

**Preliminary Evaluation of the Effects of
Wet and Dry Sieving on the
Concentrations and Homolog Composition
of PCBs in Choccolocco Creek Sediment Samples**

Prepared - *June, 2009* - by:

Don MacDonald¹, Jeffery Steevens², Warren Lorentz², Peter Tuttle³, and Sharon Thoms⁴

¹MESL, #24 - 4800 Island Highway North, Nanaimo, B.C. V9T 1W6

²USACE, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199

³USFWS, 1208 Main Street, Daphne, AL 36526-4419

⁴USEPA, 61 Forsyth Street SW, Atlanta, GA 30303

1.0 Introduction and Background

The Anniston PCB Superfund Site is located in the northeastern portion of Alabama in the vicinity the municipality of Anniston in Calhoun County. Although there are a variety of land use activities within the Choccolocco Creek watershed, environmental concerns in the area have focused primarily on releases of PCBs. Polychlorinated biphenyls were manufactured by Monsanto, Inc. at the Anniston facility from 1935 to 1971. During production, PCBs may have been released from the facility in production waste, effluent discharges, uncontrolled releases from landfills, accidental spills, stormwater runoff, and other sources. The total mass of PCBs released from the Anniston facility is uncertain, however.

In response to public concerns, a Remedial Investigation and Feasibility Study (RI/FS) are being conducted to evaluate the need for remedial measures for protecting human health and the environment at the Anniston PCB Site. Based on the available data, environmental media from the Anniston facility to the Coosa River and beyond have been contaminated by PCBs and, hence, pose potential risks to human health and ecological receptors. For the purposes of the RI/FS, the site has been divided into four operable units, including the Solutia, Inc. facility (OU-3), Anniston non-residential properties (OU-2), Anniston residential properties (OU-1), and Choccolocco Creek and floodplain (OU-4).

As part of the RI, a baseline ecological risk assessment (BERA) is being conducted in Choccolocco Creek. To support the BERA, Solutia/Pharmacia (SP; the responsible parties) will be collecting surface water, soil, and tissue samples throughout OU-4 during 2009 and 2010. The resultant surface water chemistry, soil chemistry, and tissue chemistry data will be used to assess risks to

ecological receptors associated with exposure to environmental media, either through direct comparison of the results to literature-based toxicity reference values (TRVs) or by comparing modeled daily dietary doses of chemicals of potential concern (COPCs) to relevant TRVs. Matching sediment chemistry and sediment toxicity data will also be collected and used to derive site-specific toxicity thresholds (SSTTs) for sediment-associated COPCs. These SSTTs will provide a basis for assessing risks to benthic invertebrates associated with exposure to PCB-contaminated sediments. Variation in sediment grain size and composition can greatly affect the outcome of sediment toxicity bioassays and analytical chemistry. Because sediment grain size varies substantially throughout Choccolocco Creek, USEPA has recommended that the sediment samples be sieved to <2.00 mm prior to homogenization and preparation of samples for chemical analysis and toxicity testing. This preliminary investigation was undertaken to evaluate the influence of sieving on the concentrations and homolog composition of PCBs in Choccolocco Creek sediments.

2.0 Field Methods

On May 28, 2009, a sediment sample was collected from Choccolocco Creek between the confluence with Snow Creek and the Friendship Road bridge (Coordinates: 33°36'03.73N; 85°49'40.35W; Photograph 1). In total, about six liters of sediment were collected through multiple deployments of a modified Besser sampler (Photograph 2 and 3). Following collection, this sediment sample was homogenized (using a stainless steel trowel) for about two minutes (i.e., until uniform color and consistency was attained). Subsequently, a sub-sample was obtained from the sample homogenate by filling a 500 ml glass jar with the material (Photograph 4). The sample homogenate was also dry sieved through 10.00 mm (Photograph 5), 5.00 mm (Photograph 6), or 2.00 mm (Photograph 7) sieves to obtain three additional sub-samples of material. Dry sieving was accomplished by pressing sediment through the sieve using a gloved hand. Each of these sub-samples was transferred to 500 ml glass jars for transport to the laboratory. Finally, about 500 ml of sample homogenate was wet sieved to <2.00 mm in a 20 L plastic bucket (Photograph 8). Samples of the material that passed through the 2.00 mm sieve and of the supernatant were obtained by filling 500 ml glass jars (Photograph 9). Care was taken to ensure that no headspace was present in any of the sample jars that were prepared.

The five sediment samples and one water sample were labeled (see Table 1), sealed in sealable plastic bags, carefully wrapped in paper towels, and stored in a cooler on ice. These six samples were transported to the USACE facility in Vicksburg, MS on May 29, 2009 and submitted for chemical analysis on the same date. The field sampling team consisted of Jeffery Steevens

(USACE), Warren Lorentz (USACE), Peter Tuttle (USFWS), Sharon Thoms (USEPA), and Don MacDonald (MESL).

3.0 Analytical Methods

The six samples that were collected from Choccolocco Creek were submitted to the Environmental Chemistry Branch of the USACE's Engineer Research and Development Center for chemical analysis. More specifically, each sample was submitted for analysis of PCB congeners using the following methods:

- **Sediments** - After thorough stirring, 15g aliquots were taken for extraction by Accelerated Solvent Extraction following SW846 Method 3545. A separate aliquot was also taken for % solids determination. After extraction and concentration, extracts were treated with concentrated sulfuric acid to remove interfering compounds. Extracts were then analyzed by GC/ECD following SW846 Method 8082 using dual-columns. Analyte concentrations were corrected for the % solids.
- **Water** - Sample was shaken thoroughly then allowed to settle. Water was carefully decanted from the majority of the solids that were in the sample. Water was extracted by solid-phase extraction following SW846 Method 3535. After extraction and concentration, extract was analyzed by GC/ECD following SW846 Method 8082.

4.0 Results and Discussion

The concentrations of total PCBs (tPCBs; i.e., sum of the concentrations reported for the 10 homolog groups) are shown in Table 1. A total of 127 PCB congeners were quantified in each sediment sample (Tables 2 to 7). The resultant data were used to estimate the concentrations (and percent composition) of each of the 10 PCB homolog groups in each sample (Table 8). The reporting limits for the sediment samples ranged from 11.8 to 12.9 µg/kg DW. By comparison, the reporting limit for the water sample was 0.004 µg/L.

These results suggested that concentrations of tPCBs were influenced by sieving in the field. More specifically, the lowest concentration of tPCBs was reported for the wet-sieved sediment sample. Each of the dry-sieved sediment samples had tPCB concentrations that were a factor of three or more higher than the concentration that was reported for the wet-sieved sample. Importantly, elevated levels of tPCBs were observed in the supernatant obtained following wet sieving to <2.00 mm,

indicating that the PCBs in the sediment were mobilized during the wet-sieving process. Interestingly, the whole-sediment sample had the lowest concentration of tPCBs among the four sediment samples that were not wet sieved. These results indicate that the presence of larger sediment particles (i.e., >10.00 mm) in the whole-sediment sample may have diluted the tPCBs that were measured in the sample.

The results obtained from this investigation also indicated that wet sieving may have altered the composition of the PCBs in sediment from Choccolocco Creek. More specifically, wet sieving appears to selectively mobilize the lower chlorinated PCBs from these sediments, as indicated by the following results:

Homolog Groups	Dry-Sieved Sediment <2.00 mm (% in Mixture)	Wet-Sieved Sediment <2.00 mm (% in Mixture)	Supernatant of Wet- Sieved Sediment (% in Mixture)
Mono + Di	4.8%	1.5%	11.4%
Mono + Di + Tri	20.5%	5.0%	14.8%

The reduction in the percent composition of lower chlorinated PCBs in the wet-sieved <2.00 mm sediment sample corresponds with an increased percentage composition of the compounds in the supernatant from the wet-sieved <2.00 mm sediment. As this supernatant would normally be discarded, wet sieving has the potential to result in losses of lower chlorinated PCBs. Selective mobilization of the lower chlorinated PCB congeners represents a concern because these substances tend to be the most available and most toxic to aquatic organisms (i.e., such PCBs have the lowest log K_{ow} values and the Aroclor mixtures with the highest percentage of lower chlorinated congeners tend to have the lowest sediment-quality benchmarks; Fuchsman *et al.* 2006). Therefore, loss of these substances during the sieving process could lead to erroneous conclusions regarding the toxicity of PCB-contaminated sediments in Choccolocco Creek.

5.0 Summary and Conclusions

A total of five sediment samples and one water sample (supernatant from the wet-sieving process) were prepared by processing a sediment sample collected from Choccolocco Creek (between the Snow Creek confluence and the Friendship Road bridge) on May 28, 2009. These samples were submitted for analysis of PCB congeners. The results were used to estimate the concentrations of each of ten PCB homolog groups and tPCBs in each sample.

The results of this investigation showed that wet sieving can result in losses of PCBs from Choccolocco Creek sediments, with tPCB concentrations in the wet-sieved sample being a factor of three or more lower than those in dry-sieved or unsieved samples. Analysis of the supernatant from the wet-sieving process showed that PCBs were mobilized to the aqueous phase during sieving. In addition, these results showed that lower chlorinated PCBs tended to be selectively mobilized from sediment during the wet-sieving process. Because the lower chlorinated PCBs tend to be among the most biologically available and the most toxic PCBs, loss of these substances has the potential to influence the results of toxicity tests conducted using Choccolocco Creek sediments. Accordingly, wet sieving of sediments for chemical analysis and toxicity tests is not recommended at this site. Instead, sediment samples should be dry sieved to <2.00 mm to facilitate chemical analysis and toxicity testing for OU-4 of the Anniston PCB Site.

6.0 References

Fuchsman, P.C., T.R. Barber, J.C. Lawton, and K.B. Leigh. 2006. An evaluation of cause-effect relationships between polychlorinated biphenyl concentrations and sediment toxicity to benthic invertebrates. *Env. Tox. and Chem.* 25(10):2601-2612.



Photograph 1. Aerial image showing sample location.



Photograph 2. Use of modified-Besser sampler.



Photograph 3. Use of modified-Besser sampler.



Photograph 4. Sampling of whole sediment composite.



Photograph 5. Dry sieving of sediment through a 10 mm sieve.



Photograph 6. Dry sieving of sediment through a 5 mm sieve.



Photograph 7. Dry sieving of sediment through a 2 mm sieve.



Photograph 8. Wet sieving of sediment through a 2 mm sieve.



Photograph 9. Sample collection of overlying water from wet sieving of sediment.

Table 1. Sample nomenclature, description and total PCB (tPCB) concentrations.

Field Sample #	Lab Sample #	Sample Description	tPCB Concentration
CC1-1U	9060106-01	Choccolocco Creek - whole sediment;	884 µg/kg
CC1-2S <1.0D	9060106-02	Choccolocco Creek - dry-sieved sediment: <10.00 mm;	1788 µg/kg
CC1-3S <0.5D	9060106-03	Choccolocco Creek - dry-sieved sediment: <5.00 mm;	994 µg/kg
CC1-4S <0.2 D	9060106-04	Choccolocco Creek - dry-sieved sediment: <2.00 mm;	1176 µg/kg
CC1-5S <0.2W	9060106-05	Choccolocco Creek - wet-sieved sediment: <2.00 mm; and,	289 µg/kg
CC1-6W	9060106-06	Choccolocco Creek - water: Supernatant from wet sieving.	561 µg/L

Table 2. Results of PCB congener analysis of an unsieved sediment sample from Choccolocco Creek (Sample 9060106-01).

Congener Number	Number of Chlorines	Results		
		Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	11.9
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	7.05
9	2	222	31.5%	0
10	2	222	31.5%	0
17	3	256	41.0%	3.13
18	3	256	41.0%	3.21
20	3	256	41.0%	0
22	3	256	41.0%	0
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	0
27	3	256	41.0%	0
28	3	256	41.0%	7.76
31	3	256	41.0%	6.71
32	3	256	41.0%	3.98
33	3	256	41.0%	0
37	3	256	41.0%	0
40	4	290	48.3%	0
41	4	290	48.3%	0
42	4	290	48.3%	10.4
44	4	290	48.3%	13.8
45	4	290	48.3%	0
47	4	290	48.3%	21.7
48	4	290	48.3%	0
49	4	290	48.3%	29.2
50	4	290	48.3%	17
51	4	290	48.3%	0
52	4	290	48.3%	34.4
53	4	290	48.3%	0
54	4	290	48.3%	0
56	4	290	48.3%	8.1

Table 2. Results of PCB congener analysis of an unsieved sediment sample from Choccolocco Creek (Sample 9060106-01).

Congener Number	Number of Chlorines	Results		
		Mass	% Chlorine	Results
59	4	290	48.3%	0
60	4	290	48.3%	0
64	4	290	48.3%	0
66	4	290	48.3%	15.9
67	4	290	48.3%	0
70	4	290	48.3%	17.9
71	4	290	48.3%	0
74	4	290	48.3%	5.07
80	4	290	48.3%	0
81	4	290	48.3%	0
82	5	324	54.0%	6.12
83	5	324	54.0%	2.16
84	5	324	54.0%	7.23
85	5	324	54.0%	8.61
86	5	324	54.0%	13.41
87	5	324	54.0%	6.75
89	5	324	54.0%	0
90	5	324	54.0%	18.3
91	5	324	54.0%	7.52
92	5	324	54.0%	9.02
95	5	324	54.0%	31.4
99	5	324	54.0%	17.5
101	5	324	54.0%	18.3
103	5	324	54.0%	0
114	5	324	54.0%	0
115	5	324	54.0%	60.2
118	5	324	54.0%	37.2
119	5	324	54.0%	3.22
120	5	324	54.0%	0
121	5	324	54.0%	0
123	5	324	54.0%	0
126	5	324	54.0%	0
128	6	358	58.7%	6.54
129	6	358	58.7%	0
130	6	358	58.7%	0

Table 2. Results of PCB congener analysis of an unsieved sediment sample from Choccolocco Creek (Sample 9060106-01).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
132	6	358	58.7%	14.7
134	6	358	58.7%	3.02
135	6	358	58.7%	5.43
136	6	358	58.7%	6.51
137	6	358	58.7%	0
138	6	358	58.7%	49.6
141	6	358	58.7%	13.9
143	6	358	58.7%	0
144	6	358	58.7%	2.79
146	6	358	58.7%	9.65
147	6	358	58.7%	3.01
149	6	358	58.7%	30.7
151	6	358	58.7%	12.7
153	6	358	58.7%	90.9
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	9.21
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	3.24
169	6	358	58.7%	0
170	7	392	62.5%	13.7
171	7	392	62.5%	2.7
172	7	392	62.5%	2.93
173	7	392	62.5%	0
174	7	392	62.5%	12.2
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	6.82
179	7	392	62.5%	7.55
180	7	392	62.5%	23.5
182	7	392	62.5%	0
183	7	392	62.5%	7.41

Table 2. Results of PCB congener analysis of an unsieved sediment sample from Choccolocco Creek (Sample 9060106-01).

Congener Number	Number of Chlorines	Results		
		Mass	% Chlorine	Results
184	7	392	62.5%	0
185	7	392	62.5%	0
186	7	392	62.5%	0
187	7	392	62.5%	31.3
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	2.03
194	8	426	65.7%	10.2
195	8	426	65.7%	3.4
196	8	426	65.7%	4.55
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	0
200	8	426	65.7%	0
201	8	426	65.7%	0
202	8	426	65.7%	0
203	8	426	65.7%	7.3
205	8	426	65.7%	0
206	9	460	68.5%	10.9
207	9	460	68.5%	0
208	9	460	68.5%	4.15
209	10	494	70.9%	7.45

Table 3. Results of PCB congener analysis of a dry0sieved sediment sample (<10.00 mm) from Choccolocco Creek (Sample 9060106-02).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	35.8
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	45.6
9	2	222	31.5%	0
10	2	222	31.5%	2.66
17	3	256	41.0%	21.1
18	3	256	41.0%	40.6
20	3	256	41.0%	0
22	3	256	41.0%	0
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	37.3
27	3	256	41.0%	0
28	3	256	41.0%	41.1
31	3	256	41.0%	45.7
32	3	256	41.0%	17.7
33	3	256	41.0%	0
37	3	256	41.0%	36
40	4	290	48.3%	2.53
41	4	290	48.3%	0
42	4	290	48.3%	21.1
44	4	290	48.3%	28.5
45	4	290	48.3%	0
47	4	290	48.3%	39.7
48	4	290	48.3%	0
49	4	290	48.3%	60.8
50	4	290	48.3%	35.7
51	4	290	48.3%	8.34
52	4	290	48.3%	79.7
53	4	290	48.3%	0
54	4	290	48.3%	0
56	4	290	48.3%	12.17

Table 3. Results of PCB congener analysis of a dry0sieved sediment sample (<10.00 mm) from Choccolocco Creek (Sample 9060106-02).

Congener Number	Results				Results
	Number of Chlorines	Mass	% Chlorine		
59	4	290	48.3%		3.96
60	4	290	48.3%		4.22
64	4	290	48.3%		0
66	4	290	48.3%		25
67	4	290	48.3%		0
70	4	290	48.3%		31.9
71	4	290	48.3%		0
74	4	290	48.3%		8.54
80	4	290	48.3%		0
81	4	290	48.3%		0
82	5	324	54.0%		12.4
83	5	324	54.0%		4.28
84	5	324	54.0%		15.5
85	5	324	54.0%		17.5
86	5	324	54.0%		19.44
87	5	324	54.0%		11.16
89	5	324	54.0%		0
90	5	324	54.0%		34.3
91	5	324	54.0%		17.1
92	5	324	54.0%		20.7
95	5	324	54.0%		55
99	5	324	54.0%		32.4
101	5	324	54.0%		34.3
103	5	324	54.0%		0
114	5	324	54.0%		0
115	5	324	54.0%		108
118	5	324	54.0%		55.5
119	5	324	54.0%		5.88
120	5	324	54.0%		0
121	5	324	54.0%		0
123	5	324	54.0%		0
126	5	324	54.0%		0
128	6	358	58.7%		11.91
129	6	358	58.7%		0
130	6	358	58.7%		7.612

Table 3. Results of PCB congener analysis of a dry0sieved sediment sample (<10.00 mm) from Choccolocco Creek (Sample 9060106-02).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
132	6	358	58.7%	25.2
134	6	358	58.7%	4.43
135	6	358	58.7%	9.52
136	6	358	58.7%	15.7
137	6	358	58.7%	0
138	6	358	58.7%	81.7
141	6	358	58.7%	19.7
143	6	358	58.7%	0
144	6	358	58.7%	7.05
146	6	358	58.7%	11.2
147	6	358	58.7%	2.4
149	6	358	58.7%	57.1
151	6	358	58.7%	19.5
153	6	358	58.7%	123
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	10.3
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	4.65
169	6	358	58.7%	0
170	7	392	62.5%	19.7
171	7	392	62.5%	4.22
172	7	392	62.5%	4.28
173	7	392	62.5%	0
174	7	392	62.5%	19.1
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	8
179	7	392	62.5%	10.43
180	7	392	62.5%	33.8
182	7	392	62.5%	0
183	7	392	62.5%	12.6

Table 3. Results of PCB congener analysis of a dry0sieved sediment sample (<10.00 mm) from Choccolocco Creek (Sample 9060106-02).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
184	7	392	62.5%	0
185	7	392	62.5%	3.06
186	7	392	62.5%	0
187	7	392	62.5%	64.4
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	1.58
194	8	426	65.7%	19.5
195	8	426	65.7%	5.17
196	8	426	65.7%	6.95
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	2.17
200	8	426	65.7%	0
201	8	426	65.7%	0
202	8	426	65.7%	0
203	8	426	65.7%	10
205	8	426	65.7%	0
206	9	460	68.5%	11.9
207	9	460	68.5%	0
208	9	460	68.5%	3.97
209	10	494	70.9%	7.49

Table 4. Results of PCB congener analysis of a dry-sieved sediment sample (<5.00 mm) from Choccolocco Creek (Sample 9060106-03).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	16.1
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	8.55
9	2	222	31.5%	0
10	2	222	31.5%	1.28
17	3	256	41.0%	5.35
18	3	256	41.0%	5.01
20	3	256	41.0%	0
22	3	256	41.0%	0
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	0
27	3	256	41.0%	0
28	3	256	41.0%	8.94
31	3	256	41.0%	5.46
32	3	256	41.0%	4.83
33	3	256	41.0%	0
37	3	256	41.0%	25.257
40	4	290	48.3%	5.75
41	4	290	48.3%	0
42	4	290	48.3%	10
44	4	290	48.3%	15.1
45	4	290	48.3%	0
47	4	290	48.3%	23.9
48	4	290	48.3%	0
49	4	290	48.3%	28.7
50	4	290	48.3%	23.3
51	4	290	48.3%	0
52	4	290	48.3%	35.4
53	4	290	48.3%	0
54	4	290	48.3%	0
56	4	290	48.3%	7.72

Table 4. Results of PCB congener analysis of a dry-sieved sediment sample (<5.00 mm) from Choccolocco Creek (Sample 9060106-03).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
59	4	290	48.3%	0
60	4	290	48.3%	0
64	4	290	48.3%	0
66	4	290	48.3%	15
67	4	290	48.3%	0
70	4	290	48.3%	16.7
71	4	290	48.3%	0
74	4	290	48.3%	5.28
80	4	290	48.3%	0
81	4	290	48.3%	0
82	5	324	54.0%	6.44
83	5	324	54.0%	2.47
84	5	324	54.0%	7.8
85	5	324	54.0%	8.98
86	5	324	54.0%	12.84
87	5	324	54.0%	6.87
89	5	324	54.0%	0
90	5	324	54.0%	19.35
91	5	324	54.0%	7.74
92	5	324	54.0%	12.2
95	5	324	54.0%	36.6
99	5	324	54.0%	18.6
101	5	324	54.0%	19.35
103	5	324	54.0%	0
114	5	324	54.0%	0
115	5	324	54.0%	64.3
118	5	324	54.0%	39.9
119	5	324	54.0%	3.62
120	5	324	54.0%	0
121	5	324	54.0%	0
123	5	324	54.0%	0
126	5	324	54.0%	0
128	6	358	58.7%	8.8
129	6	358	58.7%	0
130	6	358	58.7%	0

Table 4. Results of PCB congener analysis of a dry-sieved sediment sample (<5.00 mm) from Choccolocco Creek (Sample 9060106-03).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
132	6	358	58.7%	16.4
134	6	358	58.7%	3.37
135	6	358	58.7%	4.76
136	6	358	58.7%	10.1
137	6	358	58.7%	0
138	6	358	58.7%	60
141	6	358	58.7%	14.4
143	6	358	58.7%	0
144	6	358	58.7%	4.23
146	6	358	58.7%	8.84
147	6	358	58.7%	2.3
149	6	358	58.7%	33.4
151	6	358	58.7%	13.8
153	6	358	58.7%	81.5
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	9.8
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	4.25
169	6	358	58.7%	0
170	7	392	62.5%	15.4
171	7	392	62.5%	3.29
172	7	392	62.5%	2.99
173	7	392	62.5%	0
174	7	392	62.5%	15.7
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	7.34
179	7	392	62.5%	8.27
180	7	392	62.5%	28.2
182	7	392	62.5%	0
183	7	392	62.5%	8.6

Table 4. Results of PCB congener analysis of a dry-sieved sediment sample (<5.00 mm) from Choccolocco Creek (Sample 9060106-03).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
184	7	392	62.5%	0
185	7	392	62.5%	0
186	7	392	62.5%	0
187	7	392	62.5%	33.2
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	2.28
194	8	426	65.7%	15.4
195	8	426	65.7%	5.78
196	8	426	65.7%	5.93
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	0
200	8	426	65.7%	0
201	8	426	65.7%	0
202	8	426	65.7%	0
203	8	426	65.7%	8.3
205	8	426	65.7%	0
206	9	460	68.5%	12.8
207	9	460	68.5%	0
208	9	460	68.5%	3.68
209	10	494	70.9%	6.52

Table 5. Results of PCB congener analysis of a dry-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-04).

Congener Number	Number of Chlorines	Results		
		Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	16.1
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	40
9	2	222	31.5%	0
10	2	222	31.5%	0
17	3	256	41.0%	11.32
18	3	256	41.0%	24.9
20	3	256	41.0%	0
22	3	256	41.0%	6.92
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	24.6
27	3	256	41.0%	0
28	3	256	41.0%	36.8
31	3	256	41.0%	33.2
32	3	256	41.0%	8.56
33	3	256	41.0%	8.38
37	3	256	41.0%	29.474
40	4	290	48.3%	0
41	4	290	48.3%	0
42	4	290	48.3%	18.2
44	4	290	48.3%	17
45	4	290	48.3%	0
47	4	290	48.3%	21
48	4	290	48.3%	0
49	4	290	48.3%	44.3
50	4	290	48.3%	24.6
51	4	290	48.3%	0
52	4	290	48.3%	50.6
53	4	290	48.3%	0
54	4	290	48.3%	0
56	4	290	48.3%	9.81

Table 5. Results of PCB congener analysis of a dry-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-04).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
59	4	290	48.3%	0
60	4	290	48.3%	2.83
64	4	290	48.3%	0
66	4	290	48.3%	21.7
67	4	290	48.3%	0
70	4	290	48.3%	22.6
71	4	290	48.3%	0
74	4	290	48.3%	6.97
80	4	290	48.3%	0
81	4	290	48.3%	0
82	5	324	54.0%	5.6
83	5	324	54.0%	0
84	5	324	54.0%	7.32
85	5	324	54.0%	8.07
86	5	324	54.0%	8.62
87	5	324	54.0%	6.17
89	5	324	54.0%	0
90	5	324	54.0%	17.7
91	5	324	54.0%	8.29
92	5	324	54.0%	11.6
95	5	324	54.0%	33
99	5	324	54.0%	19
101	5	324	54.0%	17.7
103	5	324	54.0%	0
114	5	324	54.0%	0
115	5	324	54.0%	60.4
118	5	324	54.0%	37.9
119	5	324	54.0%	3.03
120	5	324	54.0%	0
121	5	324	54.0%	0
123	5	324	54.0%	0
126	5	324	54.0%	0
128	6	358	58.7%	6.59
129	6	358	58.7%	0
130	6	358	58.7%	0

Table 5. Results of PCB congener analysis of a dry-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-04).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
132	6	358	58.7%	14
134	6	358	58.7%	3.18
135	6	358	58.7%	6.26
136	6	358	58.7%	9.22
137	6	358	58.7%	0
138	6	358	58.7%	57.3
141	6	358	58.7%	9.62
143	6	358	58.7%	0
144	6	358	58.7%	0
146	6	358	58.7%	9.1
147	6	358	58.7%	2.26
149	6	358	58.7%	29.1
151	6	358	58.7%	10.7
153	6	358	58.7%	88.8
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	10.2
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	3.01
169	6	358	58.7%	0
170	7	392	62.5%	17.8
171	7	392	62.5%	3.37
172	7	392	62.5%	2.79
173	7	392	62.5%	0
174	7	392	62.5%	13.1
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	5.28
179	7	392	62.5%	7.9
180	7	392	62.5%	29.1
182	7	392	62.5%	0
183	7	392	62.5%	8.98

Table 5. Results of PCB congener analysis of a dry-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-04).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
184	7	392	62.5%	0
185	7	392	62.5%	0
186	7	392	62.5%	0
187	7	392	62.5%	32.1
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	2.28
194	8	426	65.7%	14.9
195	8	426	65.7%	5.24
196	8	426	65.7%	7.04
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	0
200	8	426	65.7%	0
201	8	426	65.7%	0
202	8	426	65.7%	0
203	8	426	65.7%	11.1
205	8	426	65.7%	0
206	9	460	68.5%	17.3
207	9	460	68.5%	0
208	9	460	68.5%	5.7
209	10	494	70.9%	8.08

Table 6. Results of PCB congener analysis of a wet-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-05).

Results				
Congener Number	Number of Chlorines	Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	0
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	4.32
9	2	222	31.5%	0
10	2	222	31.5%	0
17	3	256	41.0%	0
18	3	256	41.0%	0
20	3	256	41.0%	0
22	3	256	41.0%	0
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	2.19
27	3	256	41.0%	0
28	3	256	41.0%	4.37
31	3	256	41.0%	3.47
32	3	256	41.0%	0
33	3	256	41.0%	0
37	3	256	41.0%	0
40	4	290	48.3%	0
41	4	290	48.3%	0
42	4	290	48.3%	0
44	4	290	48.3%	5.9
45	4	290	48.3%	0
47	4	290	48.3%	6.97
48	4	290	48.3%	0
49	4	290	48.3%	12.8
50	4	290	48.3%	2.09
51	4	290	48.3%	0
52	4	290	48.3%	14.5
53	4	290	48.3%	0
54	4	290	48.3%	0
56	4	290	48.3%	3.79

Table 6. Results of PCB congener analysis of a wet-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-05).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
59	4	290	48.3%	0
60	4	290	48.3%	0
64	4	290	48.3%	0
66	4	290	48.3%	6.83
67	4	290	48.3%	0
70	4	290	48.3%	7.25
71	4	290	48.3%	0
74	4	290	48.3%	2.09
80	4	290	48.3%	0
81	4	290	48.3%	0
82	5	324	54.0%	3.4
83	5	324	54.0%	0
84	5	324	54.0%	2.62
85	5	324	54.0%	4.04
86	5	324	54.0%	3.86
87	5	324	54.0%	3.24
89	5	324	54.0%	0
90	5	324	54.0%	6.95
91	5	324	54.0%	2.87
92	5	324	54.0%	3.1
95	5	324	54.0%	14.5
99	5	324	54.0%	6.9
101	5	324	54.0%	6.95
103	5	324	54.0%	0
114	5	324	54.0%	0
115	5	324	54.0%	25.6
118	5	324	54.0%	13
119	5	324	54.0%	0
120	5	324	54.0%	0
121	5	324	54.0%	0
123	5	324	54.0%	0
126	5	324	54.0%	0
128	6	358	58.7%	2.16
129	6	358	58.7%	0
130	6	358	58.7%	0

Table 6. Results of PCB congener analysis of a wet-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-05).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
132	6	358	58.7%	6.37
134	6	358	58.7%	0
135	6	358	58.7%	2.33
136	6	358	58.7%	0
137	6	358	58.7%	0
138	6	358	58.7%	19.1
141	6	358	58.7%	0
143	6	358	58.7%	0
144	6	358	58.7%	0
146	6	358	58.7%	3.02
147	6	358	58.7%	0
149	6	358	58.7%	10.3
151	6	358	58.7%	3.57
153	6	358	58.7%	31.5
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	0
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	0
169	6	358	58.7%	0
170	7	392	62.5%	3.64
171	7	392	62.5%	0
172	7	392	62.5%	0
173	7	392	62.5%	0
174	7	392	62.5%	3.74
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	0
179	7	392	62.5%	2.17
180	7	392	62.5%	7.14
182	7	392	62.5%	0
183	7	392	62.5%	3.65

Table 6. Results of PCB congener analysis of a wet-sieved sediment sample (<2.00 mm) from Choccolocco Creek (Sample 9060106-05).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
184	7	392	62.5%	0
185	7	392	62.5%	0
186	7	392	62.5%	0
187	7	392	62.5%	10.3
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	0
194	8	426	65.7%	3.19
195	8	426	65.7%	0
196	8	426	65.7%	0
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	0
200	8	426	65.7%	0
201	8	426	65.7%	0
202	8	426	65.7%	0
203	8	426	65.7%	0
205	8	426	65.7%	0
206	9	460	68.5%	3.2
207	9	460	68.5%	0
208	9	460	68.5%	0
209	10	494	70.9%	0

Table 7. Results of PCB congener analysis of a supernatant sample generated during wet sieving (<2.00mm) of a sediment sample from Choccolocco Creek (Sample 9060106-06).

Results				
Congener Number	Number of Chlorines	Mass	% Chlorine	Results
1	1	188	18.6%	0
3	1	188	18.6%	0
4	2	222	31.5%	0.057
5	2	222	31.5%	0
7	2	222	31.5%	0
8	2	222	31.5%	0.004
9	2	222	31.5%	0
10	2	222	31.5%	0.003
16	3	256	41.0%	
17	3	256	41.0%	0.007
18	3	256	41.0%	0.005
20	3	256	41.0%	0
22	3	256	41.0%	0.007
24	3	256	41.0%	0
25	3	256	41.0%	0
26	3	256	41.0%	0
27	3	256	41.0%	0
28	3	256	41.0%	0
31	3	256	41.0%	0
32	3	256	41.0%	0
33	3	256	41.0%	0
37	3	256	41.0%	0
40	4	290	48.3%	0
41	4	290	48.3%	0
42	4	290	48.3%	0
44	4	290	48.3%	0.014
45	4	290	48.3%	0
47	4	290	48.3%	0.019
48	4	290	48.3%	0
49	4	290	48.3%	0
50	4	290	48.3%	0
51	4	290	48.3%	0
52	4	290	48.3%	0.024
53	4	290	48.3%	0
54	4	290	48.3%	0.004

Table 7. Results of PCB congener analysis of a supernatant sample generated during wet sieving (<2.00mm) of a sediment sample from Choccolocco Creek (Sample 9060106-06).

Congener Number	Results			
	Number of Chlorines	Mass	% Chlorine	Results
56	4	290	48.3%	0
59	4	290	48.3%	0
60	4	290	48.3%	0
64	4	290	48.3%	0
66	4	290	48.3%	0.004
67	4	290	48.3%	0
70	4	290	48.3%	0.01
71	4	290	48.3%	0
74	4	290	48.3%	0
80	4	290	48.3%	0
81	4	290	48.3%	0
82	5	324	54.0%	0.004
83	5	324	54.0%	0
84	5	324	54.0%	0.005
85	5	324	54.0%	0
86	5	324	54.0%	0.01
87	5	324	54.0%	0.004
89	5	324	54.0%	0
90	5	324	54.0%	0.002
91	5	324	54.0%	0
92	5	324	54.0%	0.006
95	5	324	54.0%	0.019
99	5	324	54.0%	0.009
101	5	324	54.0%	0.002
103	5	324	54.0%	0
114	5	324	54.0%	0
115	5	324	54.0%	0.034
118	5	324	54.0%	0.024
119	5	324	54.0%	0.002
120	5	324	54.0%	0
121	5	324	54.0%	0
123	5	324	54.0%	0
126	5	324	54.0%	0
128	6	358	58.7%	0.004
129	6	358	58.7%	0

Table 7. Results of PCB congener analysis of a supernatant sample generated during wet sieving (<2.00mm) of a sediment sample from Choccolocco Creek (Sample 9060106-06).

Results				
Congener Number	Number of Chlorines	Mass	% Chlorine	Results
130	6	358	58.7%	0
132	6	358	58.7%	0.008
134	6	358	58.7%	0
135	6	358	58.7%	0.007
136	6	358	58.7%	0.004
137	6	358	58.7%	0
138	6	358	58.7%	0.04
141	6	358	58.7%	0
143	6	358	58.7%	0.02
144	6	358	58.7%	0.002
146	6	358	58.7%	0
147	6	358	58.7%	0.007
149	6	358	58.7%	0
151	6	358	58.7%	0
153	6	358	58.7%	0.007
154	6	358	58.7%	0
155	6	358	58.7%	0
156	6	358	58.7%	0
157	6	358	58.7%	0
158	6	358	58.7%	0
166	6	358	58.7%	0
167	6	358	58.7%	0
169	6	358	58.7%	0
170	7	392	62.5%	0.009
171	7	392	62.5%	0.002
172	7	392	62.5%	0
173	7	392	62.5%	0
174	7	392	62.5%	0.006
175	7	392	62.5%	0
176	7	392	62.5%	0
177	7	392	62.5%	0
178	7	392	62.5%	0
179	7	392	62.5%	0
180	7	392	62.5%	0.014
182	7	392	62.5%	0

Table 7. Results of PCB congener analysis of a supernatant sample generated during wet sieving (<2.00mm) of a sediment sample from Choccolocco Creek (Sample 9060106-06).

Results				
Congener Number	Number of Chlorines	Mass	% Chlorine	Results
183	7	392	62.5%	0
184	7	392	62.5%	0
185	7	392	62.5%	0
186	7	392	62.5%	0.032
187	7	392	62.5%	0.022
189	7	392	62.5%	0
191	7	392	62.5%	0
193	7	392	62.5%	0
194	8	426	65.7%	0.008
195	8	426	65.7%	0.002
196	8	426	65.7%	0.007
197	8	426	65.7%	0
198	8	426	65.7%	0
199	8	426	65.7%	0
200	8	426	65.7%	0
201	8	426	65.7%	0.008
202	8	426	65.7%	0.042
203	8	426	65.7%	0.006
205	8	426	65.7%	0
206	9	460	68.5%	0.01
207	9	460	68.5%	0
208	9	460	68.5%	0.004
209	10	494	70.9%	0.011

Table 8. Summary of the PCB homolog concentration data for the Choccolocco Creek sediment sieving study (June, 2009).

9060106-01 - R.L. 12.2 ug/kg			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.00	0.0%
2	31.5%	18.95	2.1%
3	41.0%	24.79	2.8%
4	48.3%	173.47	19.6%
5	54.0%	246.94	27.9%
6	58.7%	261.90	29.6%
7	62.5%	110.14	12.5%
8	65.7%	25.45	2.9%
9	68.5%	15.05	1.7%
10	70.9%	7.45	0.8%
Total Conc.		884.14	
9060106-02 - R.L. 12.2 ug/kg			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.00	0.0%
2	31.5%	84.06	4.7%
3	41.0%	239.50	13.4%
4	48.3%	362.16	20.2%
5	54.0%	443.46	24.8%
6	58.7%	410.97	23.0%
7	62.5%	181.17	10.1%
8	65.7%	43.79	2.4%
9	68.5%	15.87	0.9%
10	70.9%	7.49	0.4%
Total Conc.		1788.47	
9060106-03 - R.L. 11.9 ug/kg			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.00	0.0%
2	31.5%	25.93	2.6%
3	41.0%	54.85	5.5%
4	48.3%	186.85	18.8%
5	54.0%	267.06	26.9%
6	58.7%	275.95	27.8%
7	62.5%	125.27	12.6%
8	65.7%	35.41	3.6%
9	68.5%	16.48	1.7%
10	70.9%	6.52	0.7%
Total Conc.		994.32	

Table 8. Summary of the PCB homolog concentration data for the Choccolocco Creek sediment sieving study (June, 2009).

9060106-04 - R.L. 11.8 ug/kg			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.00	0.0%
2	31.5%	56.10	4.8%
3	41.0%	184.15	15.7%
4	48.3%	239.61	20.4%
5	54.0%	244.40	20.8%
6	58.7%	259.34	22.1%
7	62.5%	122.70	10.4%
8	65.7%	38.28	3.3%
9	68.5%	23.00	2.0%
10	70.9%	8.08	0.7%
Total Conc.		1175.66	

9060106-05 - R.L. 12.9 ug/kg			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.00	0.0%
2	31.5%	4.32	1.5%
3	41.0%	10.03	3.5%
4	48.3%	62.22	21.5%
5	54.0%	97.03	33.6%
6	58.7%	78.35	27.1%
7	62.5%	30.64	10.6%
8	65.7%	3.19	1.1%
9	68.5%	3.20	1.1%
10	70.9%	0.00	0.0%
Total Conc.		288.98	

9060106-06 - R.L. 0.004 ug/L			
<i>Number of ChlorineAtoms</i>	<i>% Chlorine</i>	<i>Total Conc.</i>	<i>% in Mixture</i>
1	18.6%	0.000	0.0%
2	31.5%	0.064	11.4%
3	41.0%	0.019	3.4%
4	48.3%	0.075	13.4%
5	54.0%	0.121	21.6%
6	58.7%	0.099	17.6%
7	62.5%	0.085	15.2%
8	65.7%	0.073	13.0%
9	68.5%	0.014	2.5%
10	70.9%	0.011	2.0%
Total Conc.		0.561	

Currently we run 65% of the congeners available

Congener 90 and 101 co-elute, so their concentration was split for easy entry into the table
this does not mean that the concentration is equal, it is only for bookkeeping.

J Values are not marked are considered as any value under the reporting limit