

CE-QUAL-W2 Control File Converter to 4.5

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April 2021

This document outlines the steps required to convert a legacy application control file, **w2_con.npt**, and its companion **graph.npt** file into the Excel version of the control file or to convert a **w2_con.csv** file from 4.1 or 4.22 to 4.5.

This is a relatively simple process that involves these steps:

1. Copy **ConverterControlFile.exe** into the directory of a legacy application or copy the three files read by the program (**w2_con.npt**, **graph.npt**, and the bathymetry file) into a directory with the executable. If you are just converting a 4.1 or 4.22 **w2_con.csv** file to the new format, just copy **w2_con.csv** and the bathymetry file into a new directory. After execution (double click the converter executable), the following files are written to the directory:
 - a. **w2_con45.csv** – this is a csv file format of the control file. This will then need to be copied into a Version 4.5 example **w2_con.xlsm** template.
 - b. A csv form of the bathymetry file (if the bathymetry file was not already in csv format). The output bathymetry file is named **bthX.csv**, where X is the waterbody number. This new format is much easier for editing and analysis than the older file format. The file name in the **w2_con.csv** is also changed to **bthX.csv**.
2. Copy **w2_con.csv** into an existing Version 4.5 example file ***.xlsm** from another application (you can use one from the W2 Model Examples) by following these steps:
 - a. Open the file **w2_con.xlsm** (or it may have a different descriptive name, such as **w2_con_DeGray.xlsm**) from an existing example problem supplied in the CE-QUAL-W2 example problems.

Row	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L	Column M
1	Note COL A and B are not written out to w2_con.csv	w2_con.csv file format	CE-QUAL-W2 Version	4.2.1									
2			Control File version	4.2.1	w2_con.csv								
3	Fixed length of file except when more than 5 algae, 5 zooplankton,	TITLE C	Title comments: next 10 lines										
4	5 macrophytes, 5 structures, 5 periphyton groups.		"Version 3.7 Long Lake Model"										
5	The # of rows though changes with the # of active water quality constituents.	Any comment - this is written only to the SNP file	"Workshop water balance problem"										
6	Do not change the file tab name for this sheet since the output file name is tied to the name of the tab												
7	NWB: # of waterbodies												
8	NBR: number of branches												
9	IMX: maximum number of segments including inactive segments												
10	KMX: maximum number of vertical layers including inactive layers (top and bottom)	Export to CSV file											
11	NPROC: # of processors (INACTIVE at this time)		"Tom Cole WES; Scot; PSU; Rob; PSU; Chris PSU"										
12	CLOSEC: close dialog box after executing if=ON												
13	NTR: number of tributaries												
14	NST: maximum # of structures in a branch												
15	NIW: # of internal weirs	GRID/NPROC/CLOSE DIALOG BOX	NWB	NBR	IMX	KMX	NPROC	CLOSEC					
16	NWD: # of withdrawals		1	1	37	47	1	ON					
17	NGT: # of gates												
18	NSP: # of spillways	IN/OUTFLOW	NTR	NST	NIW	NWD	NGT	NSP	NPI	NPU			
19	NPI: # of pipes		1	1	0	0	0	0	0	0			
20	NPU: # of pumps or water level control rules												
21	NGC: # of generic water quality constituents	CONSTITUENTS	NGC	NSS	NAL	NEP	NBOD	NMC	NZP				
22			5	1	3	1	10	0	1				
23	NDAY: Maximum number of output dates or timestep related changes												
24	SELECTC: Turn ON/OFF/USGS automatic port selection from a multiple outlet structure	MISCELLANEOUS	NDAY	SELECTC	HABTATC	ENVIRPC	AERATEC	INITUWL					
25	HABTATC: Turn ON/OFF habitat analyses for fish and eutrophication variables		100	OFF	ON	OFF	OFF	OFF					
26	ENVIRPC: Turn ON/OFF environmental performance criteria												
27	AERATEC: Turn ON/OFF aeration to waterbody with dissolved oxygen probe control	TIME CON	TMSTRT	TMEND	YEAR								
28	INITUWL: Turn ON/OFF initial water surface slope and velocity calculation for a river system		1.0402	240	2000								
29													
30	Do not change bolded headers in COL C - these are checked by the program	DLT CON	NDLT	DLTMIN	DLTINTER								
31		Time step control parameters	6	0.1	ON								

Figure 1. An example of an existing w2_con.xlsm file. Columns A and B are not used in the control file and we will be pasting the w2_con45.csv into column C1, not A1.

- i. The easiest option is to open the file **w2_con45.csv** from the converter utility in Excel. Select the columns and rows with data. Do not select the entire sheet since you cannot copy and paste these into Cell C1 in **w2_con.xlsm**. Select the rows and columns necessary to select all the data. Be careful you select all the columns – especially for the SOD specification per segment. You will need to select as many columns as the # of segments (IMX).

Row	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L	Column M	Column N	Column O	Column P	Column Q	Column R	Column S	Column T	Column U	Column V
1	CE-QUAL-W2 Version	4.2.1	w2_con.csv																			
2	Control File version	4.2.1																				
3	Title comments: next 10 lines																					
4	"Version 3.7 Long Lake Model"																					
5	"Workshop water balance problem"																					
6																						
7																						
8																						
9																						
10																						
11	"Tom Cole WES; Scot; PSU; Rob; PSU; Chris PSU"																					
12																						
13																						
14																						
15	NWB	NBR	IMX	KMX	NPROC	CLOSEC																
16	1	1	37	47	1	ON																
17																						
18	NTR	NST	NIW	NWD	NGT	NSP	NPI	NPU														
19	1	1	0	0	0	0	0	0														
20																						
21	NGC	NSS	NAL	NEP	NBOD	NMC	NZP															
22	5	1	3	1	10	0	1															
23																						
24	NDAY	SELECTC	HABTATC	ENVIRPC	AERATEC	INITUWL																
25	100	OFF	OFF	OFF	OFF	OFF																
26																						
27	TMSTRT	TMEND	YEAR																			
28	100	272	2000																			
29																						

Figure 2. An example of the w2_con45.csv file from the converter utility.

- ii. Then Copy the selected cells from **w2_con45.csv** and paste to **w2_con.xlsm** cell C1 using *Paste Values and Number Formatting* so that the colors and other formatting are preserved in the original document.
- b. The next step is to adjust rows for the number of constituents. The template file you used **w2_con.xlsm** had an assumed number of water quality constituents that may be different from the number you will use. Go to approximately row 384 as shown below and delete or add cells **in only column A and B** only to match the specified number in

[illegible]

- c. If you have more than 5 structures, 5 epiphyton/periphyton groups, 5 algae groups, 5 macrophyte groups, or 5 zooplankton groups, you will have to add additional rows where necessary only in columns A and B. You can search in Column A for “increase # of rows” for where these areas are located.
 - i. For structures, look at rows 136-165 – there are notes in Col A and B describing where to add rows if more than 5 structures.

[illegible]

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- ii. For more than 5 epiphyton/periphyton groups, look in the epiphyton section (search for epiphyton).

A	B	C	D	E	F	G	H	I	J	K	L	M
604	ANEQN NH4 NO3 preference equation #	2	2	2								
605	ANPR Parameter for ANEQNH2	0.001	0.001	0.001								
606	O2AR Stoichiometric ratio of O2 to algae biomass, for algal respiration (mg O2/mg a	1.1	1.1	1.1								
607	O2AG Stoichiometric ratio of O2 to algae biomass, for algal primary production (mg	1.8	1.8	1.8								
608												
609	If more than 5 Periphyton groups need to adjust the # of rows - keep 5 as a co	EPIPHYTON										
610	If less than 5 groups - leave blank	EPIC Turn ON/OFF Periphyton group 1	ON		WB1	WB2	WB3	WB4	WB5	WB6	WB7	WB8
611		EPIC Turn ON/OFF print for Periphyton group 1	ON	10								
612		EPIC INIT Initial areal density Periphyton group 1 g/m2										
613		EPIC Turn ON/OFF Periphyton group 2										
614		EPIC Turn ON/OFF print for Periphyton group 2										
615		EPIC INIT Initial areal density Periphyton group 2 g/m2										
616		EPIC Turn ON/OFF Periphyton group 3										
617		EPIC Turn ON/OFF print for Periphyton group 3										
618		EPIC INIT Initial areal density Periphyton group 3 g/m2										
619		EPIC Turn ON/OFF Periphyton group 4										
620		EPIC Turn ON/OFF print for Periphyton group 4										
621		EPIC INIT Initial areal density Periphyton group 4 g/m2										
622		EPIC Turn ON/OFF Periphyton group 5										
623		EPIC Turn ON/OFF print for Periphyton group 5										
624	Increase # of rows if > 5 Periphyton groups	EPIC INIT Initial areal density Periphyton group 5 g/m2										
625												
626		EPIPHYTON growth rate constants for each periphyton group	EP1	EP2	EP3	EP4	EP5	EP6				
627		EG growth rate day-1	1.2									
628		ER respiration rate day-1	0.04									
629		EE excretion rate day-1	0.04									
630		EM mortality rate day-1	0.1									
631		EB burial rate day-1	0.001									
632		EHSP half saturation constant P- g/m^3	0.003									
633		EHSN half saturation constant N- g/m^3	0.014									
634		EHSI half saturation constant Si- g/m^3	0									

Figure 5. Location in Excel file where the number of rows needs to be increased in case there are more than 5 epiphyton/periphyton groups..

- iii. For more than 5 algae and 5 zooplankton groups, look in the zooplankton section (search for zooplankton).

A	B	C	D	E	F	G	H	I	J	K	L	M
655		ZOOPLANKTON RATES	Zoo1	Zoo2	Zoo3	Zoo4	Zoo5	Zoo6	Zoo7			
656		ZG growth rate day-1	1.5									
657		ZR respiration rate day-1	0.1									
658		ZM mortality rate day-1	0.01									
659												
660		ZEFF Zooplankton assimilation efficiency or the proportion of food assimilated to fo	0.5									
661		PREFP Preference factor of zooplankton for detritus or LPOM (dimensionless), from	0.5									
662		ZOOMIN Threshold food concentration at which zooplankton feeding begins, g m-3	0.01									
663		ZSP Zooplankton half saturation constant for food (includes LPOM, algae, and zoo	0.3									
664		ZT1 Lower temperature for zooplankton growth, oC	0									
665		ZT2 Lower temperature for maximum zooplankton growth, oC	15									
666		ZT3 Upper temperature for maximum zooplankton growth, oC	20									
667		ZT4 Upper temperature for zooplankton growth, oC	36									
668		ZK1 Fraction of maximum zooplankton growth rate at ZT1	0.1									
669		ZK2 Fraction of maximum zooplankton growth rate at ZT2	0.9									
670		ZK3 Fraction of maximum zooplankton growth rate at ZT3	0.98									
671		ZK4 Fraction of maximum zooplankton growth rate at ZT4	0.1									
672		ZP Stoichiometric equivalent between zooplankton biomass and phosphorus	0.015									
673		ZN Stoichiometric equivalent between zooplankton biomass and nitrogen	0.08									
674		ZC Stoichiometric equivalent between zooplankton biomass and carbon	0.45									
675		O2ZR Oxygen stoichiometry for zooplankton respiration (mg O2/mg zooplankton or	1.1									
676	This is set for a maximum of 5 algae groups and 5 zooplankton groups - you	PREFA-Algal Group 1 Preference factor of zooplankton for algae (dimensionless) fro	1									
677	You must keep the 5 groups even if not used	PREFA-Algal Group 2 Preference factor of zooplankton for algae (dimensionless) fro	0.5									
678		PREFA-Algal Group 3 Preference factor of zooplankton for algae (dimensionless) fro	0.5									
679		PREFA-Algal Group 4 Preference factor of zooplankton for algae (dimensionless) from 0 to 1.										
680	Increase # of rows if > 5 algal groups	PREFA-Algal Group 5 Preference factor of zooplankton for algae (dimensionless) from 0 to 1.										
681		PREFZ-Group 1 Preference factor of zooplankton for zooplankton (dimensionless) fr	0									
682		PREFZ-Group2 Preference factor of zooplankton for zooplankton (dimensionless) from 0 to 1.										
683		PREFZ-Group3 Preference factor of zooplankton for zooplankton (dimensionless) from 0 to 1.										
684		PREFZ-Group4 Preference factor of zooplankton for zooplankton (dimensionless) from 0 to 1.										
685	Increase # rows if > 5 zooplankton groups	PREFZ-Group5 Preference factor of zooplankton for zooplankton (dimensionless) from 0 to 1.										

Figure 6. Location in Excel file where the number of rows needs to be increased in case there are more than 5 zooplankton groups.

- iv. For more than 5 macrophyte groups, look in the macrophyte section (search for macrophyte).

	A	B	C	D	E	F	G	H	I	J	K	L	M
		MACROPHYTES	WB1	WB2	WB3	WB4	WB5	WB6	WB7	WB8	WB9	WB10	
687	Initial conditions for 5 macrophyte groups - rows must be added to if more than 5 groups	MAC Waterbody macrophyte 1 computations, ON or OFF	OFF										
688	You must keep the 5 groups even if not used	MAC Waterbody macrophyte 2 computations, ON or OFF	OFF										
689		MAC Waterbody macrophyte 3 computations, ON or OFF	OFF										
690		MAC Waterbody macrophyte 4 computations, ON or OFF	OFF										
691		MAC Waterbody macrophyte 5 computations, ON or OFF	OFF										
692	Increase rows if more than 5 macrophyte groups	MPRWBC Macrophyte 1 concentration print output, ON or OFF	OFF										
693		MPRWBC Macrophyte 2 concentration print output, ON or OFF	OFF										
694		MPRWBC Macrophyte 3 concentration print output, ON or OFF	OFF										
695		MPRWBC Macrophyte 4 concentration print output, ON or OFF	OFF										
696		MPRWBC Macrophyte 5 concentration print output, ON or OFF	OFF										
697	Increase rows if more than 5 macrophyte groups	MACWBCI-Group1 Initial macrophyte concentration for each macrophyte group, gm-3	0										
698		MACWBCI-Group2 Initial macrophyte concentration for each macrophyte group, gm-3											
699		MACWBCI-Group3 Initial macrophyte concentration for each macrophyte group, gm-3											
700		MACWBCI-Group4 Initial macrophyte concentration for each macrophyte group, gm-3											
701		MACWBCI-Group5 Initial macrophyte concentration for each macrophyte group, gm-3											
702	Increase rows if more than 5 macrophyte groups	MAC RATE	MacGroup1	MacGroup2	MacGroup3	MacGroup4	MacGroup5						
703		MG maximum macrophyte growth rate, day-1	0.3										
704		MR maximum macrophyte respiration rate, day-1	0.05										
705		MM maximum macrophyte mortality rate, day-1	0.05										
706		MSAT light saturation intensity at maximum photosynthetic rate, W m-2	30										
707		MHSP macrophyte half-saturation for phosphorus limited growth, g m-3	0										
708		MHSN macrophyte half-saturation for nitrogen limited growth, g m-3	0										
709		MHSC macrophyte half-saturation for carbon limited growth, g m-3	0										
710		MPOM Fraction of macrophyte biomass that is converted to particulate organic matter	0.9										
711		LRPMAC Fraction of POM which originates as dead macrophytes becoming labile	0.2										
712		PSFD Fraction of phosphorus uptake by macrophytes obtained from sediments	0.5										
713		NSFD Fraction of nitrogen uptake by macrophytes obtained from sediments	0.5										
714		MBMP Threshold macrophyte concentration for which growth is moved to the above	40										
715		MMAX Maximum macrophyte concentration, g m-3	500										
716													
717													

Figure 7. Location in Excel file where the number of rows needs to be increased in case there are more than 5 macrophyte groups.

- d. You will need to put quotes around the **TITLE** field, **HNAME** field, **CNAME** field, and **CDNAME** field. This can be done by setting up a formula using the existing cells as `'=char(34)&[CELLREF]&char(34)'` where CELLREF is the cell reference number of the original text. Then paste the **values** with the double quotes to the locations in the control file. *If anyone figures out an easier way to do this let me know! Frustratingly, Excel drops the double quotes on importing them.*
- e. The **w2_con.xlsm** file should now be working. As edits are made in this file, you will push the button on the top of the file in Column B to export it to **w2_con.csv**, which is read in by the W2 model. The preprocessor will 'yell' at you in case there is an error in the set up.