

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
1	CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS																
2	The spreadsheet logic will function correctly when ALL yellow cells with "?" have data entered. For an Arkansas River/Stream																
3	Do not enter data in yellow cells marked "Reserved". White cells marked "Reserved" have comp; Seasonal Critical Flow from June through November																
4	STEP 1:	INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)						GC									
5																	
6																	
7	Codes & TSS for Ecoregions and Large Rivers																
8	Ouachita Mts. Eco (OM) = 2.0 mg/l Arkansas (Ft. Smith to Dardanelle Dam) 12.0 mg/l																
9	Ozark Highlands Eco (OH) = 2.5 mg/l Arkansas (Dardanelle Dam to Terry L&D) 10.5 mg/l																
10	Permittee NPDES Permit No. EDCC AR0000752 Boston Mts. Eco (BM) = 1.3 mg/l Arkansas (Terry L&D to L&D No. 5) 8.3 mg/l																
11	Outfall No.(s) 003 Ark River Valley Eco (AV) = 3.0 mg/l Arkansas (L&D No. 5 to Mouth) 9.0 mg/l																
12	Plant Effluent Flow (MGD) 0.017 Gulf Coastal Eco (GC) = 5.5 mg/l White (Above Beaver Lake) 2.5 mg/l																
13	Plant Effluent Flow (cfs) 0.026 Delta Ecoregion (DL) = 8.0 mg/l White (Below Bull Shoals to Black Riv) 3.3 mg/l																
14																	
15	RECEIVING STREAM																
16																	
17	Is this a Large River from the list at right? (enter "1" if yes, "0" if no; make entry as a number) 0																
18	Name of Receiving Stream: unnamed tributary																
19																	
20	Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number) 0																
21	Seasonal Limits May Apply 1																
22	(Reserved) DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK→ ?																
23	(Reserved)																
24	(Reserved)																
25	(Reserved)																
26	(Reserved)																
27	(Reserved)																
28																	
29	Ecoregion TSS (mg/l) (For Large River, See List to Right) 5.50																
30	Ecoregion Hardness (mg/l) (Reserved) 31.00																
31	Enter 7Q10 (cfs) as the Critical Flow (Reserved) Seasonal limits may apply, 0.00 0.97 <====This is White (Below confluence with Black River)																
32	Seasonal LTA/Harmonic Mean Flow based on site verification. 0.00 2.92 <====This is Ouachita (Below confluence with Little Miss. River)																
33	Using Diffusers (Yes/No) no																
34	pH (Avg) 7.00																
35	Percent (%) of Critical Flow for Chronic Criteria 0.67																
36	Percent (%) of Critical Flow for Acute Criteria 0.33																
37	Water Effect Ratio (WER) 1.00																
38	Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control) 1.55																
39	Max Daily Limit LTA Multiplier (Ref: " " " ") 3.11																
40	Max Daily Limit LTA Multiplier for Human Health (Ref: 2009 CPP; Section 5.27.2) 1.64																

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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).														
45		For 20 or more data points in set enter highest concentration as micro-gram per liter (ug/l or ppb).														
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		$IWC = [(F*Qa*Cb) + (Qe*2.13*Ce)] / (F*Qa + Qe)$														
54		Where:														
55		IWC = Instream Waste Concentration														
56		F = Fraction of stream allowed for mixing														
57		Ce = Reported concentration in effluent														
58		Cb = Ambient stream concentration upstream of discharge														
59		Qe = Plant effluent flow														
60		Qb = Critical low flow of stream at discharge point expressed as the 7Q10 or harmonic mean flow for human health criteria														
61		Upstream Flow (Qb)= (% 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		$Kp = Kpo * (TSS**a)$					Kp = Linear partition coefficient; Kpo and a can be found in table below									
66		$C/Ct = 1 / (1 + Kp*TSS* 10^{-6})$					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 "Total")							Lake Linear Partition Coefficient							
70	Total Metals	Dissolved Value in Stream	Kpo	alpha (a)	Kp	C/Ct	Total Value	Kpo	alpha (a)	Kp	C/Ct	Total Value				
71																
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		<i>*Note: Use this section to convert lab concentrations shown as "dissolved" to "total"</i>														
82								Dissolved	Total							

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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.															
132	POLLUTANTS		Number of Data points	MQL	EPA Statistical Factor	Background Conc. Cb ug/l	Effluent Conc. Ce ug/l	Domestic Supply IWC ug/l	Acute Aquatic IWC ug/l	Chronic Aquatic IWC ug/l	Bioacc. IWC ug/l	[Reserved]	Arkansas Acute Aquatic ug/l	Arkansas Chronic Aquatic ug/l	Arkansas Bioacc. ug/l	EPA Bioacc. ug/l
133				ug/l	Factor	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l		ug/l	ug/l	ug/l	ug/l
137	METALS AND CYANIDE															
138	8. Copper Total		12	0.5	2.13	0	12.67	26.99	26.99	26.99	26.99	9999999	14.79	10.93	9999999	13,000
139																
140																
141																
142																

*Primary Drinking Water MCL

