

TEXTOX MENU #4 - LAKE OR RESERVOIR

The water quality-based effluent limitations demonstrated below are calculated using:

Table 1, 2000 Texas Surface Water Quality Standards (30 TAC 307) for Freshwater Aquatic Life

Table 3, 2000 Texas Surface Water Quality Standards for Human Health

"Procedures to Implement the Texas Surface Water Quality Standards," Texas Commission on Environmental Quality, January 2003.

PERMITTEE INFORMATION:

Permittee Name: CIMAREX ENERGY

NPDES Permit No: TX0134054

Outfall No: 001

Prepared by: Maria Okpala

Date: 3/20/2018

DISCHARGE INFORMATION:

Receiving Upper Pecos River

Segment No.: 2311

TSS (mg/L): 6

pH (Standard Units): 7.6

Hardness (mg/L as CaCO₃): 1973

Chloride (mg/L): 1954

Effluent Flow for Aquatic Life (MGD): 0.002

Percent Effluent for Mixing Zone: 59.5

Percent Effluent for Zone of Initial Dilution: 100

Effluent Flow for Human Health (MGD): 0.002

Percent Effluent for Human Health: 29.8

Public Water Supply Use?: N

CALCULATE TOTAL/DISSOLVED RATIO:

			Partition Coefficient (Kp)	Dissolved Fraction (Cd/Ct)		Water Effects Ratio (WER)	
Lake Metal	Intercept (b)	Slope (m)					
Aluminum	N/A	N/A	N/A	1.00	Assumed	1.00	Assumed
Arsenic	5.68	-0.73	129404.56	0.56		1.00	Assumed
Cadmium	6.55	-0.92	682497.16	0.20		1.00	Assumed
Chromium (Total)	6.34	-0.27	1348650	0.11		1.00	Assumed
Chromium (+3)	6.34	-0.27	1348650	0.11		1.00	Assumed
Chromium (+6)	N/A	N/A	N/A	1.00	Assumed	1.00	Assumed

Copper	6.45	-0.9	561906.27	0.23		1.00	Assumed
Lead	6.31	-0.53	789914.05	0.17		1.00	Assumed
Mercury	N/A	N/A	N/A	1.00	Assumed	1.00	Assumed
Nickel	6.34	-0.76	560537.99	0.23		1.00	Assumed
Selenium	N/A	N/A	N/A	1.00	Assumed	1.00	Assumed
Silver	6.38	-1.03	378882.21	0.31		1.00	Assumed
Zinc	6.52	-0.68	979167.86	0.15		1.00	Assumed

AQUATIC LIFE

CALCULATE DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS

Parameter	Acute Standard (perennial) (ug/L)	Chronic Standard (ug/L)	WLAa	WLAc	LTAA	LTAc	Daily Avg. (ug/L)	Daily Max. (ug/L)
Aldrin	3.000	N/A	3.00	N/A	0.96	N/A	1.41	2.99
Aluminum	991.000	N/A	991.00	N/A	317.12	N/A	466.17	986.24
Arsenic	360.000	190.000	639.51	567.26	204.64	346.03	300.83	636.44
Cadmium	947.394	10.720	4826.96	91.80	1544.63	56.00	82.32	174.15
Carbaryl	2.000	N/A	2.00	N/A	0.64	N/A	0.94	1.99
Chlordane	2.400	0.004	2.40	0.01	0.77	0.00	0.01	0.01
Chlorpyrifos	0.083	0.041	0.08	0.07	0.03	0.04	0.04	0.08
Chromium (+3)	6310.652	2047.110	57375.80	31280.87	18360.26	19081.33	26989.58	57100.40
Chromium (+6)	15.700	10.600	15.70	17.82	5.02	10.87	7.39	15.62
Copper	305.987	157.045	1337.60	1153.81	428.03	703.82	629.21	1331.18
Cyanide	45.780	10.690	45.78	17.97	14.65	10.96	16.11	34.08
4,4'-DDT	1.100	0.001	1.10	0.00	0.35	0.00	0.00	0.00
Dementon	N/A	0.100	N/A	0.17	N/A	0.10	0.15	0.32
Dicofol	59.300	19.800	59.30	33.28	18.98	20.30	27.89	59.02
Dieldrin	2.500	0.002	2.50	0.00	0.80	0.00	0.00	0.01
Diuron	210.000	70.000	210.00	117.65	67.20	71.76	98.78	208.99
Endosulfan I (alpha)	0.220	0.056	0.22	0.09	0.07	0.06	0.08	0.18
Endosulfan II (beta)	0.220	0.056	0.22	0.09	0.07	0.06	0.08	0.18
Endosulfan sulfate	0.220	0.056	0.22	0.09	0.07	0.06	0.08	0.18
Endrin	0.180	0.002	0.18	0.00	0.06	0.00	0.00	0.01
Guthion	N/A	0.010	N/A	0.02	N/A	0.01	0.02	0.03
Heptachlor	0.520	0.004	0.52	0.01	0.17	0.00	0.01	0.01
Hexachlorocyclohexane (Lindane)	2.000	0.080	2.00	0.08	0.64	0.05	0.07	0.15
Lead	3232.426	112.219	18552.46	1082.49	5936.79	660.32	970.67	2053.58
Malathion	N/A	0.010	N/A	0.02	N/A	0.01	0.02	0.03
Mercury	2.400	1.300	2.40	2.18	0.77	1.33	1.13	2.39
Methoxychlor	N/A	0.030	N/A	0.05	N/A	0.03	0.05	0.10

Mirex	N/A	0.001	N/A	0.00	N/A	0.00	0.00	0.00
Nickel	17642.441	1959.335	76977.99	14368.11	24632.96	8764.54	12883.88	27257.73
Parathion (ethyl)	0.065	0.013	0.07	0.02	0.02	0.01	0.02	0.04
Pentachlorophenol	16.577	10.465	16.58	17.59	5.30	10.73	7.80	16.50
Phenanthrene	30.000	30.000	30.00	50.42	9.60	30.76	14.11	29.86
Polychlorinated Biphenyls (PCBs)	2.000	0.014	2.00	0.02	0.64	0.01	0.02	0.04
Selenium	20.000	5.000	20.00	8.40	6.40	5.13	7.54	15.94
Silver, (free ion)	0.800	N/A	29.16	N/A	9.33	N/A	13.72	29.02
Toxaphene	0.780	0.000	0.78	0.00	0.25	0.00	0.00	0.00
Tributyltin (TBT)	0.130	0.024	0.13	0.04	0.04	0.02	0.04	0.08
2,4,5 Trichlorophenol	136.000	64.000	136.00	107.56	43.52	65.61	63.97	135.35
Zinc	1432.079	1307.705	9845.55	15110.06	3150.58	9217.13	4631.35	9798.30

HUMAN HEALTH

CALCULATE DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS

Parameter	Water and FW Fish		FW Fish		Daily Avg. (ug/L)	Daily Max. (ug/L)
	(ug/L)	Only (ug/L)	WLAh	LTAh		
Acrylonitrile	1.280	10.900	36.58	34.02	50.00	105.79
Aldrin	0.004	0.004	0.01	0.01	0.02	0.04
Arsenic	50.000	N/A	N/A	N/A	N/A	N/A
Barium	2000.000	N/A	N/A	N/A	N/A	N/A
Benzene	5.000	106.000	355.70	330.81	486.28	1028.80
Benzidine	0.001	0.003	0.01	0.01	0.02	0.03
Benzo(a)anthracene	0.099	0.810	2.72	2.53	3.72	7.86
Benzo(a)pyrene	0.099	0.810	2.72	2.53	3.72	7.86
Bis(chloromethyl)ether	0.005	0.019	0.06	0.06	0.09	0.19
Cadmium	5.000	N/A	N/A	N/A	N/A	N/A
Carbon Tetrachloride	3.760	8.400	28.19	26.21	38.54	81.53
Chlordane	0.021	0.021	0.07	0.07	0.10	0.21
Chlorobenzene	776.000	1380.000	4630.87	4306.71	6330.87	13393.87
Chloroform	100.000	1292.000	4335.57	4032.08	5927.16	12539.77
Chromiumd	100.000	3320.000	101292.29	94201.83	138476.69	292968
Chrysene	0.417	8.100	27.18	25.28	37.16	78.62
Cresols	3313.000	13116.000	44013.42	40932.48	60170.75	127300.02
Cyanide	200.000	N/A	N/A	N/A	N/A	N/A
4,4'-DDD	0.010	0.010	0.03	0.03	0.05	0.10
4,4'-DDE	0.007	0.007	0.02	0.02	0.03	0.07
4,4'-DDT	0.007	0.007	0.02	0.02	0.03	0.07
2,4'-D	70.000	N/A	N/A	N/A	N/A	N/A
Danitol	0.709	0.721	2.42	2.25	3.31	7.00
Dibromochloromethane	9.200	71.600	240.27	223.45	328.47	694.93

1,2-Dibromoethane	0.014	0.335	1.12	1.05	1.54	3.25
1,3-Dichloropropene (1,3- Dichloropropylene)	22.800	161.000	540.27	502.45	738.60	1562.62
Dieldrin	0.002	0.002	0.01	0.01	0.01	0.02
p-Dichlorobenzene	75.000	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane	5.000	73.900	247.99	230.63	339.02	717.25
1,1-Dichloroethylene	1.630	5.840	19.60	18.23	26.79	56.68
Dicofol	0.215	0.217	0.73	0.68	1.00	2.11
Dioxins/Furans (TCDD Equivalents)	1.34E-07	1.40E-07	4.70E-07	4.37E-07	6.42E-07	1.36E-06
Endrin	1.270	1.340	4.50	4.18	6.15	13.01
Fluoride	4000.000	N/A	N/A	N/A	N/A	N/A
Heptachlor	0.003	0.003	0.01	0.01	0.01	0.03
Heptachlor Epoxide	0.159	1.100	3.69	3.43	5.05	10.68
Hexachlorobenzene	0.019	0.020	0.07	0.06	0.09	0.19
Hexachlorobutadiene	2.990	3.600	12.08	11.23	16.52	34.94
Hexachlorocyclohexane (alpha)	0.163	0.413	1.39	1.29	1.89	4.01
Hexachlorocyclohexane (beta)	0.570	1.450	4.87	4.53	6.65	14.07
Hexachlorocyclohexane (gamma) (Lindane)	0.200	2.000	6.71	6.24	9.18	19.41
Hexachloroethane	84.200	278.000	932.89	867.58	1275.35	2698.19
Hexachlorophene	0.053	0.053	0.18	0.17	0.24	0.51
Lead	4.980	25.300	487.28	453.17	666.16	1409.36
Mercury	0.012	0.012	0.04	0.04	0.06	0.12
Methoxychlor	2.210	2.220	7.45	6.93	10.18	21.55
Methyl Ethyl Ketone	5.29E+04	9.94E+06	3.34E+07	3.10E+07	4.56E+07	9.65E+07
Nitrate-Nitrogen (as Total Nitrogen)	10000.000	N/A	N/A	N/A	N/A	N/A
Nitrobenzene	37.300	233.000	781.88	727.15	1068.91	2261.43
N-Nitrosodiethylamine	0.038	7.680	25.77	23.97	35.23	74.54
N-Nitroso-di-n-Butylamine	1.840	13.500	45.30	42.13	61.93	131.03
PCB's (Polychlorinated Biphenyls)	0.001	0.001	0.00	0.00	0.01	0.01
Pentachlorobenzene	6.100	6.680	22.42	20.85	30.65	64.83
Pentachlorophenol	1.000	135.000	453.02	421.31	619.32	1310.27
Pyridine	88.100	13333.000	44741.61	41609.70	61166.26	129406.16
Selenium	50.000	N/A	N/A	N/A	N/A	N/A
1,2,4,5-Tetrachlorobenzene	0.241	0.243	0.82	0.76	1.11	2.36
Tetrachloroethylene	5.000	323.000	1083.89	1008.02	1481.79	3134.94
Toxaphene	0.005	0.014	0.05	0.04	0.06	0.14
2,4,5-TP (Silvex)	47.000	50.300	168.79	156.98	230.76	488.20
2,4,5-Trichlorophenol	953.000	1069.000	3587.25	3336.14	4904.13	10375.40
Trichloroethylene	5.000	612.000	2053.69	1909.93	2807.60	5939.89
1,1,1-Trichloroethane	200.000	12586.000	42234.90	39278.46	57739.33	122156.00
TTHM (Sum of Total Trihalomethanes)	100.000	N/A	N/A	N/A	N/A	N/A
Vinyl Chloride	2.000	415.000	1392.62	1295.13	1903.85	4027.87

CALCULATE 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS

<i>Parameter</i>	<i>70%</i>	<i>85%</i>	
Aquatic Life			
Aldrin	0.988	1.200	
Aluminum	326.316	396.241	
Arsenic	210.579	255.703	27.39
Cadmium	57.621	69.968	
Carbaryl	0.659	0.800	
Chlordane	0.005	0.006	
Chlorpyrifos	0.027	0.033	
Chromium (+3)	18892.70	22941.14	
Chromium (+6)	5.170	6.277	
Copper	440.446	534.827	2.74
Cyanide	11.277	13.694	
4,4'-DDT	0.001	0.001	
Dementon	0.105	0.128	
Dicofol	19.526	23.711	
Dieldrin	0.002	0.002	
Diuron	69.149	83.966	
Endosulfan (alpha)	0.059	0.072	
Endosulfan (beta)	0.059	0.072	
Endosulfan sulfate	0.059	0.072	
Endrin	0.002	0.003	
Guthion	0.011	0.013	
Heptachlor	0.004	0.005	
Hexachlorocyclohexane (Lindane)	0.050	0.061	
Lead	679.466	825.065	5.32
Malathion	0.011	0.013	
Mercury	0.790	0.960	10.26
Methoxychlor	0.032	0.038	
Mirex	0.001	0.001	
Nickel	9018.717	10951.299	31.3
Parathion (ethyl)	0.014	0.017	
Pentachlorophenol	5.458	6.628	
Phenanthrene	9.878	11.995	
Polychlorinated Biphenyls (PCBs)	0.015	0.018	
Selenium	5.275	6.405	
Silver, (free ion)	9.601	11.659	
Toxaphene	0.000	0.000	
Tributyltin (TBT)	0.025	0.031	
2,4,5 Trichlorophenol	44.782	54.378	

Zinc	3241.944	3936.646	92.01
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Human Health

Acrylonitrile	35.003	42.504
Aldrin	0.014	0.017
Arsenic	N/A	N/A
Barium	N/A	N/A
Benzene	340.399	413.341
Benzidine	0.011	0.014
Benzo(a)anthracene	2.601	3.159
Benzo(a)pyrene	2.601	3.159
Bis(chloromethyl)ether	0.062	0.075
Cadmium	N/A	N/A
Carbon Tetrachloride	26.975	32.755
Chlordane	0.068	0.083
Chlorobenzene	4431.606	5381.236
Chloroform	4149.011	5038.085
Chromium	96933.68	117705.19
Chrysene	26.012	31.586
Cresols	42120	51145
Cyanide	N/A	N/A
4,4'-DDD	0.032	0.039
4,4'-DDE	0.022	0.027
4,4'-DDT	0.022	0.027
2,4'-D	N/A	N/A
Danitol	2.315	2.812
Dibromochloromethane	229.930	279.200
1,2-Dibromoethane	1.076	1.306
1,3-Dichloropropene (1,3- Dichloropropylene)	517.021	627.811
Dieldrin	0.006	0.008
p-Dichlorobenzene	N/A	N/A
1,2-Dichloroethane	237.316	288.169
1,1-Dichloroethylene	18.754	22.773
Dicofol	0.697	0.846
Dioxins/Furans (TCDD Equivalents)	4.50E-07	5.46E-07
Endrin	4.303	5.225
Fluoride	N/A	N/A
Heptachlor	0.009	0.010
Heptachlor Epoxide	3.532	4.289
Hexachlorobenzene	0.064	0.077
Hexachlorobutadiene	11.561	14.038
Hexachlorocyclohexane (alpha)	1.326	1.610

Hexachlorocyclohexane (beta)	4.656	5.654
Hexachlorocyclohexane (gamma) (Lindane)	6.423	7.799
Hexachloroethane	892.744	1084.046
Hexachlorophene	0.170	0.207
Lead	466.311	566.235
Mercury	0.039	0.048
Methoxychlor	7.129	8.657
Methyl Ethyl Ketone	3.19E+07	3.88E+07
Nitrate-Nitrogen (as Total Nitrogen)	N/A	N/A
Nitrobenzene	748.235	908.571
N-Nitrosodiethylamine	24.663	29.948
N-Nitroso-di-n-Butylamine	43.353	52.643
PCB's (Polychlorinated Biphenyls)	0.004	0.005
Pentachlorobenzene	21.452	26.048
Pentachlorophenol	433.527	526.425
Pyridine	42816	51991
Selenium	N/A	N/A
1,2,4,5-Tetrachlorobenzene	0.780	0.948
Tetrachloroethylene	1037.253	1259.521
Toxaphene	0.045	0.055
2,4,5-TP (Silvex)	161.529	196.142
2,4,5-Trichlorophenol	3432.889	4168.508
Trichloroethylene	1965.321	2386.461
1,1,1-Trichloroethane	40418	49078
TTHM (Sum of Total Trihalomethanes)	N/A	N/A
Vinyl Chloride	1332.693	1618.270