ATTACHMENT A

Toxic Screening Spreadsheet

WQM Model 7.0 Output

PENTOXSD Output

TRC Spreadsheet

TOXICS SCREENING ANALYSIS
WATER QUALITY POLLUTANTS OF CONCERN
VERSION 2.1

Facility: Bethlehem WWTP
Analysis Hardness (mg/L): 90.3
NPDES Permit No.: PA0026042
Discharge Flow (MGD): 20
Outfall: 001
Analysis pH (SU): 8

	Parameter		Maximum Concentration in Application or DMRs (µg/L)	Most Stringent Criterion (µg/L)	Candidate for PENTOXSD Modeling?	Most Stringent WQBEL (µg/L)	Screening Recommendation
Group 1	Total Dissolved Solids		446000	500000	No		Monitor
	Chloride			250000			Monitor
	Bromide	<	0.2	N/A	No (Value < QL)		Monitor
	Sulfate			250000			Monitor
Group 2	Total Aluminum		40	750	No		
	Total Antimony	<	5	5.6	No		
	Total Arsenic		2	10	No		
	Total Barium		16	2400	No		
	Total Beryllium	<	5	N/A	No		
	Total Boron		200	1600	No		
	Total Cadmium	<	0.2	0.229	No (Value < QL)	0.728	
	Total Chromium		7	N/A	No		
	Hexavalent Chromium	<	0.25	10	No (Value < QL)	16.551	
	Total Cobalt	<	5	19	No		
	Total Copper		28	8.21	Yes	9.945	Establish Limits
	Free Available Cyanide	<	4	5.2	No		
	Total Cyanide		5	N/A	No		
	Dissolved Iron		220	300	No		
	Total Iron		140	1500	No		
	Total Lead	<	1	2.25	No (Value < QL)	5.447	
	Total Manganese		29	1000	No		
	Total Mercury	<	0.2	0.05	No (Value < QL)		
	Total Nickel		6.4	47.7	No		
	Total Phenols (Phenolics)		76	5	Yes		
	Total Selenium	<	2	4.6	No (Value < QL)		
	Total Silver		0.6	2.7	No		
	Total Thallium	<	1	0.24	No (Value < QL)		
	Total Zinc		75	107.5	No		
	Total Molybdenum	<	4	N/A	No (Value < QL)		
Group 3	Acrolein	<	2	3	No (Value < QL)	5.052	
	Acrylonitrile	<	2	0.051	No (Value < QL)	1.075	
	Benzene	<	5	1.2	Yes	25.293	No Limits/Monitoring
	Bromoform	<	5	4.3	Yes	90.834	No Limits/Monitoring
	Carbon Tetrachloride	<	0.5	0.23	No (Value < QL)	4.848	
	Chlorobenzene	<	5	130	No		
	Chlorodibromomethane	<	0.5	0.4	No (Value < QL)	8.431	
	Chloroethane	<	5	N/A	No		
	2-Chloroethyl Vinyl Ether	<	5	3500	No (Value < QL)		
	Chloroform	<	5	5.7	No		
	Dichlorobromomethane	<	0.5	0.55	No (Value < QL)	11.593	
	1,1-Dichloroethane	<	5	N/A	No		
	1,2-Dichloroethane	<	0.5	0.38	No (Value < QL)	8.009	
	1,1-Dichloroethylene	<	5	33	No		
	1,2-Dichloropropane	<	5	2200	No		
	1,3-Dichloropropylene	<	0.5	0.34	No (Value < QL)	7.166	
	1,4-Dioxane	<	8.31	N/A	No		
	Ethylbenzene	<	5	530	No		
	Methyl Bromide	<	5	47	No		
	Methyl Chloride	<	5	5500	No		
	Methylene Chloride	<	5	4.6	Yes	96.957	No Limits/Monitoring
	1,1,2,2-Tetrachloroethane	<	0.5	0.17	No (Value < QL)	3.583	
	Tetrachloroethylene	<	0.5	0.69	No (Value < QL)	14.544	
	Toluene	<	5	330	No		
	1,2-trans-Dichloroethylene	<	5	140	No		
	1,1,1-Trichloroethane	<	5	610	No		
	1,1,2-Trichloroethane	<	0.5	0.59	No (Value < QL)	3.583	
	Trichloroethylene	<	5	2.5	Yes	52.694	No Limits/Monitoring
	Vinyl Chloride	<	0.5	0.025	No (Value < QL)	0.527	
Group 4	2-Chlorophenol	<	10	81	No (Value < QL)		
	2,4-Dichlorophenol	<	10	77	No (Value < QL)		
	2,4-Dimethylphenol	<	10	130	No (Value < QL)		
	4,6-Dinitro-o-Cresol	<	10	13	No (Value < QL)	65.673	
	2,4-Dinitrophenol	<	50	69	No		
	2-Nitrophenol	<	10	1500	No (Value < QL)		
	4-Nitrophenol	<	50	470	No		
	p-Chloro-m-Cresol	<	20	30	No		
	Pentachlorophenol	<	10	0.27	No (Value < QL)	5.691	
	Phenol	<	10	10400	No (Value < QL)		

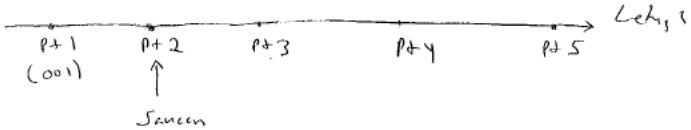
	2,4,6-Trichlorophenol	<	10	1.4	No (Value < QL)		
Group 5	Acenaphthene	<	10	17	No		
	Acenaphthylene	<	10	N/A	No		
	Anthracene	<	10	8300	No		
	Benzidine	<	50	0.000085	No (Value < QL)		
	Benzo(a)Anthracene	<	2.5	0.0038	No (Value < QL)	0.08	
	Benzo(a)Pyrene	<	2.5	0.0038	No (Value < QL)	0.08	
	3,4-Benzofluoranthene	<	2.5	0.0038	No (Value < QL)	0.08	
	Benzo(ghi)Perylene	<	10	N/A	No		
	Benzo(k)Fluoranthene	<	2.5	0.0038	No (Value < QL)	0.08	
	Bis(2-Chloroethoxy)Methane	<	10	N/A	No		
	Bis(2-Chloroethyl)Ether	<	5	0.03	No (Value < QL)	0.632	
	Bis(2-Chloroisopropyl)Ether	<	10	1400	No		
	Bis(2-Ethylhexyl)Phthalate	<	5	1.2	No (Value < QL)	25.293	
	4-Bromophenyl Phenyl Ether	<	10	54	No		
	Butyl Benzyl Phthalate	<	10	35	No		
	2-Chloronaphthalene	<	10	1000	No		
	4-Chlorophenyl Phenyl Ether	<	10	N/A	No		
	Chrysene	<	2.5	0.0038	No (Value < QL)	0.08	
	Dibenzo(a,h)Anthracene	<	2.5	0.0038	No (Value < QL)	0.08	
	1,2-Dichlorobenzene	<	10	160	No		
	1,3-Dichlorobenzene	<	10	69	No		
	1,4-Dichlorobenzene	<	10	150	No		
	3,3-Dichlorobenzidine	<	5	0.021	No (Value < QL)	0.443	
	Diethyl Phthalate	<	20	600	No		
	Dimethyl Phthalate	<	20	500	No		
	Di-n-Butyl Phthalate	<	20	21	No		
	2,4-Dinitrotoluene	<	10	0.05	Yes	1618.556	No Limits/Monitoring
	2,6-Dinitrotoluene	<	10	0.05	Yes	1005.846	No Limits/Monitoring
	Di-n-Octyl Phthalate	<	20	N/A	No		
	1,2-Diphenylhydrazine	<	10	0.036	No (Value < QL)		
	Fluoranthene	<	10	40	No		
	Fluorene	<	10	1100	No		
	Hexachlorobenzene	<	5	0.00028	No (Value < QL)	0.096	
	Hexachlorobutadiene	<	0.5	0.44	No (Value < QL)	9.274	
	Hexachlorocyclopentadiene	<	5	1	No (Value < QL)	5.052	
	Hexachloroethane	<	5	1.4	No (Value < QL)	29.509	
	Indeno(1,2,3-cd)Pyrene	<	2.5	0.0038	No (Value < QL)	0.08	
	Isophorone	<	10	35	No		
	Naphthalene	<	10	43	No		
	Nitrobenzene	<	10	17	No		
	n-Nitrosodimethylamine	<	5	0.00069	No (Value < QL)	0.015	
	n-Nitrosodi-n-Propylamine	<	5	0.005	No (Value < QL)	0.105	
	n-Nitrosodiphenylamine	<	5	3.3	No (Value < QL)	69.556	
	Phenanthrene	<	2.5	1	No (Value < QL)	5.052	
	Pyrene	<	10	830	No		
	1,2,4-Trichlorobenzene	<	10	26	No		
Group 6	Aldrin	<	0.02	0.000049	No (Value < QL)	0.001	
	alpha-BHC	<	0.02	0.0026	No (Value < QL)	0.055	
	beta-BHC	<	0.02	0.0091	No (Value < QL)	0.192	
	gamma-BHC	<	0.02	0.098	No (Value < QL)	0.495	
	delta BHC	<	0.5	N/A	No		
	Chlordane	<	1	0.0008	No (Value < QL)		
	4,4-DDT	<	0.02	0.00022	No (Value < QL)	0.005	
	4,4-DDE	<	0.02	0.00022	No (Value < QL)	0.005	
	4,4-DDD	<	0.02	0.00031	No (Value < QL)	0.005	
	Dieldrin	<	0.02	0.000052	No (Value < QL)	0.001	
	alpha-Endosulfan	<	0.02	0.056	No (Value < QL)	0.223	
	beta-Endosulfan	<	0.02	0.056	No (Value < QL)	0.223	
	Endosulfan Sulfate	<	0.5	N/A	No		
	Endrin	<	0.02	0.036	No (Value < QL)	0.087	
	Endrin Aldehyde	<	0.02	0.29	No (Value < QL)	1.465	
	Heptachlor	<	0.02	0.000079	No (Value < QL)	0.002	
	Heptachlor Epoxide	<	0.02	0.000039	No (Value < QL)	0.000822	
	Toxaphene	<	0.02	0.0002	No (Value < QL)	0.001	
	2,3,7,8-TCDD	<	0.000002	0.000000005	No (Value < QL)		
Group 7	Gross Alpha (pCi/L)		3.23	N/A	No		
	Total Beta (pCi/L)		26.68	N/A	No		
	Radium 226/228 (pCi/L)		4.57	N/A	No		
	Total Strontium		100	4000	No		
	Total Uranium	<	2	N/A	No (Value < QL)		

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
02C	3335	LEHIGH RIVER

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
9.540	COB	PA0026042	20.000	CBOD5	25		
				NH3-N	5	10	
				Dissolved Oxygen			3

Ammonia-N discharge
WWF (5.0 min)
pH 8
25°C



PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
02C	3335	LEHIGH RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
9.54	Beth WWTP	PA0026042	20.0000

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
1,1,2,2-TETRACHLOROETHANE	3.583	CRL	5.59	3.583	CRL
1,1,2-TRICHLOROETHANE	5	INPUT	7.801	12.436	CRL
1,1-DICHLOROETHYLENE	5	INPUT	7.801	166.707	THH
1,2-DICHLOROETHANE	5	INPUT	7.801	8.009	CRL
1,3-DICHLOROPROPYLENE	5	INPUT	7.801	7.166	CRL
2,3,7,8-TCDD	0	CRL	0	0	CRL
2,4-DINITROTOLUENE	10	INPUT	15.602	1616.556	CFC
2,6-DINITROTOLUENE	10	INPUT	15.602	1005.646	AFC
3,3'-DICHLORO-BENZIDINE	0.443	CRL	0.691	0.443	CRL
3,4-BENZOFLUORANTHENE	0.08	CRL	0.125	0.08	CRL
4,4'-DDD	0.005	CFC	0.008	0.005	CFC
4,4'-DDE	0.005	CRL	0.007	0.005	CRL
4,4'-DDT	0.005	CRL	0.007	0.005	CRL
4,6-DINITRO-o-CRESOL	50	INPUT	78.008	65.673	THH
ACROLEIN	5.052	CFC	7.882	5.052	CFC
ACRYLONITRILE	1.075	CRL	1.677	1.075	CRL
ALDRIN	0.001	CRL	0.002	0.001	CRL
alpha-BHC	0.055	CRL	0.085	0.055	CRL
alpha-ENDOSULFAN	0.223	AFC	0.349	0.223	AFC
BENZENE	5	INPUT	7.801	25.293	CRL
BENZO(a)ANTHRACENE	0.08	CRL	0.125	0.08	CRL
BENZO(a)PYRENE	0.08	CRL	0.125	0.08	CRL
BENZO(k)-FLUORANTHENE	0.08	CRL	0.125	0.08	CRL
beta-BHC	0.192	CRL	0.299	0.192	CRL
beta-ENDOSULFAN	0.223	AFC	0.349	0.223	AFC
BIS(2-CHLOROETHYL) ETHER	0.632	CRL	0.987	0.632	CRL
BIS(2-ETHYLHEXYL) PHTHALATE	10	INPUT	15.602	25.293	CRL
BROMOFORM	5	INPUT	7.801	90.834	CRL
CADMIUM	0.5	INPUT	0.78	0.728	CFC
CARBON TETRACHLORIDE	4.848	CRL	7.563	4.848	CRL
CHLORODIBROMOMETHANE	5	INPUT	7.801	8.431	CRL
CHROMIUM, VI	10	INPUT	15.602	16.551	AFC
CHRYSENE	0.08	CRL	0.125	0.08	CRL
COBALT	5	INPUT	7.801	95.983	CFC
COPPER	9.945	AFC	15.516	9.945	AFC
DIBENZO(a,h) ANTHRACENE	0.08	CRL	0.125	0.08	CRL
DICHLOROBROMOMETHANE	5	INPUT	7.801	11.593	CRL
DIELDRIN	0.001	CRL	0.002	0.001	CRL

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
02C	3335	LEHIGH RIVER

DINITROTOLUENE, TOTAL	1.054	CRL	1.644	1.054	CRL
ENDOSULFAN, TOTAL	1	INPUT	1.56	313.208	THH
ENDRIN	0.087	AFC	0.136	0.087	AFC
ENDRIN ALDEHYDE	0.5	INPUT	0.78	1.465	THH
gamma-BHC (LINDANE)	0.495	THH	0.772	0.495	THH
HEPTACHLOR	0.002	CRL	0.003	0.002	CRL
HEPTACHLOR EPOXIDE	0.000822	CRL	0.001	0.000822	CRL
HEXACHLOROBENZENE	0.006	CRL	0.009	0.006	CRL
HEXACHLOROBUTA-DIENE	9.274	CRL	14.469	9.274	CRL
HEXACHLOROCYCLO-PENTADIE	5.052	CFC	7.882	5.052	CFC
HEXACHLOROETHANE	10	INPUT	15.602	29.509	CRL
INDENO(1,2,3-cd)PYRENE	0.08	CRL	0.125	0.08	CRL
LEAD	5.447	CFC	8.497	5.447	CFC
METHYLENE CHLORIDE	5	INPUT	7.801	96.957	CRL
N-NITROSODI-METHYLAMINE	0.015	CRL	0.023	0.015	CRL
N-NITROSODI-N-PROPYLAMINE	0.105	CRL	0.164	0.105	CRL
N-NITROSODI-PHENYLAMINE	20	INPUT	31.203	69.556	CRL
PENTACHLOROPHENOL	5.691	CRL	8.879	5.691	CRL
PHENANTHRENE	5.052	CFC	7.882	5.052	CFC
PHENOLICS (PWS)	76	INPUT	118.572	NA	NA
PYRENE	10	INPUT	15.602	4192.941	THH
TETRACHLOROETHYLENE	5	INPUT	7.801	14.544	CRL
TOXAPHENE	0.001	CFC	0.002	0.001	CFC
TRICHLOROETHYLENE	5	INPUT	7.801	52.694	CRL
VINYL CHLORIDE	0.527	CRL	0.822	0.527	CRL
ZINC	75	INPUT	117.012	88.24	AFC

1A	B	C	D	E	F	G
2	**TRC EVALUATION**					
3	Input appropriate values in B4:B8 and E4:E7			Bethlehem WWTP		
4	370.944	= Q stream (cfs)		0.5	= CV Daily	
5	20	= Q discharge (MGD)		0.5	= CV Hourly	
6	30	= no. samples		1	= AFC_Partial Mix Factor	
7	0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
8	0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
9	0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
	0	= % Factor of Safety (FOS)			=Decay Coefficient (K)	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	1.3.2.iii	WLA afc = 3.844		1.3.2.iii	WLA cfc = 3.740
12	PENTOXSD TRG	5.1a	LTAMULT afc = 0.373		5.1c	LTAMULT cfc = 0.581
13	PENTOXSD TRG	5.1b	LTA_afc= 1.432		5.1d	LTA_cfc = 2.174
14						
15	Source		Effluent Limit Calculations			
16	PENTOXSD TRG	5.1f	AML MULT = 1.231			
17	PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500		BAT/BPJ	
18			INST MAX LIMIT (mg/l) = 1.635			

WLA afc	(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...
	...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...
	...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)