qualified with the K flag should not be used except to estimate a maximum level of that compound.

5.2 Labeled Compound and Cleanup Standard Recovery: Acceptable recovery was achieved for all labeled congeners and cleanup standards for each sample in this batch except for Samples L47597-3 and -4 where the PCB-1L, -3L and -4L labeled congeners were slightly below the acceptance limits in Table 6. Since the method corrects for recovery, the slight variance from the acceptance limits should not have significantly biased the data.

5.3 Reported Detection Limits: The detection limit reported for each congener is determined using a sample-specific S/N ratio. Values are reported for a particular congener if the relative retention time is within the lab-defined RRT limits and the measured value is at or above the sample-specific detection limit. Sample-specific detection limits reported for certain congeners were above the MDL values in Table 5 of the SAP. In most of these cases, the congener was detected above the MDL so the data quality objectives were not compromised. For a small set of congeners (PCB-5, -14, -36, -38, -39, -127 and -169) a response was not

measured above the sample-specific MDL for all samples. The results for these congeners may not have met project objectives.

5.4 Reported Sample Values Compared to Method Blank Responses: Sample results are reported down to a detection limit based on the signal to noise ratio, rather than defining a detection limit based on recent method blank responses (section 17.6.1.4.1). Reported values are therefore potentially biased by lab contamination and have not been qualified relative to levels detected in the method blank. Comparing sample data to the levels detected in the associated method blank indicate a small percentage of the reported values for the samples may have been biased by lab contamination. Sample results which were ≤ 5 times the blank response have been qualified with a "B" in the table in Attachment A. According to CLP guidance, all results associated with a B in Attachment A should be considered as not detected ("U" qualified), with the measured value assigned as the detection limit.

6. Summary:

Except as noted above, all samples and the associated QC results met the reference method and SAP requirements. All results should be usable without qualification except for values reported with the K qualifier and those identified with a B qualifier in Attachment A. All these data should be considered as undetected ("U" qualified), with the measured value assigned as the detection limit. All other undetected data are identified by Axys using the "<" symbol. These data should also be "U" qualified.

Attachment A. Suggested Data Qualification due to Potential Lab Contamination
(For values reported >MDL)

CLIENT ID	L47597-2	L47597-3	L47597-4	L47597-5	L47834-1	L47834-2	L47834-3	L47834-4
AXYS ID	L12556-1	L12556-2	L12556-3	L12556-4	L12556-5	L12556-6	L12556-7	L12556-8
WORKGROUP	WG28538	WG28538	WG28538	WG28538	WG28538	WG28538	WG28538	WG28538
Sample Size	0.913 L	0.921 L	0.911 L	0.922 L	0.928 L	0.895 L	0.879 L	0.874 L
UNITS	pg/L	pg/L	pg/L	pg/L	pg/L	pg/L	pg/L	pg/L
CL1-PCB-1								B
CL1-PCB-2								
CL1-PCB-3						B	B	B
CL2-PCB-4								B
CL2-PCB-5								
CL2-PCB-6								
CL2-PCB-7	B	B	B	B	B	B	B	B
CL2-PCB-8								
CL2-PCB-9								
CL2-PCB-10								
CL2-PCB-11								
CL2-PCB-12/13								
CL2-PCB-14								
CL2-PCB-15								
CL3-PCB-16								
CL3-PCB-17								
CL3-PCB-18/30								
CL3-PCB-19								B
CL3-PCB-20/28								
CL3-PCB-21/33								
CL3-PCB-22								
CL3-PCB-23					B			
CL3-PCB-24								
CL3-PCB-25								
CL3-PCB-26/29								
CL3-PCB-27								
CL3-PCB-31								
CL3-PCB-32								
CL3-PCB-34	B	B		B	B	B		
CL3-PCB-35								
CL3-PCB-36								
CL3-PCB-37								
CL3-PCB-38								
CL3-PCB-39								
CL4-PCB-40/41/71								
CL4-PCB-42								
CL4-PCB-43								
CL4-PCB-44/47/65								
CL4-PCB-45/51								
CL4-PCB-46								

CL4-PCB-48								
CL4-PCB-49/69								
CL4-PCB-50/53								
CL4-PCB-52								
CL4-PCB-54	B			B				
CL4-PCB-55								
CL4-PCB-56								
CL4-PCB-57								
CL4-PCB-58								
CL4-PCB-59/62/75								
CL4-PCB-60								
CL4-PCB-61/70/74/76								
CL4-PCB-63								
CL4-PCB-64								
CL4-PCB-66								
CL4-PCB-67								
CL4-PCB-68								
CL4-PCB-72								
CL4-PCB-73								
CL4-PCB-77								
CL4-PCB-78								
CL4-PCB-79								
CL4-PCB-80								
CL4-PCB-81	B	B	B	B		B		
CL5-PCB-82								
CL5-PCB-83/99								
CL5-PCB-84								
CL5-PCB-85/116/117								
CB-86/87/97/108/119/125								
CL5-PCB-88/91								
CL5-PCB-89								
CL5-PCB-90/101/113								
CL5-PCB-92								
CL5-PCB-93/95/98/100/102								
CL5-PCB-94								
CL5-PCB-96								
CL5-PCB-103								
CL5-PCB-104	B	B	B	B	B	B	B	
CL5-PCB-105								
CL5-PCB-106								
CL5-PCB-107/124								
CL5-PCB-109								
CL5-PCB-110/115								
CL5-PCB-111								
CL5-PCB-112								
CL5-PCB-114					B	B		
CL5-PCB-118								

CL5-PCB-120								
CL5-PCB-121								
CL5-PCB-122								
CL5-PCB-123						B		
CL5-PCB-126					B	B		B
CL5-PCB-127								
CL6-PCB-128/166								
CL6-PCB-129/138/160/163								
CL6-PCB-130								
CL6-PCB-131								
CL6-PCB-132								
CL6-PCB-133								
CL6-PCB-134/143								
CL6-PCB-135/151/154								
CL6-PCB-136								
CL6-PCB-137								
CL6-PCB-139/140								
CL6-PCB-141								
CL6-PCB-142								
CL6-PCB-144								
CL6-PCB-145								
CL6-PCB-146								
CL6-PCB-147/149								
CL6-PCB-148								
CL6-PCB-150								
CL6-PCB-152								
CL6-PCB-153/168								
CL6-PCB-155					B	B	B	B
CL6-PCB-156/157								
CL6-PCB-158								
CL6-PCB-159								
CL6-PCB-161								
CL6-PCB-162								
CL6-PCB-164								
CL6-PCB-165								
CL6-PCB-167								
CL6-PCB-169								
CL7-PCB-170								
CL7-PCB-171/173								
CL7-PCB-172								
CL7-PCB-174								
CL7-PCB-175								
CL7-PCB-176								
CL7-PCB-177								
CL7-PCB-178								
CL7-PCB-179								
CL7-PCB-180/193								

CL7-PCB-181								
CL7-PCB-182								
CL7-PCB-183/185								
CL7-PCB-184								
CL7-PCB-186								
CL7-PCB-187								
CL7-PCB-188	B	B	B	B	B	B	B	B
CL7-PCB-189								
CL7-PCB-190								
CL7-PCB-191								
CL7-PCB-192								
CL8-PCB-194								
CL8-PCB-195								
CL8-PCB-196								
CL8-PCB-197/200								
CL8-PCB-198/199								
CL8-PCB-201								
CL8-PCB-202								
CL8-PCB-203								
CL8-PCB-204								
CL8-PCB-205								
CL9-PCB-206								
CL9-PCB-207								
CL9-PCB-208								
CL10-PCB-209								
Total Monochloro Biphenyl								
Total Dichloro Biphenyl								
Total Trichloro Biphenyl								
Total Tetrachloro Biphenyl								
Total Pentachloro Biphenyl								
Total Hexachloro Biphenyl								
Total Heptachloro Biphenyl								
Total Octachloro Biphenyl								
Total Nonachloro Biphenyl								
Decachloro Biphenyl								
TOTAL PCBs								

Attachment B. Relative Percent Differences for Sample and Field Replicates

CLIENT ID	L47597-3	L47597-4 (Field replicate)	Relative Percent Difference	L47834-1	L47834-2 (Field replicate)	Relative Percent Difference
AXYS ID	L12556-2	L12556-3		L12556-5	L12556-6	
WORKGROUP	WG28538	WG28538		WG28538	WG28538	
Sample Size	0.921 L	0.911 L		0.928 L	0.895 L	
UNITS	pg/L	pg/L		pg/L	pg/L	
CL1-PCB-1	271	291	-7.1	86.8	90.6	-4.3
CL1-PCB-2	24.5	18.9	25.8	11.2	9.34	18.1
CL1-PCB-3	99.8	100	-0.2	35.7	34.7	2.8
CL2-PCB-4	411	381	7.6	173	187	-7.8
CL2-PCB-5	11.9	< 9.87	NA	K 3.24	< 5.75	NA
CL2-PCB-6	174	182	-4.5	92.3	97.7	-5.7
CL2-PCB-7	18.3	20.3	-10.4	6.06	K 6.35	NA
CL2-PCB-8	371	360	3.0	147	161	-9.1
CL2-PCB-9	34.7	38	-9.1	15.3	15.8	-3.2
CL2-PCB-10	10.3	12.8	-21.6	K 5.19	6.05	NA
CL2-PCB-11	1000	749	28.7	204	248	-19.5
CL2-PCB-12/13	K 55.6	53.8	NA	18.3	K 21.5	NA
CL2-PCB-14	< 5.48	< 9.43	NA	< 3.05	< 5.49	NA
CL2-PCB-15	192	163	16.3	58.2	71.3	-20.2
CL3-PCB-16	184	148	21.7	63.1	64	-1.4
CL3-PCB-17	190	169	11.7	68.2	75.7	-10.4
CL3-PCB-18/30	396	330	18.2	148	163	-9.6
CL3-PCB-19	119	105	12.5	46.5	49	-5.2
CL3-PCB-20/28	689	543	23.7	185	211	-13.1
CL3-PCB-21/33	336	255	27.4	87.9	102	-14.8
CL3-PCB-22	281	218	25.3	71.4	79	-10.1
CL3-PCB-23	< 1.77	< 4.76	NA	1.55	< 1.93	NA
CL3-PCB-24	5.44	4.95	9.4	1.49	2	-29.2
CL3-PCB-25	75.8	67.7	11.3	26	28.7	-9.9
CL3-PCB-26/29	136	118	14.2	41.5	46.8	-12.0
CL3-PCB-27	K 40.7	31.7	NA	16.9	16.2	4.2
CL3-PCB-31	1350	1170	14.3	353	471	-28.6
CL3-PCB-32	266	227	15.8	91.1	105	-14.2
CL3-PCB-34	3.05	< 4.69	NA	2.34	K 2.48	NA
CL3-PCB-35	K 33.5	24.3	NA	8.64	11.5	-28.4
CL3-PCB-36	K 5.59	< 4.39	NA	K 1.89	K 2.17	NA
CL3-PCB-37	241	171	34.0	60.3	68.7	-13.0
CL3-PCB-38	< 1.78	< 4.79	NA	< 0.882	< 1.94	NA
CL3-PCB-39	< 1.79	< 4.84	NA	< 0.892	< 1.96	NA
CL4-PCB-40/41/71	488	391	22.1	121	134	-10.2
CL4-PCB-42	174	154	12.2	45.3	52.3	-14.3
CL4-PCB-43	24	18	28.6	K 4.87	K 6.30	NA
CL4-PCB-44/47/65	1980	1730	13.5	656	707	-7.5
CL4-PCB-45/51	791	701	12.1	301	312	-3.6
CL4-PCB-46	64.9	54.8	16.9	18.1	20.4	-11.9

CL4-PCB-48	109	96.4	12.3	K 26.0	35	NA
CL4-PCB-49/69	980	821	17.7	265	294	-10.4
CL4-PCB-50/53	673	595	12.3	204	223	-8.9
CL4-PCB-52	1630	1350	18.8	427	450	-5.2
CL4-PCB-54	139	K 125	NA	48.2	49.4	-2.5
CL4-PCB-55	13.1	16.9	-25.3	4.64	K 4.29	NA
CL4-PCB-56	347	273	23.9	85.9	94.5	-9.5
CL4-PCB-57	3.55	< 3.31	NA	< 1.46	< 2.06	NA
CL4-PCB-58	3.45	< 3.35	NA	< 1.48	< 2.09	NA
CL4-PCB-59/62/75	74.1	69.6	6.3	21.8	25.4	-15.3
CL4-PCB-60	185	142	26.3	43.9	48.3	-9.5
CL4-PCB-61/70/74/76	1640	1240	27.8	370	428	-14.5
CL4-PCB-63	37.1	K 29.5	NA	8.93	10	-11.3
CL4-PCB-64	326	258	23.3	73.6	83.4	-12.5
CL4-PCB-66	669	528	23.6	159	188	-16.7
CL4-PCB-67	26.8	19.3	32.5	6.13	K 7.28	NA
CL4-PCB-68	51.6	46.3	10.8	48.5	45.7	5.9
CL4-PCB-72	11.6	10.7	8.1	3.1	K 3.59	NA
CL4-PCB-73	35.3	33.9	4.0	11.7	K 11.4	NA
CL4-PCB-77	138	90.5	41.6	27.2	31.1	-13.4
CL4-PCB-78	< 1.39	< 3.55	NA	< 1.57	< 2.21	NA
CL4-PCB-79	26.1	17	42.2	5.84	6.34	-8.2
CL4-PCB-80	19.8	14.4	31.6	4	K 4.95	NA
CL4-PCB-81	5.51	K 5.26	NA	< 1.71	K 3.46	NA
CL5-PCB-82	292	222	27.2	68.6	62.9	8.7
CL5-PCB-83/99	1260	1010	22.0	316	307	2.9
CL5-PCB-84	598	436	31.3	122	124	-1.6
CL5-PCB-85/116/117	416	320	26.1	99.2	92.4	7.1
CB-86/87/97/108/119/125	1860	1390	28.9	402	387	3.8
CL5-PCB-88/91	498	385	25.6	124	123	0.8
CL5-PCB-89	19.9	14.9	28.7	4.61	3.6	24.6
CL5-PCB-90/101/113	2830	2200	25.0	656	639	2.6
CL5-PCB-92	543	441	20.7	127	126	0.8
CL5-PCB-93/95/98/100/102	2130	1690	23.0	497	517	-3.9
CL5-PCB-94	72.1	61.9	15.2	20	18.4	8.3
CL5-PCB-96	34.5	36	-4.3	K 11.1	10.4	NA
CL5-PCB-103	70.5	59	17.8	21	19.3	8.4
CL5-PCB-104	18.8	14.9	23.1	7.49	5.98	22.4
CL5-PCB-105	995	697	35.2	199	210	-5.4
CL5-PCB-106	2260	< 6.03	NA	< 2.23	< 3.38	NA
CL5-PCB-107/124	107	K 80.6	NA	23.1	19.3	17.9
CL5-PCB-109	181	124	37.4	34.9	37.8	-8.0
CL5-PCB-110/115	3220	2360	30.8	676	671	0.7
CL5-PCB-111	K 4.98	K 3.65	NA	< 0.792	< 1.32	NA
CL5-PCB-112	< 1.46	< 2.15	NA	< 0.746	< 1.24	NA
CL5-PCB-114	54.9	38.8	34.4	10.4	K 10.2	NA

CL5-PCB-118	2380	1700	33.3	493	504	-2.2
CL5-PCB-120	10.2	K 6.22	NA	K 2.30	2.68	NA
CL5-PCB-121	6.37	3.95	46.9	1.59	K 2.94	NA
CL5-PCB-122	30.3	22.7	28.7	7.12	K 5.06	NA
CL5-PCB-123	34.5	25.6	29.6	K 11.7	9.3	NA
CL5-PCB-126	21	13.3	44.9	4.64	5.17	-10.8
CL5-PCB-127	< 4.11	< 6.86	NA	< 2.54	< 3.85	NA
CL6-PCB-128/166	653	472	32.2	135	145	-7.1
CL6-PCB-129/138/160/163	4730	3310	35.3	1010	1080	-6.7
CL6-PCB-130	248	183	30.2	52	60.2	-14.6
CL6-PCB-131	50.7	38	28.6	11.4	11.2	1.8
CL6-PCB-132	1500	1100	30.8	318	340	-6.7
CL6-PCB-133	80.7	52.5	42.3	17.6	19.1	-8.2
CL6-PCB-134/143	225	155	36.8	49.1	51.7	-5.2
CL6-PCB-135/151/154	1510	1120	29.7	328	387	-16.5
CL6-PCB-136	503	391	25.1	115	117	-1.7
CL6-PCB-137	157	122	25.1	K 29.9	31	NA
CL6-PCB-139/140	66.4	48.9	30.4	K 13.2	K 14.8	NA
CL6-PCB-141	936	665	33.9	202	215	-6.2
CL6-PCB-142	< 4.85	< 8.22	NA	< 1.93	< 4.34	NA
CL6-PCB-144	190	142	28.9	42.3	48.4	-13.5
CL6-PCB-145	< 2.11	< 2.54	NA	< 0.992	< 1.43	NA
CL6-PCB-146	702	477	38.2	151	173	-13.6
CL6-PCB-147/149	3740	2550	37.8	814	900	-10.0
CL6-PCB-148	16.4	K 14.7	NA	K 4.20	5.01	NA
CL6-PCB-150	10.7	7.58	34.1	6.1	6.45	-5.6
CL6-PCB-152	4.85	K 4.38	NA	K 3.77	K 4.38	NA
CL6-PCB-153/168	3840	2700	34.9	877	925	-5.3
CL6-PCB-155	< 2.14	< 2.24	NA	K 4.44	4.5	NA
CL6-PCB-156/157	501	361	32.5	100	105	-4.9
CL6-PCB-158	457	308	39.0	95.1	99.2	-4.2
CL6-PCB-159	51.9	33.9	42.0	K 13.0	12.3	NA
CL6-PCB-161	< 3.44	< 5.83	NA	< 1.37	< 3.08	NA
CL6-PCB-162	K 13.6	K 8.89	NA	K 4.49	< 3.28	NA
CL6-PCB-164	344	250	31.6	76	81	-6.4
CL6-PCB-165	6.67	< 6.65	NA	< 1.56	< 3.51	NA
CL6-PCB-167	188	125	40.3	39	39.3	-0.8
CL6-PCB-169	< 5.86	< 6.51	NA	< 2.24	< 3.60	NA
CL7-PCB-170	1470	884	49.8	334	330	1.2
CL7-PCB-171/173	458	290	44.9	107	106	0.9
CL7-PCB-172	264	177	39.5	63.2	61.2	3.2
CL7-PCB-174	1520	992	42.0	344	325	5.7
CL7-PCB-175	60.6	45.1	29.3	14.5	14.1	2.8
CL7-PCB-176	193	130	39.0	43.2	42.6	1.4
CL7-PCB-177	896	574	43.8	196	203	-3.5
CL7-PCB-178	321	220	37.3	75.5	76.1	-0.8
CL7-PCB-179	640	431	39.0	139	143	-2.8

CL7-PCB-180/193	3380	2190	42.7	792	746	6.0
CL7-PCB-181	8.51	< 3.10	NA	K 2.26	K 2.70	NA
CL7-PCB-182	K 9.38	K 7.67	NA	K 2.54	2.53	NA
CL7-PCB-183/185	1100	723	41.4	256	258	-0.8
CL7-PCB-184	6.52	K 4.86	NA	5.84	K 6.21	NA
CL7-PCB-186	< 1.97	< 2.32	NA	< 0.959	< 1.07	NA
CL7-PCB-187	2000	1250	46.2	434	440	-1.4
CL7-PCB-188	K 7.24	K 4.94	NA	2.59	K 2.55	NA
CL7-PCB-189	K 44.9	K 38.5	NA	12.1	K 10.7	NA
CL7-PCB-190	307	195	44.6	69.6	68.3	1.9
CL7-PCB-191	61	40.5	40.4	14.4	13.8	4.3
CL7-PCB-192	< 2.27	< 2.68	NA	< 1.11	< 1.24	NA
CL8-PCB-194	822	526	43.9	174	173	0.6
CL8-PCB-195	289	190	41.3	60.8	64.6	-6.1
CL8-PCB-196	430	306	33.7	97.1	98.9	-1.8
CL8-PCB-197/200	142	102	32.8	32.9	31.2	5.3
CL8-PCB-198/199	1010	669	40.6	216	218	-0.9
CL8-PCB-201	111	80.6	31.7	K 23.4	K 23.9	NA
CL8-PCB-202	222	144	42.6	51.1	52.9	-3.5
CL8-PCB-203	637	425	39.9	134	136	-1.5
CL8-PCB-204	< 1.87	< 2.70	NA	< 0.895	< 1.13	NA
CL8-PCB-205	34.8	27.4	23.8	8.65	K 10.6	NA
CL9-PCB-206	380	264	36.0	81.7	85.8	-4.9
CL9-PCB-207	53.8	37.1	36.7	12.9	11.3	13.2
CL9-PCB-208	104	72.7	35.4	25.6	27.8	-8.2
CL10-PCB-209	122	79.8	41.8	K 46.7	33.7	NA
Total Monochloro Biphenyl	395	410	-3.7	134	135	-0.7
Total Dichloro Biphenyl	2220	1960	12.4	714	787	-9.7
Total Trichloro Biphenyl	4270	3580	17.6	1270	1490	-15.9
Total Tetrachloro Biphenyl	10700	8670	21.0	2960	3240	-9.0
Total Pentachloro Biphenyl	19900	13300	39.8	3910	3900	0.3
Total Hexachloro Biphenyl	20700	14600	34.6	4440	4860	-9.0
Total Heptachloro Biphenyl	12700	8140	43.8	2900	2830	2.4
Total Octachloro Biphenyl	3700	2470	39.9	775	775	0.0
Total Nonachloro Biphenyl	538	374	36.0	120	125	-4.1
Decachloro Biphenyl	122	79.8	41.8	<	33.7	NA
TOTAL PCBs	75300	53600	33.7	17200	18200	-5.6

N/A = Not applicable if the one or more results were "K" qualified or are <MDL