PCE PLUME LENGTH AND DURATION CALCULATIONS
ATLAS PARK SITE - PARCEL B

1. Hydraulic Conductivity, K (ft/d) 270.00
(Franke and McClymonds, USGS 1972)

2. Hydraulic Gradient, i (ft/ft) 0.001
(Hydraulic gradient between MW-63 and MW-6 from Figure 7)

3. Effective Porosity, n_e 0.3
(Freeze and Cherry, 1979)

4. Bulk Density of Formation, r_b (g/cm^3) 1.5
(EPA, 1998)

5. Soil Sorption Coefficient, K_{oc} (ml/g)
(Domenico, 1987)

PCE 300

6. Fraction of Organic Carbon, f_{oc} 0.0017
(EPA, 1998)

7. Seepage Velocity, v_s (ft/d) 0.90
$[v_s = K * i / n_e]$
ft/yr 329

8. Retardation Factor, R_d
$[R_d = 1 + (K_{oc} * f_{oc} * r_b / n_e)]$

PCE 3.6

9. Contaminant Transport Rate, V_{pt} (ft/d)
$[V_{pt} = v_s / R_d]$

PCE 0.25

10. Contaminant Data

	PCE (MW-63)
Initial Concentration of Compound, C_o (ug/l)	337
Target Compound Concentration (GWQS), C (ug/l)	5
Half-Life for Compound - High (days)	720
Half-Life for Compound - Low (days)	360
Degradation Constant, k - High (1/day)	0.0010
Degradation Constant, k - Low (1/day)	0.0019

PCE PLUME LENGTH AND DURATION CALCULATIONS
ATLAS PARK SITE - PARCEL B

1. Initial concentration is based on SRI groundwater data for well MW-63.
2. Half-life equation (NJDEP 1998).

$$[t_{1/2} = 0.693 / k]$$

where k is the degradation constant

3. Half-lives from Handbook of Environmental Degradation Rates (Howard et al., 1991).

11. Plume Duration

First-order decay equation to calculate plume duration (NJDEP 1998):

$$[C = C_o e^{-kt}]$$

Therefore,

$$[t = -\ln (C / C_o) / k]$$

Contaminant	Decay Duration			
	Minimum		Maximum	
	Days	Years	Days	Years
PCE	2,187	5.99	4,375	12.0

12. Length of Plume, d (ft)

(NJDEP 1998) $[d = V_{pt} * t]$

Contaminant	Plume Length (ft)	
	Minimum	Maximum
PCE	554.5	1,109

References:

Domenico, P.A. "An Analytical Model For Multidimensional Transport of a Decaying Contaminant Species." Journal of Hydrology 91 (1987): 49-58.

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Howard, P.H., et al. Handbook of Environmental Degradation Rates. CRC Press LLC, 1991.

NJDEP. Final Guidance on Designation of Classification Exception Areas. 1998.

USEPA, 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA/600/R-98/128.

APPENDIX C

ATTENUATION CALCULATIONS