"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.**

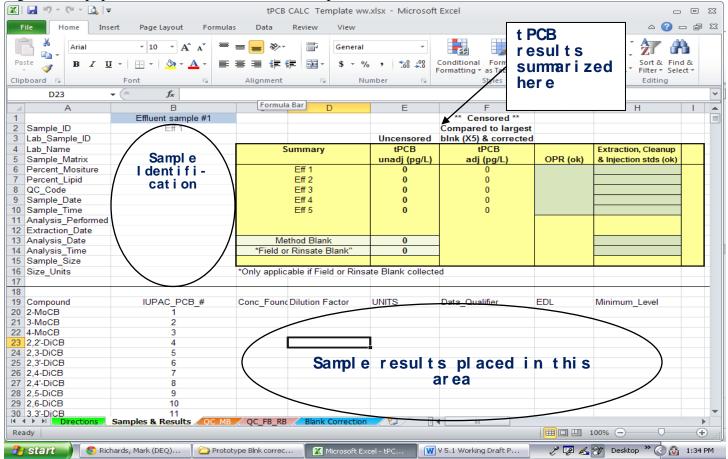


Figure a. Unpopulated "tPCB Auto-Calculation" spreadsheet.

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
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 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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PCB-3 4-MoO	E 3	2051-62-9	9.84	1	PG/L	в	0.691	4.35			2.99	2.66	3.6	1.001
PCB-4 22'-Di	4	3029-08-8	5.43	1	PG/L		2.58	4.35			0	1.33	1.79	1.0011
PCB-5 23-DiC	E 5	16605-91-7		1	PG/L	U	3.07	4.35				1.33	1.79	
PCB-6 23'-D	16	25569-80-6		1	PG/L	U	3.06	4.35				1.33	1.79	
PCB-7 24-D C	E 7	33284-50-3	324	1	PG/L		2.9	4.35			1.46	1.33	1.79	1.0115
PCB-8 24'-Dic	8	34883-43-7	2.25	1	PG/L	J	0.979	4.35			C		II: ~l	1: -1.4
PCB-9 25-DiCE	39	34883-39-1		1	PG/L	U	3.26	4.35				tep 4 -	- Higi	mgni
PCB-10 26-Di	C 10	33146-45-1		1	PG/L	U	3.66	4.35			a	nd Co	ov res	ults
PCB-11 33'-Di	(11	2050-67-1	6.43	1	PG/L	в	1.04	4.35				-		
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PCB-16 22'3-1	li 16	38444-78-9		1	PG/L	U	1.22	4.35						
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PCB-18 22'5-	li 18	37680-65-2	2.99	1	PG/L	JC	0.808	4.35			1.15	0.88	1.2	1.1083
PCB-19 22'6-	î 19	38444-73-4	4.74	1	PG/L		1.14	4.35			0.95	0.88	1.2	1.0012
PCB-20 233'-	i 20	88444-84-7	13.4	1	PG/L	С	0.678	4.35			1.08	0.88	1.2	0.8583
PCB-21 234-T	21	55702-46-0	2.44	1	PG/L	JC	0.659	4.35			0.95	0.88	1.2	0.865
PCB-22 234'-1	Tr 22	38444-85-8	1.81	1	PG/L	J	0.74	4.35			0.99	0.88	1.2	0.8807
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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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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 C¹³ 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 C¹³ 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 C¹³ 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 C¹³ 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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17 HRP1025	60085	15509	13C-3,3'	4 126L	208263-65	7	4	1 %	C4.	5. (13 Labo		CD	50	106	1.607365	
L8 HRP1025	60085	15509	13C-2,2'	4 155L	234432-90	5	6	1 %	26	ep 5: (C ¹³ labe	lea P	CB	25	124	1.265392	
19 HRP1025	60085	15509	13C-2,3,	3' 156L	208263-69	7	0	1 %	Co	ngong	er % Re	COVO	rx/	40	120	1.304924	
20 HRP1025	60085	15509	13C-2,3,	3' 157L	208263-68-	7		1 %		0			•	о	о	0	
21 HRP1025	60085	15509	13C-4,4	-C 15L	208263-67	5	1	1 %	Re	esults i	n Colu	mn A	A	19	107	1.530427	
22 HRP1025	60085	15509	13C-2,3'	4 167L	235416-30	7	1	1 %						45	118	1.261364	
23 HRP1025	60085	15509	13C-3,3'	4 169L	208263-70	7	9	1 %	COI	mpare	ed to ra	nge 11	n	37	117	1.242796	
4 HRP1025	60085	15509	13C-2,2'	3 178L	232919-67	7	1	1 %	00	lumna	AG &	A LI		57	125	1.057624	
25 HRP1025	60085	15509	13C-2,2'	3 188L	234432-91	5	9	1 %	COI	luiiiis	AGa	AII		23	125	1.066304	
6 HRP1025	60085		13C-2,3,		208263-73	6	3	1 %						47	116	1.017023	
27 HRP1025	60085		13C-2,2'	-	234432-87	4	8	1 %						1	108	1.039855	
28 HRP1025	60085		13C-2-M		234432-85	4	0	1 %						4	100	2.9629	
29 HRP1025	60085		13C-2,2'		105600-26	6	4	1 %						31	134	0.898576	
30 HRP1025	60085		13C-2,3,		234446-64	6	2	1%	_					46	115	0.918666	
31 HRP1025	60085		13C-2,2'	-	234432-92	6		1 %						38	122	0.785074	
32 HRP1025	60085		13C-2,2'		208263-75	6	4	1 %						31	126	0.770048	
33 HRP1025	60085		13C-2,2'		105600-27	6		1 %						43	115	1.167006	
34 HRP1025	60085 lytical Resu	15509	130-24		208263-76	5		1 %	1	4				14	131	1 036192	
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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.

	<u>,</u>			tPCB C	ALC test w	orksheet	for do	c.xlsx -	Microsoft	Excel				_	Ξ Σ
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1	Sample_ID		d Blank												
2	Lab_Sample_ID	MB1_9282	PCB_TL	Copy/Pas	te Metl	hod B	lank	Data	into th	is Worl	ksheet				
3	Lab Name		bХ												
4	Sample Matrix	Water	(whole)												
5	Percent_Mositure														
6	Percent Lipid														
7	QC Code	N	1B												
8	Sample Date														
9	Sample Time														
0	Analysis_Performed	160	68C												
1	Extraction_Date	10/29	/2011												
2	Analysis_Date	11/2	/2011												
13	Analysis_Time	19	:59												
4	Sample_Size	2	.1			1									
15	Size_Units		L												
16															
17												Method Blank			
	Compound	IUPAC	PCB #	Conc Found	Dilution F		Dat	a Qual I	=DI	Minimum I	evel	Adj conc (5X)			
	2-MoCB	101710	1	oono_round		I PG/L	U	a_aaaa	0.473	4.76		0			
	3-MoCB		2	0.877		I PG/L	J		0.48	4.76		4,385			
	4-MoCB		3	0.91		I PG/L	J		0.47	4.76		4.55			
	2,2'-DiCB		4	0.01		I PG/L	Ŭ		5.49	4.76		0			
	2,3-DiCB		5			I PG/L	Ŭ		1.38	4.76		0			
	2.3'-DiCB		6			I PG/L	Ŭ		1.38	4.76		0			
	2.4-DiCB		7			I PG/L	Ŭ		1.3	4.76		0			
	2.4'-DiCB	1	8			I PG/L	Ū		1.36	4.76		0			
	2,5-DiCB		9			I PG/L	U		1.46	4.76		0			
	2,6-DiCB	1	0			I PG/L	U		3.26	4.76		0			
29	3,3'-DiCB		1	1.96		I PG/L	J		0.492	4.76		9.8			
4 -	🕩 🕨 🔚 Directions 🦯 S	Samples & R	esults 🦲	C_MB QC_FB_	RB 🖉 Blar	k Correct	ion 🏑	* 🔁 🦯				III			- ▶ [
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Figure h. "QC_FB_RB" worksheet.

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Sample_ID	VA0000000-001-RB-1020201	1								
Lab_Sample_ID	A3761_9282_PCB_004	Copy/Pas	ste Field	l or Ril	nsate Bl	ank Da	ta into	this W	orksheet	
Lab Name	Lab X									
Sample Matrix	Water (whole)									
Percent Mositure										
Percent Lipid										
QC Code	SA									
Sample_Date	10/8/2011									
Sample_Time										
Analysis_Performed	1668C									
Extraction_Date	10/29/2011									
2 Analysis_Date	11/2/2011									
3 Analysis_Time	20:54									
Sample_Size	2.5									
Size_Units	L									
									Blank	
Compound	IUPAC PCB #	Conc Found	Dilution Fa	UNITS	Data Qua	EDL	Minimum	Level	Adj conc (5X)	
2-MoCB	1	0.8		PG/L	J EMPC	0.608	4		4.15	
3-MoCB	2			PG/L	U	0.826	4		0	
4-MoCB	3			PG/L	Ū	0.809	4		0	
2 2,2'-DiCB	4		1	PG/L	U	6.59	4		0	
3 2.3-DiCB	5		1	PG/L	U	2.65	4		0	
4 2,3'-DiCB	6			PG/L	Ū	2.64	4		0	
5 2,4-DiCB	7	24.	7 1	PG/L		2.5	4		123.5	
5 2,4'-DiCB	8			PG/L	U	2.61	4		0	
7 2,5-DiCB	9		1	PG/L	U	2.81	4		0	
3 2,6-DiCB	10		1	PG/L	U	3.91	4		0	
9 3,3'-DiCB	11	4.3	2 1	PG/L	в	0.915	4		21.6	
🔹 🕨 📒 Directions 🖉 Si	amples & Results 🔪 OC MB 🖉 🕻	C_FB_RB Blan	k Correction	/				1111		•
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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	
3	IUPAC PCB #	Method Blank	Associated Field		VA0	000000-001-DW-100	20 VA000000-001-DW-100202011		Eff 2	
4		Adj conc (X5)	or Rinsate Blank (X5)			Conc_Found	Adj Conc		Conc_Found	
5	1	0	4.15			6.91	6.91		0	
5	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	
0	6	0	0			0	0		0	
1	7	0	123.5			324	324		0	
2	8	0	0			2.25	2.25		0	
3	9	0	0			0	0		0	
4	10	0	0			0	0		0	
5	11	9.8	21.6			6.43	0		0	
6	12	0	0			0	0		0	
7	13	0	0			0	0		0	
8	14	0	0			0	0		0	
9	15	0	0			2.99	2.99		0	
0	16	0	0			0	0		0	
1	17	0	13.75			8.14	0		0	
2	18	0	0			2.99	2.99		0	I
23 10	19	0	0			4.74	4.74	+	0	
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Figure i. "tPCB Auto-Calculation" worksheet in the "tPCB Calculation" Spreadsheet.