APPENDIX H
Uncertainty/Sensitivity Analysis

Uncertainty Analysis for EEM 1: Excavation/Removal
Emission Rate for Benzene from Gasoline-Contaminated Soil

Variable parameters are in bold:

Assumptions:	**C =**	10	ppm	soil concentration of benzene
	beta =	1.5	g/cm^3	bulk density of the soil
	A=	2500	m^2	emitting surface area
	Q=	0.042	m^3/sec	excavation rate
	Mfrac=	0.15	%/100	moisture by weight

Equations used:

ER = ERps + ERdiff

ERps = [(Pa)(Mw)(10^6)(Ea)(Q)(ExC)]/[(R)(T)]

ERdiff = [Cs)(10,000)(A)]/{[(Ea)/(Keq)(Kg)] + [(pi)(t)/(De)(Keq)]^0.5}

Cs = (C)(beta)(10^-6)

Et = 1 - (beta/p)

Ea = 1- (beta + (beta*Mfrac)/p)

Additional Parameters:

Pa=	95.2	mm Hg	vapor pressure of benzene at ambient temp. (298K)
Mw=	78	g/g-mol	molecular weight
Ea=	0.349057	vol/vol	air-filled porosity
Et=	0.433962	vol/vol	total porosity
ExC=	0.10	%/100	soil-gas to atmosphere exchange constant
Ta=	298	degrees K	ambient temperature
Cs=	1.50E-05	g/cm^3	mass loading in bulk soil
Keq=	1	g/g	equilibrium coefficient
Kg=	0.15	cm/sec	gas phase mass transfer coefficient
t=	60	sec	time to achieve best curve fit
De=	0.014872	cm^2/sec	effective diffusivity in air
p=	2.65	g/cm^3	particle density

Point Estimates Using the Above Parameters/Equations:

ERps=	0.585797	g/sec	emission rate from pore space
ERdif=	3.263417	g/sec	emission rate from diffusion
ER =	3.849215	g/sec	total emission rate