

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P			
1	<b>CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS</b>																		
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 (Reserved)																		
4	<b>STEP 1:</b>	INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)						GC											
5																			
6																			
7	<b>FACILITY</b>															<b>Codes &amp; TSS for Ecoregions and Large Rivers</b>			
8									Ouachita Mts. Eco (OM) =	2.0 mg/l	Arkansas (Ft. Smith to Dardanelle Dam	12.0 mg/l							
9	Permittee								EDCC	Ozark Highlands Eco (OH) =	2.5 mg/l	Arkansas (Dardanelle Dam to Terry L&I	10.5 mg/l						
10	NPDES Permit No.								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)								103ST	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)								0.65	Gulf Coastal Eco (GC) =	5.5 mg/l	White (Above Beaver Lake)	2.5 mg/l						
13	Plant Effluent Flow (cfs)								1.00	Delta Ecoregion (DL) =	8.0 mg/l	White (Below Bull Shoals to Black Riv)	3.3 mg/l						
14																			
15	<b>RECEIVING STREAM</b>															White (From Black River to Mouth)	18.5 mg/l		
16																	St. Francis River	18.0 mg/l	
17	Is this a <b>Large River from the list at right?</b> (enter "1" if yes, "0" if no; make entry as a number)							0					Ouachita (Above Caddo River)	2.0 mg/l					
18	Name of Receiving Stream:							unnamed tributary					Ouachita (Below Caddo River)	5.5 mg/l					
19																			
20	Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number)							0					<b>Total Hardness for:</b>						
21	(Reserved)								0					Arkansas River = 125 mg/l	Red River = 211 mg/l				
22	(Reserved)	DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK→ ?												Ouachita River = 28 mg/l	St. Francis River = 103 mg/l				
23	(Reserved)													White River = 116 mg/l					
24		(Reserved)						(Reserved)											
25			(Reserved)						(Reserved)					Gulf Coastal = 31 mg/l	Ouachita Mount = 31 mg/l				
26			(Reserved)						(Reserved)					Ozark Highlands = 148 mg/l	Ark River Valley = 25 mg/l				
27			(Reserved)						(Reserved)					Boston Mount = 25 mg/l	Delta = 81 mg/l				
28																			
29	Ecoregion TSS (mg/l) (For Large River, See List to Right)							5.50					<b>Large Rivers</b>						
30	Ecoregion Hardness (mg/l) (Reserved)							31.00					Mississippi River, Arkansas River, Red River						
31	Enter 7Q10 (cfs) as the Critical Flow (Reserved)							23.05	(Reserved)					White (Below confluence with Black River)					
32	Long Term Ave / Harmonic Mean Flow (cfs)							1.00	(Reserved)	(Reserved)					Ouachita (Below confluence with Little Miss. River)				
33	Using Diffusers (Yes/No)							no											
34	pH (Avg)							7.00					For industrial and federal facility, use the highest monthly average flow for the past 24 months. For POTWs, use the design flow.						
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	These cells				#VALUE! => No violation or Not Applicable						
38	Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control)							1.55	must be				999999.00 => No EPA/ADEQ Guideline						
39	Max Daily Limit LTA Multiplier (Ref: " " " " )							3.11	unlocked										
40	Max Daily Limit LTA Multiplier for Human Health (Ref: 2009 CPP; Section 5.27.2)							1.64	to change.										

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41	<b>STEP 2:</b>		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			$IWC = [(F \cdot Q_a \cdot C_b) + (Q_e \cdot 2.13 \cdot C_e)] / (F \cdot Q_a + Q_e)$														
54			Where:														
55			IWC = Instream Waste Concentration														
56			F = Fraction of stream allowed for mixing														
57			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			<b>*Stream Linear Partition Coefficient (Insert "Dissolved" Conc in Column B to convert to "Total")</b>							<b>Lake Linear Partition Coefficient</b>							
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	<b>METALS AND CYANIDE</b>															
138	8. Copper Total		18	0.5	2.13	0	8.25	0.73	2.04	1.07	8.78	9999999	14.79	10.93	9999999	13,000
139	9. Lead Total		53	0.5	1	0	9.9	0.41	1.15	0.60	4.95	9999999	87.29	3.40	9999999	50
140	16. Zinc Total		18	20	2.13	0	101.29	8.95	25.02	13.10	107.77	9999999	130.87	119.50	9999999	260,000
141	<b>*Primary Drinking Water MCL</b>															

