

CALCULATIONS OF ARKANSAS WATER QUALITY-BASED EFFLUENT LIMITATIONS
For an Arkansas River/Stream

STEP 1: INPUT TWO LETTER CODE FOR ECOREGION (Use Code at Right)		OH
Basin Name	Ozark Highlands	
Facility		
Permittee & Date	Bentonville	
NPDES Permit No.	AR0022403	
Outfall No.	1	
Plant Avg Flow (MGD)	3.17	
SIUs Avg Flow (MGD)	0.02	
Domestic Flow (MGD)	3.15	
Plant Design Flow (MGD)	4.00	
Plant Design Flow (cfs)	6.18	
Receiving Stream		
Is this a large river? (see list at right)(enter "1" if yes, "0" if no; make entry as a number)	0	
Name of Receiving Stream:	Town Branch	
Waterbody Segment Code No.	3J	
Is this a lake or reservoir? (enter '1' if yes, '0' = no; make entry as a number)	0	
Is seasonal critical flow applicable (1=yes, 0=no); see Reg 2 page 1-3 for details.	0	
(Reserved) DO NOT INPUT DATA INTO CELL H22, H23 & H24....LEAVE BLANK	?	
(Reserved)	?	
(Reserved)	?	
(Reserved)	?	
(Reserved)	?	
Ecoregion TSS (mg/l) (For Large River, See List to Right)	2.50	
Ecoregion Hardness (mg/l)	148.00	
Enter 7Q10 (cfs) (Reserved)	0.10	
Long Term Avg / Harmonic Mean Flow (cfs)	0.30	
Using Diffusers (Yes/No)	No	
pH (Avg)	6.83	
Percent (%) of 7Q10 for Chronic Criteria	0.67	
Percent (%) of 7Q10 for Acute Criteria	0.33	
Water Effect Ration (WER)	1.00	
EPA Statistical Factor for Data (enter 2.13 for <20; enter 1 for >20)	2.13	
Ave Monthly Limit LTA Multiplier (Ref: page 103 TSD for WQ-Based Toxics Control)	1.55	
Max Daily Limit LTA Multiplier (Ref: " " " ")	3.11	

Codes & TSS for Ecoregions and Large Rivers		
Ouachita Mts. Eco (OM)	2.00	mg/l
Ozark Highlands Eco (OH)	2.50	mg/l
Boston Mts. Eco (BM)	1.30	mg/l
Ark River Valley Eco (AV)	3.00	mg/l
Arkansas (Ft. Smith to Dardanelle Dam)	12.0	mg/l
Arkansas (Dardanelle Dam to Terry L&D)	10.5	mg/l
Arkansas (Terry L&D to L&D No. 5)	8.3	mg/l
Arkansas (L&D No. 5 to Mouth)	9.0	mg/l
Gulf Coastal Eco (GC)	5.5	mg/l
Delta Ecoregion (DL)	8.0	mg/l
White (Above Beaver Lake)	2.5	mg/l
White (Below Bull Shoals to Black Riv)	3.3	mg/l
White (From Black River to Mouth)	18.5	mg/l
St. Francis River	18.0	mg/l
Ouachita (Above Caddo River)	2.0	mg/l
Ouachita (Below Caddo River)	5.5	mg/l
Red River	33.0	mg/l

Large Rivers
Mississippi River, Arkansas River, Red River
White (Below confluence with Black River)
Ouachita (Below confluence with Little Miss. River)

Total Hardness for:		
Arkansas River	125	mg/l
Ouachita River	28	mg/l
White River	116	mg/l
Red River	211	mg/l
St. Francis River	103	mg/l
Gulf Coastal	31	mg/l
Ozark Highlands	148	mg/l
Boston Mount	25	mg/l
Ouachita Mount	31	mg/l
Ark River Valley	25	mg/l
Delta	81	mg/l

Treatment Facility: **City of Bentonville**

Data Range: **2016 - 2020**

Pollutant	% Rem ^{***}	Water Quality mg/l	Sludge mg/kg	Inhibition ^{**} mg/l	Water Quality [*] lbs/day	Sludge ^{****} lbs/day	Inhibition ^{^^} lbs/day	MAHL lbs/day	MAHC mg/l	Domestic lbs/day	Allocation for %SF lbs/day [^]	MAIL lbs/day	Max Inf Exceeded MAHC	Max Effluent vs WQ(mg/l)
Cadmium	67.0	0.01	85	1.00	0.57	1.05	26.42	0.57	0.02	0.02	0.48	0.46	No	No
Copper	84.4	0.04	4300	1.00	7.02	46.44	26.42	7.02	0.27	1.08	5.97	4.89	No	No
Lead	81.5	0.02	840	1.00	2.70	10.01	26.42	2.70	0.10	0.06	2.30	2.23	No	No
Mercury	96.2	0.000014	57	0.10	0.01	0.56	2.64	0.01	0.000358	0.000007	0.008030	0.008023	No	No
Nickel	43.2	0.43	420	1.00	19.85	7.87	26.42	7.87	0.30	0.16	6.69	6.53	No	No
Selenium	50.0	0.01	100	0.20	0.30	1.84	5.28	0.30	0.01	0.29	0.25	0.03	No	No
Silver	79.4	0.02		0.25	2.58		6.61	2.58	0.10	0.01	2.19	2.18	No	No
Zinc	77.1	0.37	7500	0.30	43.21	102.76	7.93	7.93	0.30	11.05	6.74	4.31	No	No
Chromium	59.1	1.27	3000	1.00	81.94	33.59	26.42	26.42	1.00	0.05	22.46	22.41	No	No
Cyanide	69.0	0.01		0.10	0.50		2.64	0.50	0.02	0.26	0.43	0.16	No	No
Arsenic	87.3	0.35	75	0.10	72.00	1.09	2.64	1.09	0.04	3.83	0.93	2.90	Yes	No
Molybdenum	50.0	1.00	75	0.20	52.85	1.15	5.28	1.15	0.04	0.01	0.98	0.97	No	No
Beryllium	50.0	0.01		0.10	0.32		2.64	0.32	0.01	0.01	0.27	0.26	No	No
Driving Criteria														
Dry tons/day of sludge	4.59													
Safety Factor	0.15													

* lbs/day = mg/l X 8.34 X POTW avg flow / (1-Total POTW %Rem)

** EPA Default values (most conservative) from page G-1 of the 7/04 EPA TBLL guidance manual (Be est. @ 0.10 mg/l; Se & Mo est. @ 0.2 mg/l; Ag from old 12/87 EPA guidance manual)

*** EPA Default Median Removal Numbers from page R-2 of the 7/04 TBLL guidance manual for Cd, Se, Mo, & CN (Be est. @ 50%)

**** lbs/day = dry tons/day X 0.002 X CFR 503 criteria / % removal from EPA Pret. Prog. Implementation workshop mtrl. ~ 6/93

^^lbs/day = mg/l X Avg POTW flow X 8.34

^ lbs/day = (1 - SF) X MAHL

MAIL = Maximum allowable industrial loading = MAHL - Allocation for % SF - Domestic lb/day

Treatment Facility: City of Bentonville

Data Range: 2016 - 2020

Influent (mg/l) - No data entered if Non-detects < MQL

INFLUENT SAMPLING													
Date	Cadmium mg/l	Copper mg/l	Lead mg/l	Mercury mg/l	Nickel mg/l	Selenium mg/l	Silver mg/l	Zinc mg/l	Chromium mg/l	Cyanide mg/l	Arsenic mg/l	Molybdenum mg/l	Beryllium mg/l
1/11-12/16		0.0200	0.0011	0.00007	0.0054		0.001	0.1200			0.003		
4/11-12/16		0.0290	0.0017	0.00011	0.0100		0.0016	0.2100			0.0056		
7/11-12/16		0.0018		0.00004	0.0037			0.0290			0.00052		
10/4-5/16		0.0330	0.00320	0.00005	0.0073		0.0009	0.2500			0.0049		
1/9-10/17		0.0510	0.00240	0.00002	0.0083		0.0048	0.2700			0.0077		
4/3-5/17		0.0270	0.00100	0.00009	0.0043		0.00061	0.1400			0.0056		
7/10-11/17		0.0310	0.00150	0.00006	0.0056			0.1100			0.0062		
10/9-10/17		0.0390	0.00120	0.00001	0.0044		0.00062	0.1400			0.0032		
1/29-30/18		0.0300	0.00068	0.00001	0.0067		0.00083	0.0990			0.0019		
4/9-10/18		0.0160	0.00120	0.00011	0.0062			0.2400			0.00082		
7/9-10/18		0.0160	0.00120	0.00008	0.0039			0.1400			0.0016		
10/8-9/18		0.0280	0.00150	0.00005	0.0064			0.1800			0.0026		
1/14-15/19		0.0140	0.00056	0.00001	0.0032		0.00062	0.0690			0.0011		
4/8-9/19		0.0290	0.00110	0.00002	0.0055		0.00091	0.1400			0.0016		
9/9-10/19		0.0450	0.00160	0.00005	0.0082		0.00091	0.2500	0.022		0.0900		
10/28-29/19		0.0150		0.00003	0.0042			0.1400			0.0200		
1/20-21/20		0.0130		0.00002	0.0031			0.0710			0.0140		
4/6-7/20		0.0230	0.00096		0.0043			0.1700			0.0400		
7/14-15/20		0.0240	0.00086		0.0043			0.1400			0.0230		
10/5-6/20		0.0420	0.00120	0.00005	0.0056		0.00057	0.3200					
Quantitation Level (QL):	0.0005	0.0005	0.0005	0.00002	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005	0.01	0.0005
Average		0.0263	0.0014	0.000049	0.0055		0.0012	0.1614	0.0220		0.0123		
Maximum		0.0510	0.0032	0.0001	0.0100		0.0048	0.3200	0.0220		0.0900		
All Concs > QL (Yes/No)	No	Yes	No	No	Yes	No	No	Yes	No	No	No	No	No

Effluent (mg/l) No data entered if Non-detects < MQL; entered 1/2 MQL if detected in Inf. & ND in Eff

EFFLUENT SAMPLING													
Date	Cadmium mg/l	Copper mg/l	Lead mg/l	Mercury mg/l	Nickel mg/l	Selenium mg/l	Silver mg/l	Zinc mg/l	Chromium mg/l	Cyanide mg/l	Arsenic mg/l	Molybdenum mg/l	Beryllium mg/l
1/13-14/16		0.00230	0.00025	0.0000011	0.00320			0.0470			0.00062		
4/13-14/16		0.00250	0.00025	0.0000007	0.00470			0.0370			0.00067		
7/13-14/16		0.00250		0.0000014	0.00430			0.0330			0.00064		
10/6-7/16		0.00250	0.00025	0.0000005	0.00510			0.0570			0.00092		
1/11-12/17		0.00310	0.00025	0.0000015	0.00340			0.0450			0.00059		
3/5-6/17		0.00200	0.00025	0.0000013	0.00280			0.0300			0.00063		
7/11-12/17		0.00240	0.00025	0.0000040	0.00360			0.0310			0.00091		
10/10-11/17		0.00470	0.00025	0.0000013	0.00280			0.0370			0.00092		
1/31-2/1/18		0.01300	0.00025	0.0000060	0.00350		0.00025	0.0470			0.00058		
4/11-12/18		0.00200	0.00025	0.0000013	0.00280			0.0300			0.00063		
7/11-12/18		0.00240	0.00025	0.0000040	0.00360			0.0310			0.00091		
10/10-11/18		0.00470	0.00025	0.0000013	0.00280			0.0370			0.00092		
1/16-17/19		0.00360	0.00025	0.0000010	0.00200		0.00025	0.0500			0.00025		
4/10-11/19		0.00620	0.00025	0.0000010	0.00270		0.00025	0.0370			0.00025		
9/11-12/19		0.00460	0.00025	0.0000011	0.00270		0.00025	0.0440	0.005		0.00300		
10/30-31/19		0.00280		0.0000010	0.00250			0.0270			0.00420		
1/22-23/20		0.00550		0.0000037	0.00200			0.0370			0.00790		
4/8-9/20		0.00400	0.00025		0.00300			0.0310	0.013		0.00370		
7/16-17/20		0.00460	0.00025	0.0000006	0.00280			0.0100			0.00140		
10/7-8/20		0.00690	0.00025	0.0000024	0.00250		0.00025	0.0420					
Quantitation Level (QL):	0.0005	0.0005	0.0005	0.00002	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005	0.01	0.0005
Average		0.0041	0.0003	0.000002	0.0031		0.00025	0.0370	0.0090		0.0016		
Maximum		0.0130	0.0003	0.000006	0.0051		0.00025	0.0570	0.0130		0.0079		
All Concs > QL (Yes/No)	No	Yes	No	No	Yes	No	No	No	No	No	No	No	No

Avg % Removal Rate	#DIV/0!	84	81	96	43	#DIV/0!	79	77	59	#DIV/0!	87	#DIV/0!	#DIV/0!
EPA % REM	67.000	86.000	61.000	90.000	42.000	50.000	75.000	79.000	82.000	69.000	45.000	50.000	50.000
* Use EPA default #s	*					*				*		*	*
Geometric Mean*		0.0044	0.0003	0.0000	0.0027		0.0003	0.0331	0.0081		0.0012		

*Geometric Mean: The range in the geometric mean cannot contain a "zero" value; if less than 30 values are entered in each column, the user must either enter one-half the detection level or change the range of the geometric mean. The range of the geometric mean can be changed by specifying which rows have data.

Treatment Facility: City of Bentonville

Data Range: 2016 - 2020

Domestic (mg/l) No data entered if Non-detects < MQL

DOMESTIC SAMPLING													
Date	Cadmium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Chromium	Cyanide	Arsenic	Molybdenum	Beryllium
3/28-29/16	0.000318	0.00790	0.00639		0.0070			0.60	0.002		0.0005	0.0003	
9/6-7/16		0.01950	0.00375		0.0043			0.14					
5/23-24/18		0.00971						0.07					
7/30-31/18								0.21					
8/7-8/18		0.03940						0.46					
10/23-24/18		0.02800	0.00059		0.0035			0.18			0.0074		
9/18-19/19	0.000520	0.05400	0.00080		0.0097			0.66			0.5400		
10/8-9/19		0.03700	0.00057		0.0058		0.0015	0.28			0.0350		
7/27-28/20		0.02710						0.16					
8/10-11/20	0.002000	0.14800				0.0109		1.45					
Quantitation Level (QL):	0.0005	0.0005	0.0005	0.000001	0.0005	0.0050	0.0005	0.0200	0.0100	0.0100	0.0005	0.0100	0.0005
Average	0.000946	0.04118	0.00242		0.0061	0.0109		0.42	0.002		0.1457	0.0003	
Maximum	0.002	0.148	0.0008		0.0097	0.0109		1.45	0.002		0.5400	0.0003	
All Concs > QL (Yes/No)	No	No	No	No	No	No	No	Yes	No	No	No	No	No
	0.00025	0.00025	0.00025	0.00000025	0.00025	0.0025	0.00025	0.01	0.005	0.005	0.00025	0.005	0.00025

Pollutant	EPA pg V-1 mg/l	Avg Reported mg/l	Loadings lbs/day	Note
Cadmium	0.0030	0.00094600	0.024834511	2016 - 2020 City Data
Copper	0.0607	0.04117889	1.081033358	2016 - 2020 City Data
Lead	0.0490	0.00242000	0.063530144	2016 - 2020 City Data
Mercury	0.0003	0.00000025	0.000006563	used 1/2 the MQL of 0.000001 mg/l
Nickel	0.0210	0.00605000	0.158825359	2016 - 2020 City Data
Selenium	~	0.01090000	0.286148168	2016 - 2020 City Data
Silver	0.0050	0.00025000	0.006563031	used 1/2 the MQL of 0.000001 mg/l
Zinc	0.1750	0.42076000	11.04584432	2016 - 2020 City Data
Chromium	0.0050	0.00200000	0.052504251	2016 - 2020 City Data
Cyanide	0.0410	0.01000000	0.262521255	used min. EPA guidance value
Arsenic	0.0030	0.14573475	3.825846944	2016 - 2020 City Data
Molybdenum	~	0.00026900	0.007061822	2016 - 2020 City Data
Beryllium	~	0.00025000	0.006563031	used 1/2 the MQL of 0.0005 mg/l

MQL Data													
Year	Cadmium ug/l	Copper ug/l	Lead ug/l	Mercury ug/l	Nickel ug/l	Selenium ug/l	Silver ug/l	Zinc ug/l	Chromium ug/l	Cyanide ug/l	Arsenic ug/l	Molybdenum ug/l	Beryllium ug/l
2016	0.5	0.5	0.5	0.002	0.5	5	0.5	20	10	10	0.5		0.5
2017	0.5	0.5	0.5	0.002	0.5	5	0.5	20	10	10	0.5		0.5
2018	0.5	0.5	0.5	0.002	0.5	5	0.5	20	10	10	0.5	0.5	0.5
2019	0.5	0.5	0.5	0.0005	0.5	5	0.5	20	10	10	0.5	10	0.5
2020	0.5	0.5	0.5	0.0005	0.5	5	0.5	20	10	10	0.5	10	0.5
MQL Data Convertered to mg/l													
Year	Cadmium mg/l	Copper mg/l	Lead mg/l	Mercury mg/l	Nickel mg/l	Selenium mg/l	Silver mg/l	Zinc mg/l	Chromium mg/l	Cyanide mg/l	Arsenic mg/l	Molybdenum mg/l	Beryllium mg/l
2016	0.0005	0.0005	0.0005	0.000002	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005		0.0005
2017	0.0005	0.0005	0.0005	0.000002	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005		0.0005
2018	0.0005	0.0005	0.0005	0.000002	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005	0.0005	0.0005
2019	0.0005	0.0005	0.0005	0.000001	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005	0.01	0.0005
2020	0.0005	0.0005	0.0005	0.000001	0.0005	0.005	0.0005	0.02	0.01	0.01	0.0005	0.01	0.0005

Used current year MQL Data converted to mg/l for data needs.

POTW FLOW DATA

Mth/Year	INF Flow MG/Mth	INF Flow Avg MG/Day	Mth/Year	INF Flow MG/Mth	INF Flow Avg MG/Day
Nov-15	90.2	3.01	Jul-19	75.4	2.51
Dec-15	151.4	5.05	Aug-19	107.2	3.57
Jan-16	105.4	3.51	Sep-19	82.7	2.76
Feb-16	67.5	2.25	Oct-19	166.7	5.56
Mar-16	95.3	3.18	Nov-19	116.4	3.88
Apr-16	77.3	2.58	Dec-19	87.5	2.92
May-16	86.4	2.88	Jan-20	123.8	4.13
Jun-16	87.2	2.91	Feb-20	99.0	3.30
Jul-16	101.9	3.40	Mar-20	129.2	4.31
Aug-16	73.7	2.46	Apr-20	106.2	3.54
Sep-16	80.6	2.69	May-20	132.3	4.41
Oct-16	75.7	2.52	Jun-20	67.7	2.26
Nov-16	63.4	2.11	Jul-20	74.3	2.48
Dec-16	67.1	2.24	Aug-20	69.3	2.31
Jan-17	87.7	2.92	Sep-20	59.9	2.00
Feb-17	110.9	3.70	Oct-20	85.6	2.85
Mar-17	96.7	3.22	<i>Avg Mthly Q (MGD)</i>		3.17
Apr-17	137.4	4.58			
May-17	141.8	4.73			
Jun-17	83.4	2.78			
Jul-17	89.3	2.98			
Aug-17	95.4	3.18			
Sep-17	64.6	2.15			
Oct-17	78.5	2.62			
Nov-17	68.1	2.27			
Dec-17	77.0	2.57			
Jan-18	78.7	2.62			
Feb-18	110.9	3.70			
Mar-18	116.7	3.89			
Apr-18	102.2	3.41			
May-18	104.2	3.47			
Jun-18	69.1	2.30			
Jul-18	76.9	2.56			
Aug-18	78.8	2.63			
Sep-18	71.9	2.40			
Oct-18	74.6	2.49			
Nov-18	76.1	2.54			
Dec-18	90.8	3.03			
Jan-19	137.1	4.57			
Feb-19	96.1	3.20			
Mar-19	104.1	3.47			
Apr-19	105.3	3.51			
May-19	148.4	4.95			
Jun-19	123.9	4.13			

SIU FLOW DATA

Mth/Year	Avg SIU Flow (MGD)	Mth/Year	Avg SIU Flow (MGD)	
Nov-15	0.01	Jul-19	0.02	
Dec-15	0.01	Aug-19	0.01	
Jan-16	0.005	Sep-19	0.04	
Feb-16	0.003	Oct-19	0.005	
Mar-16	0.01	Nov-19	0.01	
Apr-16	0.29	Dec-19	0.01	
May-16	0.01	Jan-20	0.01	
Jun-16	0.01	Feb-20	0.02	
Jul-16	0.23	Mar-20	0.02	
Aug-16	0.02	Apr-20	0.01	
Sep-16	0.01	May-20	0.01	
Oct-16	0.06	Jun-20	0.01	
Nov-16	0.01	Jul-20	0.03	
Dec-16	0.01	Aug-20	0.01	
Jan-17	0.01	Sep-20	0.01	
Feb-17	0.01	Oct-20		
Mar-17	0.004	<i>Avg Mthly Q (MGD)</i>		0.02
Apr-17	0.01			
May-17	0.01			
Jun-17	0.02			
Jul-17	0.01			
Aug-17	0.01			
Sep-17	0.01			
Oct-17	0.01			
Nov-17				
Dec-17	0.01			
Jan-18	0.004			
Feb-18	0.01			
Mar-18	0.01			
Apr-18				
May-18				
Jun-18				
Jul-18	0.01			
Aug-18	0.01			
Sep-18	0.005			
Oct-18				
Nov-18				
Dec-18	0.01			
Jan-19				
Feb-19	0.01			
Mar-19	0.01			
Apr-19	0.01			
May-19	0.005			
Jun-19	0.01			