

TEXTOX MENU #5 - BAY OR WIDE TIDAL RIVER

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

Table 1, 2014 Texas Surface Water Quality Standards (30 TAC 307) for Saltwater Aquatic Life

Table 2, 2014 Texas Surface Water Quality Standards for Human Health

"Procedures to Implement the Texas Surface Water Quality Standards," TCEQ, June 2010

PERMIT INFORMATION

Permittee Name:	Freeport Mcmoran LNG
TPDES Permit No:	TX0127566
Outfall No:	006
Prepared by:	Maria Okpala
Date:	November 16, 2017

DISCHARGE INFORMATION

Receiving Waterbody:	Gulf of Mexico
Segment No:	2501
TSS (mg/L):	12
Effluent Flow for Aquatic Life (MGD)	0.000175
% Effluent for Chronic Aquatic Life (Mixing Zone):	8
% Effluent for Acute Aquatic Life (ZID):	30
Oyster Waters?	yes
Effluent Flow for Human Health (MGD):	0.000175
% Effluent for Human Health:	4

CALCULATE DISSOLVED FRACTION (AND ENTER WATER EFFECT RATIO IF APPLICABLE):

<i>Estuarine Metal</i>	<i>Intercept (b)</i>	<i>Slope (m)</i>	<i>Partition Coefficient (Kp)</i>	<i>Dissolved Fraction (Cd/Ct)</i>	<i>Water Effect Ratio (WER)</i>
Aluminum	N/A	N/A	N/A	1.00	Assumed 1.00
Arsenic	N/A	N/A	N/A	1.00	Assumed 1.00
Cadmium	N/A	N/A	N/A	1.00	Assumed 1.00
Chromium (Total)	N/A	N/A	N/A	1.00	Assumed 1.00
Chromium (+3)	N/A	N/A	N/A	1.00	Assumed 1.00
Chromium (+6)	N/A	N/A	N/A	1.00	Assumed 1.00
Copper	4.85	-0.72	11830.13	0.88	1.00
Lead	6.06	-0.85	138897.98	0.37	1.00
Mercury	N/A	N/A	N/A	1.00	Assumed 1.00
Nickel	N/A	N/A	N/A	1.00	Assumed 1.00
Selenium	N/A	N/A	N/A	1.00	Assumed 1.00
Silver	5.86	-0.74	115187.64	0.42	1.00
Zinc	5.36	-0.52	62925.37	0.57	1.00

AQUATIC LIFE

CALCULATE DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS:

<i>Parameter</i>	<i>SW Acute Criterion (ug/L)</i>	<i>SW Chronic Criterion (ug/L)</i>	<i>WLAa</i>	<i>WLAc</i>	<i>LTAa</i>	<i>LTAc</i>
Aldrin	1.3	N/A	4.33	N/A	1.39	N/A
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	149	78	496.67	975.00	158.93	594.75
Cadmium	40.0	8.75	133.33	109.38	42.67	66.72
Carbaryl	613	N/A	2043.33	N/A	653.87	N/A
Chlordane	0.09	0.004	0.30	0.05	0.10	0.03
Chlorpyrifos	0.011	0.006	0.04	0.08	0.01	0.05
Chromium (+3)	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (+6)	1,090	49.6	3633.33	620.00	1162.67	378.20
Copper	13.5	3.6	51.39	51.39	16.44	31.35
Copper (oyster waters)	N/A	N/A	N/A	N/A	N/A	N/A

Cyanide (free)	5.6	5.6	18.67	70.00	5.97	42.70
4,4'-DDT	0.13	0.001	0.43	0.01	0.14	0.01
Demeton	N/A	0.1	N/A	1.25	N/A	0.76
Diazinon	0.819	0.819	2.73	10.24	0.87	6.24
Dicofol	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin	0.71	0.002	2.37	0.03	0.76	0.02
Diuron	N/A	N/A	N/A	N/A	N/A	N/A
Endosulfan I (alpha)	0.034	0.009	0.11	0.11	0.04	0.07
Endosulfan II (beta)	0.034	0.009	0.11	0.11	0.04	0.07
Endosulfan sulfate	0.034	0.009	0.11	0.11	0.04	0.07
Endrin	0.037	0.002	0.12	0.03	0.04	0.02
Guthion	N/A	0.01	N/A	0.13	N/A	0.08
Heptachlor	0.053	0.004	0.18	0.05	0.06	0.03
Hexachlorocyclohexane (Lindane)	0.16	N/A	0.53	N/A	0.17	N/A
Lead	133	5.3	1182.27	176.67	378.33	107.77
Malathion	N/A	0.01	N/A	0.13	N/A	0.08
Mercury	2.1	1.1	7.00	13.75	2.24	8.39
Methoxychlor	N/A	0.03	N/A	0.38	N/A	0.23
Mirex	N/A	0.001	N/A	0.01	N/A	0.01
Nickel	118	13.1	393.33	163.75	125.87	99.89
Nonylphenol	7	1.7	23.33	21.25	7.47	12.96
Parathion (ethyl)	N/A	N/A	N/A	N/A	N/A	N/A
Pentachlorophenol	15.1	9.6	50.33	120.00	16.11	73.20
Phenanthrene	7.7	4.6	25.67	57.50	8.21	35.08
Polychlorinated Biphenyls (PCBs)	10	0.03	33.33	0.38	10.67	0.23
Selenium	564	136	1880.00	1700.00	601.60	1037.00
Silver	2	N/A	15.88	N/A	5.08	N/A
Toxaphene	0.21	0.0002	0.70	0.00	0.22	0.00
Tributyltin (TBT)	0.24	0.0074	0.80	0.09	0.26	0.06
2,4,5 Trichlorophenol	259	12	863.33	150.00	276.27	91.50
Zinc	92.7	84.2	542.33	1847.25	173.54	1126.82

HUMAN HEALTH

CALCULATE DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS:

<i>Parameter</i>	<i>Fish Only Criterion (ug/L)</i>	<i>WLAh</i>	<i>LTAh</i>	<i>Daily Avg. (ug/L)</i>	<i>Daily Max. (ug/L)</i>
Acrylonitrile	3.8	95.00	88.35	129.87	274.77
Aldrin	0.0010	0.03	0.02	0.03	0.07
Anthracene	N/A	N/A	N/A	N/A	N/A
Antimony	1,071	26775.00	24900.75	36604.10	77441.33
Arsenic	N/A	N/A	N/A	N/A	N/A
Barium	N/A	N/A	N/A	N/A	N/A
Benzene	513	12825.00	11927.25	17533.06	37093.75
Benzidine	0.0020	0.05	0.05	0.07	0.14
Benzo(a)anthracene	3.28	82.00	76.26	112.10	237.17
Benzo(a)pyrene	0.33	8.25	7.67	11.28	23.86
Bis(chloromethyl)ether	0.44	11.00	10.23	15.04	31.82
Bis(2-chloroethyl)ether	10.06	251.50	233.90	343.83	727.41
Bis(2-ethylhexyl)phthalate	41	1025.00	953.25	1401.28	2964.61
Bromodichloromethane (Dichlorobromomethane)	322	8050.00	7486.50	11005.16	23283.02
Bromoform	2,175	54375.00	50568.75	74336.06	157268.81
Cadmium	N/A	N/A	N/A	N/A	N/A
Carbon Tetrachloride	30.5	762.50	709.13	1042.41	2205.38
Chlordane	0.0081	0.20	0.19	0.28	0.59
Chlorobenzene	5,201	130025.00	120923.25	177757.18	376071.31
Chlorodibromomethane (Dibromochloromethane)	239	5975.00	5556.75	8168.42	17281.49
Chloroform	7,143	178575.00	166074.75	244129.88	516492.47
Chromium (+6)	502	12550.00	11671.50	17157.11	36298.37

Chrysene	327	8175.00	7602.75	11176.04	23644.55
Cresols (Methylphenols)	9,301	232525.00	216248.25	317884.93	672532.06
Cyanide (free)	N/A	N/A	N/A	N/A	N/A
4,4'-DDD	0.0059	0.15	0.14	0.20	0.43
4,4'-DDE	0.0040	0.10	0.09	0.14	0.29
4,4'-DDT	0.0040	0.10	0.09	0.14	0.29
2,4'-D	N/A	N/A	N/A	N/A	N/A
Danitol	473	11825.00	10997.25	16165.96	34201.45
1,2-Dibromoethane	4.24	106.00	98.58	144.91	306.58
m-Dichlorobenzene (1,3-Dichlorobenzene)	1,445	36125.00	33596.25	49386.49	104484.34
o-Dichlorobenzene (1,2-Dichlorobenzene)	4,336	108400.00	100812.00	148193.64	313525.32
p-Dichlorobenzene (1,4-Dichlorobenzene)	N/A	N/A	N/A	N/A	N/A
3,3'-Dichlorobenzidine	0.44	11.00	10.23	15.04	31.82
1,2-Dichloroethane	553	13825.00	12857.25	18900.16	39986.05
1,1-Dichloroethylene	23,916	597900.00	556047.00	817389.09	1729306.17
Dichloromethane (Methylene Chloride)	22,222	555550.00	516661.50	759492.41	1606817.27
1,2-Dichloropropane	226	5650.00	5254.50	7724.12	16341.50
1,3-Dichloropropene (1,3- Dichloropropylene)	211	5275.00	4905.75	7211.45	15256.88
Dicofol	0.30	7.50	6.98	10.25	21.69
Dieldrin	0.001	0.03	0.02	0.03	0.07
2,4-Dimethylphenol	571	14275.00	13275.75	19515.35	41287.58
Di-n-Butyl Phthalate	3,010	75250.00	69982.50	102874.28	217645.58
Dioxins/Furans (TCDD Equivalents)	7.97E-08	1.99E-06	1.85E-06	2.72E-06	5.76E-06
Endrin	0.20	5.00	4.65	6.84	14.46
Ethylbenzene	7,143	178575.00	166074.75	244129.88	516492.47
Fluoride	N/A	N/A	N/A	N/A	N/A
Heptachlor	0.0015	0.04	0.03	0.05	0.11
Heptachlor Epoxide	0.00075	0.02	0.02	0.03	0.05
Hexachlorobenzene	0.0045	0.11	0.10	0.15	0.33
Hexachlorobutadiene	274	6850.00	6370.50	9364.64	19812.26
Hexachlorocyclohexane (alpha)	0.093	2.33	2.16	3.18	6.72
Hexachlorocyclohexane (beta)	0.33	8.25	7.67	11.28	23.86
Hexachlorocyclohexane (gamma) (Lindane)	6.2	155.00	144.15	211.90	448.31
Hexachlorocyclopentadiene	N/A	N/A	N/A	N/A	N/A
Hexachloroethane	11.51	287.75	267.61	393.38	832.26
Hexachlorophene	2.90	72.50	67.43	99.11	209.69
Lead	3.83	255.34	237.47	349.08	738.53
Mercury	0.0250	0.63	0.58	0.85	1.81
Methoxychlor	1.61	40.25	37.43	55.03	116.42
Methyl Ethyl Ketone	992,000	24800000	23064000	33904080	71729040
Nickel	1,140	28500.00	26505.00	38962.35	82430.55
Nitrate-Nitrogen (as Total Nitrogen)	N/A	N/A	N/A	N/A	N/A
Nitrobenzene	1,853	46325.00	43082.25	63330.91	133985.80
N-Nitrosodiethylamine	2.1	52.50	48.83	71.77	151.85
N-Nitroso-di-n-Butylamine	4.2	105.00	97.65	143.55	303.69
Pentachlorobenzene	1.0	25.00	23.25	34.18	72.31
Pentachlorophenol	9.1	227.50	211.58	311.02	658.00
Polychlorinated Biphenyls (PCBs)	6.4E-04	0.02	0.01	0.02	0.05
Pyridine	947	23675.00	22017.75	32366.09	68475.20
Selenium	N/A	N/A	N/A	N/A	N/A
1,2,4,5-Tetrachlorobenzene	0.71	17.75	16.51	24.27	51.34
1,1,2,2-Tetrachloroethane	40	1000.00	930.00	1367.10	2892.30
Tetrachloroethylene	525	13125.00	12206.25	17943.19	37961.44
Thallium	0.23	5.75	5.35	7.86	16.63
Toluene	N/A	N/A	N/A	N/A	N/A
Toxaphene	0.0053	0.13	0.12	0.18	0.38
2,4,5-TP (Silvex)	21	525.00	488.25	717.73	1518.46
1,1,1-Trichloroethane	956,663	23,916,575	22,242,415	32,696,350	69,173,910
1,1,2-Trichloroethane	295	7375.00	6858.75	10082.36	21330.71

Trichloroethylene	82	2050.00	1906.50	2802.56	5929.22
2,4,5-Trichlorophenol	2,435	60875.00	56613.75	83222.21	176068.76
TTHM (Sum of Total Trihalomethanes)	N/A	N/A	N/A	N/A	N/A
Vinyl Chloride	24	600.00	558.00	820.26	1735.38

CALCULATE 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS:

Aquatic Life

Parameter	70%	85%
Aldrin	1.427	1.733
Aluminum	N/A	N/A
Arsenic	163.542	198.587
Cadmium	43.904	53.312
Carbaryl	672.829	817.006
Chlordane	0.031	0.038
Chlorpyrifos	0.012	0.015
Chromium (+3)	N/A	N/A
Chromium (+6)	389.168	472.561
Copper	16.921	20.547
Copper (oyster waters)	N/A	N/A
Cyanide (free)	6.147	7.464
4,4'-DDT	0.008	0.010
Demeton	0.785	0.953
Diazinon	0.899	1.092
Dicofol	N/A	N/A
Dieldrin	0.016	0.019
Diuron	N/A	N/A
Endosulfan (alpha)	0.037	0.045
Endosulfan (beta)	0.037	0.045
Endosulfan sulfate	0.037	0.045
Endrin	0.016	0.019
Guthion	0.078	0.095
Heptachlor	0.031	0.038
Hexachlorocyclohexane (Lindane)	0.176	0.213
Lead	110.896	134.660
Malathion	0.078	0.095
Mercury	2.305	2.799
Methoxychlor	0.235	0.286
Mirex	0.008	0.010
Nickel	102.784	124.809
Nonylphenol	7.683	9.330
Parathion (ethyl)	N/A	N/A
Pentachlorophenol	16.574	20.125
Phenanthrene	8.452	10.263
Polychlorinated Biphenyls (PCBs)	0.235	0.286
Selenium	619.046	751.699
Silver	5.230	6.350
Toxaphene	0.0016	0.0019
Tributyltin (TBT)	0.058	0.071
2,4,5 Trichlorophenol	94.154	114.329
Zinc	178.578	216.844

170

30

450

Human Health

Parameter	70%	85%
Acrylonitrile	90.912	110.393
Aldrin	0.024	0.029
Anthracene	N/A	N/A
Antimony	25622.872	31113.487
Arsenic	N/A	N/A

Barium	N/A	N/A
Benzene	12273.140	14903.099
Benzidine	0.048	0.058
Benzo(a)anthracene	78.472	95.287
Benzo(a)pyrene	7.895	9.587
Bis(chloromethyl)ether	10.527	12.782
Bis(2-chloroethyl)ether	240.678	292.252
Bis(2-ethylhexyl)phthalate	980.894	1191.086
Bromodichloromethane (Dichlorobromomethane)	7703.609	9354.382
Bromoform	52035.244	63185.653
Cadmium	N/A	N/A
Carbon Tetrachloride	729.690	886.052
Chlordane	0.194	0.235
Chlorobenzene	124430.024	151093.601
Chlorodibromomethane (Dibromochloromethane)	5717.896	6943.159
Chloroform	170890.918	207510.400
Chromium (+6)	12009.974	14583.539
Chrysene	7823.230	9499.636
Cresols (Methylphenols)	222519.449	270202.188
Cyanide (free)	N/A	N/A
4,4'-DDD	0.141	0.171
4,4'-DDE	0.096	0.116
4,4'-DDT	0.096	0.116
2,4'-D	N/A	N/A
Danitol	11316.170	13741.064
1,2-Dibromoethane	101.439	123.176
m-Dichlorobenzene (1,3-Dichlorobenzene)	34570.541	41978.514
o-Dichlorobenzene (1,2-Dichlorobenzene)	103735.548	125964.594
p-Dichlorobenzene (1,4-Dichlorobenzene)	N/A	N/A
3,3'-Dichlorobenzidine	10.527	12.782
1,2-Dichloroethane	13230.110	16065.134
1,1-Dichloroethylene	572172.363	694780.727
Dichloromethane (Methylene Chloride)	531644.684	645568.544
1,2-Dichloropropane	5406.881	6565.498
1,3-Dichloropropene (1,3- Dichloropropylene)	5048.017	6129.735
Dicofol	7.177	8.715
Dieldrin	0.024	0.029
2,4-Dimethylphenol	13660.747	16588.050
Di-n-Butyl Phthalate	72011.993	87443.134
Dioxins/Furans (TCDD Equivalents)	1.91E-06	2.32E-06
Endrin	4.785	5.810
Ethylbenzene	170890.918	207510.400
Fluoride	N/A	N/A
Heptachlor	0.036	0.044
Heptachlor Epoxide	0.018	0.022
Hexachlorobenzene	0.108	0.131
Hexachlorobutadiene	6555.245	7959.940
Hexachlorocyclohexane (alpha)	2.225	2.702
Hexachlorocyclohexane (beta)	7.895	9.587
Hexachlorocyclohexane (gamma) (Lindane)	148.330	180.115
Hexachlorocyclopentadiene	N/A	N/A
Hexachloroethane	275.368	334.376
Hexachlorophene	69.380	84.248
Lead	244.356	296.718
Mercury	0.598	0.726
Methoxychlor	38.518	46.772
Methyl Ethyl Ketone	23,732,856	28,818,468
Nickel	27273.645	33117.998
Nitrate-Nitrogen (as Total Nitrogen)	N/A	N/A

Nitrobenzene	44331.635	53831.271
N-Nitrosodiethylamine	50.241	61.007
N-Nitroso-di-n-Butylamine	100.482	122.014
Pentachlorobenzene	23.924	29.051
Pentachlorophenol	217.711	264.363
Polychlorinated Biphenyls (PCBs)	0.015	0.019
Pyridine	22656.265	27511.179
Selenium	N/A	N/A
1,2,4,5-Tetrachlorobenzene	16.986	20.626
1,1,2,2-Tetrachloroethane	956.970	1162.035
Tetrachloroethylene	12560.231	15251.709
Thallium	5.503	6.682
Toluene	N/A	N/A
Toxaphene	0.127	0.154
2,4,5-TP (Silvex)	502.409	610.068
1,1,1-Trichloroethane	22,887,445	27,791,897
1,1,2-Trichloroethane	7057.654	8570.008
Trichloroethylene	1961.789	2382.172
2,4,5-Trichlorophenol	58255.549	70738.881
TTHM (Sum of Total Trihalomethanes)	N/A	N/A
Vinyl Chloride	574.182	697.221

Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed
Assumed

<i>Daily Avg.</i>	<i>Daily Max.</i>
<i>(ug/L)</i>	<i>(ug/L)</i>
2.04	4.31
N/A	N/A
233.63	494.28
62.72	132.69
961.18	2033.53
0.04	0.09
0.02	0.04
N/A	N/A
555.95	1176.20
24.17	51.14
N/A	N/A

8.78	18.58
0.01	0.02
1.12	2.37
1.28	2.72
N/A	N/A
0.02	0.05
N/A	N/A
0.05	0.11
0.05	0.11
0.05	0.11
0.02	0.05
0.11	0.24
0.04	0.09
0.25	0.53
158.42	335.17
0.11	0.24
3.29	6.97
0.34	0.71
0.01	0.02
146.83	310.65
10.98	23.22
N/A	N/A
23.68	50.09
12.07	25.54
0.34	0.71
884.35	1870.98
7.47	15.81
0.00	0.00
0.08	0.18
134.51	284.57
255.11	539.72