### "How To" Review, Blank Correct and Calculate Total PCB (Supplemental document to TMDL GM14-2004) Note - Basic knowledge of Microsoft Excel is necessary to perform these tasks.

## Automated Excel Spreadsheet Used to Calculate Total PCB (tPCB)

An Excel "tPCB Auto-Calculation" spreadsheet has been developed to automatically compute "uncensored" and "censored" (i.e., blank corrected) tPCB concentrations. The spreadsheet is comprised of a worksheet that includes directions as well as four interactive worksheets: 1) "Directions" provides an overview of the spreadsheet, 2) "Samples & Results" is the worksheet where effluent (i.e., field sample) data are uploaded yielding a summary of computed "uncensored" and "censored" tPCB results, 3) "QC\_MB" is the worksheet where method blank data are uploaded, 4) the worksheet "QC\_FB\_RB" receives field and/or rinsate blanks, and 5) "Blank Correction" is where an automatic comparative analysis for the blank correction process occurs with the calculated results transferred to the "Samples & Results" worksheet. Information is taken directly from the "Analytical Results" EDD .csv spreadsheet (provided by the laboratory) by copying and pasting the appropriate data into the "Samples & Results", "QC\_MB", and "QC\_FB\_RB" worksheets. The formatting of the EDD .csv file is defined in Appendix E of **TMDL GM No. 09-2001, Amendment No. 1** and the PCB data should be delivered by the laboratory in this format. An example of the "tPCB Calculation" spreadsheet is found in Figure a. below with instructions for populating the spreadsheet. **Note: When dual computer screens are available, do not open Excel software twice and show on both screens as the copy and paste functions become disabled.** 



Figure a. Unpopulated "tPCB Auto-Calculation" spreadsheet.

Steps required to populate the PCB spreadsheet:

- Open an unpopulated "tPCB Auto-Calculation" spreadsheet. A functional copy of the spreadsheet is available at: (<u>http://www.deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/PCBTMDLs.aspx</u>). Next open the "Analytical Results" EDD .csv file of interest and locate column G (labeled as QC\_Code, see Figure b.). This field ("QC-Code") identifies the different type of samples included in the EDD .csv file (i.e., "MB" = Method Blank, "OPR" = On-going Precision and Recovery, "SA" = Sample).
  - a. Three of the worksheets included inThe "tPCB Auto-Calculation" spreadsheet are set-up to receive imported data. These are identified as "Samples & Results", "QC\_MB", and "QC\_FB\_RB". Up to 5 <u>effluent</u> sample results associated with the "SA" identifier in column G of the EDD can be copied into the "Samples & Results" worksheet (scroll right to include additional samples). Field blanks and rinsate blanks, also identified in column G with an "SA", are imported to the "QC\_FB\_RB" worksheet. These can be separated from the effluent samples by referring to column A (Sample ID) of the EDD .csv spreadsheet. Lastly, results associated with the "MB" identifier in column G will be copied into "QC\_MB" worksheet. Specific directions follow.
- 2) From the "Analytical Results" EDD .csv file, find and select records from a single row in columns A through O from the first targeted sample (QC\_code = "SA"). Highlight and copy (see Figure b).

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Figure b. "Analytical Results" EDD.csv file

 Records A-O are pasted into cell B2 of the "Sample & Results" spreadsheet (or "QC\_MB" or "QC\_FB\_RB") using the Paste Special - <u>transpose</u> function. The information fits into cell array B2:B16 (Figure c).

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Figure c. "tPCB Auto-Calculation" spreadsheet

- 4) The next step is to copy the PCB congener data set from the targeted sample in the Analytical Results EDD .csv to the "tPCB Auto-Calculation" spreadsheet.
  - a. Referring to the example presented in Figure d below, use PCB congener numbers 1-209 in column Y from the "Analytical Results" EDD .csv file as a guide in determining what should be copied from columns AA through AF. Congeners 1-209 are provided for each sample result.
    - i. *IMPORTANT:* For the "tPCB Auto-Calculation" spreadsheet to work properly, all PCB congeners found in column Y must be in numeric rank order (1-209). If one or more PCBs are out of rank order, highlight all rows (i.e., PCB records 1-209) for that sample beginning at column A and extending to the far right to include all fields for that sample. Next, using column Y as a guide, go to the DATA Tab and click on the "Sort" function. Sort in asscending order 1-209.
    - ii. Occasionly, a single congener from a sample may be errantly located within the labeled PCB surrogates from the same sample. In this situation, insert a blank row in the numerically ordered spot, then cut and paste the out-of-order record in the newly created row.
  - b. Records from columns AA through AF, including 209 rows to capture all PCB congeners from a

specific sample, are highlighted in the "Analytical Results" EDD.csv and copied to the predetermined worksheet file (see Figure d).

c. Columns AA - AF in the "Analytical Results" EDD .csv file are labeled as follows:

"Analytical Results" EDD .csv	Field Name
file Column Heading	
AA	Conc_Found
AB	Dilution Factor
AC	UNITS
AD	Data_Qualifier
AE	EDL
AF	Minimum_Level

Figure d. "Analytical Results" EDD .csv file

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3 PCB-2 3-1	NoCE	2	2051-61-8		1	PG/L	U	0.826	4				2.66	3.6	
4 PCB-3 4-1	NoCE	3	2051-62-9	9.84	1	PG/L	В	0.691	4.35			2.99	2.66	3.6	1.001
5 PCB-4 22	-DiCl	4	13029-08-8	5.43	1	PG/L		2.58	4.35			0	1.33	1.79	1.0011
6 PCB-5 23	DICE	5	16605-91-7		1	PG/L	U	3.07	4.35				1.33	1.79	
7 PCB-6 23	-DCI	6	25569-80-6		1	PG/L	U	3.06	4.35				1.33	1.79	
8 PCB-7 24	DCE	7	33284-50-3	324	1	PG/L		2.9	4.35			1.46	1.33	1.79	1.0115
9 PCB-8 24	-DiCl	8	34883-43-7	2.25	1	PG/L	J	0.979	4.35			C I	ton /	High	light
10 PCB-9 25-	DICB	9	34883-39-1		1	PG/L	U	3.26	4.35				iep 4 -	- mgn	Ingin
11 PCB-10 2	5-DiC	10	33146-45-1		1	PG/L	U	3.66	4.35			ar	nd Cop	by resi	ults
12 PCB-11 3	3'-DiC	11	2050-67-1	6.43	1	PG/L	В	1.04	4.35			fr	om D(		200
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15 PCB-14 3	5-DiC	14	34883-41-5		1	PG/L	U	2.66	4.35				ida)		
16 PCB-15 4	4'-DiC	15	2050-68-2	2.99	1	PG/L	J	0.893	4.35			gu	lide)		
17 PCB-16 2	2'3-Tr	16	38444-78-9		1	PG/L	U	1.22	4.35						
18 PCB-17 2	2'4 Ti	17	37680-66-3	8.14	1	PG/L		0.939	4.35			1.03	0.88	1.2	1.1323
19 PCB-18 2	2'5-Tr	18	37680-65-2	2.99	1	PG/L	1 C	0.808	4.35			1.15	0.88	1.2	1.1083
20 PCB-19 2	2'6-Tr	19	38444-73-4	4.74	1	PG/L		1.14	4.35			0.95	0.88	1.2	1.0012
21 PCB-20 2	33'-11	20	88444-84-7	13.4	1	PG/L	С	0.678	4.35			1.08	0.88	1.2	0.8583
22 PCB-21 2	34-Ti	21	55702-46-0	2.44	1	PG/L	J C	0.659	4.35			0.95	0.88	1.2	0.865
23 PCB-22 2	34'-Tr	22	38444-85-8	1.81	1	PG/L	L	0.74	4.35			0.99	0.88	1.2	0.8807
24 PCB-23 2	35-Tr	23	55720-44-0		1	PG/L	U	0.66	4.35				0.88	1.2	
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d. The 209 records are pasted into the applicable worksheet of the "tPCB Auto-Calculation" spreadsheet beginning at cell C20 (see Figure e.). For additional samples, move within the spreadsheet to the right and find cells M20, W20, etc. for data placement.

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21 3-MoCB		2		5.96		1 PG/L	В	0.706	4.35				
22 4-MoCB	Sten	<b>4</b> d 3		9.84		1 PG/L	В	0.691	4.35				
23 2,2'-DiCB	Dich	1 d 4		5.43		1 PG/L		2.58	4.35				
24 2,3-DiCB	Paste	PCB 5	J			1 PG/L	U	3.07	4.35				
25 2,3'-DiCB	Conge	ener <sup>6</sup>	$\prec$			1 PG/L	U	3.06	4.35				
26 2,4-DiCB	rocult	hore 7		324		1 PG/L		2.9	4.35				
27 2,4'-DiCB	result	8		2.25		1 PG/L	J	0.979	4.35				
28 2,5-DiCB	L	9				1 PG/L	U	3.26	4.35				
29 2,6-DiCB		10				1 PG/L	U	3.66	4.35				
30 3.3'-DiCB		11		6.43		1 PG/L	B	1.04	4.35	<b>•</b>			
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#### Figure e. "tPCB Auto-Calculation" spreadsheet.

Note: For simplicity, only the first 11 PCB congeners are presented (altogether there are 209).

- 5) The next step is to a perform a QC review of the PCB  $C^{13}$  labeled congener results including surrogates, extraction, cleanup, and injection standards (this step does not involve copying QC data to the spreadsheet).
  - a. Following the example provided in Figure f., locate the PCB C<sup>13</sup> labeled congeners in the "Analytical Results" EDD .csv file immediately below the final PCB congener result from the sample of interest (i.e., use column Y as a guide and look immediately below PCB 209). Note that PCB C<sup>13</sup> labeled congeners are identified with a "L" (e.g., 104L).
    - i. In addition to the "Analytical Results" EDD .csv file, it is necessary to locate these results in the "hardcopy" .pdf document also provided as a laboratory deliverable. This serves as a cursory check of the overall results as well as providing information on the PCB C<sup>13</sup> labeled congeners.
  - b. Percent recovery results found in column AA are reviewed to ensure the data are within the lab specific range in columns AG and AH. Column AC includes units which are identified as "%".
    - i. If percent recoveries cannot be found in the EDD .csv file, refer to the "hardcopy" .pdf file.
  - c. If the PCB C<sup>13</sup> labeled congener recoveries are in the acceptable range (i.e., columns AG and AH), place "ok" in the specified slot for Surrogates, Clean-up and Extraction Stds found in the "Samples & Results" worksheet tPCB summary table (see Figure e). If the recoveries are out of range, refer to Section III.B.3.c. of the guidance.

d. The OPR and OPR (duplicate) samples are reviewed (not copied) similarly to the labeled surrogates (i.e., percent recovery results in column AA are reviewed to ensure the results are within the lab specific range included in columns AG and AH). If the OPR sample recoveries are in the acceptable range, place "ok" in the "Samples & Results" worksheet tPCB summary table (see Figure e). If the data are out of range, refer to Section III.B.3.b. of the guidance. OPR data are not copied to the spreadsheet.

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210		25	60085	15509	120-2	1041	209 203	1/22-29	1.4	2 Q	1 %	_	JEIVIPC	0.915	4.	51	26	115	575292	- 1
212	HRP10	25	60085	15509	130-2,2	105	208	263-64	. 7	4	1 %						50	111	1.60744	
213	HRP10	25	60085	15509	13C-2.3.3	1111	235	416-29	6	3	1 %						57	112	1.618333	
214	HRP10	25	60085	15509	13C-2,3,4	,114L	104	130-40	6	9	1 %						41	121	1.554698	
215	HRP10	25	60085	15509	13C-2,3',4	118L	208	3263-63	6	8	1 %						49	111	1.552027	
216	HRP10	25	60085	15509	13C-2,3',4	123L	208	3263-62	7	2	1 %						49	116	1.533645	
217	HRP10	25	60085	15509	13C-3,3',4	126L	208	263-65	7	4	1 %	C	ton 5. (	$C^{13}$ labe	lod D	CD	50	106	1.607365	
218	HRP10	25	60085	15509	13C-2,2',4	155L	234	432-90	5	6	1 %	0	tep 5: v	c labe	leu r	CD	25	124	1.265392	
219	HRP10	25	60085	15509	13C-2,3,3	156L	208	8263-69	7	0	1 %	C	longene	er % R	ecove	rv	40	120	1.304924	
220	HRP10	25	60085	15509	13C-2,3,3	157L	208	8263-68	-7		1 %		- Berry			- 3	0	0	0	
221	HRP10	25	60085	15509	13C-4,4'-	C 15L	208	3263-67	5	1	1 %	K	lesults i	in Colu	mn A	A	19	107	1.530427	
222	HRP10	25	60085	15509	13C-2,3',4	167L	235	6416-30	7	1	1 %	0	omnore	ad to ra	ngo i	n	45	118	1.261364	_
223	HRP10	25	60085	15509	13C-3,3',4	1, 169L	208	8263-70	7	9	1%	u	ompare		inge n	LIII.	37	117	1.242796	_
224	HRP10	25	60085	15509	13C-2,2',3	3, <mark>178L</mark>	232	2919-67	7	1	1 %	C	olumns	AG&	AH		57	125	1.057624	_
225	HRP10	25	60085	15509	13C-2,2',3	3, <mark>188L</mark>	234	432-91	5	9	1 %						23	125	1.066304	
226	HRP10	25	60085	15509	13C-2,3,3	189L	208	3263-73	6	3	1 %						47	116	1.017023	
227	HRP10	25	60085	15509	13C-2,2',6	5 19L	234	432-87	4	8	1 %						1	108	1.039855	
228	HRP10	25	60085	15509	13C-2-Mo	1L	234	432-85	4	0	1%						4	100	2.9629	
229	HRP10	25	60085	15509	13C-2,2',3	202L	105	600-26	6	4	1%						31	134	0.898576	
230	HRP10	25	60085	15509	13C-2,3,3	205L	234	446-64	6	2	1%						46	115	0.918666	
231	HRP10	25	60085	15509	13C-2,2',3	206L	234	432-92	. 6	9	1%						38	122	0.785074	
232	HRP10	25	60085	15509	130-2,2,3	2081	208	600 27	- 0 -	4 2	1 %						31	120	1 167006	
233		25	60085	15500	120 2 4 4	1209L	105	262 76	6	5 2	1 %						43	115	1.026102	
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Figure f. Analytical Results EDD.csv file.

- 6) Steps 1-5 are followed for all "SA" and "MB" samples types.
  - a. "MB" data are copied and pasted to the "QC\_MB" worksheet (see figure g. below).
  - b. Similarly, data originating from a field blank or rinsate blank, also notated with an "SA" but differentiated by looking in column A of the Analytical Results EDD.csv file, are copied and pasted into the "QC\_FB\_RB" worksheet (see figure h. below).

# Figure g. "QC\_MB" worksheet.

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4 Sample_Matrix	Water (whole)							
5 Percent_Mositure								
6 Percent_Lipid								
7 QC_Code	IVID							
9 Sample Time								
10 Applycic Porformod	16680							
11 Extraction Date	10/29/2011							
12 Analysis Date	11/2/2011							
13 Analysis Time	19:59							
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15 Size Units	L							
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17						Method Blook		
18 Compound	IUPAC PCB #	Conc. Found	Dilution EaLINITS	Data Qual EDI	Minimum Level	Adi conc (5X)		
19 2-MoCB	1	Conc_round	1 PG/I		4 76	0		
20 3-MoCB	2	0 877	1 PG/I	J 04	4 76	4 385		
21 4-MoCB	3	0.91	1 PG/L	J 0.4	47 4.76	4.55		
22 2,2'-DiCB	4		1 PG/L	U 5.4	4.76	0		
23 2,3-DiCB	5		1 PG/L	U 1.3	4.76	0		
24 2,3'-DiCB	6		1 PG/L	U 1.3	4.76	0		
25 2,4-DiCB	7		1 PG/L	U 1	.3 4.76	0		
26 2,4'-DiCB	8		1 PG/L	U 1.3	36 4.76	0		
27 2,5-DiCB	9		1 PG/L	U 1.4	46 4.76	0		
28 2,6-DiCB	10		1 PG/L	U 3.2	26 4.76	0		
29 3,3'-DiCB	11	1.96	1 PG/L	J 0.49	4.76	9.8		-
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# Figure h. "QC\_FB\_RB" worksheet.

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4	Sample_Matr	ix		Water (v	vhole)												
5	Percent_Mos	iture															
6	Percent_Lipid	1															
7	QC_Code			SA													
8	Sample_Date			10/8/2	011												
9	Sample_Time	9															
10	Analysis_Per	formed		1668	C												
11	Extraction_Da	ate		10/29/2	2011												
12	Analysis_Dat	e		11/2/2	011												
13	Analysis_Tim	e		20:5	4												
14	Sample_Size			2.5													
15	Size_Units			L													
16																	
17		ſ													Blank		
18	Compound			UPAC F	PCB #	Conc	Found	Dilution Fa		Data	a Qual	EDL	Minimum	Level	Adj conc (5X)		
19	2-MoCB			1	_		0.83	1	PG/L	J EN	MPC	0.608	4		4.15		
20	3-MoCB			2				1	PG/L	U		0.826	4		0		
21	4-MoCB			3				1	PG/L	U		0.809	4		0		
22	2,2'-DiCB			4				1	PG/L	U		6.59	4		0		
23	2,3-DiCB			5				1	PG/L	U		2.65	4		0		
24	2,3'-DiCB			6				1	PG/L	U		2.64	4		0		
25	2,4-DiCB			7			24.7	1	PG/L			2.5	4		123.5		
26	2,4'-DiCB			8				1	PG/L	U		2.61	4		0		
27	2,5-DiCB			9				1	PG/L	U		2.81	4		0		
28	2,6-DiCB			10				1	PG/L	U		3.91	4		0		
29	3,3'-DiCB			11			4.32	1	PG/L	В	_	0.915	4		21.6		-
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7) Figure i. provides an example of the "Blank Correction" worksheet. The sheet is automatically populated with data transferred from the Analytical Results EDD into the "Samples & Results", "QC\_MB", and QC\_FB\_RB" worksheets. Upon entering the PCB results into the aforementioned worksheets the data are autocorrected for laboratory background and/or field contamination. The tPCB results are auto linked to the "Samples & Results" worksheet data summary (see Figure e.).

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2						Unadj		Adj Conc			Unadj			
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5	1	0	4.15			6.91		6.91			0			
6	2	4.385	0			5.96		5.96			0			
7	3	4.55	0			9.84		9.84			0			
8	4	0	0			5.43		5.43			0			
9	5	0	0			0		0			0			
10	6	0	0			0	_	0			0			
11	7	0	123.5			324		324			0			
12	8	0	0			2.25		2.25			0			
13	9	0	0			0		0			0			
14	10	0	0			0		0			0			
15	11	9.8	21.6			6.43		0			0			
16	12	0	0			0		0			0			
17	13	0	0			0		0			0			
18	14	0	0			0		0			0			
19	15	0	0			2.99	_	2.99			0			
20	16	0	0			0	_	0			0			
21	1/	0	13.75			8.14	_	U			0			
22	18	0	U			2.99	_	2.99			0			
23	19	U	U			4.14		4.74			0			
210	206	U	U			0		U			0			
211	207	U	U			0		U			0			
212	208	0	0			0	_	U			0			
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Figure i. "tPCB Auto-Calculation" worksheet in the "tPCB Calculation" Spreadsheet.