APPENDIX B

EFDC SEDIMENT DIAGENESIS MODEL PARAMETERS AND KINETIC COEFFICIENTS

Lake Thunderbird, Oklahoma

Kinetic Coefficients and Model Parameters for the Sediment Flux Model

		Zones									
Kinetic Coefficient	**Global**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Recycle fractions-BlueGreen algae											
Fraction of PON from BlueGreen algae group routed to G1 class	0.65										
Fraction of PON from BlueGreen algae group routed to G2 class	0.25										
Fraction of PON from BlueGreen algae group routed to G3 class	0.10										
Fraction of POP from BlueGreen algae group routed to G1 class	0.65										
Fraction of POP from BlueGreen algae group routed to G2 class	0.20										
Fraction of POP from BlueGreen algae group routed to G3 class	0.15										
Fraction of POC from BlueGreen algae group routed to G1 class	0.65										
Fraction of POC from BlueGreen algae group routed to G2 class	0.20										
Fraction of POC from BlueGreen algae group routed to G3 class	0.15										
Recycle fractions-Green algae											
Fraction of PON from green algae group routed to G1 class	0.65										
Fraction of PON from green algae group routed to G2 class	0.25										
Fraction of PON from green algae group routed to G3 class	0.10										
Fraction of POP from green algae group routed to G1 class	0.65										
Fraction of POP from green algae group routed to G2 class	0.20										
Fraction of POP from green algae group routed to G3 class	0.15										
Fraction of POC from green algae group routed to G1 class	0.65										
Fraction of POC from green algae group routed to G2 class	0.20										
Fraction of POC from green algae group routed to G3 class	0.15										

Diagenesis											
Decay rate of PON at 20 degC in Layer 2 for G1 class (/day)	0.0350										
Decay rate of PON at 20 degC in Layer 2 for G2 class (/day)	0.0018										
Decay rate of PON at 20 degC in Layer 2 for G3 class (/day)	0.0000										
Decay rate of POP at 20 degC in Layer 2 for G1 class (/day)	0.0350										
Decay rate of POP at 20 degC in Layer 2 for G2 class (/day)	0.0018										
Decay rate of POP at 20 degC in Layer 2 for G3 class (/day)	0.0000										
Decay rate of POC at 20 degC in Layer 2 for G1 class (/day)	0.0350										
Decay rate of POC at 20 degC in Layer 2 for G2 class (/day)	0.0018										
Decay rate of POC at 20 degC in Layer 2 for G3 class (/day)	0.0000										
Constant for temperature adjustment for KPON1 (unitless)	1.100										
Constant for temperature adjustment for KPON2 (unitless)	1.175										
Constant for temperature adjustment for KPON3 (unitless)	1.000										
Constant for temperature adjustment for KPOP1 (unitless)	1.100										
Constant for temperature adjustment for KPOP2 (unitless)	1.175										
Constant for temperature adjustment for KPOP3 (unitless)	1.000										
Constant for temperature adjustment for KPOC1 (unitless)	1.100										
Constant for temperature adjustment for KPOC2 (unitless)	1.175										
Constant for temperature adjustment for KPOC3 (unitless)	1.000										
SOD scaling factor		1.00	0.30	1.50	1.60	1.00	0.50	2.00	1.20	2.50	0.30
Sediment bed											
Sediment thickness (m)		0.10	0.20	0.10	0.10	0.10	0.10	0.15	0.10	0.10	0.10
Burial rate (cm/yr)		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Initial sediment temperature	20.00										

		Zones									
Kinetic Coefficient	**Global**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Solids											
Solid concentrations in Layer 1 (Kg/L)	0.50										

Solid concentrations in Layer 2 (Kg/L)	0.50										
Constant for temperature adjustment for Dd (unitless)	1.15										
Constant for temperature adjustment for Dp (unitless)	1.15										
Reference concentration for GPOC(1)	100										
Particle mixing half-saturation constant for oxygen (mg/L)	4.00										
Minimum diffusion coefficient for particle mixing (m2/d)	6.00E-06										
Mixing											
Diffusion coefficient in porewater (m2/day)	0.0005	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.2E-03
Particle mixing apparent diffusion coefficient (m2/day)	0.00006	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04	1.2E-04
Diffusion cofficient for sediment temperature	9.E-08										
Benthic stress											
Initial accumulated benthic stress (days)	5.00										
1st order decay of accumulated benthic stress (/day)	0.01										
Ammonia kinetics											
Partition coefficient for NH4 in aerobic conditions (1/kg)	1										
Partition coefficient for NH4 in anaerobic conditions (1/kg)	1										
Nitrification half-Sat. constant for ammonium (gN /m3)	0.728										
Nitrification half-Sat. constant for dissolved oxygen (gO2 /m3)	0.37										
Constant for temperature adjustment for KNH4 (unitless)	1.125										
Optimal reaction velocity for nitrification (m/day)		0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
Coefficient for oxygen consumed by nitrification (g O2/gN)	4.571										
Nitrate kinetics											
Denitrification velocity, layer 1 (20 degC) (m/day)		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Denitrification velocity, layer 2 (20 degC) (m/day)		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Constant for temperature adjustment for KNO3 (unitless)	1.08										
Coefficient for oxygen consumed by denitrification (g O2/gN)	2.857										
Phosphate kinetics											

Partition coefficient for PO4 in anaerobic conditions (1/kg)	20										
Critical dissolved oxygen for PO4 sorption (mg/L)	2										
PO4 sorption enhancement factor		300	300	300	300	300	300	300	300	300	300
Sulfide kinetics											
Partitioin coefficient for H2S in Layer 1 (1/kg)	100										
Partitioin coefficient for H2S in Layer 2 (1/kg)	100										
Reaction velocity for dissolved sulfide oxidation in Layer 1 at 20 degC (m/day)	0.2										
Reaction velocity for particulate sulfide oxidation in Layer 1 at 20 degC (m/day)	0.4										
Constant for temperature adjustment for Kh2Sd1 and Kh2Sp1 (unitless)	1.17										
Constant to normalize the sulfide oxidation rate for oxygen (mg O2/L)	4										
Reaction velocity of methane oxidation in Layer 1 at 20 degC (m/day)	0.35										
Constant for temperature adjustment for KCH4 (unitless)	1.035										
Critical salinity; < then CH4 is produced, > then H2S is produced (g/L)	1										
Coefficient for oxygen consumed by H2S oxidation (g O2/gC)	2.667										