Table_1_suppl

Simple outcomes from the tool, a set of equations and reactions

Parameters:	Equation/reaction used in the calculation
Radius of influence / Total flow path in model	$$\lg R = \frac{k(h^2 - H^2)}{0.733Q} + \lg r$$ Where R – radius of influence, k – hydraulic conductivity, h – water table level after the injection, H – water table level before the injection, Q – injection rate, r – radius of well.
Total bulk treatment volume	$V = Am$, where $A = \Pi R^2$ Where V – total bulk treatment volume, A – area, R – ROI (radius of influence), m – thickness of polluted layer.
Maximum oxidant concentration	$C_{\max} = M_{ox} * 1000000 \ / V_{liq} * 1000$ Where C_{max} – maximum concentration of oxidant, M_{ox} – mass of the injected oxidant(real data in kg), V_{liq} – volume of injected liquid in m^3.
Mass of porous media	$M = dV$ Where M – mass of porous medium, V – total bulk treatment volume, d – dry bulk density.
Volume of oxidant to be delivered	$V_{ox} = Vn$ Where V_{ox} – volume of oxidant must be delivered, V – total bulk treatment volume, n – porosity.
Dose of oxidant	$D = (C_{\max} V_{ox}) / M$ Where D - dose of oxidant, V_{ox} – volume of oxidant must be delivered, C_{max} – maximum concentration of oxidant, M – mass of porous medium.
Effective porosity, usually 10 to 48% smaller than porosity	$n_e = (0.1 \div 0.48)n$

	Where n_e – effective porosity, n – porosity.
Velocity of water for max effective porosity	$v_{\min} = kI / n_{e\max}$, where $I = deltaH / R$ Where v_{min} – minimum velocity, I – hydraulic gradient, deltaH – pressure equal (703,069679*pressure in psi)/1000), n_{emax} – maximum effective porosity, k – hydraulic conductivity, R – ROI.
Velocity of water for min effective porosity	$v_{\max} = kI / n_{e\min}$, where $I = deltaH / R$ Where v_{max} – maximum velocity, I – hydraulic gradient, deltaH – pressure equal (703,069679*pressure in psi)/1000), n_{emin} – minimum effective porosity, k – hydraulic conductivity, R – ROI.
pE of groundwater	$pe = (Eh * 96485) / (2.303 * 8.314 * (283.15 + T))$ Where T – temperature in Celsius degrees, Eh – oxidation-reduction potential in V.
Time of reaching the ROI for max effective porosity	$t_{\max} = R / v_{\min}$ Where t_{max} – maximum time of reaching ROI, R – ROI, v_{min} – minimum velocity.
Time of reaching ROI for min effective porosity	$t_{\min} = R / v_{\max}$ Where t_{min} – minimum time of reaching ROI, R – ROI, v_{max} – maximum velocity.
Number of wells for max effective porosity	$N_{\min} = V_{ox} / Qt_{\max}$ Where N_{min} – minimum number of wells, V_{ox} – volume of oxidant must be delivered, Q – injection rate, t_{max} – maximum time of reaching ROI.
Numbers of wells for min effective porosity	$N_{\max} = V_{ox} / Qt_{\min}$ Where

	N_{max} – maximum number of wells, V_{ox} – volume of oxidant must be delivered, Q– injection rate, t_{min} – minimum time of reaching ROI.
Mass of $KMnO_4$ oxidant needed for calculated amount of pollutant [kg] (stoichiometric ratios): Toluene	$C_7H_8 + 2H^+ + 2\ MnO_4^- = C_7H_6O_2 + 2MnO_2 + 2H_2O$ Y_MnO_4^-/Toluene = (2*118.9)/(1*92.14) = 2.58 (mg/mg)
Ethylobenzene	$C_6H_5CH_2CH_3 + 4MnO_4^- + 4HCl = C_6H_5CO_2H + CO_2 + 4MnO_2 + 4KCl + 4H_2O$ Y_MnO_4^-/Ethylbenzene = (4*118.9)/(1*106.17) = 4.48 (mg/mg)
Benzene	$C_6H_6 + 10\ MnO_4^- + 10\ H^+ = 10\ MnO_2 + 6\ CO_2 + 8\ H_2O$ Y_MnO_4^-/Benzene = (10*118.9)/(1*78.11) = 15.22 (mg/mg)
PCE	$3C_2Cl_4 + 4MnO_4^- + 4H_2O = 6CO_2 + 12Cl^- + 4MnO_2 + 8H^+$ Y_MnO_4^-/Pce = (4*118.9)/(3*165.7) = 0.96 (mg/mg)
TCE	$C_2Cl_3H + 2MnO_4^- = 2CO_2 + 3Cl^- + 2MnO_2 + H^+$ Y_ MnO_4^-/Tce = (2*118.9)/131.29 = 1.81 (mg/mg)
DCE	$3C_2Cl_2H_2 + 8MnO_4^- = 2CO_2 + 3Cl^- + 2MnO_2 + H^+$ Y_MnO_4^-/Dce = (8*118.9)/(3*96.88) = 3.27(mg/mg)
VC	$3C_2H_3Cl + 10MnO_4^- = 6CO_2 + 10MnO_2 + 7OH^- + 3Cl^- + H_2O$ Y_MnO_4^-/Vc = (10*118.9)/(3*62.47) = 6.34(mg/mg)
NOD	$3C_7H_8O_4 + 28MnO_4^- + 28H^+ = 21CO_2 + 28MnO_2 + 26H_2O$ Y_ MnO_4^-/NOM = (28*118.9)/(3*156.07) = 7.11(mg/mg)
TOTAL	Total mass of permanganate used for oxidation of COCs and NOD according to reactions described above