Appendix 7-A

GLOBAL AND VARIABLE RATES

QUAL2E Modeling Global Rates Table

GLOBAL PARAMETER	Symbol	Units - Cust US	VALUE Default	VALUE User	VALUE Rate Range
O UPTAKE BY NH_3 OXID	α_5	mg O/mg N	3.430	4.300	(3.0 - 5.0)
O PROD BY ALGAE (MG O/MG A)	α_3	mg O/mg A	1.600	1.600	(1.4 - 1.8)
N CONTENT OF ALGAE (MG N/MG A)	α_1	mg N/mg A	0.080	0.080	(0.07 - 0.09)
ALG MAX SPEC GROWTH RATE(1/DAY)	μ_{max}	1/day	2.300	2.800	(1.0 - 3.0)
N HALF SATURATION CONST (MG/L)	K_N	mg N/L	0.030	0.030	(0.01 - 0.3)
LIN ALG SHADE CO (1/H-UGCHA/L)	λ_1	1/ft-(ugChl-a/L)	0.00268	0.00268	(.002 - .02)
LIGHT FUNCTION OPTION (LFNOPT)			1.0	2.0	-
DAILY AVERAGING OPTION (LAVOPT)			1.0	2.0	-
NUMBER OF DAYLIGHT HOURS (NDLH)	n_h		14.0	14.0	-
ALGY GROWTH CALC OPTION (LGROPT)			2.0	2.0	-
ALG/TEMP SOLR RAD FACTOR (TFACT)			0.44	0.44	(0 - 1.0)
OXY PROD BY PERI (MG O/MG AP)	α_7	mg O/mg Ap	1.600	1.600	-
NTRGN CNT OF PERI (MG N/MG AP)	α_9	mg N/mg Ap	0.080	0.080	-
CARB CNT OF PERI (MG C/MG AP)	α_{12}	mg C/mg Ap	0.400	0.400	-
MAX SPEC GRTH RATE: PERI (1/DAY)	$\mu_{max,P}$	1/day	2.000	2.000	
N SAT COEF FOR PERI (MG/L)	$K_{N,P}$	mg N/L	0.030	0.030	
PERI LIGHT SAT COEF (INT/MIN)	$K_{L,*,P}$	Btu/ft2-min	0.3	0.3	
O UPTAKE BY NO2 OXID(MG O/MG N)	α_6	mg O/mg N	1.140	1.140	(1 - 1.14)
O UPTAKE BY ALGAE (MG O/MG A)	α_4	mg O/mg A	2.000	2.000	(1.6 - 2.3)
P CONTENT OF ALGAE (MG P/MG A)	α_2	mg P/mg A	0.011	0.011	(.01 - .02)
ALGAE RESPIRATION RATE (1/DAY)	ρ	1/day	0.120	0.130	(0.05 - 0.5)
P HALF SATURATION CONST (MG/L)	K_P	mg P/L	0.005	0.005	(.001 - .05)
NLIN SHADE (1/H-(UGCHA/L)**2/3)	λ_2	1/ft-(ugChl-a/L)^2/3	0.0165	0.0165	-
LIGHT SATURATION COEF (INT/MIN)	$K_{L,*}$	Btu/ft2-min	0.3	0.3	(.02 - 1)
LIGHT AVERAGING FACTOR (AFACT)			0.94	0.94	-
TOTAL DAILY SOLAR RADTN (INT)	$I_{Total,Phyto}$	Btu/ft2	1200	994.332	(calculated)
ALGAL PREF FOR NH3-N (PREFN)	P_N	decimal fraction	0.9	0.9	-
C CONTENT OF ALGAE (MG C/MG A)	α_{11}	mg C/mg A	0.4	0.4	-
OXY UPTAKE BY PERI (MG O/MG AP)	α_8	mg O/mg Ap	2.000	2.000	
P CONTENT OF PERI (MG P/MG AP)	α_{10}	mg P/mg Ap	0.011	0.011	
PERI PREF FOR NH3-N (PPREFN)	$P_{N,AP}$	decimal fraction	0.900	0.900	-
RESP RATE FOR PERI (1/DAY)	ρ_P	1/day	0.0267	0.0267	
P SAT COEF FOR PERI (MG/L)	$K_{P,P}$	mg P/L	0.005	0.005	
PERI DENS SAT CO (MG-CHLA/AREA)	K_S	mgChl-a/ft2	1.5	1.5	

QUAL2E Modeling Variable Rates Table

	CBOD and DO Reaction Coefficients		Nitrogen Simulation				Phosphorus Simulation		
Reach Order Number	Fast CBOD oxidation rate coefficient	SOD Rate	Organic nitrogen hydrolysis rate coefficient	Organic nitrogen settling velocity	Ammonium oxidation rate coefficient	Nitrite oxidation rate coefficient	Organic phosphorus hydrolysis rate coefficient	Organic phosphorus settling velocity	Dissolved phosphorus settling velocity
	k_{1f}	k_4	β_3	v_{ON}	β_1	β_2	β_4	v_{OP}	v_{DP}
	1/day	g /ft2 - day	1/day	ft /day	1/day	1/day	1/day	ft /day	ft /day
Reach	Literature Rate Range (0.02 - 3.4)	Literature Rate Range (variable)	Literature Rate Range (0.02 - 0.4)	Literature Rate Range (0.001 - 0.1)	Literature Rate Range (0.1 - 1)	Literature Rate Range (0.2 - 2)	Literature Rate Range (.01 - 0.7)	Literature Rate Range (0.001 - 0.1)	Literature Rate Range (0.8 - 3.0)
1	0.2	0.1	0.05	0.001	5	2	0.01	0.001	0
2	0.2	0.05	0.05	0.001	5	2	0.01	0.001	0
3	0.2	0.05	0.05	0.001	5	2	0.01	0.001	2
4	0.2	0.05	0.05	0.001	5	2	0.01	0.001	2
5	0.2	0.05	0.05	0.001	5	2	0.01	0.001	2
6	0.2	0.05	0.05	0.001	5	2	0.01	0.001	0
7	0.2	0.03	0.05	0.001	5	2	0.01	0.001	0
8	0.2	0.03	0.05	0.001	5	2	0.01	0.001	0
9	0.2	0.03	0.05	0.001	5	2	0.01	0.001	2
10	0.2	0.03	0.05	0.001	5	2	0.01	0.001	2
11	0.2	0.2	0.05	0.001	5	2	0.01	0.001	2
12	0.2	0.05	0.05	0.001	5	2	0.01	0.001	0
13	0.2	0.05	0.05	0.001	5	2	0.01	0.001	0
14	0.2	0.24	0.05	0.001	5	2	0.01	0.001	0
15	0.2	0.05	0.05	0.001	5	2	0.01	0.001	0
16	0.2	0.12	0.05	0.001	5	2	0.01	0.001	0
17	0.2	0.03	0.05	0.001	5	2	0.01	0.001	0

QUAL2E Modeling Variable Rates Table

Reach Order Number	Algae (Phytoplankton) Coefficients				Periphyton Coefficients	
	Chlorophyll-a to phyto-plankton biomass ratio	Phyto-plankton settlng velocity	Phyto-plankton death rate coefficient	Non-algal light extinction coefficient	Chlorophyll-a to periphyton biomass ratio	Periphyton death rate coefficient
	α_0	v_A	$k_{d,A}$	λ_0	α_P	$k_{d,Ap}$
	mg Chla/ g A	ft /day	1/day	1/ft	mg Chla/ g Ap	1/day
Reach	Literature Rate Range (5 - 20)	Literature Rate Range (0.5 - 6.0)	Literature Rate Range (0.003 - 0.17)	Literature Rate Range (.03 - .09)	Literature Rate Range (5-20)	Literature Rate Range (0.003 0.17)
1	10	0.5	0.05	0.06	10	0.05
2	10	0.5	0.05	0.06	10	0.05
3	10	0.5	0.05	0.06	10	0.05
4	10	0.5	0.05	0.06	10	0.05
5	10	0.5	0.05	0.06	10	0.05
6	10	0.5	0.05	0.06	10	0.05
7	10	0.5	0.05	0.06	10	0.05
8	10	0.5	0.05	0.06	10	0.05
9	10	0.5	0.05	0.06	10	0.05
10	10	0.5	0.05	0.06	10	0.05
11	10	0.5	0.05	0.06	10	0.05
12	10	0.5	0.05	0.06	10	0.05
13	10	0.5	0.05	0.06	10	0.05
14	10	0.5	0.05	0.06	10	0.05
15	10	0.5	0.05	0.06	10	0.05
16	10	0.5	0.05	0.06	10	0.05
17	10	0.5	0.05	0.06	10	0.05