

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
40																
41	STEP 2:	INPUT AMBIENT AND EFFLUENT DATA														
42		CALCULATE IN-STREAM WASTE CONCENTRATIONS														
43																
44	DATA INPUT	For less than 20 data points enter geometric mean concentration as micro-gram per liter (ug/l or ppb). For 20 or more data points in set enter highest concentration as micro-gram per liter (ug/l or ppb).														
45																
46																
47		Effluent value reported as "< detection level" (DL) but the DL is greater than MQL, the 1/2 DL is used.														
48		Effluent value reported as "< detection level" (DL) and the DL is smaller than MQL, "0" is used.														
49		If a firm value is reported, even less than MQL, the reported value is used.														
50																
51		The following formulae is used to calculate the Instream Waste Concentration (IWC)														
52		(Please refer to CPP for detail)														
53		$IWC = [(F \cdot Q_a \cdot C_b) + (Q_e \cdot 2.13 \cdot C_e)] / (F \cdot Q_a + Q_e)$														
54		Where:														
55		IWC = Instream Waste Concentration														
56		F = Fraction of stream allowed for mixing														
57		C _e = Reported concentration in effluent														
58		C _b = Ambient stream concentration upstream of discharge														
59		Q _e = Plant effluent flow														
60		Q _b = Critical low flow of stream at discharge point expressed as the 7Q10 or harmonic mean flow for human health criteria														
61		Upstream Flow (Q _b)= (% of 7Q10) X 7Q10 for Chronic and Acute														
62																
63		The following formulae convert metals reported in total form to dissolved form if criteria are in dissolved form														
64																
65		$K_p = K_{po} \cdot (TSS^{\alpha})$ K _p = Linear partition coefficient; K _{po} and α can be found in table below														
66		$C/Ct = 1 / (1 + K_p \cdot TSS \cdot 10^{-6})$ TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)														
67		Total Metal Criteria (Ct) = Cr / (C/Ct) C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value														
68																
69		*Stream Linear Partition Coefficient (Insert "Dissolved" Conc in Column B to convert to Lake Linear Partition Coefficient														
70	Total Metals	Dissolved Value in Stream	K _{po}	alpha (α)	K _p	C/Ct	Total Value				K _{po}	alpha (α)	K _p	C/Ct	Total Value	
71																
72	Arsenic		480000	-0.73	138285.446	0.56799788	0.00				480000.00	-0.73	138285.45	0.5679979	0	
73	Cadmium		4000000	-1.13	582706.889	0.237818469	0.00				3520000.00	-0.92	733514.98	0.1986361	0	
74	Chromium(3)		3360000	-0.93	688338.365	0.208948818	0.00				2170000.00	-0.27	1369499.28	0.1172024	0	
75	Copper		1040000	-0.74	294554.016	0.381672529	0.00				2850000.00	-0.9	614495.12	0.2283249	0	
76	Lead		2800000	-0.8	715925.58	0.202527926	0.00				2040000.00	-0.53	826490.64	0.1803199	0	
77	Mercury		2900000	-1.14	415321.613	0.30448177	0.00				1970000.00	-1.17	268066.09	0.4041443	0	
78	Nickel		490000	-0.57	185433.992	0.495077211	0.00				2210000.00	-0.76	604946.03	0.2310962	0	
79	Zinc		1250000	-0.7	379014.766	0.324193117	0.00				3340000.00	-0.68	1047851.74	0.1478593	0	
80	Silver		2400000	-1.03	414607.994	0.30484608	0.00				2400000.00	-1.03	414607.99	0.3048461	0	
81		*Note: Use this section to convert lab concentrations shown as "dissolved" to "total"														

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
82											Dissolved	Total					
83	The following formulas are used to calculate water quality criteria based on Regulation No. 2 (Act 472 of Ark 1949)										WQC (ug/l)	WQC(ug/l)					
84	Cadmium			Acute			WER X CF1 X e(1.128[ln(hardness)]-3.828)				1.04		CF1 = 1.136672 - [0.041838*ln(hardness)]				
85				Chronic			WER X CF2 X e(0.7852[ln(hardness)]-3.490)				0.43		CF2 = 1.101672 - [0.041838*ln(hardness)]				
86																	
87	Chromium Tri			Acute			WER X 0.316 X e(0.819[ln(hardness)]+3.688)				210.28						
88				Chronic			WER X 0.86 X e(0.819[ln(hardness)]+1.561)				68.21						
89																	
90	Chromium Hex			Acute			WER X 0.982 X 16				15.71						
91				Chronic			WER X 11 X 0.962				10.58						
92																	
93	Copper			Acute			WER X 0.96 X e(0.9422[ln(hardness)]-1.464)				5.64						
94				Chronic			WER X 0.96 X e(0.8545[ln(hardness)]-1.465)				4.17						
95																	
96	Lead			Acute			WER X e(1.273[ln(hardness)]-1.460)*CF3				17.68		CF3 = 1.46203 - [0.145712*ln(hardness)]				
97				Chronic			WER X e(1.273[ln(hardness)]-4.705)*CF3				0.69						
98																	
99	Mercury			Acute			WER X 0.85 X 2.4				2.04						
100				Chronic			WER X 0.012				0.01						
101																	
102	Nickel			Acute			WER X 0.998 X e(0.8460[ln(hardness)]+3.3612)				525.50						
103				Chronic			WER X 0.997 X e(0.8460[ln(hardness)]+1.1645)				58.36						
104																	
105	Zinc			Acute			WER X 0.978 X e(0.8473[ln(hardness)]+0.8604)				42.43						
106				Chronic			WER X 0.986 X e(0.8473[ln(hardness)]+0.7614)				38.74						
107																	
108	Silver			Acute			WER X 0.85 X e(1.72[ln(hardness)]-6.52)				0.46						
109																	
110	Cyanide			Acute			WER X 22.36				22.36						
111				Chronic			WER X 5.2				5.20						
112																	
113	Arsenic			Acute			WER X 360				360.00						
114				Chronic			WER X 190				190.00						
115																	
116	Beryllium			Acute			WER X 130				130.00						
117				Chronic			WER X 5.3				5.30						
118																	
119	Selenium			Acute			WER X 20				20.00						
120				Chronic			WER X 5				5.00						
121																	
122	The following formulas are applicable to the Jet Stream Model for lakes for calculating the Dilution Factor (DF):																
123	DF = ((2.8 * D * 3.1416^0.5) / X) where DF is % of effluent at distance X, D is the diameter of the outfall pipe																
124	and X is aquatic life criteria--25 feet for ZID; 100 feet for mixing zone; human health criteria 200 feet for mixing zone.																
125	DF = #VALUE! Acute #VALUE! Chronic #VALUE! Bioacc.																
126																	
127	The following formulas are used to calculate the instream waste concentration (IWC) for each pollutant:																
128																	
129	IWC = [(Frac X Critical Flow X Cb) + (2.13 X Ce X Qd)] / [Frac X Critical Flow + Qd] where the critical flow is the 7Q10 except for lakes with the Jet Stream Model.																
130	Use EPA Statistical Factor of 2.13 for less than 20 Ce data points with the Geometric Mean of the Ce's; use 1 for more than 20 data points with the maximum Ce.																
131	IWC = (DF X Ce) + Cb for lakes with Jet Stream Model.																

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
132	POLLUTANTS		Number of Data points	MQL	EPA Statistical	Background Conc.	Effluent Conc.	Domestic Supply	Acute Aquatic IWC	Chronic Aquatic IWC	Bioacc.	Domestic Criteria	Arkansas Acute Aquatic Criteria	Arkansas Chronic Aquatic	Arkansas Bioacc.	
133				ug/l	Factor	Cb ug/l	Ce ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
137	METALS AND CYANIDE															
138	1. Antimony Total		1	60	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9000.00	1600.00	4300	
139	2. Arsenic Total		1	0.5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	50	633.81	334.51	1.4	
140	3. Beryllium Total		1	0.5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	130.00	5.30	4	
141	4. Cadmium Total		1	1	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	10	4.37	1.82	#####	
142	6. Chromium (Tri)		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	50	1006.35	326.45	#####	
143	7. Chromium (hex)		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	50	15.71	10.58	#####	
144	8. Copper Total		1	0.5	2.13	0	0.52	1.11	1.11	1.11	1.11	#####	14.79	10.93	#####	
145	9. Lead Total		1	0.5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	50	87.29	3.40	#####	
146	10. Mercury Total		1	0.005	2.13	0	0.029	0.06	0.06	0.06	0.06	2	6.70	0.012	0.15	
147	12. Nickel Total		1	0.5	2.13	0	0.95	2.02	2.02	2.02	2.02	#####	1061.45	117.88	4600	
148	13. Selenium Total		1	5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	10	20.00	5.00	#####	
149	14. Silver Total		1	0.5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	50	1.51	#####	#####	
150	15. Thallium Total		1	0.5	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	1400.00	#####	6.3	
151	16. Zinc Total		1	20	1	0	155	155.00	155.00	155.00	155.00	#####	130.87	119.50	#####	
152	129. Phenols, Total		1	5	2.13	0	16	34.08	34.08	34.08	34.08	#####	9999999.00	#####	#####	
153	17. Cyanide Total		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	22.36	5.2	220000	
156	DIOXIN															
157	18. 2-3-7-8-TCDD		1	0.00001	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	0.01	1.00E+07	1.00E-06	
159	VOLATILE COMPOUNDS															
160	19. Acrolein		1	50	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	68	21	780	
161	20. Acrylonitrile		1	20	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	7550	2600	6.6	
162	21. Benzene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	5300	9999999	710	
163	22. Bromoform		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999	#####	3600	
164	23. Carbon Tetrach		1	2	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	35200	#####	44	
165	24. Chlorobenzene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	250	50	2.10E+04	
166	25. Chlorodibromomethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999	#####	340	
167	26. Chloroethane		1	50	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999	#####	1.00E+07	
168	27. 2-Chloroethylvinyl ether		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999	#####	1.00E+07	
169	28. Chloroform		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	28900	1240	4700	
170	29. Dichlorobromomethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999	#####	220	
171	30. 1-1-Dichloroethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	7	9999999.00	#####	#####	
172	31. 1-2-Dichloroethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	11800	20000	990	
173	32. 1-1-Dichloroethylene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	11600	#####	32	
174	33. 1,2 Dichloropropane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	23000	5700	#####	
175	34. 1,3 Dichloropropylene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	6060	244	1700	
176	35. Ethylbenzene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	32000	#####	29000	
177	37. Methyl Chloride		1	50	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999.00	#####	#####	
178	36. Methyl bromide		1	50	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999.00	#####	4000	
179	38. Methylene chloride		1	20	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999.00	#####	16000	
180	39. 1-1-2-2-Tetrachloroetha		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9320	2400	110	
181	40. Tetrachloroethylene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	5280	840	88.5	
182	41. Toluene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	17500	#####	2.00E+05	
183	42. 1,2-trans-dichloroethyler		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	9999999.00	#####	#####	
184	44. 1-1-2-Trichloroethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#####	18000	9400	420	
185	43. 1-1-1-Trichloroethane		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	200	18000	#####	#####	
186	45. Trichloroethylene		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	5	45000	21900	810	
187	46. Vinyl Chloride		1	10	2.13	?	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!	2	9999999.00	#####	5250	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
278																	
279	STEP 3:	APPLICABLE WATER QUALITY-BASED LIMITS															
280																	
281																	
282																	
283	POLLUTANTS		Permit Daily Maximum	Permit Monthly Average	Permit Daily Maximum	Permit Monthly Average							EPA Bioac Status				
284			ug/l	ug/l	lb/day	lb/day											
285	Alpha-BHC		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
286	Beta-BHC		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
287	Gamma-BHC		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
288	Delta-BHC		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
289	Pentachlorophenol		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
290	Aldrin		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
291	Chlordane		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
292	4,4'-DDT		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
293	4,4'-DDE		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
294	4,4'-DDD		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
295	Dieldrin		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
296	Alpha-endosulfan		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
297	Beta-endosulfan		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
298	Endosulfan sulfate		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
299	Endrin		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
300	Endrin aldehyde		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
301	Heptachlor		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
302	Heptachlor epoxide		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
303	Toxaphene		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
304	Chlorpyrifos		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
305	Cadmium Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
306	Chromium (hex)		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
307	Copper Total		NO	NO	NO	NO							N/A				
308	Lead Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
309	Mercury Total		0.0269	0.0134	0.0023082	0.0011504							N/A				
310	Nickel Total		NO	NO	NO	NO							N/A				
311	Selenium Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
312	Silver Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
313	Zinc Total		231.9893	115.6217	19.928349	9.93213534							N/A				
314	Chromium (Tri)		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
315	Cyanide Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
316	Beryllium Total		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
317	PCB-1242		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
318	PCB-1254		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
319	PCB-1221		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
320	PCB-1232		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
321	PCB-1248		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
322	PCB-1260		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
323	PCB-1016		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
324	2-3-7-8-TCDD		#VALUE!	#VALUE!	#VALUE!	#VALUE!							N/A				
325	Antimony												#VALUE!				
326	Arsenic												#VALUE!				
327	Thallium												#VALUE!				
328	Acrolein												#VALUE!				
329	Acrylonitrile												#VALUE!				
330	Benzene												#VALUE!				
331	Bromoform												#VALUE!				
332	Carbon Tetrach												#VALUE!				
333	Chlorodibromomethane												#VALUE!				
334	Chloroform												#VALUE!				
335	Dichlorobromomethane												#VALUE!				