R-49-2-92-1

FINAL
REMEDIAL INVESTIGATION REPORT
NAVAL WEAPONS INDUSTRIAL
RESERVE PLANT
BETHPAGE, NEW YORK

VOLUME IV
(APPENDIX I)

PREPARED BY

HALLIBURTON NUS
ENVIRONMENTAL CORPORATION
PITTSBURGH, PENNSYLVANIA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
(CLEAN) PROGRAM

CONTRACT NO. N62472-90-D-1298
CONTRACT TASK ORDER NUMBER 0003

MAY 1992

HALLIBURTON NUS
Environmental Corporation

Donohue ENGINEERS ARCHITECTS SCIENTISTS

ENSR™

APPENDIX I

RISK ASSESSMENT CALCULATIONS

I.1

FUGITIVE DUST EMISSIONS

NUS CORPORATION AND SUBSIDIARIES	STANDARD CALCULATION SHEET

CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 6
SUBJECT: Fugitive Dust Emissions- Bethpage		CHECKED BY:	DATE: 2/27/92

Current Surface Soil, Adult Residents, Site 1, Tetrachloroethene

Objective: Determine exposure resulting from fugitive dust emissions.

Approach: Use model from Cowherd, et al, 1984, and compare exposures to risk reference doses (RfDs) and calculate estimated cancer risks.

Relevant Equations:

$$HQ = \frac{IEX}{RfD}$$

where: HQ = Hazard Quotient
IEX = Inhalation exposure dose (mg/kg/day)
RfD = Risk reference dose (mg/kg/day)

$$CR = IEX \cdot CSF$$

where: CR = Estimated cancer risk
IEX = Inhalation exposure dose (mg/kg/day)
CSF = Cancer slope factor [(mg/kg/day)$^{-1}$]

$$IEX = \frac{\chi \cdot IR \cdot ET \cdot EF \cdot ED \cdot AF}{BW \cdot LT \cdot AT \cdot CF}$$

where: χ = Contaminant concentration in air (ug/m^3)
IR = Inhalation rate (m^3/hr)
ET = Exposure time (hr/day)
EF = Exposure frequency (day/yr)
ED = Exposure duration (yr)
AF = Absorption fraction
BW = Body weight (kg)
LT = Lifetime (yr)
AT = Averaging time (365 days/yr)
CF = Conversion factor (1000 ug/mg)

NUS CORPORATION AND SUBSIDIARIES	STANDARD CALCULATION SHEET

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$$X = Q_I \cdot F_I$$

where: X = Contaminant concentration in air ($\mu g/m^3$)
Q_I = Wind erosion scaling factor (g/sec)
F_I = Unscaled concentration factor ($\mu g/sec/g/m^3$)

$$Q_I = R_{10}/PR$$

where: Q_I = Wind erosion scaling factor (g/sec)
R_{10} = Emission rate of contaminant as PM_{10} (g/sec)
PR = Regional climate factor

$$R_{10} = \alpha \cdot E_{10} \cdot A \cdot CF_1 \cdot CF_2$$

where: α = Mass fraction of contaminant
E_{10} = Emission rate of respirable particulates ($mg/m^2\,hr$)
A = Source extent (area) (m^2)
R_{10} = Emission rate of contaminant as PM_{10} (g/sec)
CF_1 = Conversion factor (1 hr / 3600 sec)
CF_2 = Conversion factor (1 g / 1000 mg)

$$E_{10} = \frac{0.83 \cdot f \cdot P(U+) \cdot (1-V)}{\left(\frac{PE}{50}\right)^2}$$

where: E_{10} = Emission rate of respirable particulates ($mg/m^2\,hr$)
f = Frequency of disturbance (events/mo.)
$U+$ = Fastest wind speed
$P(U+)$ = Erosion potential (g/m^2)
V = Vegetative cover factor
PE = Thornwaite's precipitation/evaporation index

$$P(U+) = 6.7 \cdot (U+ - U_T)$$

where: $P(U+)$ = Erosion potential (g/m^2)
$U+$ = Fastest wind speed (m/sec)
U_T = Erosion threshold wind speed at height z (m/sec)

$$U_T = \frac{U{*}T}{0.4} \ln\left(\frac{z}{z_0}\right)$$

where: U_T = Erosion threshold wind speed at height z (m/sec)
$U{*}T$ = Friction velocity (m/sec)
z = Height at which U_T measured (cm)
z_0 = Roughness height (cm)

Assumptions: Wind acts over entire site; therefore, representative concentration is used.

Rep. conc. Tetrachloroethene, site 1 = 27.4 ug/kg
(Therefore, $\alpha = 2.74 \times 10^{-8}$)

Source surface area A = 15000 m² (estimate from site visit)
Closest receptor/strongest wind direction 200 m to southeast; site size range 100 m × 100 m (as opposed to 10 m × 10 m)
(Therefore, F_i = 3.837; source: Cowherd, App. D)

f = Disturbance frequency = 20 events/month
V = 0.2 (estimate from site visit)
IR = 0.83 m³/hr (adult) (see Table 6-16)
EF = 350 days/yr (see Table 6-16)
ED = 30 yr (see Table 6-16)
BW = 70 kg (adult)
LT = 70 yr
PR = 0.296 (Cowherd, Fig. 4-5, 4-7, Region 7)

NUS CORPORATION AND SUBSIDIARIES			*STANDARD CALCULATION SHEET*
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$U+ = 22.5$ m/sec (Cowherd, Table 4-1; used New York, NY weather station)

PE = 139 (Cowherd, Fig. 4-2)

$U^*T = 0.6$ m/sec (Cowherd, 1984, Fig 3-4, assuming median particle size 0.8 mm)

$Z = 700$ cm (Cowherd, 1984)

$Z_0 = 10$ cm (Cowherd, Fig 3-6, assuming suburban residential - institutional)

RFD = 1×10^{-2} mg/kg/day (oral) (USEPA, Jan. 1991)

CSF = 1.8×10^{-3} (mg/kg/day)$^{-1}$ (resp.)

5.1×10^{-2} (mg/kg/day)$^{-1}$ (oral) (USEPA, Jan. 1991)

ET = 24 hr/day

AF = GI = 0.625 (Cowherd, 1984)

Resp. = 0.125

<u>Sample Calculation:</u>

$$U_T = \frac{U^*T}{0.4} \ln \frac{Z}{Z_0} = \left(\frac{0.6 \text{ m/sec}}{0.4}\right) \ln\left(\frac{700}{10}\right) = 6.37 \text{ m/sec}$$

$$P(U+) = 6.7(U+ - U_T) = \left(6.7 \frac{g \cdot sec}{m^3}\right)(22.5 \text{ m/sec} - 6.37 \text{ m/sec})$$

$$= 108.07 \text{ g/m}^2$$

$$E_{10} = \frac{0.83 \cdot f \cdot P(U+) \cdot (1-V)}{\left(\frac{PE}{50}\right)^2} = \frac{\left(0.83 \frac{mg \cdot mo.}{g \cdot hr}\right)\left(\frac{20}{mo.}\right)\left(108.07 \frac{g}{m^2}\right)(1-0.?)}{\left(\frac{139}{50}\right)^2}$$

$$= 185.7 \text{ mg/m}^2\text{hr}$$

$$R_{10} = \alpha \cdot E_{10} \cdot A \cdot CF_1 \cdot CF_2$$

$$= (2.74 \times 10^{-8})\left(185.7 \frac{mg}{m^2 hr}\right)(15000 m^2)\left(\frac{1 hr}{3600 sec}\right)\left(\frac{1 g}{1000 mg}\right)$$

$$= 2.12 \times 10^{-8} \text{ g/sec}$$

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$$Q_I = RID/PR = (2.12 \times 10^{-8} g/sec)/(0.296) = 7.16 \times 10^{-8} g/sec$$

$$\chi = Q_I \cdot F_I = (7.16 \times 10^{-8} g/sec)\left(3.837 \frac{ug/sec}{g/m^3}\right)$$

$$= 2.75 \times 10^{-7} ug/m^3$$

FOR NONCARCINOGENIC, INHALATION (Resp.)
Non-time-weighted, ∴ don't use ED or LT

$$IEX = \frac{\chi \cdot IR \cdot EF \cdot ET \cdot AF_{Resp}}{BW \cdot AT \cdot CF} = \frac{\left(2.75 \times 10^{-7} \frac{ug}{m^3}\right)\left(0.83 \frac{m^3}{hr}\right)\left(24 \frac{hr}{day}\right)(0.125)\left(350 \frac{day}{yr}\right)}{(70 kg)(365 day/yr)(1000 ug/mg)}$$

$$IEX_{NC, Resp} = 9.4 \times 10^{-12} mg/kg/day$$

FOR NONCARCINOGENIC, ORAL (GI):
Non-time-weighted, ∴ omit ED, LT

$$IEX = \frac{\chi \cdot IR \cdot EF \cdot ET \cdot AF_{GI}}{BW \cdot AT \cdot CF} = \frac{\left(2.75 \times 10^{-7} \frac{ug}{m^3}\right)\left(0.83 \frac{m^3}{hr}\right)\left(24 \frac{hr}{day}\right)\left(350 \frac{day}{yr}\right)(0.625)}{(70 kg)(365 day/yr)(1000 ug/mg)}$$

$$IEX_{NC, GI} = 4.7 \times 10^{-11} mg/kg/day$$

FOR CARCINOGENIC, INHALATION (Resp.):
Time-weighted

$$IEX = \frac{\chi \cdot IR \cdot ET \cdot EF \cdot ED \cdot AF_{Resp}}{BW \cdot LT \cdot AT \cdot CF}$$

$$= \frac{\left(2.75 \times 10^{-7} \frac{ug}{m^3}\right)\left(0.83 \frac{m^3}{hr}\right)\left(24 \frac{hr}{day}\right)\left(350 \frac{day}{yr}\right)(30 yr)(0.125)}{(70 kg)(70 yr)(365 day/yr)(1000 ug/mg)}$$

$$IEX_{C, Resp} = 4.0 \times 10^{-12} mg/kg/day$$

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FOR CARCINOGENIC, ORAL (GI):
Time-weighted

$$IEX = \frac{X \cdot IR \cdot ET \cdot EF \cdot ED \cdot AF_{GI}}{BW \cdot LT \cdot AT \cdot CF}$$

$$= \frac{(2.75\times10^{-7}\frac{ug}{m^3})(0.83\frac{m^3}{hr})(24\frac{hr}{day})(350\frac{day}{yr})(30yr)(0.625)}{(70kg)(70yr)(365\frac{day}{yr})(1000ug/mg)}$$

$$IEX_{C,GI} = 2.0\times10^{-11} mg/kg/day$$

INGESTION

$$HQ = \frac{IEX_{NC,GI}}{RfD_{oral}} = \frac{4.7\times10^{-11} mg/kg/day}{1\times10^{-2} mg/kg/day} = \boxed{4.7\times10^{-9}}$$

$$CR = IEX_{C,GI} \cdot CSF_{oral} = (2.0\times10^{-11} mg/kg/day)\left(\frac{5.1\times10^{-2}}{mg/kg/day}\right)$$

$$= \boxed{1.0\times10^{-12}}$$

INHALATION

HQ N/A; No inhalation RfD

$$CR = IEX_{C,Resp} \cdot CSF_{inhal} = (4\times10^{-12} mg/kg/day)\left(\frac{1.8\times10^{-3}}{mg/kg/day}\right)$$

$$= \boxed{7.2\times10^{-15}}$$

$$CR_{GI} + CR_{Resp} = 1\times10^{-12} + 7.2\times10^{-15} = \boxed{1\times10^{-12}}$$

References: Cowherd et al., Sept. 1984. Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites. Midwest Research Institute, Kansas City, MO.

USEPA, Jan. 1991. Health Effects Assessment Summary Tables. Office of Emergency and Remedial Response, Washington, DC. OERR 9200.6-303(91-1).

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I.2

REPRESENTATIVE CONCENTRATIONS

NUS CORPORATION AND SUBSIDIARIES			STANDARD CALCULATION SHEET
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 5
SUBJECT: Representative Conc. - Bethpage Lead - Unfiltered Monitoring wells, Pyrene - Monitoring wells		CHECKED BY: [illegible]	DATE: 1/27/92

Objective: Determine representative concentrations of contaminants.

Approach: Use upper 95% confidence limit (UCL) on arithmetic mean, or maximum if UCL exceeds maximum positive detection. Average duplicates and use ½ detection limit for non-detects.

Relevant Equations:

$$S = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}}$$

where: S = standard deviation
x_i = individual sample value
n = number of samples

$$\bar{x} = \frac{\Sigma x_i}{n}$$

where: $\bar{x}$ = arithmetic mean
x_i = individual sample value
n = number of samples

$$UCL = \bar{x} + t_{(\alpha, n-1)} \frac{S}{\sqrt{n}}$$

where: UCL = representative concentration (upper confidence limit)
S = standard deviation
$\bar{x}$ = arithmetic mean
n = number of samples
t = distribution factor
α = level of significance

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NUS CORPORATION AND SUBSIDIARIES			STANDARD CALCULATION SHEET
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SUBJECT: Rep. Conc. - Bethpage		CHECKED BY: DJL	DATE: 1/27/92

$$CL = 1 - \alpha$$

where: CL = confidence level
α = level of significance
Source: Zar, 1974

Assumptions: For 95% UCL, CL = 0.95 (2-sided). When considering only upper value ($\bar{x} + t\frac{s}{\sqrt{n}}$ instead of $\bar{x} \pm t\frac{s}{\sqrt{n}}$), CL = 0.975. ~~(1-sided)~~ JRH 1/27

Sample Calculation: For lead in unfiltered MWs, following results reported:
(ug/L)

n = 15

	x_i	x_i^2
Duplicates $\bar{x}_1 = \frac{1+0.5}{2} = 0.75$	1 0.5 (½ det. lim.)	0.5625
	32.6	1062.76
	3.6	12.96
	29.8	888.04
	0.5 (½ DL)	0.25
	43.4	1883.56
	3.6	12.96
Duplicates $\bar{x}_8 = \frac{3+3}{2} = 3$	3 3 (½ DL)	9
	11	121
	8.1	65.61
	124	15376
Duplicates $\bar{x}_{12} = \frac{7+7.4}{2} = 7.2$	7 7.4	51.84
	0.5 (½ DL)	0.25
	0.5 (½ DL)	0.25
	18.8	353.44
	$\Sigma x_i = 287.35$	$\Sigma x_i^2 = 19838.483$

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$$s = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}} = \sqrt{\frac{19838.483 - \frac{(287.35)^2}{15}}{15-1}} = 31.99$$

$$CL = 1 - \alpha$$
$$\alpha = 1 - CL$$

$$\alpha_2 = 1 - 0.95 = 0.05 \qquad \alpha_1 = 1 - 0.975 = 0.025$$

$$\bar{x} = \frac{\Sigma x_i}{n} = \frac{287.35}{15} = 19.16$$

$$UCL = \bar{x} + t_{(\alpha, n-1)} \frac{s}{\sqrt{n}} = 19.16 + t_{(\alpha_2\,0.05,\, \alpha_1\,0.025,\, 14)} \frac{31.99}{\sqrt{15}}$$

$$t = 2.145$$

TABLE D.10 Critical Values of the *t* Distribution

n-1	α(2): 0.50	0.20	0.10	0.05	0.02	0.01	0.005	0.002	0.001
	α(1): 0.25	0.10	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
1	1.000	3.078	6.314	12.706	31.821	63.657	127.321	318.309	636.619
2	0.816	1.886	2.920	4.303	6.965	9.925	14.089	22.327	31.599
3	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.215	12.924
4	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	0.890	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.768
24	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	0.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
31	0.682	1.309	1.696	2.040	2.453	2.744	3.022	3.375	3.633
32	0.682	1.309	1.694	2.037	2.449	2.738	3.015	3.365	3.622
33	0.682	1.308	1.692	2.035	2.445	2.733	3.008	3.356	3.611
34	0.682	1.307	1.691	2.032	2.441	2.728	3.002	3.348	3.601
35	0.682	1.306	1.690	2.030	2.438	2.724	2.996	3.340	3.591

source Zar, 1974

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SUBJECT: Rep. Conc. - Bethpage		CHECKED BY: DSC	DATE: 1/27/92

$$UCL = 19.16 + (2.145)\frac{31.99}{\sqrt{15}} = 36.877$$

Maximum positive detection: 124

UCL < MPD ∴ use UCL for representative concentration

$\boxed{\text{Representative concentration} = 36.9\ \text{ug/L}}$

Pyrene, Monitoring Wells
(ug/L)

n = 15

	x_i	x_i^2
Duplicates $\bar{x}_1 = \frac{5.5+6}{2} = 5.75$	5.5 (1/2 DL)	33.0625
	6 (1/2 DL)	
	5.5 (1/2 DL)	30.25
	5.5 (1/2 DL)	30.25
	6 (1/2 DL)	36
	5 (1/2 DL)	25
	5.5 (1/2 DL)	30.25
	5 (1/2 DL)	25
	5 (1/2 DL)	25
	5 (1/2 DL)	25
Duplicates $\bar{x}_{10} = \frac{5+5}{2} = 5$	5 (1/2 DL)	25
	5 (1/2 DL)	
	5.5 (1/2 DL)	30.25
	5 (1/2 DL)	25
	2 ~~(1/2 DL)~~ JCH 1/27	4
	5.5 (1/2 DL)	30.25
Duplicates $\bar{x}_{15} = \frac{5+5}{2} = 5$	5 (1/2 DL)	25
	5 (1/2 DL)	
	$\Sigma x_i = 76.25$	$\Sigma x_i^2 = 399.3125$

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NYSDEC 032445

NUS CORPORATION AND SUBSIDIARIES	STANDARD CALCULATION SHEET

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$$s = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}} = \sqrt{\frac{399.3125 - \frac{(76.25)^2}{15}}{15-1}} = 0.91$$

$$CL = 1 - \alpha$$
$$\alpha = 1 - CL$$

$$\alpha_2 = 1 - 0.95 = 0.05 \qquad \alpha_1 = 1 - 0.975 = 0.025$$

$$\bar{x} = \frac{\Sigma x_i}{n} = \frac{76.25}{15} = 5.08$$

$$UCL = \bar{x} + t_{(\alpha, n-1)} \frac{s}{\sqrt{n}} = 5.08 + (2.145)\frac{0.91}{\sqrt{15}} = 5.58$$

Maximum positive detection: 2 ug/L

UCL > MPD ∴ use MPD for rep. conc.

$\boxed{\text{Representative concentration} = 2 \text{ ug/L}}$

References: Zar, Jerrold H., 1974. Biostatistical Analysis. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

I.3

FUTURE GROUNDWATER

NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
CLIENT: NAVYCLEAN	FILE NO.:	BY: J. Hubbard	PAGE 1 OF 2
SUBJECT: Future Groundwater - Bethpage (Leachate Model) Tetrachloroethene, site 1		CHECKED BY:	DATE: 1/27/92

Objective: To project estimated groundwater concentrations from subsurface soil contaminant concentrations.

Approach: Use Koc (organic carbon partition coefficient) and site-specific factors, such as fraction organic carbon (Foc), area, infiltration rate.

Relevant Equations: $CL = \frac{CS}{Kd}$

where: CL = Leachate concentration (mg/L)
CS = Representative soil conc. (mg/kg)
Kd = Distribution coefficient

$CGW = \frac{CL}{DR}$

where: CGW = Groundwater conc. (mg/L)
CL = Leachate concentration (mg/L)
DR = Dilution ratio

Assumptions: DR = 8.1 (site 1) Based on net infiltration rate 13.65 in/yr, hydraulic conductivity 0.02 cm/sec, hydraulic gradient 0.0023, mixing zone 50 ft, area 65000 ft²

= 10.2 (site 2) Based on area 50000 ft²

= 8.7 (site 3) Based on area 60000 ft²

Tetrachloroethene CS = 0.834 mg/kg (see Table 6-3)

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SUBJECT: Future Groundwater - Bethpage		CHECKED BY: DJC	DATE: 1/27/92

Tetrachloroethene Kd at Site 1 = 0.22 (see Table 5-5)

Sample Calculation: $CL = \frac{CS}{Kd} = \frac{0.834}{0.22} = 3.79\ mg/L$

$$CGW = \frac{CL}{DR} = \frac{3.79\ mg/L}{8.1} = 0.4679\ mg/L$$

Projected CGW = 0.468 mg/L = 468 ug/L.

Computer-generated CGW = 475.4 ug/L

$$RPD = \cancel{x_1 + x} \left|\frac{x_1 - x_2}{\bar{x}}\right| \times 100\%$$

JRH 1/27

where RPD = Relative percent difference
x_1 = Sample result
x_2 = Sample result
$\bar{x}$ = arithmetic mean of x_1 and x_2

$$RPD = \left|\frac{468 - 475.4}{\left(\frac{468 + 475.4}{2}\right)}\right| \times 100\% = 1.6\%$$

< 10%; results acceptable

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NYSDEC 032449

I.4

RETARDATION FACTORS

NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 2
SUBJECT: Retardation Factors - Bethpage Toluene, Site 3		CHECKED BY: [illegible]	DATE: 1/27/92

Objective: Determine retardation factors for organic chemicals in soil.

Approach: Use density, porosity, Koc (organic carbon partition coefficient) and site-specific parameters.

Relevant Equations:

$$R = 1 + \frac{\rho}{n} Kd$$

where: R = retardation factor
ρ = bulk density (kg/L) or (g/cc)
n = effective porosity
Kd = distribution coefficient

$$Kd = FOC \times Koc$$

where:
Kd = distribution coefficient (ug/kg/ug/L)
FOC = soil organic carbon content (kg/kg)
Koc = organic carbon partition coefficient (ug/kg carbon/ug/L)

Assumptions:
FOC_1 = 5.95e-4 (site 1) (mean of measured values)
FOC_2 = 1.3e-3 (site 2) (mean of measured values)
FOC_3 = 1.6e-2 (site 3) (mean of measured values)
ρ_1 = 1.4 g/cc (site 1) (mean of measured values)
ρ_2 = 1.9 g/cc (site 2) (mean of measured values)
ρ_3 = 2.0 g/cc (site 3) (mean of measured values)
n = 0.3 (unconsolidated mixed sand and gravel; Fetter, 1988)

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K_{oc} toluene = 300 (see Table 5-3)

Sample Calculation:

$$K_d = (F_{OC})(K_{oc}) = \left(1.6 \times 10^{-2} \frac{kg\,C}{kg\,soil}\right)\left(300 \frac{ug/kg\,C}{ug/L}\right)$$

$$= 4.8 \; ug/kg/ug/L$$

$$R = 1 + \frac{\rho}{n} K_d = 1 + \left(\frac{2.0 \frac{kg}{L}}{0.3}\right)\left(4.8 \frac{ug/kg}{ug/L}\right)$$

$$\boxed{R = 33}$$

References: Fetter, C.W. 1988. Applied Hydrogeology. Merril Publishing Co, Columbus OH.

I.5

DERMAL EXPOSURE GROUNDWATER

NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 3
SUBJECT: Dermal Exposure Groundwater - Benz page 1,1- Dichloroethene - Adult Resident		CHECKED BY: [illegible]	DATE: 1/28/91

Objective: Determine dermal exposure to groundwater chemicals.

Approach: Estimate intake and use chemical-specific factors and ~~dermal~~ [illegible] 1/22 ingestion (oral) RFDs and cancer slope factors to estimate risk.

Relevant Equations:

$$DEX = \frac{C \cdot SA \cdot PC \cdot ET \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

where: DEX = dermal exposure dose (mg/kg/day)
C = chemical conc. in water (mg/L)
SA = skin surface area available for contact (cm^2)
PC = dermal permeability constant of water (cm/hr)
ET = exposure time (hr/day)
EF = exposure frequency (day/yr)
ED = exposure duration (yr)
BW = body weight (kg)
AT = averaging time (days)
CF = conversion factor (1000 cm^3/L)

$$HQ = \frac{DEX}{RFD}$$

where: HQ = Hazard Quotient
DEX = dermal exposure dose (mg/kg/day)
RFD = oral risk reference dose (mg/kg/day)

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$$CR = DEX \cdot CSF$$

where: CR = estimated cancer risk
DEX = dermal exposure dose (mg/kg/day)
RFD = oral risk reference dose $(mg/kg/day)^{-1}$

Assumptions: C = Representative conc. 1,1-dichloroethene (0.0547 mg/L)
$SA = 19400\ cm^2$ (see Table 6-12)
$PC = 8 \times 10^{-4}$ cm/hr (based on H_2O)
ET = 0.20 hr/day (see Table 6-12)
EF = 350 day/yr (see Table 6-12)
ED = 30 yr (adult resident; see Table 6-12)
BW = 70 kg (see Table 6-12)
AT = 365 day/yr × 30 yr (noncarcinogenic)
= 365 day/yr × 70 yr (carcinogenic)

Sample Calculations:

NONCARCINOGENIC, ADULT RESIDENT

$$DEX = \frac{C \cdot SA \cdot PC \cdot ET \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

$$= \frac{(0.0547\ mg/L)(19400\ cm^2)(8\times10^{-4}\ \tfrac{cm}{hr})(0.20\ \tfrac{hr}{day})(350\ \tfrac{day}{yr})(30\ yr)}{(70\ kg)(365\ \tfrac{day}{yr} \cdot 30\ yr)(1000\ \tfrac{cm^3}{L})}$$

$= 2.\cancel{48}\ 33 \times 10^{-6}$ mg/kg/day
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CARCINOGENIC, ADULT RESIDENT

$$DCX = \frac{C \cdot SA \cdot PC \cdot ET \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

$$= \frac{(0.0547 \frac{mg}{L})(19400\ cm^2)(8 \times 10^{-4} \frac{cm}{hr})(0.2 \frac{hr}{day})(350 \frac{day}{yr})(30\ yr)}{(70\ kg)(365 \frac{day}{yr} \cdot 70\ yr)(1000 \frac{cm^3}{L})}$$

$$= 9.97 \times 10^{-7}\ mg/kg/day$$

NONCARC. RISK

$$HQ = \frac{DCX}{RfD} = \frac{2.33 \times 10^{-6}\ mg/kg/day}{9 \times 10^{-3}\ mg/kg/day}$$

$$= 2.58 \times 10^{-4}$$

CARC. RISK

$$CR = CSF \cdot DCX = (6 \times 10^{-1} (mg/kg/day)^{-1})(9.97 \times 10^{-7}\ mg/kg/day)$$

$$= 5.98 \times 10^{-7}$$

References: USEPA, December 1989. Risk Assessment Guidance for Superfund Sites. Vol. I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response. EPA 540/1-89/002.

I.6

INHALATION OF GROUNDWATER

NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 7
SUBJECT: Inhalation of Groundwater - Bethpage		CHECKED BY: [signature]	DATE: 1/28/92

1,1- Dichloroethene, Adult Resident, Current Groundwater

Objective: Determine intakes of groundwater chemicals emitted during showering (via inhalation exposure).

Approach: Use Foster and Chrostowski model; calculates risks from estimated exposure.

Relevant Equations:

$$IEX = \frac{S \cdot IR \cdot EF \cdot ED}{BW \cdot AT \cdot Ra \cdot CF}\left[D_S + \frac{e^{-Ra\,D_T}}{Ra} - \frac{e^{Ra(D_S - D_T)}}{Ra}\right]$$

where: IEX = Inhalation exposure dose (mg/kg/day)
S = Volatile chemical generation rate (ug/m³/min)
EF = Exposure frequency (days/yr)
ED = Exposure duration (yr)
BW = Body weight (kg)
AT = Averaging time (days)
CF = Conversion factor (1×10^6 L/m³ ~~mg/kg~~ mg/ug) JPH 1/28
Ra = Air exchange rate (min^{-1})
Ds = Shower duration (min)
D_T = Total time in shower room (min)
IR = Inhalation rate (L/min)

$$S = \frac{(C_{wd} \cdot FR)}{SV}$$

where: S = Volatile chemical generation rate (ug/m³/min)
C_{wd} = concentration leaving shower droplet (ug/L)
FR = Shower flow rate (L/min)
SV = Shower room air volume (m³).

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$$C_{wd} = C_{wo}\left[1 - \exp(-K_{aL} t_s)/60d)\right]$$

where: C_{wo} = Conc. of chemical in shower water (ug/L)
K_{aL} = Adjusted overall mass transfer coefficient (cm/hr)
t_s = Shower droplet time (sec)*
d = Shower droplet diameter)(mm)*

[* Units cancel as follows:

The term $\frac{6}{d}$ is introduced to account for the surface area to volume ratio: $A = 4\pi r^2$
$V = 4/3\pi r^3$

$$\frac{A}{V} = \frac{4\pi r^2}{4/3\pi r^3} = \frac{3}{r} = \frac{3}{d/2} = \frac{6}{d}$$

$$\left(\frac{6}{d\ \text{mm}}\right)\left(K_{aL}\frac{\text{cm}}{\text{hr}}\right)\left(10\frac{\text{mm}}{\text{cm}}\right)(t_s\ \text{sec})\left(\frac{\text{hr}}{3600\ \text{sec}}\right) = \frac{K_{aL}t_s}{60d}$$]

$$K_{aL} = K_L\left(T_1 m_2 / T_s m_1\right)^{-1/2}$$

where: K_L = Overall mass transfer coefficient
T_1 = Calibration water temp of K_L (K)
T_s = Shower water temp (K)
m_1 = Viscosity of water at T_1 (cp)
m_2 = Viscosity of water at T_s (cp)
cp = centipoise

$$K_L = \frac{1}{\frac{1}{k_\ell} + \frac{RT}{H k_g}}$$

where: k_ℓ = Liquid phase mass transfer coeff. (cm/hr)
k_g = Gas phase mass transfer coefficient (cm/hr)
T = Temp. corresponding to Henry's Law constant (K)

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R = Ideal gas law constant $\left(\frac{atm\ m^3}{mol\ K}\right)$

H = Henry's Law Constant $\left(\frac{atm\ m^3}{mol}\right)$

$HQ = \frac{IEX}{RfD}$ where: HQ = Hazard Quotient
IEX = Inhalation exposure dose (mg/kg/day)
RfD = Inhalation risk reference dose (mg/kg/day)

CR = IEX · CSF where: CR = Estimated cancer risk
IEX = Inhalation exposure dose (mg/kg/day)
CSF = Inhalation cancer slope factor $(mg/kg/day)^{-1}$

~~Assumptions~~: JRH 1/28 $K_l = 20\ \frac{cm}{hr}\left[\frac{44}{MW}\right]^{1/2}$

where: K_l = Liquid phase mass transfer coefficient (cm/hr)
MW = Molecular weight of chemical (g)

$K_g = 3000\ \frac{cm}{hr}\left[\frac{18}{MW}\right]^{1/2}$

where: K_g = Gas phase mass transfer coefficient (cm/hr)
MW = Molecular weight of chemical (g)

Assumptions:
K_l is based on K_l for CO_2
K_g is based on K_g for H_2O
IR = 10.4 L/min (see Table 6-13)
BW = 70 kg (see Table 6-13)
Ds = 12 min (see Table 6-13)

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AT = 365 day/yr (non-carc) ; 365 day/yr · 70yr (carc.) · 30yr

D_f = 20 min (see Table 6-13)

R_a = 8.3×10^{-3} min^{-1} (Assume ½ volume/hr)

FR = 10 L/min (see Table 6-13)

SV = 12 m^3 (see Table 6-13)

d = 1 mm (see Table 6-13)

t_s = 2 sec (see Table 6-13)

T_1 = 293 K (20 C) (see Table 6-13)

Ts = 318 K (45 C) (see Table 6-13)

m_1 = 0.982 cp (see Table 6-13)

m_2 = 0.616 cp (see Table 6-13)

T = 293 K (see Table 6-13)

R = $8.2 \times 10^{-5} \frac{atm\ m^3}{mol\ K}$ (see Table 6-13)

C_{wo} = Representative conc. of 1,1-dichloroethene = 54.7 ug/L (see Table 6-6)

MW = 96.94 g (see Table 5-3)

RfD = Not available

CSF = 1.2 $(mg/kg/day)^{-1}$ (USEPA, Jan 1991)

H = $1.9 \times 10^{-1} \frac{atm\ m^3}{mol}$ (see Table 5-3)

~~CF = 1000 ug/mg~~ JRH 1/28

Sample Calculations:

$$K_\ell = 20 \frac{cm}{hr} \sqrt{\frac{44}{MW}} = 20 \frac{cm}{hr} \sqrt{\frac{44g}{96.94g}} = 13.47 \frac{cm}{hr}$$

$$K_g = 3000 \frac{cm}{hr} \left[\frac{18}{MW}\right]^{1/2} = 3000 \frac{cm}{hr} \sqrt{\frac{18g}{96.94g}} = 1292.7 \frac{cm}{hr}$$

$$K_L = \frac{1}{\frac{1}{K_\ell} + \frac{RT}{HK_g}} = \frac{1}{\frac{1}{13.47\frac{cm}{hr}} + \frac{(8.2 \times 10^{-5} \frac{atm\ m^3}{mol\ K})(293\ K)}{(1.9 \times 10^{-1} \frac{atm\ m^3}{mol})(1292.7 \frac{cm}{hr})}}$$

$$= \frac{1}{0.074 \frac{hr}{cm} + 9.7 \times 10^{-5} \frac{hr}{cm}} = 13.5 \frac{cm}{hr}$$

$$K_{aL} = K_L \frac{1}{\sqrt{\frac{T_1 m_2}{T_s m_1}}} = 13.5 \frac{cm}{hr} \frac{1}{\sqrt{\frac{293\,K \cdot 0.616\,cp}{318\,K \cdot 0.982\,cp}}}$$

$$= 17.76 \frac{cm}{hr}$$

$$C_{wd} = C_{wo}\left[1 - e^{-\frac{K_{aL} t_s}{60 d}}\right]$$

$$= \left(54.7 \frac{ug}{L}\right)\left[1 - e^{-\frac{(17.76)(2)}{(60)(1)}}\right] = 24.4\ ug/L$$

$$S = \frac{C_{wd} \cdot FR}{SV} = \frac{\left(24.4 \frac{ug}{L}\right)\left(10 \frac{L}{min}\right)}{12\ m^3} = 20.3 \frac{ug}{m^3 min}$$

For $IEX = \frac{S \cdot IR \cdot EF \cdot ED}{BW \cdot AT \cdot Ra \cdot CF}\left[D_s + \frac{e^{-Ra\,D_T}}{Ra} - \frac{e^{Ra(D_S - D_T)}}{Ra}\right]$,

Let $K = D_s + \frac{e^{-Ra\,D_T}}{Ra} - \frac{e^{Ra(D_S - D_T)}}{Ra}$

$$K = 12 min + \frac{e^{-(8.3\times10^{-3} min^{-1})(20 min)} - e^{(8.3\times10^{-3} min^{-1})(\cancel{20}\ 12 min - 20 min)}}{8.3\times10^{-3} min^{-1}}$$

JRH 1/28

$$= 12 min + \frac{e^{-1.66\times10^{-1}} - e^{-6.64\times10^{-2}}}{8.3\times10^{-3} min^{-1}} = 12 min + \frac{0.847 - 9.36\times10^{-1}}{8.3\times10^{-3} min^{-1}}$$

JRH 1/28

$$= 12 min - \frac{1.07\times10^{+1}}{min^{-1}} = \cancel{144 mi} = 1.3 min$$

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NONCARCINOGENIC:

$$IEX = \frac{S \cdot IR \cdot EF \cdot ED \cdot K}{BW \cdot AT \cdot Ra \cdot CF}$$

$$= \frac{\left(20.3 \frac{ug}{m^3 min}\right)\left(10.4 \frac{L}{min}\right)\left(350 \frac{day}{yr}\right)(30 yr)(1.3 min)}{(30 yr)(70 kg)\left(365 \frac{day}{yr}\right)(8.3 \times 10^{-3} min^{-1})\left(10^6 \frac{L \cdot ug}{m^3 mg}\right)}$$

$$= \boxed{4.5 \times 10^{-4} \frac{mg}{kg} \text{ (per day)}}$$

No Inhalation RfD ∴ no HQ calculable

CARCINOGENIC:

$$ICX = \frac{S \cdot IR \cdot EF \cdot ED \cdot K}{BW \cdot AT \cdot Ra \cdot CF}$$

$$= \frac{\left(20.3 \frac{ug}{m^3 min}\right)\left(10.4 \frac{L}{min}\right)\left(350 \frac{day}{yr}\right)(30 yr)(1.3 min)}{(70 kg)\left(365 \frac{day}{yr} \cdot 70 yr\right)(8.3 \times 10^{-3} min^{-1})\left(10^6 \frac{L \cdot ug}{m^3 mg}\right)}$$

$$= \boxed{1.94 \times 10^{-4} \text{ mg/kg (per day)}}$$

$$CR = CSF \cdot IEX = \frac{1.2}{mg/kg/day} \cdot 1.94 \times 10^{-4} \text{ mg/kg/day}$$

$$= \boxed{2.33 \times 10^{-4}}$$

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<u>References:</u>

Foster, SA and PC Chrostowski, 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. Presented at the 80th Annual Meeting of the Air Pollution Control Association, New York, June.

USEPA, December 1989. Risk Assessment Guidance for Superfund Sites Vol I. Interim Final. OERR, EPA 540/1-89/002.

USEPA, Jan. 1991. Health Effects Assessment Summary Tables. OERR, Washington, DC. OERR 9200.6-303(91-1).

NUS 156A REVISED 0285

NYSDEC 032464

I.7

GROUNDWATER INGESTION

NUS CORPORATION AND SUBSIDIARIES			STANDARD CALCULATION SHEET
CLIENT: NavyCLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 2
SUBJECT: Groundwater Ingestion - Bethpage		CHECKED BY: [illegible]	DATE: 1/28/92

1,1-Dichloroethene - Current Groundwater (Monitoring Wells) - Adult Employees

Objective: Determine oral exposure to groundwater chemicals

Approach: Estimate exposure based on estimated intake; determine risks using RfD and cancer slope factors.

Relevant Equations:

$$IEX = \frac{C \cdot IR \cdot EF \cdot ED}{BW \cdot AT}$$

where: IEX = Ingestion exposure (mg/kg/day)
IR = Ingestion rate (L/day)
C = Groundwater representative concentration (mg/L)
EF = Exposure frequency (days/yr)
ED = Exposure duration (yr)
BW = Body weight (kg)
AT = Averaging time (days)

(Source USEPA, Dec. 1989)

Assumptions: C = 0.0547 mg/L for 1,1-dichloroethene (see Table 4-12)
IR = 1 L/day (see Table 6-11)
EF = 250 days/yr (see Table 6-11)
ED = 25 yr (see Table 6-11)
BW = 70 kg (see Table 6-11)
AT = $365 \frac{days}{yr} \times 25$ yr (noncarc.)
= $365 \frac{days}{yr} \times 70$ yr (carc.)
RfD oral = 9×10^{-3} mg/kg/day (USEPA, Jan. 1991)
CSF oral = 6×10^{-1} (mg/kg/day)$^{-1}$ (USEPA, Jan. 1991)

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Sample Calculations:

NONCARCINOGENIC:

$$IEX = \frac{C \cdot IR \cdot EF \cdot ED}{BW \cdot AT} = \frac{(.0547\,\frac{mg}{L})(1\,\frac{L}{day})(250\,\frac{day}{yr})(25\,yr)}{(70\,kg)(365\,\frac{day}{yr} \cdot 25\,yr)}$$

$$= \boxed{5.3 \times 10^{-4}\ mg/kg/day}$$

$$\text{Hazard Quotient} = \frac{IEX}{RfD} = \frac{5.3 \times 10^{-4}\ mg/kg/day}{9 \times 10^{-3}\ mg/kg/day}$$

$$= \boxed{5.89 \times 10^{-2}}$$

CARCINOGENIC:

$$IEX = \frac{C \cdot IR \cdot EF \cdot ED}{BW \cdot AT} = \frac{(.0547\,\frac{mg}{L})(1\,\frac{L}{day})(250\,\frac{day}{yr})(25\,yr)}{(70\,kg)(365\,\frac{day}{yr} \cdot 70\,yr)}$$

$$= \boxed{1.9 \times 10^{-4}\ mg/kg/day}$$

$$\text{Cancer Risk} = IEX \cdot CSF = (1.9 \times 10^{-4}\ mg/kg/day)\ \frac{6 \times 10^{-1}}{mg/kg/day}$$

$$= \boxed{1.14 \times 10^{-4}}$$

References: USEPA, Dec. 1989. Risk Assessment Guidance for Superfund Sites. Vol I. Interim Final. OERR, EPA 540/1-89/002.

USEPA, Jan. 1991. Health Effects Assessment Summary Tables. OERR, Washington, DC. OERR 9200.6-303(91-1).

I.8

DERMAL SOIL EXPOSURE

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SUBJECT: Dermal Soil Exposure - Bethpage		CHECKED BY:	DATE: 2/27/92

Assumptions:

C = Representative soil conc. = 1.298 mg/kg
SA = 2950 cm^2/day (see Table 6-14)
AF = 1.45 mg/cm^2 (see Table 6-14)
ABS = 0.05 for BNA (see Table 6-14)
EF = 30 days/yr (see Table 6-14)
ED = 25 yrs (see Table 6-14)
BW = 70 kg (see Table 6-14)
CF = 10^6 mg/kg
AT = $365 \frac{days}{yr} \cdot 25 yr$ (noncarc.)

$365 \frac{days}{yr} \cdot 70 yr$ (carc.)

RFD = 2×10^{-2} mg/kg/day (USEPA, Jan. 1991)
CSF = 1.4×10^{-2} $(mg/kg/day)^{-1}$ (USEPA, Jan. 1991)

Sample Calculations:

NONCARCINOGENIC

$$DEX_{NC} = \frac{C \cdot SA \cdot AF \cdot ABS \cdot EF \cdot ED}{BW \cdot AT \cdot CF} = \frac{(1.298 \frac{mg}{kg})(2950 \frac{cm^2}{day})(1.45 \frac{mg}{cm^2})(0.05)(30 \frac{days}{yr})(25 yr)}{(70 kg)(365 \frac{days}{yr} \cdot 25 yr)(10^6 \frac{mg}{kg})}$$

$$= 3.3 \times 10^{-7} mg/kg/day$$

$$HQ = \frac{DEX_{NC}}{RFD} = \frac{3.3 \times 10^{-7} mg/kg/day}{2 \times 10^{-2} mg/kg/day} = \boxed{1.63 \times 10^{-5}} \cancel{mg/kg}$$

JRH 2/27

CARCINOGENIC

$$DEX_C = \frac{C \cdot SA \cdot AF \cdot ABS \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

$$= \frac{(1.298 \frac{mg}{kg})(2950 \frac{cm^2}{day})(1.45 \frac{mg}{cm^2})(.05)(30 \frac{days}{yr})(25 yr)}{(70 kg)(365 \frac{days}{yr} \cdot 70 yr)(10^6 \frac{mg}{kg})}$$

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SUBJECT: Dermal Soil Exposure - Bethpage		CHECKED BY:	DATE: 2/27/92

Bis(2-ethylhexyl)phthalate in Surface Soil Site 3, Adult Employee

Objective: Determine soil exposure to chemicals via dermal exposure.

Approach: Estimate intake, calculate exposure and use RfD and cancer slope factors (oral) to estimate risks.

Relevant Equations:

$$DEX = \frac{C \cdot SA \cdot AF \cdot ABS \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

where: DEX = Dermal exposure dose (mg/kg/day)
SA = Exposed skin surface area (cm^2/day)
AF = Adherence factor (mg/cm^2)
ABS = Absorption fraction
EF = Exposure frequency (days/yr)
ED = Exposure duration (yr)
BW = Body weight (kg)
AT = Averaging time (days)
CF = Conversion factor (10^6 mg/kg)
C = Chemical conc. in soil (mg/kg)

$$HQ = \frac{DEX}{RfD}$$ where: HQ = Hazard Quotient
RfD = Risk reference dose (mg/kg/day)
DEX = Dermal exposure dose (mg/kg/day)

$CR = CSF \cdot DEX$ where: CR = Estimated cancer risk
CSF = Oral cancer slope factor $(mg/kg/day)^{-1}$
DEX = Dermal exposure dose (mg/kg/day)

(Source: USEPA, Dec. 1989)

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NYSDEC 032470

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$$DEX_c = 1.16 \times 10^{-7} \text{ mg/kg/day}$$

$$CR = DEX_c \cdot CSF = 1.16 \times 10^{-7} \text{ mg/kg/day} \cdot \frac{1.4 \times 10^{-2}}{\text{mg/kg/day}}$$

$$= \boxed{1.63 \times 10^{-9}}$$

References: USEPA, Dec. 1989. Risk Assessment Guidance for Superfund Sites. Vol. I. Interim Final. OERR, EPA 540/1-89/002.

USEPA, Jan. 1991. Health Effects Assessment Summary Tables. OERR, Washington, DC. OERR 9200.6-303(91-1).

I.9

INCIDENTAL SOIL INGESTION

NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
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SUBJECT: Incidental Soil Ingestion - Bethpage		CHECKED BY:	DATE: 1/28/92

Bis(2-ethylhexyl) phthalate - Surface Soil Site 2, ~~Adult~~ Employee

<u>Objective:</u> Determine soil exposure to chemicals via incidental ingestion.

<u>Approach:</u> Estimate intake, calculate exposure and use RFD and cancer slope factors to estimate risks.

<u>Relevant Equations:</u>

$$IEX = \frac{C \cdot IR \cdot Fi \cdot EF \cdot ED}{BW \cdot AT \cdot CF}$$

where:

IEX = Ingestion exposure dose (mg/kg/day)
C = ~~Mean~~ Representative concentration in soil (mg/kg) SRH 1/28
Fi = Fraction from contaminated source
EF = Exposure frequency (events/yr)
ED = Exposure duration (yrs)
BW = Body weight (kg)
AT = Averaging time (days)
CF = Conversion factor (10^6 mg/kg)
IR = Ingestion rate (mg/day)

$$HQ = \frac{IEX}{RFD}$$ where: HQ = Hazard Quotient
RFD = Oral Risk reference dose (mg/kg/day)
IEX = Ingestion dose (mg/kg/day)

$$CR = CSF \cdot IEX$$ where: CR = Estimated oral cancer risk
CSF = Cancer slope factor $(mg/kg/day)^{-1}$
IEX = Ingestion dose (mg/kg/day)

(Source, USEPA, Dec. 1989)

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NUS CORPORATION AND SUBSIDIARIES — STANDARD CALCULATION SHEET

CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 2 OF 3
SUBJECT: Incidental Soil Ingestion - Bethpage		CHECKED BY: DSC	DATE: 1/28/92

Assumptions:

$C = 0.188$ mg/kg (see Table 6-1)
$F_i = 0.1$ (see Table 6-15)
$EF = \cancel{50}$ 30 days/yr (see Table 6-15)
JMH 1/28

$ED = 25$ yrs (see Table 6-15)
$IR = 50$ mg soil/day (see Table 6-15)
$BW = 70$ kg (see Table 6-15)
$AT = 365 \frac{days}{yr} \cdot 25$ yr (noncarcinogenic)
$= 365 \frac{days}{yr} \cdot 70$ yr (carcinogenic)

$CF = 10^6$ mg/kg
$RfD = 2 \times 10^{-2}$ mg/kg/day (USEPA, Jan. 1991)
$CSF = 1.4 \times 10^{-2}$ (mg/kg/day)$^{-1}$ (USEPA, Jan. 1991)

Sample Calculations:

NONCARCINOGENIC

$$IEX = \frac{C \cdot IR \cdot Fi \cdot EF \cdot ED}{BW \cdot AT \cdot CF} = \frac{(0.188 \frac{mg}{kg})(50 \frac{mg}{day})(0.1)(30 \frac{days}{yr})(25 yr)}{(70 kg)(365 \frac{days}{yr} \cdot 25 yr)(10^6 \frac{mg}{kg})}$$

$$= \boxed{1.1 \times 10^{-9} \text{ mg/kg/day}}$$

$$HQ = \frac{IEX}{RfD} = \frac{1.1 \times 10^{-9} \text{ mg/kg/day}}{2 \times 10^{-2} \text{ mg/kg/day}} = \boxed{5.52 \times 10^{-8}}$$

CARCINOGENIC

$$IEX = \frac{C \cdot IR \cdot Fi \cdot EF \cdot ED}{BW \cdot AT \cdot CF} = \frac{(0.188 \frac{mg}{kg})(50 \frac{mg}{day})(0.1)(30 \frac{days}{yr})(25 yr)}{(70 kg)(365 \frac{days}{yr} \cdot 70 yr)(10^6 \frac{mg}{kg})}$$

$$= \boxed{3.9 \times 10^{-10} \text{ mg/kg/day}}$$

CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 3 OF 3
SUBJECT: Incidental Soil Ingestion - Bethpage		CHECKED BY: DJC	DATE: 1/28/92

$$CR = CSF \cdot IEX = \left(\frac{1.4 \times 10^{-2}}{mg/kg/day}\right)(3.9 \times 10^{-10}\ mg/kg/day)$$

$$= \boxed{5.52 \times 10^{-12}}$$

References:

USEPA, Dec. 1989. Risk Assessment Guidance for Superfund Sites. Vol I. Interim Final. OERR, EPA 540/1-89/002.

USEPA, Jan. 1991. Health Effects Assessment Summary Tables. OERR, Washington, DC. OERR 9200.6-303(91-1).

I.10

BACKGROUND "B" CALCULATIONS

NUS CORPORATION AND SUBSIDIARIES			*STANDARD CALCULATION SHEET*
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 1 OF 2
SUBJECT: Background "B" Calc. - Bethpage		CHECKED BY:	DATE: 2/27/92

Potassium, Mercury in Background soil

Objective: Determine a single concentration for background soil inorganics from four background samples.

Approach: Value should be relative to mean and standard deviation, and should exceed maximum background concentration to allow for variability due to inhomogeneity of soil samples.

Relevant Equations:

$$\bar{x} = \frac{\Sigma x_i}{n}$$

where: $\bar{x}$ = Arithmetic mean
x_i = Individual sample value
n = Number of samples

$$s = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}}$$

where: s = Standard deviation
x_i = Individual sample value
n = Number of samples

$$B = 1.645\,S + \bar{x}$$

where: B = Desired sample value
S = Standard deviation
$\bar{x}$ = Arithmetic mean
1.645 = t-Distribution for Upper 95% confidence limit for infinite degrees of freedom

Assumptions: Where at least one positive result detected, use ½ detection limit for non-detects

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NUS CORPORATION AND SUBSIDIARIES		STANDARD CALCULATION SHEET	
CLIENT: Navy CLEAN	FILE NO.: 3281	BY: J. Hubbard	PAGE 2 OF 2
SUBJECT: Background "B" - Bethpage		CHECKED BY:	DATE: 2/27/92

Sample Calculations:

Potassium (mg/kg) $n=4$

x_i	x_i^2
478	228484
644	414736
503	253009
353	124609
$\Sigma x_i = 1978$	$\Sigma x_i^2 = 1020838$

JRH 2/27

$$\bar{x} = \frac{\Sigma x_i}{n} = \frac{1978}{4} = 494.5$$

$$s = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}} = \sqrt{\frac{1020838 - \frac{1978^2}{4}}{4-1}} = 119.3$$

$$B = (1.645)(119.3) + 494.5 = 690.8 \approx \boxed{690 \text{ mg/kg}}$$

Mercury (mg/kg) $n=4$

x_i	x_i^2
0.05 (½ DL)	0.0025
0.055 (½ DL)	0.003025
0.14	0.0196
0.055 (½ DL)	0.003025
$\Sigma x_i = 0.3$	$0.02815 = \Sigma x_i^2$

$$\bar{x} = \frac{\Sigma x_i}{n} = \frac{0.3}{4} = 0.075$$

$$s = \sqrt{\frac{\Sigma x_i^2 - \frac{(\Sigma x_i)^2}{n}}{n-1}} = \sqrt{\frac{0.02815 - \frac{0.3^2}{4}}{4-1}} = 0.043$$

$$B = \bar{x} + 1.645 s = 0.075 + (1.645)(0.043)$$

$$= 0.146 \approx \boxed{0.15 \text{ mg/kg}}$$

NUS 155A REVISED 0285

I.11

UPPER 95% CONFIDENCE LIMIT CALCULATION

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acenapthene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	41	6468.755
2	53	4682.469
3	175	2869.898
4	51	4960.184
5	175	2869.898
6	180	3430.612
7	175	2869.898
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 121.4286 Std. Dev.: 68.49783

Upper 95% confidence limit on mean: 184.7808

Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Phenanthrene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	400	3430.612
2	600	66859.18
3	140	40573.47
4	700	128573.5
5	140	40573.47
6	200	20002.04
7	210	17273.47
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 341.4286 Std. Dev.: 229.9586

Upper 95% confidence limit on mean: 554.1125

Representative Concentration: 554.1125

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Anthracene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	43	6841.653
2	66	3565.796
3	175	2429.082
4	66	3565.796
5	175	2429.082
6	180	2946.939
7	175	2429.082
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 125.7143 Std. Dev.: 63.51828

Upper 95% confidence limit on mean: 184.4610 Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	740	49030.61
2	740	49030.61
3	190	107959.2
4	1100	338059.2
5	260	66859.18
6	260	66859.18
7	340	31887.76
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 518.5714 Std. Dev.: 343.9200

Upper 95% confidence limit on mean: 836.6558 Representative Concentration: 836.6558

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	710	45308.16
2	830	110793.9
3	200	88293.88
4	950	205079.6
5	240	66122.45
6	270	51593.88
7	280	47151.02
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 497.1429 Std. Dev.: 319.9851

Upper 95% confidence limit on mean: 793.0904 Representative Concentration: 793.0904

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	350	11479.59
2	310	4508.163
3	130	12736.73
4	420	31379.59
5	150	8622.449
6	190	2193.878
7	150	8622.449
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 242.8571 Std. Dev.: 115.5731

Upper 95% confidence limit on mean: 349.7483

Representative Concentration: 349.7483

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chrysene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	420	11175.51
2	470	24246.94
3	190	15446.94
4	580	70604.08
5	170	20818.37
6	170	20818.37
7	200	13061.22
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 314.2857 Std. Dev.: 171.3532

Upper 95% confidence limit on mean: 472.7667

Representative Concentration: 472.7667

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[b]fluoranthene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	670	80008.16
2	380	51.02041
3	250	18808.16
4	680	85765.31
5	230	24693.88
6	270	13722.45
7	230	24693.88
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 387.1429 Std. Dev.: 203.2006

Upper 95% confidence limit on mean: 575.0788

Representative Concentration: 575.0788

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Surface soil Site I

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	350	625
2	460	18225
3	175	22500
4	620	87025
5	180	21025
6	240	7225
7	250	5625
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 325 Std. Dev.: 164.4435

Upper 95% confidence limit on mean: 477.0904

Representative Concentration: 477.0904

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN.

Enter Chemical: Benzo[a]pyrene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	500	28416.33
2	440	11787.76
3	190	20002.04
4	620	83273.47
5	190	20002.04
6	200	17273.47
7	180	22930.61
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 331.4286 Std. Dev.: 184.2488

Upper 95% confidence limit on mean: 501.8364

Representative Concentration: 501.8364

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Indeno[1,2,3-c,d]pyrene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	350	12736.73
2	290	2793.878
3	110	16165.31
4	430	37193.88
5	150	7593.878
6	190	2222.449
7	140	9436.735
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 237.1429 Std. Dev.: 121.2043

Upper 95% confidence limit on mean: 349.2422

Representative Concentration: 349.2422

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Dibenz[a,h]anthracene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	150	293.8776
2	130	1379.592
3	175	61.73469
4	185	318.8776
5	175	61.73469
6	180	165.3061
7	175	61.73469
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 167.1429 Std. Dev.: 19.76047

Upper 95% confidence limit on mean: 185.4189 Representative Concentration: 185

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Surface soil Site I

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	350	10875.51
2	310	4132.653
3	150	9161.224
4	420	30375.51
5	150	9161.224
6	190	3104.082
7	150	9161.224
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 245.7143 Std. Dev.: 112.5251

Upper 95% confidence limit on mean: 349.7864

Representative Concentration: 349.7864

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	2.698980
2	1	9.877551
3	11.5	54.12755
4	3	1.306122
5	2.5	2.698980
6	6	3.448980
7	2.5	2.698980
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Aritm. Mean: 4.142857 Std. Dev.: 3.579040

Upper 95% confidence limit on mean: 7.453036

Representative Concentration: 7.453036

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 4,4'-DDE
Enter Matrix: Surface soil Site 1

Enter number of samples: 2
Degrees of Freedom: 1

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	270	1225
2	340	1225
3		0
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 305 Std. Dev.: 49.49747

Upper 95% confidence limit on mean: 749.71

Representative Concentration: 340

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 4,4'-DDt
Enter Matrix: Surface soil Site 1

Enter number of samples: 2
Degrees of Freedom: 1

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	7225
2	340	7225
3		0
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 255 Std. Dev.: 120.2082

Upper 95% confidence limit on mean: 1335.01

Representative Concentration: 340

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: gamma-Chlordane
Enter Matrix: Surface soil Site 1

Enter number of samples: 2
Degrees of Freedom: 1

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	240	532900
2	1700	532900
3		0
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 970 Std. Dev.: 1032.376

Upper 95% confidence limit on mean: 10245.38

Representative Concentration: 1700

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aroclor 1248
Enter Matrix: Surface soil Site I

Enter number of samples: 2
Degrees of Freedom: 1

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7900	40000
2	7500	40000
3		0
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7700 Std. Dev.: 282.8427

Upper 95% confidence limit on mean: 10241.2

Representative Concentration: 7900

NYSDEC 032497

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluorene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	1070.224
2	42	9079.367
3	175	1422.367
4	44	8702.224
5	175	1422.367
6	180	1824.510
7	175	1422.367
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 137.2857 Std. Dev.: 64.47665

Upper 95% confidence limit on mean: 196.9188 Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	1358.449
2	80	2824.163
3	105	792.0204
4	130	9.877551
5	175	1752.020
6	200	4469.878
7	72	3738.449
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 133.1429 Std. Dev.: 49.90801

Upper 95% confidence limit on mean: 179.3017

Representative Concentration: 179.3017

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Tetrachloroethene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	68.65306
2	3	60.61735
3	51	1617.189
4	3	60.61735
5	2.5	68.65306
6	2.5	68.65306
7	11	.0459184
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.78571 Std. Dev.: 18.00198

Upper 95% confidence limit on mean: 27.43537

Representative Concentration: 27.43537

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: 2-Methylnaphthalene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	147.4490
2	185	736.7347
3	55	10579.59
4	185	736.7347
5	175	293.8776
6	160	4.591837
7	175	293.8776
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 157.8571 Std. Dev.: 46.17513

Upper 95% confidence limit on mean: 200.5636

Representative Concentration: 185

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Butylbenzylphthalate
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	61.73469
2	185	522.4490
3	120	1776.020
4	185	522.4490
5	180	318.8776
6	120	1776.020
7	175	165.3061
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 162.1429 Std. Dev.: 29.27700

Upper 95% confidence limit on mean: 189.2205

Representative Concentration: 185

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Naphthalene
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	105.7959
2	185	639.3673
3	175	233.6531
4	185	639.3673
5	175	233.6531
6	53	11387.94
7	175	233.6531
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 159.7143 Std. Dev.: 47.38746

Upper 95% confidence limit on mean: 203.5420

Representative Concentration: 185

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4750	1716100
2	10800	22467600
3	7180	1254400
4	4090	3880900
5	3370	7236100
6	7550	2220100
7	4680	1904400
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6060 Std. Dev.: 2603.831

Upper 95% confidence limit on mean: 8468.228

Representative Concentration: 8468.228

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	8.9	54.54878
2	18.6	5.355918
3	14.9	1.920204
4	6.8	89.97878
5	3.4	166.0416
6	55.8	1561.379
7	5.6	114.1845
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 16.28571 Std. Dev.: 18.22731

Upper 95% confidence limit on mean: 33.14377

Representative Concentration: 33.14377

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	10.8	400
2	44.8	196
3	35.8	25
4	28.7	4.41
5	16.4	207.36
6	59	795.24
7	20.1	114.49
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 30.8 Std. Dev.: 17.04162

Upper 95% confidence limit on mean: 46.56143

Representative Concentration: 46.56143

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	243	11071781
2	4490	845611.6
3	5580	4038377.
4	3660	8023.041
5	2870	490600.2
6	6190	6862154.
7	1960	2593480.
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3570.429 Std. Dev.: 2078.061

Upper 95% confidence limit on mean: 5492.384

Representative Concentration: 5492.384

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	25	97.72735
2	18.8	258.7502
3	61.1	687.1888
4	40.3	29.31449
5	20.8	198.4073
6	46.8	141.9502
7	31.4	12.15020
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 34.88571 Std. Dev.: 15.41368

Upper 95% confidence limit on mean: 49.14150

Representative Concentration: 49.14150

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cobalt
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.25	.8229082
2	2.45	.5000510
3	5	3.396122
4	2.45	.5000510
5	2.3	.7346939
6	5.3	4.591837
7	2.35	.6514796
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.157143 Std. Dev.: 1.366086

Upper 95% confidence limit on mean: 4.420607 Representative Concentration: 4.420607

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Copper
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	41	67.00592
2	33.3	252.3559
3	47	4.777347
4	32.5	278.4131
5	24.8	594.6631
6	121	5157.292
7	44.7	20.12163
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 49.18571 Std. Dev.: 32.59506

Upper 95% confidence limit on mean: 79.33221

Representative Concentration: 79.33221

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7331.97	14174311
2	14062.64	8795919.
3	15873.28	22814297
4	7266.89	14668583
5	7817.05	10757079
6	15434.74	18817302
7	9891.37	1453179.
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 11096.85 Std. Dev.: 3904.712

Upper 95% confidence limit on mean: 14708.24 Representative Concentration: 14708.24

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: magnesium
Enter Matrix: Surface soil Site i

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	544	1651592.
2	1740	7946.449
3	2970	1301555.
4	1790	1532.163
5	1450	143749.3
6	3100	1615078.
7	1210	383337.9
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1829.143 Std. Dev.: 922.3874

Upper 95% confidence limit on mean: 2682.240 Representative Concentration: 2682.240

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Nickel
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	6.5	30.88184
2	9.1	8.744694
3	13.9	3.396122
4	9.2	8.163265
5	15.8	14.00898
6	19.2	51.02041
7	10.7	1.841837
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 12.05714 Std. Dev.: 4.435785

Upper 95% confidence limit on mean: 16.15971 Representative Concentration: 16.15971

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	368	17161
2	600	10201
3	550	2601
4	460	1521
5	424	5625
6	648	22201
7	443	3136
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 499 Std. Dev.: 102.0180

Upper 95% confidence limit on mean: 593.3543

Representative Concentration: 593.3543

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Silver
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.9	.1830617
2	.135	1.787951
3	.63	.7092046
4	.38	1.192776
5	.4	1.149490
6	.56	.8320046
7	6.3	23.30820
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.472143 Std. Dev.: 2.204643

Upper 95% confidence limit on mean: 3.511171 Representative Concentration: 3.511171

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Cnemical: Sodium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CROL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	204	19281.31
2	244	9772.735
3	692	121900.7
4	283	3582.878
5	286	3232.735
6	419	5797.735
7	272	5020.735
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 342.8571 Std. Dev.: 167.6250

Upper 95% confioence limit on mean: 497.8900

Representative Concentration: 497.8900

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	16.5	33.97224
2	22.8	.2222449
3	39.3	288.0294
4	13.7	74.45224
5	16.4	35.14796
6	27.5	26.74367
7	20.1	4.966531
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 22.32857 Std. Dev.: 8.789523

Upper 95% confidence limit on mean: 30.45782

Representative Concentration: 30.45782

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cyanide
Enter Matrix: Surface soil Site 1

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.025	.4308985
2	1.12	.3152020
3	1.055	.3924128
4	1.105	.3322699
5	1.04	.4114306
6	5.36	13.53189
7	1.065	.3799842
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.681429 Std. Dev.: 1.622451

Upper 95% confidence limit on mean: 3.182000 Representative Concentration: 3.182000

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Acenaphthene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	581.5518
2	175	581.5518
3	170	847.7056
4	190	83.09024
5	610	168826.2
6	175	581.5518
7	175	581.5518
8	190	83.09024
9	175	581.5518
10	175	581.5518
11	170	847.7056
12	180	365.3979
13	28.5	29109.61
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 199.1154 Std. Dev.: 130.2728

Upper 95% confidence limit on mean: 277.8452

Representative Concentration: 277.8452

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Phenanthrene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	49	156542.0
2	175	72713.20
3	170	75434.74
4	165.5	77926.87
5	3700	10597279
6	200	59855.50
7	43	161325.8
8	79	133702.7
9	220	50469.35
10	190	64848.58
11	170	75434.74
12	64	144897.4
13	555	12176.27
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 444.6538 Std. Dev.: 986.6866

Upper 95% confidence limit on mean: 1040.954

Representative Concentration: 1040.954

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Anthracene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	1438.160
2	175	1438.160
3	170	1842.391
4	190	525.4675
5	760	299293.2
6	175	1438.160
7	175	1438.160
8	190	525.4675
9	175	1438.160
10	175	1438.160
11	170	1842.391
12	180	1083.929
13	58	24001.16
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 212.9231 Std. Dev.: 167.7654

Upper 95% confidence limit on mean: 314.3114

Representative Concentration: 314.3114

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	102	181017.5
2	44	233735.1
3	170	127778.8
4	365	26393.75
5	3500	8835985.
6	340	35141.83
7	104	179319.7
8	160	135028.0
9	510	304.9053
10	370	24794.14
11	52	226063.7
12	120	166024.9
13	1020	242594.1
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 527.4615 Std. Dev.: 931.5838

Upper 95% confidence limit on mean: 1090.460

Representative Concentration: 1090.460

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	83	106225.9
2	40	136104.2
3	170	57084.24
4	257	23080.62
5	2500	4372603.
6	260	22178.08
7	80	108190.4
8	130	77798.08
9	370	1515.006
10	330	6228.852
11	36	139071.6
12	110	89355.01
13	950	292764.2
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 408.9231 Std. Dev.: 672.8174

Upper 95% confidence limit on mean: 815.5375 Representative Concentration: 815.5375

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benz[a]anthracene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	56	44358.84
2	175	8393.379
3	170	9334.533
4	160	11366.84
5	1200	871206.8
6	150	13599.15
7	175	8393.379
8	190	5869.917
9	180	7502.225
10	160	11366.84
11	170	9334.533
12	180	7502.225
13	500	54468.38
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 266.6154 Std. Dev.: 297.5871

Upper 95% confidence limit on mean: 446.4609 Representative Concentration: 446.4609

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chrysene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	63	40184.83
2	175	7825.444
3	170	8735.059
4	173	8183.290
5	1100	699796.6
6	160	10704.29
7	175	7825.444
8	190	5396.598
9	220	1888.905
10	180	6965.828
11	170	8735.059
12	64	39784.91
13	585	103387.0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 263.4615 Std. Dev.: 281.2788

Upper 95% confidence limit on mean: 433.4512

Representative Concentration: 433.4512

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[b]fluoranthene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	103	27889
2	175	9025
3	170	10000
4	250	400
5	920	422500
6	190	6400
7	175	9025
8	190	6400
9	220	2500
10	250	400
11	170	10000
12	87	33489
13	610	115600
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 270 Std. Dev.: 233.3859

Upper 95% confidence limit on mean: 411.0458

Representative Concentration: 411.0458

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	77	39204
2	175	10000
3	170	11025
4	250	625
5	1200	855625
6	190	7225
7	175	10000
8	190	7225
9	220	3025
10	180	9025
11	170	11025
12	78	38809
13	500	50625
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 275 Std. Dev.: 296.2879

Upper 95% confidence limit on mean: 454.0603

Representative Concentration: 454.0603

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[a]pyrene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	11864.24
2	175	11864.24
3	170	12978.47
4	240	1929.237
5	1200	839196.9
6	190	8821.544
7	175	11864.24
8	190	8821.544
9	190	8821.544
10	200	7043.083
11	170	12978.47
12	66	47490.47
13	550	70796.93
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 283.9231 Std. Dev.: 296.4331

Upper 95% confidence limit on mean: 463.0712

Representative Concentration: 463.0712

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Indeno[1,2,3-c,d]pyrene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	1997.402
2	175	1997.402
3	170	2469.325
4	120	9938.556
5	690	221189.3
6	175	1997.402
7	175	1997.402
8	190	881.6331
9	106	12925.94
10	150	4857.018
11	170	2469.325
12	180	1575.479
13	380	25698.56
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 219.6923 Std. Dev.: 155.4549

Upper 95% confidence limit on mean: 313.6408

Representative Concentration: 313.6408

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Dibenz[a,h]anthracene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	151.4793
2	175	151.4793
3	170	299.5562
4	190	7.248521
5	310	15053.40
6	175	151.4793
7	175	151.4793
8	190	7.248521
9	175	151.4793
10	175	151.4793
11	170	299.5562
12	180	53.40237
13	175	151.4793
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 187.3077 Std. Dev.: 37.39515

Upper 95% confidence limit on mean: 209.9073

Representative Concentration: 209.9073

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	2292.936
2	175	2292.936
3	170	2796.783
4	127.5	9098.225
5	630	165742.9
6	175	2292.936
7	175	2292.936
8	190	1081.398
9	175	2292.936
10	170	2796.783
11	170	2796.783
12	180	1839.090
13	385	26281.40
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 222.8846 Std. Dev.: 136.5949

Upper 95% confidence limit on mean: 305.4352

Representative Concentration: 305.4352

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	0
2	2.5	0
3	2.5	0
4	3	.25
5	2.5	0
6	2.5	0
7	2.5	0
8	3	.25
9	2.5	0
10	2.5	0
11	2.5	0
12	2.5	0
13	1.5	1
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.5 Std. Dev.: .3535534

Upper 95% confidence limit on mean: 2.713669

Representative Concentration: 2.713669

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Fluorene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	994.6746
2	175	994.6746
3	170	1335.059
4	190	273.5207
5	560	124935.1
6	175	994.6746
7	175	994.6746
8	190	273.5207
9	175	994.6746
10	175	994.6746
11	170	1335.059
12	180	704.2899
13	175	994.6746
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 206.5385 Std. Dev.: 106.3874

Upper 95% confidence limit on mean: 270.8332

Representative Concentration: 270.8332

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	41	10688.38
2	175	937.3018
3	170	656.1479
4	72	5239.533
5	175	937.3018
6	175	937.3018
7	120	594.6095
8	190	2080.763
9	175	937.3018
10	300	24216.15
11	170	656.1479
12	49	9098.225
13	65	6301.917
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 144.3846 Std. Dev.: 72.61834

Upper 95% confidence limit on mean: 188.2712

Representative Concentration: 188.2712

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2-Methylnaphthalene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	10.94083
2	175	10.94083
3	170	2.863905
4	190	335.1716
5	107	4185.095
6	175	10.94083
7	175	10.94083
8	190	335.1716
9	175	10.94083
10	175	10.94083
11	170	2.863905
12	180	69.01775
13	175	10.94083
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 171.6923 Std. Dev.: 20.42623

Upper 95% confidence limit on mean: 184.0368

Representative Concentration: 184.0368

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Butylbenzylphthalate
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	3508.284
2	175	3508.284
3	170	4125.592
4	190	1956.361
5	130	10864.05
6	175	3508.284
7	250	248.6686
8	190	1956.361
9	175	3508.284
10	890	430033.3
11	170	4125.592
12	180	2940.976
13	175	3508.284
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 234.2308 Std. Dev.: 198.7025

Upper 95% confidence limit on mean: 354.3158

Representative Concentration: 354.3158

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Naphthalene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	21.30178
2	175	21.30178
3	170	92.45562
4	190	107.8402
5	210	923.2249
6	175	21.30178
7	175	21.30178
8	190	107.8402
9	175	21.30178
10	175	21.30178
11	170	92.45562
12	180	.1479290
13	175	21.30178
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 179.6154 Std. Dev.: 11.07955

Upper 95% confidence limit on mean: 186.3113 Representative Concentration: 186.3113

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chloroform
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(xi-xbar)**2
1	1	2.136095
2	2.5	.0014793
3	2.5	.0014793
4	3	.2899408
5	2.5	.0014793
6	2.5	.0014793
7	2.5	.0014793
8	3	.2899408
9	2.5	.0014793
10	2.5	.0014793
11	2.5	.0014793
12	2.5	.0014793
13	2.5	.0014793
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.461538 Std. Dev.: .4770368

Upper 95% confidence limit on mean: 2.749834

Representative Concentration: 2.749834

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Toluene
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.0299556
2	2.5	.0299556
3	2	.1068787
4	.75	2.486686
5	1	1.760725
6	2.5	.0299556
7	2.5	.0299556
8	3	.4530325
9	2.5	.0299556
10	2	.1068787
11	2.5	.0299556
12	2.5	.0299556
13	4	2.799186
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.326923 Std. Dev.: .8125616

Upper 95% confidence limit on mean: 2.817991

Representative Concentration: 2.817991

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Dibenzofuran
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	191.7160
2	175	191.7160
3	170	355.1775
4	190	1.331361
5	330	19924.41
6	175	191.7160
7	175	191.7160
8	190	1.331361
9	175	191.7160
10	175	191.7160
11	170	355.1775
12	180	78.25444
13	175	191.7160
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 188.8462 Std. Dev.: 42.87355

Upper 95% confidence limit on mean: 214.7566

Representative Concentration: 214.7566

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-chloroethyl)ether
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	33.28402
2	175	33.28402
3	170	.5917160
4	190	431.3609
5	175	33.28402
6	175	33.28402
7	175	33.28402
8	190	431.3609
9	175	33.28402
10	75	8879.438
11	170	.5917160
12	180	115.9763
13	175	33.28402
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 169.2308 Std. Dev.: 29.00044

Upper 95% confidence limit on mean: 186.7571

Representative Concentration: 186.7571

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5690	990025
2	2810	15015625
3	1790	23961025
4	11650	24651225
5	4390	5267025
6	4440	5040025
7	3800	8323225
8	11500	23184225
9	19500	1.6422e8
10	7390	497025
11	3900	7756225
12	5040	2706025
13	5005	2822400
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6685 Std. Dev.: 4868.592

Upper 95% confidence limit on mean: 9627.314

Representative Concentration: 9627.314

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	3.5	.8030917
2	10	31.40309
3	.95	11.87596
4	10.45	36.64906
5	1.8	6.740016
6	1.6	7.818476
7	1.3	9.586163
8	7.4	9.023092
9	2.9	2.238476
10	2.7	2.876938
11	1.6	7.818476
12	6.7	5.307707
13	6.25	3.436746
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 4.396154 Std. Dev.: 3.361266

Upper 95% confidence limit on mean: 6.427521

Representative Concentration: 6.427521

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	13.8	19.93966
2	8	105.3781
3	4.6	186.7427
4	31.5	175.1550
5	12	39.25504
6	11.6	44.42735
7	7.4	118.0566
8	28.2	98.69658
9	51.6	1111.197
10	23.1	23.37351
11	10.3	63.44735
12	17.1	1.358121
13	18.25	.0002367
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 18.26538 Std. Dev.: 12.86801

Upper 95% confidence limit on mean: 26.04211

Representative Concentration: 26.04211

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Beryllium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.395	.0008321
2	.4	.0011456
3	.39	.0005686
4	.435	.0047398
5	.4	.0011456
6	.4	.0011456
7	.395	.0008321
8	.435	.0047398
9	.88	.2640379
10	.16	.0424994
11	.155	.0445859
12	.16	.0424994
13	.155	.0445859
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .3661538 Std. Dev.: .1943703

Upper 95% confidence limit on mean: .4836207 Representative Concentration: .4836207

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	405	1532806.
2	176	2152281.
3	29.85	2602464.
4	1015	394466.1
5	490	1329560.
6	1230	170623.0
7	278	1863404.
8	1470	29951.63
9	11900	1.0520e8
10	905	544740.5
11	106	2356426.
12	823	672507.2
13	2530	786653.0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1643.065 Std. Dev.: 3157.538

Upper 95% confidence limit on mean: 3551.311

Representative Concentration: 3551.311

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	20.5	1635.891
2	19.5	1717.784
3	4.2	3220.126
4	18.95	1763.677
5	98.2	1387.849
6	20.2	1660.249
7	97.8	1358.206
8	25.6	1249.351
9	10.9	2504.618
10	419	128202.6
11	20.1	1668.408
12	19.4	1726.083
13	17.95	1848.669
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 60.94615 Std. Dev.: 111.7823

Upper 95% confidence limit on mean: 128.5013

Representative Concentration: 128.5013

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cobalt
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.25	2.096927
2	2.3	1.954619
3	2.25	2.096927
4	2.5	1.435388
5	2.3	1.954619
6	2.3	1.954619
7	2.25	2.096927
8	2.5	1.435388
9	15.2	132.2942
10	3.3	.1584652
11	1.5	4.831542
12	7.1	11.57308
13	2.325	1.885340
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.698077 Std. Dev.: 3.716720

Upper 95% confidence limit on mean: 5.944261

Representative Concentration: 5.944261

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	8356.48	1043955.
2	5587.43	14370098
3	4828.72	20697961
4	13795.14	19509128
5	6964.29	5827064.
6	6078.31	10889414
7	6343.68	9208440.
8	14587.83	27140024
9	26600	2.9659e8
10	7250	4529325.
11	4810	20868645
12	8150	1508527.
13	8565	661328.6
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 9378.221 Std. Dev.: 6005.855

Upper 95% confidence limit on mean: 13007.83

Representative Concentration: 13007.83

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	739	292847.5
2	486	630680.3
3	223	1117574.
4	1300	393.8698
5	729	303770.6
6	771	259237.6
7	703	333106.6
8	1820	291433.9
9	6060	22846929
10	933	120515.8
11	484	633860.9
12	839	194616.7
13	1555	75540.41
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1280.154 Std. Dev.: 1502.789

Upper 95% confidence limit on mean: 2188.358 Representative Concentration: 2188.358

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Surface soil Site 2

Enter number of samples: 5
Degrees of Freedom: 4

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-xbar)**2
1	.05	.003481
2	.22	.012321
3	.05	.003481
4	.055	.002916
5	.17	.003721
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .109 Std. Dev.: .0804984

Upper 95% confidence limit on mean: .208935

Representative Concentration: .208935

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Nickel
Enter Matrix: Surface soil Site 2

Enter number of samples: 11
Degrees of Freedom: 10

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(X-Xbar)**2
1	7.4	2.089339
2	5	.9111570
3	2.45	12.28184
4	10.05	16.77275
5	7.1	1.312066
6	6.5	.2975207
7	7.4	2.089339
8	9.9	15.56651
9	3.25	7.314566
10	3.25	7.314566
11	3.2	7.557521
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.954545 Std. Dev.: 2.711226

upper 95% confidence limit on mean: 7.776228

Representative Concentration: 7.776228

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	423	18757.94
2	393	27875.51
3	294	70734.52
4	618	3368.686
5	402.74	24718.01
6	389	29227.19
7	405	24012.48
8	662	10412.24
9	2069.99	2280192.
10	715.93	24326.76
11	274.72	81361.64
12	302.67	66197.95
13	329.425	53146.21
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 559.9596 Std. Dev.: 475.5988

Upper 95% confidence limit on mean: 847.3858 Representative Concentration: 847.3858

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Silver
Enter Matrix: Surface soil Site 2

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.125	.0603316
2	.33	.0016504
3	.125	.0603316
4	.295	.0057191
5	1.7	1.767238
6	.125	.0603316
7	.125	.0603316
8	.14	.0531879
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .370625 Std. Dev.: .5436803

Upper 95% confidence limit on mean: .8252255

Representative Concentration: .8252258

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Surface soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	186	47277.74
2	188	46412.00
3	184	48151.48
4	227	31129.11
5	209	37804.75
6	492	7843.858
7	225	31838.85
8	337	4413.535
9	1582.91	1391163.
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 403.4344 Std. Dev.: 453.6014

Upper 95% confidence limit on mean: 752.1027

Representative Concentration: 752.1027

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	12.6	44.78698
2	7.3	143.8154
3	8.8	110.0885
4	25.2	34.90083
5	10.7	73.82775
6	11	68.76237
7	14	28.00852
8	25.3	36.09237
9	87.7	4679.612
10	12.9	40.86160
11	8	127.5162
12	13	39.59314
13	14.3	24.92314
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 19.29231 Std. Dev.: 21.31664

Upper 95% confidence limit on mean: 32.17493

Representative Concentration: 32.17493

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cyanide
Enter Matrix: Surface soil Site 2

Enter number of samples: 13
Degrees of Freedom: 12

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.035	.0316429
2	1.045	.0281852
3	1.025	.0353006
4	1.1425	.0049540
5	1.055	.0249276
6	1.055	.0249276
7	1.035	.0316429
8	1.15	.0039545
9	1.035	.0316429
10	3.06	3.411835
11	1.02	.0372045
12	1.065	.0218699
13	1.045	.0281852
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.212885 Std. Dev.: .5564975

Upper 95% confidence limit on mean: 1.549202

Representative Concentration: 1.549202

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acenaphthene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	3211.111
2	140	8402.778
3	160	5136.111
4	190	1736.111
5	170	3802.778
6	170	3802.778
7	725	243377.8
8	175	3211.111
9	180	2669.444
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 231.6667 Std. Dev.: 185.5229

Upper 95% confidence limit on mean: 374.2719

Representative Concentration: 374.2719

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Phenanthrene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	140	69344.44
2	1090	471511.1
3	1050	418177.8
4	270	17777.78
5	210	37377.78
6	170	54444.44
7	330	5377.778
8	190	45511.11
9	180	49877.78
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 403.3333 Std. Dev.: 382.3284

Upper 95% confidence limit on mean: 697.2164

Representative Concentration: 697.2164

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Anthracene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	7225
2	610	122500
3	240	400
4	34	51076
5	170	8100
6	170	8100
7	725	216225
8	36	50176
9	180	6400
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 260 Std. Dev.: 242.4361

Upper 95% confidence limit on mean: 446.3525

Representative Concentration: 446.3525

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	280	63672.11
2	1600	1139912.
3	1800	1606979.
4	450	6778.778
5	260	74165.44
6	35	247340.4
7	120	170018.8
8	210	103898.8
9	36	246346.8
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 532.3333 Std. Dev.: 676.3054

Upper 95% confidence limit on mean: 1052.187

Representative Concentration: 1052.187

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	260	261802.8
2	2100	1764469.
3	2500	2987136.
4	500	73802.78
5	360	169469.4
6	44	529498.8
7	725	2177.778
8	420	123669.4
9	36	541205.4
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 771.6667 Std. Dev.: 898.1392

Upper 95% confidence limit on mean: 1462.036

Representative Concentration: 1462.036

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benz[a]anthracene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	51882.72
2	800	157785.5
3	880	227741.0
4	320	6852.160
5	200	41118.83
6	170	54185.49
7	725	103827.2
8	175	51882.72
9	180	49629.94
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 402.7778 Std. Dev.: 305.1445

Upper 95% confidence limit on mean: 637.3322

Representative Concentration: 637.3322

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chrysene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	140	93025
2	1060	378225
3	1010	319225
4	380	4225
5	180	70225
6	170	75625
7	725	78400
8	160	81225
9	180	70225
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 445 Std. Dev.: 382.4918

Upper 95% confidence limit on mean: 739.0087

Representative Concentration: 739.0087

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	140	121917.4
2	1200	505284.0
3	1400	829617.4
4	280	43750.69
5	140	121917.4
6	170	101867.4
7	382.5	11377.78
8	510	434.0278
9	180	95584.03
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 489.1667 Std. Dev.: 478.5068

Upper 95% confidence limit on mean: 856.9789

Representative Concentration: 856.9789

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	140	127607.7
2	1200	493896.6
3	1400	815007.7
4	280	47185.49
5	140	127607.7
6	170	107074.4
7	455	1782.716
8	510	163.2716
9	180	100629.9
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 497.2222 Std. Dev.: 477.0948

Upper 95% confidence limit on mean: 863.9491

Representative Concentration: 863.9491

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[a]pyrene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	120	108900
2	960	260100
3	1300	722500
4	260	36100
5	160	84100
6	170	78400
7	725	75625
8	175	75625
9	180	72900
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 450 Std. Dev.: 435.0647

Upper 95% confidence limit on mean: 784.4197

Representative Concentration: 784.4197

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Indeno[1,2,3-c,d]pyrene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	88	66506.68
2	545	39645.23
3	920	329603.6
4	190	24301.35
5	120	51025.79
6	170	30936.90
7	725	143725.2
8	175	29203.01
9	180	27519.12
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 345.8889 Std. Dev.: 304.6446

Upper 95% confidence limit on mean: 580.0591

Representative Concentration: 580.0591

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	97	78027.11
2	670	86240.11
3	980	364413.4
4	210	27666.78
5	120	65706.78
6	170	42573.44
7	785	167008.4
8	175	40535.11
9	180	38546.78
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 376.3333 Std. Dev.: 337.4015

Upper 95% confidence limit on mean: 635.6826

Representative Concentration: 635.6826

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aroclor 1248
Enter Matrix: Surface soil Site 3

Enter number of samples: 3
Degrees of Freedom: 2

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	830	207328.4
2	250	15541.78
3	44	109340.4
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 374.6667 Std. Dev.: 407.5602

Upper 95% confidence limit on mean: 1387.184

Representative Concentration: 830

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluorene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	3871.605
2	180	3274.383
3	170	4518.827
4	190	2229.938
5	170	4518.827
6	170	4518.827
7	725	237927.2
8	175	3871.605
9	180	3274.383
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 237.2222 Std. Dev.: 183.0319

Upper 95% confidence limit on mean: 377.9128

Representative Concentration: 377.9128

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	70	410453.8
2	545	27445.44
3	390	102827.1
4	2400	2853847.
5	370	116053.8
6	66	415595.1
7	1275	318472.1
8	1100	151580.4
9	180	281607.1
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 710.6667 Std. Dev.: 764.6798

Upper 95% confidence limit on mean: 1298.451

Representative Concentration: 1298.451

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2-Methylnaphthalene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	16440.94
2	545	58456.49
3	535	53720.94
4	54	62111.72
5	170	17748.16
6	170	17748.16
7	725	177896.5
8	175	16440.94
9	180	15183.72
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 303.2222 Std. Dev.: 233.3848

Upper 95% confidence limit on mean: 482.6173

Representative Concentration: 482.6173

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Butylbenzylphthalate
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	38	73140.20
2	545	55958.53
3	190	14029.09
4	98	44286.86
5	170	19166.86
6	170	19166.86
7	725	173518.5
8	660	123591.3
9	180	16497.98
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 308.4444 Std. Dev.: 259.6527

Upper 95% confidence limit on mean: 508.0308 Representative Concentration: 508.0308

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chloroform
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1	2.086420
2	2.5	.0030864
3	2.5	.0030864
4	3	.3086420
5	2.5	.0030864
6	2.5	.0030864
7	3	.3086420
8	2.5	.0030864
9	2.5	.0030864
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.444444 Std. Dev.: .5833333

Upper 95% confidence limit on mean: 2.892833

Representative Concentration: 2.892833

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acenaphthylene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	10111.42
2	545	72600.31
3	150	15764.20
4	190	7319.753
5	170	11141.98
6	170	11141.98
7	725	202000.3
8	175	10111.42
9	180	9130.864
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 275.5556 Std. Dev.: 208.9624

Upper 95% confidence limit on mean: 436.1780

Representative Concentration: 436.1780

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Di-n-butylphthalate
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	29852.16
2	545	38896.60
3	535	35052.16
4	340	60.49383
5	170	31604.94
6	170	31604.94
7	725	142296.6
8	290	3338.272
9	180	28149.38
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 347.7778 Std. Dev.: 206.4145

Upper 95% confidence limit on mean: 506.4417

Representative Concentration: 506.4417

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Dimethylphthalate
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	21025
2	545	50625
3	535	46225
4	190	16900
5	170	22500
6	170	22500
7	725	164025
8	190	16900
9	180	19600
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 320 Std. Dev.: 218.0310

Upper 95% confidence limit on mean: 487.5931

Representative Concentration: 487.5931

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aroclor 1254
Enter Matrix: Surface soil Site 3

Enter number of samples: 3
Degrees of Freedom: 2

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1800	990025
2	530	75625
3	85	518400
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 805 Std. Dev.: 889.9579

Upper 95% confidence limit on mean: 3015.956 Representative Concentration: 1800

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Bis(2-chloroethyl)ether
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	26677.78
2	545	42711.11
3	535	38677.78
4	190	22002.78
5	170	28336.11
6	170	28336.11
7	725	149511.1
8	175	26677.78
9	360	469.4444
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 338.3333 Std. Dev.: 213.1314

Upper 95% confidence limit on mean: 502.1603

Representative Concentration: 502.1603

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Toluene
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2	1.493827
2	3	.0493827
3	2.5	.5216049
4	3	.0493827
5	2.5	.5216049
6	2.5	.5216049
7	8.5	27.85494
8	2.5	.5216049
9	2.5	.5216049
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.222222 Std. Dev.: 2.001735

Upper 95% confidence limit on mean: 4.760889

Representative Concentration: 4.760889

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	9900	18908003
2	8260	35860136
3	8280	35621003
4	28000	1.8911e8
5	9270	24783803
6	19100	23538669
7	13525	523211.1
8	10500	14050003
9	21400	51146336
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 14248.33 Std. Dev.: 7013.732

Upper 95% confidence limit on mean: 19639.56

Representative Concentration: 19639.56

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Antimony
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.15	.8919753
2	1.2	.8000309
3	3	.8200309
4	1.2	.8000309
5	1.1	.9889198
6	1.1	.9889198
7	6.05	15.64642
8	2.9	.6489198
9	1.15	.8919753
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.094444 Std. Dev.: 1.676202

Upper 95% confidence limit on mean: 3.382885

Representative Concentration: 3.382885

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Surface soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4.1	38.67285
2	3	53.56410
3	3.6	45.14160
4	56.8	2160.507
5	7.9	5.850352
6	2	69.20160
7	4.05	39.29723
8	1.1	84.98535
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.31875 Std. Dev.: 18.88771

Upper 95% confidence limit on mean: 26.11178

Representative Concentration: 26.11178

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	22.2	877.1469
2	56.1	18.34694
3	43.7	65.88028
4	99	2226.267
5	36.5	234.6003
6	23.9	779.3403
7	54.55	7.471111
8	107	3045.200
9	23.4	807.5069
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 51.81667 Std. Dev.: 31.74461

Upper 95% confidence limit on mean: 76.21769

Representative Concentration: 76.21769

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Beryllium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.155	.3481
2	.53	.046225
3	.53	.046225
4	1.5	.570025
5	.6	.021025
6	1.1	.126025
7	.51	.055225
8	.38	.133225
9	1.4	.429025
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .745 Std. Dev.: .4710494

Upper 95% confidence limit on mean: 1.107080

Representative Concentration: 1.107080

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	997	5.4048e8
2	66700	1.8024e9
3	42200	3.2237e8
4	2660	4.6592e8
5	2500	4.7285e8
6	13300	1.1980e8
7	41750	3.0642e8
8	34800	1.1140e8
9	13300	1.1980e8
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 24245.22 Std. Dev.: 23079.90

Upper 95% confidence limit on mean: 41985.97 Representative Concentration: 41985.97

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	10.4	8249.685
2	13	7784.141
3	41.1	3615.350
4	121	390.9408
5	21	6436.496
6	4.6	9336.927
7	61.85	1550.609
8	637	287051.9
9	1.1	10025.57
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 101.2278 Std. Dev.: 204.4632

Upper 95% confidence limit on mean: 258.3918 Representative Concentration: 258.3918

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cobalt
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4	45.71262
2	6.4	19.01929
3	5.4	28.74151
4	14.6	14.73707
5	3.6	51.28151
6	17.9	50.96373
7	5.85	24.11901
8	19.2	71.21485
9	19.9	83.51929
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.76111 Std. Dev.: 6.975931

Upper 95% confidence limit on mean: 16.12328

Representative Concentration: 16.12328

NYSDEC 032589

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	11000	6.6135e8
2	12300	5.9617e8
3	12900	5.6723e8
4	41000	18346944
5	16500	4.0871e8
6	36600	13611.11
7	24950	1.3845e8
8	135000	9.6596e9
9	40200	12133611
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 36716.67 Std. Dev.: 38829.80

Upper 95% confidence limit on mean: 66563.84

Representative Concentration: 66563.84

NYSDEC 032590

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1100	9032696.
2	8150	16358430
3	4640	285749.6
4	894	10313375
5	1910	4819976.
6	5230	1264625.
7	5405	1688845.
8	4510	163665.2
9	5110	1009132.
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 4105.444 Std. Dev.: 2370.034

Upper 95% confidence limit on mean: 5927.211 Representative Concentration: 5927.211

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.12	.0039410
2	.16	.0005188
3	.14	.0018299
4	.3	.0137410
5	.11	.0052966
6	.05	.0176299
7	.21	.0007410
8	.5	.1006299
9	.055	.0163272
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .1827778 Std. Dev.: .1417108

Upper 95% confidence limit on mean: .2917061 Representative Concentration: .2917061

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	395.24	68477.59
2	1054.3	157909.1
3	695.84	1514.593
4	1353.39	485067.4
5	555.69	10247.96
6	348.54	95099.59
7	758.03	10222.78
8	489.86	27909.79
9	261.41	156429.9
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 656.9222 Std. Dev.: 355.8228

Upper 95% confidence limit on mean: 930.4313

Representative Concentration: 930.4313

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Selenium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.42	.0648834
2	.435	.0574667
3	.43	.0598890
4	1	.1058056
5	.405	.0727501
6	.41	.0700779
7	.4425	.0539272
8	2.1	2.031417
9	.43	.0598890
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .6747222 Std. Dev.: .5674621

Upper 95% confidence limit on mean: 1.110911

Representative Concentration: 1.110911

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	20.5	1071.835
2	23.7	872.5460
3	25.8	752.8926
4	49.4	14.73707
5	26.5	714.9682
6	119	4324.524
7	22.35	954.1235
8	41.9	128.5704
9	150	9362.713
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 53.23889 Std. Dev.: 47.69291

Upper 95% confidence limit on mean: 89.89884

Representative Concentration: 89.89884

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cyanide
Enter Matrix: Surface soil Site 3

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.045	.1773346
2	1.09	.1414596
3	1.47	.0000151
4	1.125	.1163568
5	4.2	7.474148
6	1.03	.1901929
7	1.105	.1304012
8	1.06	.1649262
9	1.07	.1569040
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.466111 Std. Dev.: 1.033909

Upper 95% confidence limit on mean: 2.260842

Representative Concentration: 2.260842

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 18
Degrees of Freedom: 17

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	119.1736
2	2.5	119.1736
3	2.5	119.1736
4	2.5	119.1736
5	1.5	142.0069
6	2.5	119.1736
7	2.5	119.1736
8	2.5	119.1736
9	2.5	119.1736
10	2.5	119.1736
11	200	34813.34
12	2.5	119.1736
13	2.5	119.1736
14	2.5	119.1736
15	2.5	119.1736
16	2.5	119.1736
17	2.5	119.1736
18	2.5	119.1736
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 13.41667 Std. Dev.: 46.56566

Upper 95% confidence limit on mean: 36.57525

Representative Concentration: 36.57525

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Tetrachloroethene
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 18
Degrees of Freedom: 17

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2	72855.01
2	25	60967.84
3	2	72855.01
4	2	72855.01
5	17.5	64727.84
6	3	72316.17
7	2	72855.01
8	3	72316.17
9	3	72316.17
10	3	72316.17
11	4800	20503539
12	12	67556.67
13	2.5	72585.34
14	5	71244.51
15	7	70180.84
16	1	73395.84
17	2	72855.01
18	2.5	72585.34
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 271.9167 Std. Dev.: 1130.079

Upper 95% confidence limit on mean: 833.9407

Representative Concentration: 833.9407

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Di-n-butylphthalate
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	13	15890.00
2	170	957.5586
3	187.5	2346.864
4	170	957.5586
5	16	15142.67
6	175	1292.003
7	170	957.5586
8	180	1676.448
9	170	957.5586
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 139.0556 Std. Dev.: 70.86803

Upper 95% confidence limit on mean: 193.5294

Representative Concentration: 187.5

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,2-Dichloroethene
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 18
Degrees of Freedom: 17

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.0434028
2	2.5	.0434028
3	2.5	.0434028
4	2.5	.0434028
5	2.75	.0017361
6	2.5	.0434028
7	2.5	.0434028
8	2.5	.0434028
9	2.5	.0434028
10	2.5	.0434028
11	6	10.83507
12	2.5	.0434028
13	2.5	.0434028
14	2.5	.0434028
15	2.5	.0434028
16	2.5	.0434028
17	2.5	.0434028
18	2.5	.0434028
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.708333 Std. Dev.: .8235951

Upper 95% confidence limit on mean: 3.117933

Representative Concentration: 3.117933

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,1,1-Trichloroethane
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 18
Degrees of Freedom: 17

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	15.01563
2	2.5	15.01563
3	2.5	15.01563
4	2.5	15.01563
5	2.75	13.14063
6	2.5	15.01563
7	2.5	15.01563
8	2.5	15.01563
9	2.5	15.01563
10	2.5	15.01563
11	72	4306.641
12	2.5	15.01563
13	2.5	15.01563
14	2.5	15.01563
15	2.5	15.01563
16	2.5	15.01563
17	2.5	15.01563
18	2.5	15.01563
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.375 Std. Dev.: 16.37795

Upper 95% confidence limit on mean: 14.52027 Representative Concentration: 14.52027

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5140	881678.2
2	2010	4800581.
3	11429.21	52246618
4	1940	5112224.
5	2230	3884931.
6	1010	10182625
7	3040	1347974.
8	7940	13979951
9	3070	1279213.
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 4201.023 Std. Dev.: 3422.641

Upper 95% confidence limit on mean: 6831.893

Representative Concentration: 6831.893

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Antimony
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.55	.6386674
2	2.5	.7210840
3	2.7425	.3680444
4	2.5	.7210840
5	2.45	.8085007
6	9.8	41.61325
7	2.45	.8085007
8	2.65	.4888340
9	2.5	.7210840
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.349167 Std. Dev.: 2.420977

Upper 95% confidence limit on mean: 5.210091

Representative Concentration: 5.210091

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.8	142839.5
2	24.7	126054.2
3	1.67	142937.8
4	.9	143520.6
5	2.7	142160.0
6	3380	9001553.
7	2	142688.3
8	2	142688.3
9	1.9	142763.9
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 379.7411 Std. Dev.: 1125.123

Upper 95% confidence limit on mean: 1244.585

Representative Concentration: 1244.585

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	13.9	8.844015
2	5.7	27.31224
3	30.735	392.3921
4	5.5	29.44268
5	4.1	46.59579
6	7.9	9.157348
7	6.3	21.40090
8	18	50.03990
9	6.2	22.33613
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.92611 Std. Dev.: 8.714364

Upper 95% confidence limit on mean: 17.62455

Representative Concentration: 17.62455

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cadmium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.49	.2880111
2	.485	.2934028
3	.525	.2516694
4	.46	.2988444
5	.48	.2988444
6	1.3	.0747111
7	.48	.2988444
8	.5	.2773778
9	4.5	12.06404
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.026667 Std. Dev.: 1.329744

Upper 95% confidence limit on mean: 2.048796

Representative Concentration: 2.048796

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	277	7660.528
2	68.6	14610.90
3	426.18	56028.99
4	29.8	25496.28
5	72.5	13683.28
6	291	10307.21
7	77.2	12605.80
8	212	507.3506
9	251	3785.257
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 189.4756 Std. Dev.: 134.4831

Upper 95% confidence limit on mean: 292.8482

Representative Concentration: 292.8482

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7.8	1.104835
2	3.1	13.31439
3	10.94	17.56541
4	2.7	16.39350
5	3.2	12.59461
6	11.7	24.51350
7	5.6	1.319946
8	10.7	15.61128
9	5	3.058612
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.748889 Std. Dev.: 3.631048

Upper 95% confidence limit on mean: 9.539955

Representative Concentration: 9.539955

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cobalt
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.3	.0457485
2	2.25	.0696373
3	4.325	3.280123
4	2.25	.0696373
5	2.25	.0696373
6	2.35	.0268596
7	2.25	.0696373
8	2.4	.0129707
9	2.25	.0696373
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.513889 Std. Dev.: .6813487

Upper 95% confidence limit on mean: 3.037619

Representative Concentration: 3.037619

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Copper
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.2	1.777778
2	.9	6.934444
3	5.75	4.913611
4	3.1	.1877778
5	7.9	19.06778
6	5.9	5.601111
7	.85	7.200278
8	3.4	.0177778
9	1.6	3.004444
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.533333 Std. Dev.: 2.467413

Upper 95% confidence limit on mean: 5.429951

Representative Concentration: 5.429951

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7310	2189846.
2	3820	4040853.
3	12913.03	50166591
4	3420	5809002.
5	4038.66	3209570.
6	2210	13105756
7	8600	7671863.
8	6110	78295.19
9	4050	3169067.
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5830.187 Std. Dev.: 3343.666

Upper 95% confidence limit on mean: 8400.352

Representative Concentration: 8400.352

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Lead
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	3.4	.0850694
2	1.6	2.275069
3	5.375	5.137778
4	1	4.445069
5	1.7	1.983403
6	2.8	.0950694
7	1.7	1.983403
8	4.9	3.210069
9	5.5	5.720069
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.108333 Std. Dev.: 1.765467

Upper 95% confidence limit on mean: 4.465389

Representative Concentration: 4.465389

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	807	25979.71
2	465	32695.07
3	1539.36	798417.7
4	291	125895.7
5	328	101008.1
6	178	218853.5
7	341	92913.88
8	1330	468105.3
9	533	12727.85
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 645.8178 Std. Dev.: 484.3290

Upper 95% confidence limit on mean: 1018.105 Representative Concentration: 1018.105

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Manganese
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	93.4	5.918406
2	99.3	69.43519
3	91.805	.7016716
4	60.1	952.7854
5	92.7	3.002519
6	15.1	5755.835
7	167	5780.983
8	54.3	1344.485
9	145	2919.541
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 90.96722 Std. Dev.: 45.87032

Upper 95% confidence limit on mean: 126.2262

Representative Concentration: 126.2262

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.05	.0000563
2	.05	.0000563
3	.1075	.0025
4	.05	.0000563
5	.05	.0000563
6	.055	.0000063
7	.05	.0000563
8	.055	.0000063
9	.05	.0000563
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .0575 Std. Dev.: .0188746

Upper 95% confidence limit on mean: .0720083

Representative Concentration: .0720083

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Nickel
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.4597593
2	2.45	.5300649
3	6.0025	7.977486
4	2.45	.5300649
5	2.45	.5300649
6	2.55	.3944538
7	2.45	.5300649
8	5.3	4.502648
9	2.45	.5300649
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.178056 Std. Dev.: 1.413536

Upper 95% confidence limit on mean: 4.264594

Representative Concentration: 4.264594

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	276	3760.142
2	120	8964.302
3	374.64	25587.20
4	164	2568.462
5	163.13	2657.403
6	38.35	31092.27
7	173	1737.222
8	485	73072.90
9	138	5879.822
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 214.68 Std. Dev.: 139.3376

Upper 95% confidence limit on mean: 321.7842

Representative Concentration: 321.7842

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	84.84457
2	214	2324.311
3	174.1	69.07457
4	132	1141.689
5	145	432.1779
6	151	218.7112
7	158	60.66679
8	169	10.31123
9	174	67.42235
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 165.7889 Std. Dev.: 23.47661

Upper 95% confidence limit on mean: 183.8346

Representative Concentration: 183.8346

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	11.2	13.12049
2	4.3	10.74383
3	17.9	106.5483
4	1.9	32.23716
5	4.4	10.09827
6	2	31.11160
7	7	.3338272
8	13.6	36.26716
9	5.9	2.814938
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7.577778 Std. Dev.: 5.514476

Upper 95% confidence limit on mean: 11.81657

Representative Concentration: 11.81657

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Zinc
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 6
Degrees of Freedom: 5

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	10.5	.0625
2	8.9	3.4225
3	8.8	3.8025
4	17.9	51.1225
5	9.3	2.1025
6	9.1	2.7225
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.75 Std. Dev.: 3.556262

Upper 95% confidence limit on mean: 14.48268

Representative Concentration: 14.48268

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cyanide
Enter Matrix: Subsurface Soil Site 1

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.04	3.309367
2	1.03	3.345851
3	1.1175	3.033403
4	1.025	3.364167
5	1.02	3.382534
6	13.27	108.3855
7	1.02	3.382534
8	1.09	3.129951
9	5.12	5.111367
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.859167 Std. Dev.: 4.129840

Upper 95% confidence limit on mean: 6.033637

Representative Concentration: 6.033637

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Butylbenzylphthalate
Enter Matrix: Subsurface Soil Site 1/2

Enter number of samples: 9
Degrees of Freedom: 8

9R1d
1/28/92

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	175	117.3611
2	170	34.02778
3	97.5	4444.444
4	170	34.02778
5	170	34.02778
6	175	117.3611
7	170	34.02778
8	180	250.6944
9	170	34.02778
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 164.1667 Std. Dev.: 25.24876

Upper 95% confidence limit on mean: 183.5745 Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	3	11.11111
2	2.5	14.69444
3	6	.1111111
4	3	11.11111
5	2.5	14.69444
6	2.5	14.69444
7	2.5	14.69444
8	32	658.7778
9	3	11.11111
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.333333 Std. Dev.: 9.688911

Upper 95% confidence limit on mean: 13.78088

Representative Concentration: 13.78088

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Tetrachloroethene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	3	.0277778
2	6	10.02778
3	2.5	.1111111
4	3	.0277778
5	2.5	.1111111
6	2.5	.1111111
7	2.5	.1111111
8	1	3.361111
9	2.5	.1111111
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.833333 Std. Dev.: 1.322876

Upper 95% confidence limit on mean: 3.850184

Representative Concentration: 3.850184

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	62	5591.716
2	182.5	2090.522
3	46	8240.605
4	185	2325.383
5	170	1103.716
6	175	1460.938
7	170	1103.716
8	180	1868.160
9	60.5	5818.299
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 136.7778 Std. Dev.: 60.83076

Upper 95% confidence limit on mean: 183.5364

Representative Concentration: 183.5364

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Di-n-butylphthalate
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	3976.003
2	182.5	2555.864
3	180	2309.336
4	39	8638.670
5	170	1448.225
6	40	8453.781
7	170	1448.225
8	36	9205.336
9	175	1853.781
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 131.9444 Std. Dev.: 70.61270

Upper 95% confidence limit on mean: 186.2221

Representative Concentration: 186.2221

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Phenanthrene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	8382.420
2	182.5	6249.781
3	1300	1078367.
4	185	5860.753
5	170	8382.420
6	37	50425.20
7	170	8382.420
8	68	37463.75
9	71.5	36121.11
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 261.5556 Std. Dev.: 393.6424

Upper 95% confidence limit on mean: 564.1353

Representative Concentration: 564.1353

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	330	661.6327
2	182.5	30005.94
3	1900	2384794.
4	185	29146.08
5	170	34492.74
6	60	87451.63
7	170	34492.74
8	85	73290.52
9	119	56037.41
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 355.7222 Std. Dev.: 584.2059

Upper 95% confidence limit on mean: 804.7818 Representative Concentration: 804.7818

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	280	2964.198
2	182.5	23087.11
3	1800	2147853.
4	185	22333.64
5	170	27041.98
6	46	83200.20
7	170	27041.98
8	77	66277.64
9	99.5	55198.89
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 334.4444 Std. Dev.: 553.9629

Upper 95% confidence limit on mean: 760.2572

Representative Concentration: 760.2572

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[b]fluoranthene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	130	14213.94
2	182.5	4451.855
3	980	534036.2
4	185	4124.494
5	170	6276.160
6	175	5508.938
7	170	6276.160
8	180	4791.716
9	70.5	31941.63
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 249.2222 Std. Dev.: 276.5007

Upper 95% confidence limit on mean: 461.7591

Representative Concentration: 461.7591

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	110	11556.25
2	182.5	1225
3	730	262656.3
4	185	1056.25
5	170	2256.25
6	175	1806.25
7	170	2256.25
8	180	1406.25
9	55	26406.25
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 217.5 Std. Dev.: 197.0485

Upper 95% confidence limit on mean: 368.9646

Representative Concentration: 368.9646

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo(a)pyrene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	96	16398.23
2	182.5	1726.864
3	810	343330.9
4	185	1525.336
5	170	2922.003
6	175	2406.448
7	170	2922.003
8	180	1940.892
9	48	30995.56
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 224.0556 Std. Dev.: 224.7688

Upper 95% confidence limit on mean: 396.8279

Representative Concentration: 396.8279

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Indeno[1,2,3-c,d]pyrene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	62	7501.485
2	182.5	1148.457
3	180	985.2623
4	185	1324.151
5	170	457.4846
6	175	696.3735
7	170	457.4846
8	180	985.2623
9	33	13365.93
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 148.6111 Std. Dev.: 58.01066

Upper 95% confidence limit on mean: 193.2020

Representative Concentration: 185

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UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	59	15680.60
2	182.5	2.966049
3	490	93500.05
4	185	.6049383
5	170	202.2716
6	175	85.04938
7	170	202.2716
8	180	17.82716
9	46.5	18967.41
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 184.2222 Std. Dev.: 126.8163

Upper 95% confidence limit on mean: 281.7017 Representative Concentration: 281.7017

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benz[a]anthracene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	109	15088.03
2	182.5	2433.778
3	740	258233.4
4	185	2193.361
5	170	3823.361
6	175	3230.028
7	170	3823.361
8	180	2686.694
9	175	3230.028
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 231.8333 Std. Dev.: 191.9447

Upper 95% confidence limit on mean: 379.3748

Representative Concentration: 379.3748

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chrysene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	150	11083.41
2	182.5	5296.605
3	910	428661.2
4	185	4938.966
5	170	72[illegible]2.299
6	175	6444.522
7	170	7272.299
8	180	5666.744
9	175	6444.522
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 255.2778 Std. Dev.: 245.7337

Upper 95% confidence limit on mean: 444.1651

Representative Concentration: 444.1651

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Naphthalene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	690.5216
2	182.5	189.8272
3	86	6842.966
4	185	264.9660
5	170	1.632716
6	175	39.41049
7	170	1.632716
8	180	127.1883
9	175	39.41049
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 168.7222 Std. Dev.: 32.01085

Upper 95% confidence limit on mean: 193.3279

Representative Concentration: 193.3279

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acenaphthene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	34.02778
2	182.5	44.44444
3	270	6534.028
4	185	17.36111
5	170	367.3611
6	175	200.6944
7	170	367.3611
8	180	84.02778
9	175	200.6944
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 189.1667 Std. Dev.: 31.32491

Upper 95% confidence limit on mean: 213.2451 Representative Concentration: 213.2451

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Dibenzofuran
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	562.7438
2	182.5	125.9383
3	109	3878.522
4	185	188.2994
5	170	1.632716
6	175	13.85494
7	170	1.632716
8	180	76.07716
9	175	13.85494
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 171.2778 Std. Dev.: 24.65399

Upper 95% confidence limit on mean: 190.2285

Representative Concentration: 190.2285

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluorene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	250.6944
2	182.5	11.11111
3	180	.6944444
4	185	34.02778
5	170	84.02778
6	175	17.36111
7	170	84.02778
8	180	.6944444
9	175	17.36111
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 179.1667 Std. Dev.: 7.905694

Upper 95% confidence limit on mean: 185.2435

Representative Concentration: 185.2435

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Anthracene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	129.7068
2	182.5	1.234568
3	220	1324.151
4	185	1.929012
5	170	185.2623
6	175	74.15123
7	170	185.2623
8	180	13.04012
9	175	74.15123
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 183.6111 Std. Dev.: 15.76741

Upper 95% confidence limit on mean: 195.7310

Representative Concentration: 195.7310

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2-Methylnaphthalene
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	195	903.3364
2	182.5	308.1975
3	52	12756.45
4	185	402.2253
5	170	25.55864
6	175	101.1142
7	170	25.55864
8	180	226.6698
9	175	101.1142
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 164.9444 Std. Dev.: 43.08454

Upper 95% confidence limit on mean: 198.0621

Representative Concentration: 195

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	8250	12118135
2	6190	2019557.
3	6900	4541635.
4	7940	10055946
5	1600	10041857
6	3620	1319946.
7	2050	7392357.
8	4070	488445.7
9	2300	6095412.
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 4768.889 Std. Dev.: 2599.839

Upper 95% confidence limit on mean: 6767.298

Representative Concentration: 6767.298

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	10.7	54.66959
2	3.3	.0000373
3	3.95	.4145929
4	6.3	8.963371
5	.4	8.445482
6	1.4	3.633260
7	.405	8.416446
8	1.4	3.633260
9	1.9	1.977148
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.306111 Std. Dev.: 3.356955

Upper 95% confidence limit on mean: 5.886491 Representative Concentration: 5.886491

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	21.1	83.01235
2	22	100.2223
3	13.6	2.595679
4	15.6	13.04012
5	3.1	79.01235
6	10	3.955679
7	3.8	67.05790
8	14.8	7.902346
9	3.9	65.43012
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 11.98889 Std. Dev.: 7.264889

Upper 95% confidence limit on mean: 17.57317

Representative Concentration: 17.57317

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	507	38592.60
2	4550	14795947
3	169.5	285102.6
4	329	140212.8
5	29.9	453669.6
6	216	237607.5
7	30.05	453467.6
8	355	121417.4
9	144.6	312313.3
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 703.45 Std. Dev.: 1450.790

Upper 95% confidence limit on mean: 1818.624 Representative Concentration: 1818.624

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	903	78898.57
2	1570	898493.3
3	601	445.6790
4	645	523.9012
5	227	156112.8
6	551	5056.790
7	249	139211.9
8	644	479.1235
9	209	170660.8
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 622.1111 Std. Dev.: 425.7175

Upper 95% confidence limit on mean: 949.3459

Representative Concentration: 949.3459

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.17	.0034679
2	.14	.0008346
3	.055	.0031485
4	.32	.0436346
5	.11	.0000012
6	.05	.0037346
7	.05	.0037346
8	.055	.0031485
9	.05	.0037346
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .1111111 Std. Dev.: .0904426

Upper 95% confidence limit on mean: .1806313

Representative Concentration: .1806313

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	527	17911.36
2	414	434.0278
3	393	.0277778
4	450	3230.028
5	287	11271.36
6	357	1308.028
7	338	3043.361
8	411	318.0278
9	361.5	1002.778
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 393.1667 Std. Dev.: 69.38930

Upper 95% confidence limit on mean: 446.5039

Representative Concentration: 446.5039

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Silver
Enter Matrix: Subsurface Soil Site 2

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1.2	.3049494
2	.88	.0539272
3	.465	.0334077
4	.13	.2680938
5	.125	.2732966
6	.125	.2732966
7	.125	.2732966
8	.13	.2680938
9	2.65	4.008894
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .6477778 Std. Dev.: .8483260

Upper 95% confidence limit on mean: 1.299858

Representative Concentration: 1.299858

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(X-Xbar)**2
1	2.5	.01
2	1	2.56
3	2.5	.01
4	4	1.96
5	2.5	.01
6	4	1.96
7	2.5	.01
8	2.5	.01
9	2.5	.01
10	2.5	.01
11	2.5	.01
12	2.5	.01
13	2.5	.01
14	2.5	.01
15	2.5	.01
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.5 Std. Dev.: .6866066

Upper 95% confidence limit on mean: 2.980265

Representative Concentration: 2.980265

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Tetrachloroethene

Enter Matrix: Subsurface Soil Site ~~1~~ 3 JRH 1/28/92

Enter number of samples: 15

Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	15.21
2	5	1.96
3	4	5.76
4	2	19.36
5	2.5	15.21
6	8	2.56
7	2	19.36
8	2	19.36
9	1	29.16
10	2.5	15.21
11	2.5	15.21
12	1	29.16
13	55	2361.96
14	5	1.96
15	1	29.16
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.4 Std. Dev.: 13.57677

Upper 95% confidence limit on mean: 13.91931 Representative Concentration: 13.91931

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Subsurface Soil Site ~~Y~~ 3 JRH 1/28/92

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	31.64063
2	180	19.14063
3	205	862.8906
4	200	594.1406
5	170	31.64063
6	170	31.64063
7	140	1269.141
8	170	31.64063
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 175.625 Std. Dev.: 20.25507

Upper 95% confidence limit on mean: 192.5614

Representative Concentration: 192.5614

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,2-Dichloroethene

Enter Matrix: Subsurface Soil Site 2 3 JMH 2/28/92

Enter number of samples: 15

Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.0177778
2	2.5	.0177778
3	2.5	.0177778
4	3	.1344444
5	2.5	.0177778
6	4	1.867778
7	2.5	.0177778
8	2.5	.0177778
9	2.5	.0177778
10	2.5	.0177778
11	2.5	.0177778
12	2.5	.0177778
13	2.5	.0177778
14	2.5	.0177778
15	2.5	.0177778
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.633333 Std. Dev.: .3994043

Upper 95% confidence limit on mean. 2.854535 Representative Concentration: 2.854535

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Butylbenzylphthalate
Enter Matrix: Subsurface Soil Site ~~1~~ 3 JRH 1/28/92

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	45.5625
2	180	280.5625
3	205	1743.063
4	200	1350.563
5	170	45.5625
6	170	45.5625
7	170	45.5625
8	41	14945.06
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 163.25 Std. Dev.: 51.41081

Upper 95% confidence limit on mean: 206.2373

Representative Concentration: 205

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acetone
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5	17.08444
2	65	3121.084
3	5	17.08444
4	6	9.817776
5	5	17.08444
6	6	9.817776
7	5	17.08444
8	5	17.08444
9	5	17.08444
10	5	17.08444
11	5	17.08444
12	5	17.08444
13	5	17.08444
14	5	17.08444
15	5	17.08444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arithm. Mean: 9.133333 Std. Dev.: 15.45901

Upper 95% confidence limit on mean: 17.69510

Representative Concentration: 17.69510

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,1,2,2-Tetrachloroethane
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects.

Sample No.	Sample Results	(xi-Xbar)**2
1	2.5	.0011111
2	2.5	.0011111
3	2.5	.0011111
4	3	.2844444
5	2.5	.0011111
6	3	.2844444
7	2.5	.0011111
8	2.5	.0011111
9	1	2.151111
10	2.5	.0011111
11	2.5	.0011111
12	2.5	.0011111
13	2.5	.0011111
14	2.5	.0011111
15	2.5	.0011111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.466667 Std. Dev.: .4413576

Upper 95% confidence limit on mean: 2.711384

Representative Concentration: 2.711384

NYSDEC 032657

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2-Butanone
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(xi-xbar)**2
1	5	4.271111
2	5	4.271111
3	5	4.271111
4	35	780.2711
5	5	4.271111
6	6	1.137778
7	5	4.271111
8	5	4.271111
9	5	4.271111
10	5	4.271111
11	5	4.271111
12	5	4.271111
13	5	4.271111
14	5	4.271111
15	5	4.271111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7.066667 Std. Dev.: 7.731914

Upper 95% confidence limit on mean: 11.34893

Representative Concentration: 11.34893

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Subsurface Soil Site ~~1~~ 3 JRK 1/28/92

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	784
2	180	1444
3	49	8649
4	57	7225
5	170	784
6	170	784
7	170	784
8	170	784
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 142 Std. Dev.: 55.08176

Upper 95% confidence limit on mean: 188.0568

Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	702.25
2	180	1332.25
3	48	9120.25
4	70	5402.25
5	170	702.25
6	170	702.25
7	170	702.25
8	170	702.25
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 143.5 Std. Dev.: 52.59821

Upper 95% confidence limit on mean: 187.4802

Representative Concentration: 180

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[b]fluoranthene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	97.51563
2	180	395.0156
3	205	2013.766
4	46	13024.52
5	170	97.51563
6	170	97.51563
7	170	97.51563
8	170	97.51563
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 160.125 Std. Dev.: 47.69078

Upper 95% confidence limit on mean: 200.0018

Representative Concentration: 200.0018

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[k]fluoranthene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	105.0625
2	180	410.0625
3	205	2047.563
4	43	13630.56
5	170	105.0625
6	170	105.0625
7	170	105.0625
8	170	105.0625
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 159.75 Std. Dev.: 48.71711

Upper 95% confidence limit on mean: 200.4850

Representative Concentration: 200.4850

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo(a)pyrene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	87.89063
2	180	375.3906
3	205	1969.141
4	50	12237.89
5	170	87.89063
6	170	87.89063
7	170	87.89063
8	170	87.89063
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 160.625 Std. Dev.: 46.32475

Upper 95% confidence limit on mean: 199.3596

Representative Concentration: 199.3596

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[g,h,i]perylene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	123.7656
2	180	446.2656
3	41	13894.52
4	200	1691.266
5	170	123.7656
6	170	123.7656
7	170	123.7656
8	170	123.7656
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 158.875 Std. Dev.: 48.77188

Upper 95% confidence limit on mean: 199.6558

Representative Concentration: 199.6558

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chrysene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	170	105.0625
2	180	410.0625
3	205	2047.563
4	43	13630.56
5	170	105.0625
6	170	105.0625
7	170	105.0625
8	170	105.0625
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 159.75 Std. Dev.: 48.71711

Upper 95% confidence limit on mean: 200.4850

Representative Concentration: 200.4850

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Toluene
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.0044444
2	2.5	.0044444
3	2.5	.0044444
4	1	2.054444
5	2.5	.0044444
6	3	.3211111
7	2.5	.0044444
8	2.5	.0044444
9	2.5	.0044444
10	2.5	.0044444
11	2.5	.0044444
12	2.5	.0044444
13	2.5	.0044444
14	2.5	.0044444
15	2.5	.0044444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.433333 Std. Dev.: .4169047

Upper 95% confidence limit on mean: 2.664230

Representative Concentration: 2.664230

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1880	4378514.
2	5450	2183036.
3	10400	41312885
4	6550	6643558.
5	2479.92	2227765.
6	1530	5965757.
7	1770	4850962.
8	1720	5073711.
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3972.49 Std. Dev.: 3221.273

Upper 95% confidence limit on mean: 6665.969

Representative Concentration: 6665.969

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.395	1.859814
2	1.4	.1287016
3	4.6	8.072702
4	3.5	3.031952
5	1.8	.0017016
6	.395	1.859814
7	.78	.9579516
8	1.2	.3122016
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.75875 Std. Dev.: 1.522443

Upper 95% confidence limit on mean: 3.031747 Representative Concentration: 3.031747

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7.5	12.07563
2	11.1	.015625
3	28.5	307.1256
4	23.4	154.3806
5	4.2	45.90063
6	4.8	38.13063
7	3.3	58.90563
8	5	35.70063
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 10.975 Std. Dev.: 9.652794

Upper 95% confidence limit on mean: 19.04622

Representative Concentration: 19.04622

UPPER 95% CONFIDENCE LIMIT OF THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	29.65	18007.96
2	100	4076.024
3	564	160125.0
4	322	25013.40
5	67	9378.712
6	29.5	18048.24
7	129	1214.087
8	69.6	8881.884
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 163.8438 Std. Dev.: 186.9856

Upper 95% confidence limit on mean: 320.1925

Representative Concentration: 320.1925

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 5
Degrees of Freedom: 4

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(x-Xbar)**2
1	5.1	.7396
2	6.5	.2916
3	5.9	.0036
4	9.9	15.5236
5	2.4	12.6736
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.96 Std. Dev.: 2.70333

Upper 95% confidence limit on mean: 8.31609

Representative Concentration: 8.31609

NYSDEC 032671

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Copper
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.85	31.36
2	15.8	87.4225
3	12.7	39.0625
4	8.8	5.5225
5	.85	31.36
6	2.5	15.6025
7	6.8	.1225
8	3.3	9.9225
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.45 Std. Dev.: 5.610895

Upper 95% confidence limit on mean: 11.14157

Representative Concentration: 11.14157

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 5
Degrees of Freedom: 4

Enter sample results (use 1/2 CRDL for non-detects.

Sample No.	Sample Results	(xi-xbar)**2
1	4060	3461647.
2	5960	3527.858
3	5160	578518.4
4	9153.02	10448513
5	5250	449739.7
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5920.604 Std. Dev.: 1932.752

Upper 95% confidence limit on mean: 8320.047

Representative Concentration: 8320.047

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Lead
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 6
Degrees of Freedom: 5

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(xi-xbar)**2
1	1.2	4.357656
2	3.1	.0351563
3	1.3	3.950156
4	12	75.90766
5	1.9	1.925156
6	.225	9.378906
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.2875 Std. Dev.: 4.371606

Upper 95% confidence limit on mean: 7.875965

Representative Concentration: 7.975965

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	562	6045.063
2	568	7014.063
3	936	204078.1
4	564	6360.063
5	278	42539.06
6	306	31773.06
7	377	11502.56
8	283	40501.56
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 484.25 Std. Dev.: 223.5472

Upper 95% confidence limit on mean: 671.1698

Representative Concentration: 671.1698

NYSDEC 032675

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Manganese
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 6
Degrees of Freedom: 5

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	67.7	1786.471
2	121	121.7344
3	61.4	2356.721
4	267	24659.47
5	90.6	375.0678
6	52.1	3348.551
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 109.9667 Std. Dev.: 80.80543

Upper 95% confidence limit on mean: 194.7837

Representative Concentration: 194.7837

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 7
Degrees of Freedom: 6

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.05	.0003719
2	.055	.0002041
3	.05	.0003719
4	.18	.0122577
5	.05	.0003719
6	.05	.0003719
7	.05	.0003719
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .0692857 Std. Dev.: .0488560

Upper 95% confidence limit on mean: .1144716

Representative Concentration: .1144716

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.05	.0014535
2	.055	.0010973
3	.22	.0173910
4	.18	.0084410
5	.05	.0014535
6	.05	.0014535
7	.05	.0014535
8	.05	.0014535
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .088125 Std. Dev.: .0698947

Upper 95% confidence limit on mean: .1465677

Representative Concentration: .1465677

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	350	8487.016
2	183	5606.266
3	554	87690.02
4	238	395.0156
5	113	20988.77
6	348	8122.516
7	132	15844.52
8	145	12740.77
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 257.875 Std. Dev.: 151.1267

Upper 95% confidence limit on mean: 384.2401

Representative Concentration: 384.2401

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 5
Degrees of Freedom: 4

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	146	33.64
2	167	231.04
3	131	432.64
4	169	295.84
5	146	33.64
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 151.8 Std. Dev.: 16.02166

Upper 95% confidence limit on mean: 171.6936

Representative Concentration: 169

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	183	87.89063
2	167	43.89063
3	265	8349.391
4	169	21.39063
5	146	763.1406
6	182	70.14063
7	146	763.1406
8	131	1816.891
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 173.625 Std. Dev.: 41.25855

Upper 95% confidence limit on mean: 208.1235 Representative Concentration: 208.1235

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 5
Degrees of Freedom: 4

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4.9	4.41
2	8.8	3.24
3	4.3	7.29
4	11.2	17.64
5	5.8	1.44
6		0
7		0
8		0
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7 Std. Dev.: 2.916333

Upper 95% confidence limit on mean: 10.62053

Representative Concentration: 10.62053

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Zinc
Enter Matrix: Subsurface Soil Site 3

Enter number of samples: 8
Degrees of Freedom: 7

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	9	21.6225
2	16.1	6.0025
3	28.8	229.5225
4	17.8	17.2225
5	7.4	39.0625
6	16.7	9.3025
7	7.5	37.8225
8	5.9	60.0625
9		0
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 13.65 Std. Dev.: 7.751682

Upper 95% confidence limit on mean: 20.13160

Representative Concentration: 20.13160

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,2-Dichloroethene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	66306.25
2	100	25600
3	2.5	66306.25
4	2.5	66306.25
5	2.5	66306.25
6	3600	11155600
7	2.5	66306.25
8	2.5	66306.25
9	2.5	66306.25
10	2.5	66306.25
11	2.5	66306.25
12	2.5	66306.25
13	2.5	66306.25
14	170	8100
15	2.5	66306.25
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 260 Std. Dev.: 925.2403

Upper 95% confidence limit on mean: 772.4320

Representative Concentration: 772.4320

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Toluene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5	1.777778
2	2.5	14.69444
3	2.5	14.69444
4	2.5	14.69444
5	2.5	14.69444
6	2.5	14.69444
7	7	.4444444
8	2.5	14.69444
9	2.5	14.69444
10	2.5	14.69444
11	9	7.111111
12	2.5	14.69444
13	2.5	14.69444
14	39	1067.111
15	10	13.44444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.333333 Std. Dev.: 9.399215

Upper 95% confidence limit on mean: 11.53896

Representative Concentration: 11.53896

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Trichloroethene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	11	16000267
2	120	15140140
3	16	15960291
4	13	15984271
5	13	15984271
6	16	15960291
7	58000	2.9148e9
8	61	15602763
9	9	16016271
10	1100	8474115.
11	6	16040292
12	780	10439576
13	12	15992268
14	6	16040292
15	2.5	16068339
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 4011.033 Std. Dev.: 14939.19

Upper 95% confidence limit on mean: 12284.90

Representative Concentration: 12284.90

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,1-Dichloroethane
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	3672.36
2	6	3260.41
3	880	667325.6
4	2.5	3672.36
5	2.5	3672.36
6	2.5	3672.36
7	2.5	3672.36
8	2.5	3672.36
9	2.5	3672.36
10	2.5	3672.36
11	2.5	3672.36
12	2.5	3672.36
13	2.5	3672.36
14	30.5	1062.76
15	2.5	3672.36
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 63.1 Std. Dev.: 226.1032

Upper 95% confidence limit on mean: 188.3242

Representative Concentration: 188.3242

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,1,1-Trichloroethane
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	466716.7
2	9	457877.8
3	10000	86756805
4	4	464669.4
5	2.5	466716.7
6	2.5	466716.7
7	3	466033.8
8	2	467400.1
9	3	466033.8
10	8	459232.1
11	6	461946.8
12	8	459232.1
13	2.5	466716.7
14	230	207632.1
15	2	467400.1
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 685.6667 Std. Dev.: 2577.390

Upper 95% confidence limit on mean: 2113.119

Representative Concentration: 2113.119

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Tetrachloroethene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	74492.60
2	75	40173.52
3	3600	11052744
4	11	69924.99
5	2.5	74492.60
6	2.5	74492.60
7	2	74765.79
8	2	74765.79
9	2	74765.79
10	10	70454.85
11	9	70986.72
12	14	68347.39
13	2	74765.79
14	395	14296.19
15	2	74765.79
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 275.4333 Std. Dev.: 925.2117

Upper 95% confidence limit on mean: 787.8495

Representative Concentration: 787.8495

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 1,1-Dichloroethene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	285.61
2	2.5	285.61
3	250	53176.36
4	2.5	285.61
5	2.5	285.61
6	2.5	285.61
7	2.5	285.61
8	2.5	285.61
9	2.5	285.61
10	2.5	285.61
11	2	302.76
12	2	302.76
13	2.5	285.61
14	9.5	98.01
15	2.5	285.61
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 19.4 Std. Dev.: 63.81984

Upper 95% confidence limit on mean: 54.74576 Representative Concentration: 54.74576

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Carbon tetrachloride
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.1344444
2	2.5	.1344444
3	2.5	.1344444
4	2.5	.1344444
5	2.5	.1344444
6	2.5	.1344444
7	2.5	.1344444
8	2.5	.1344444
9	2.5	.1344444
10	2.5	.1344444
11	8	26.35111
12	2.5	.1344444
13	2.5	.1344444
14	2.5	.1344444
15	2.5	.1344444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.866667 Std. Dev.: 1.420094

Upper 95% confidence limit on mean: 3.553167 Representative Concentration: 3.653167

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Ethylbenzene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	.0011111
2	2.5	.0011111
3	3	.2177778
4	2.5	.0011111
5	2.5	.0011111
6	2.5	.0011111
7	2.5	.0011111
8	2.5	.0011111
9	2.5	.0011111
10	2.5	.0011111
11	2.5	.0011111
12	2.5	.0011111
13	2.5	.0011111
14	2.5	.0011111
15	2.5	.0011111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.533333 Std. Dev.: .1290994

Upper 95% confidence limit on mean: 2.604833 Representative Concentration: 2.604833

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Xylenes
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	1.21
2	2.5	1.21
3	19	237.16
4	2.5	1.21
5	2.5	1.21
6	2.5	1.21
7	2.5	1.21
8	2.5	1.21
9	2.5	1.21
10	2.5	1.21
11	2.5	1.21
12	2.5	1.21
13	2.5	1.21
14	2.5	1.21
15	2.5	1.21
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 3.6 Std. Dev.: 4.260282

Upper 95% confidence limit on mean: 5.9595

Representative Concentration: 5.9595

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Bis(2-ethylhexyl)phthalate
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	25	178.6678
2	5.5	37.61778
3	5	44.00111
4	5	44.00111
5	5.5	37.61778
6	5	44.00111
7	73	3765.868
8	6	31.73444
9	5	44.00111
10	14	5.601111
11	5	44.00111
12	5	44.00111
13	5	44.00111
14	5	44.00111
15	5.5	37.61778
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 11.63333 Std. Dev.: 17.82200

Upper 95% confidence limit on mean: 21.50381

Representative Concentration: 21.50381

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Di-n-octylphthalate
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.0544444
2	5.5	.2336111
3	5	.9669444
4	5	.9669444
5	5.5	.2336111
6	5	.9669444
7	4	3.933611
8	6	.0002778
9	5	.9669444
10	5.5	.2336111
11	5	.9669444
12	5	.9669444
13	17	121.3669
14	5	.9669444
15	5.5	.2336111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.983333 Std. Dev.: 3.082883

Upper 95% confidence limit on mean: 7.690747

Representative Concentration: 7.690747

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2-Methylphenol
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.4444444
2	5.5	.1736111
3	2	9.506944
4	5	.0069444
5	5.5	.1736111
6	5	.0069444
7	5.5	.1736111
8	6	.8402778
9	5	.0069444
10	5.5	.1736111
11	5	.0069444
12	5	.0069444
13	5	.0069444
14	5	.0069444
15	5.5	.1736111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.083333 Std. Dev.: .9144996

Upper 95% confidence limit on mean: 5.589817

Representative Concentration: 5.589817

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 4-Methylphenol
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.4444444
2	5.5	.1736111
3	2	9.506944
4	5	.0069444
5	5.5	.1736111
6	5	.0069444
7	5.5	.1736111
8	6	.8402778
9	5	.0069444
10	5.5	.1736111
11	5	.0069444
12	5	.0069444
13	5	.0069444
14	5	.0069444
15	5.5	.1736111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.083333 Std. Dev.: .9144996

Upper 95% confidence limit on mean: 5.589817

Representative Concentration: 5.589817

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: 2,4-Dimethylphenol
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.1111111
2	5.5	.0069444
3	7	2.506944
4	5	.1736111
5	5.5	.0069444
6	5	.1736111
7	5.5	.0069444
8	6	.3402778
9	5	.1736111
10	5.5	.0069444
11	5	.1736111
12	5	.1736111
13	5	.1736111
14	5	.1736111
15	5.5	.0069444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.416667 Std. Dev.: .5482657

Upper 95% confidence limit on mean: 5.720316

Representative Concentration: 5.720316

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Naphthalene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.36
2	5.5	.1225
3	3	4.6225
4	5	.0225
5	5.5	.1225
6	5	.0225
7	5.5	.1225
8	6	.7225
9	5	.0225
10	5.5	.1225
11	5	.0225
12	5	.0225
13	5	.0225
14	5	.0225
15	5.5	.1225
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.15 Std. Dev.: .6800735

Upper 95% confidence limit on mean: 5.526650

Representative Concentration: 5.526650

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Acenaphthylene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.5377778
2	5.5	.2336111
3	1	16.13361
4	5	.0002778
5	5.5	.2336111
6	5	.0002778
7	5.5	.2336111
8	6	.9669444
9	5	.0002778
10	5.5	.2336111
11	5	.0002778
12	5	.0002778
13	5	.0002778
14	5	.0002778
15	5.5	.2336111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.016667 Std. Dev.: 1.159074

Upper 95% confidence limit on mean: 5.658604

Representative Concentration: 5.658604

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Fluoranthene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.4444444
2	5.5	.1736111
3	5	.0069444
4	2	9.506944
5	5.5	.1736111
6	5	.0069444
7	5.5	.1736111
8	6	.8402778
9	5	.0069444
10	5.5	.1736111
11	5	.0069444
12	5	.0069444
13	5	.0069444
14	5	.0069444
15	5.5	.1736111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.083333 Std. Dev.: .9144996

Upper 95% confidence limit on mean: 5.589817

Representative Concentration: 5.589817

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Pyrene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.4444444
2	5.5	.1736111
3	5	.0069444
4	2	9.506944
5	5.5	.1736111
6	5	.0069444
7	5.5	.1736111
8	6	.8402778
9	5	.0069444
10	5.5	.1736111
11	5	.0069444
12	5	.0069444
13	5	.0069444
14	5	.0069444
15	5.5	.1736111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.083333 Std. Dev.: .9144996

Upper 95% confidence limit on mean: 5.589817 Representative Concentration: 5.589817

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Benzo[b]fluoranthene
Enter Matrix: Current Groundwater

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.75	.4444444
2	5.5	.1736111
3	5	.0069444
4	2	9.506944
5	5.5	.1736111
6	5	.0069444
7	5.5	.1736111
8	6	.8402778
9	5	.0069444
10	5.5	.1736111
11	5	.0069444
12	5	.0069444
13	5	.0069444
14	5	.0069444
15	5.5	.1736111
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.083333 Std. Dev.: .9144996

Upper 95% confidence limit on mean: 5.589817

Representative Concentration: 5.589817

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	119	58834576
2	20200	1.5402e8
3	3360	19619319
4	16400	74142949
5	852	48127103
6	33800	6.7655e8
7	10200	5811137.
8	1860	35157429
9	1840	35395003
10	374	54987712
11	25.55	60276901
12	17100	86687831
13	1150	44081234
14	5490	5287102.
15	4070	13833713
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7789.37 Std. Dev.: 9902.448

Upper 95% confidence limit on mean: 13273.71

Representative Concentration: 13273.71

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 9
Degrees of Freedom: 8

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	9.7	9.61
2	1.8	23.04
3	16.4	96.04
4	2.7	15.21
5	.5	37.21
6	16.4	96.04
7	.5	37.21
8	1.4	27.04
9	10	11.56
10		0
11		0
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.6 Std. Dev.: 6.642289

Upper 95% confidence limit on mean: 11.70571

Representative Concentration: 11.70571

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	17.65	2931.501
2	192	14449.64
3	41.1	942.0807
4	131	3505.429
5	9.7	3855.582
6	211	19378.50
7	95.05	540.8725
8	42	887.6427
9	45.9	670.4647
10	20.3	2651.563
11	14	3340.069
12	52.3	379.9900
13	30.7	1688.662
14	97	635.3760
15	77.2	29.23204
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 71.79333 Std. Dev.: 63.18149

Upper 95% confidence limit on mean: 106.7856

Representative Concentration: 106.7856

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Beryllium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	.0981778
2	.5	.0981778
3	.5	.0981778
4	.5	.0981778
5	.5	.0981778
6	2.9	4.354178
7	2.8	3.946844
8	.5	.0981778
9	.5	.0981778
10	.5	.0981778
11	.5	.0981778
12	.5	.0981778
13	.5	.0981778
14	.5	.0981778
15	.5	.0981778
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .8133333 Std. Dev.: .8271005

Upper 95% confidence limit on mean: 1.271412 Representative Concentration: 1.271412

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cadmium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	699.2499
2	1.8	632.1872
3	2.55	595.0347
4	.5	699.2499
5	.5	699.2499
6	392	133266.4
7	.5	699.2499
8	.5	699.2499
9	1.15	665.2960
10	.5	699.2499
11	.5	699.2499
12	.5	699.2499
13	.5	699.2499
14	.5	699.2499
15	1.65	639.7527
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 26.94333 Std. Dev.: 100.9919

Upper 95% confidence limit on mean: 82.87635

Representative Concentration: 82.87635

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 19
Degrees of Freedom: 18

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4110	10829295
2	27400	3.9997e8
3	5730	2791537.
4	25700	3.3486e8
5	7580	32116.41
6	8450	1100843.
7	6145	1577007.
8	5770	2659474.
9	6840	314484.8
10	5790	2594643.
11	5160	5021137.
12	3860	12537190
13	9640	5014064.
14	10900	12244474
15	7540	19379.57
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7400.789 Std. Dev.: 6631.428

Upper 95% confidence limit on mean: 10597.15

Representative Concentration: 10597.15

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 11
Degrees of Freedom: 10

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	30.1	47.35942
2	4	1087.800
3	59.2	493.6476
4	18.4	345.2840
5	4	1087.800
6	169	17428.80
7	13.8	537.3967
8	6	959.8731
9	4	1087.800
10	12.6	594.4731
11	85.7	2373.461
12		0
13		0
14		0
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 36.98182 Std. Dev.: 51.03302

Upper 95% confidence limit on mean: 71.26413

Representative Concentration: 71.26413

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium VI
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	43	973.44
2	61	2420.64
3	5	46.24
4	5	46.24
5	5	46.24
6	5	46.24
7	5	46.24
8	13	1.44
9	5	46.24
10	5	46.24
11	5	46.24
12	5	46.24
13	5	46.24
14	5	46.24
15	5	46.24
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 11.8 Std. Dev.: 16.79796

Upper 95% confidence limit on mean: 21.10332

Representative Concentration: 21.10332

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cobalt
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	7.3984
2	9.5	18.3184
3	12.8	57.4564
4	2.5	7.3984
5	2.5	7.3984
6	10.4	26.8324
7	2.5	7.3984
8	2.5	7.3984
9	2.5	7.3984
10	2.5	7.3984
11	2.5	7.3984
12	2.5	7.3984
13	2.5	7.3984
14	10.2	24.8004
15	10.4	26.8324
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.22 Std. Dev.: 4.037538

Upper 95% confidence limit on mean: 7.456136

Representative Concentration: 7.456136

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Copper
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4	5501.189
2	32	2131.669
3	10.9	4525.253
4	28.3	2487.017
5	3.1	5635.505
6	823	554771.7
7	23.25	3016.206
8	11.3	4471.597
9	9.5	4715.569
10	1	5955.209
11	1	5955.209
12	51.6	705.9649
13	10.8	4538.717
14	26.8	2638.877
15	136	3344.309
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 78.17 Std. Dev.: 208.8051

Upper 95% confidence limit on mean: 193.8139

Representative Concentration: 193.8139

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	106000	4.6578e9
2	4520	1.1043e9
3	6605	9.7011e8
4	2150	1.2675e9
5	24900	1.6517e8
6	125000	7.6123e9
7	19950	3.1690e8
8	325	1.4008e9
9	114	1.4166e9
10	93000	3.0524e9
11	164	1.4128e9
12	155000	1.375e10
13	2890	1.2153e9
14	25200	1.5754e8
15	457	1.3909e9
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 37751.67 Std. Dev.: 53377.10

Upper 95% confidence limit on mean: 67313.86

Representative Concentration: 67313.86

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Lead
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.75	338.8054
2	32.6	180.7232
3	3.6	242.0099
4	29.8	113.2805
5	.5	348.0712
6	43.4	587.7392
7	7.2	142.9619
8	3.6	242.0099
9	3	261.0379
10	.5	348.0712
11	.5	348.0712
12	18.8	.1272111
13	11	66.53121
14	8.1	122.2499
15	124	10992.12
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 19.15667 Std. Dev.: 31.99756

Upper 95% confidence limit on mean: 36.87809

Representative Concentration: 36.87809

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 19
Degrees of Freedom: 18

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1535	59176.96
2	7950	38090336
3	1090	473706.2
4	3180	1964866.
5	1380	158613.5
6	2750	944272.5
7	1510	71965.12
8	1520	66699.86
9	2115	113391.7
10	1440	114422.0
11	1390	150748.3
12	277	2253791.
13	2320	293478.8
14	2510	535438.8
15	2820	1085216.
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1778.263 Std. Dev.: 1605.133

Upper 95% confidence limit on mean: 2551.941 Representative Concentration: 2551.941

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Manganese
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	7.65	38379.42
2	311	11544.07
3	15.2	35478.23
4	138	4297.677
5	28.5	30644.84
6	280	5843.583
7	79.95	15278.61
8	44.4	25330.84
9	62.35	19939.32
10	37.3	27641.28
11	26.9	31207.58
12	232	809.0232
13	93.1	12200.68
14	257	2856.190
15	1440	1528792.
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 203.5567 Std. Dev.: 357.5955

Upper 95% confidence limit on mean: 401.6061

Representative Concentration: 401.6061

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Mercury
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.1	.0001778
2	.2	.0075111
3	.1	.0001778
4	.1	.0001778
5	.1	.0001778
6	.2	.0075111
7	.1	.0001778
8	.1	.0001778
9	.1	.0001778
10	.1	.0001778
11	.1	.0001778
12	.1	.0001778
13	.1	.0001778
14	.1	.0001778
15	.1	.0001778
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Aritn. Mean: .1133333 Std. Dev.: .0351866

Upper 95% confidence limit on mean: .1328209

Representative Concentration: .1328209

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Nickel
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4	56.1001
2	10.1	1.9321
3	4	56.1001
4	19.5	64.1601
5	10.9	.3481
6	26.6	228.3121
7	4	56.1001
8	4	56.1001
9	6.35	26.4196
10	4	56.1001
11	4	56.1001
12	4	56.1001
13	4	56.1001
14	4	56.1001
15	62.9	2642.988
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 11.49 Std. Dev.: 15.74135

Upper 95% confidence limit on mean: 20.20814

Representative Concentration: 20.20814

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4380	9589344.
2	5360	4480278.
3	11900	19565878
4	3770	13739378
5	5640	3373344.
6	5230	5047511.
7	4435	9251736.
8	7530	2844.444
9	1395	36986669
10	4940	6434678.
11	10600	9755211.
12	7190	82177.78
13	35100	7.5305e8
14	2620	23587211
15	2060	29340278
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7476.667 Std. Dev.: 8169.128

Upper 95% confidence limit on mean: 12001.03

Representative Concentration: 12001.03

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Selenium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.3	2.8224
2	.5	.0144
3	.5	.0144
4	.5	.0144
5	.5	.0144
6	.5	.0144
7	.5	.0144
8	.5	.0144
9	.5	.0144
10	.5	.0144
11	.5	.0144
12	.5	.0144
13	.5	.0144
14	.5	.0144
15	.5	.0144
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .62 Std. Dev.: .4647580

Upper 95% confidence limit on mean: .8774

Representative Concentration: .8774

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	16500	6.5895e8
2	35600	43164900
3	20900	4.5241e8
4	17200	6.2350e8
5	18400	5.6501e8
6	19100	5.3222e8
7	144000	1.037e10
8	18100	5.7936e8
9	12550	8.7734e8
10	16000	6.8487e8
11	19100	5.3222e8
12	222000	3.234e10
13	41700	220900
14	12100	9.0420e8
15	19300	5.2304e8
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 42170 Std. Dev.: 59572.71

Upper 95% confidence limit on mean: 75163.55 Representative Concentration: 75163.55

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Thallium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	.0300444
2	.5	.0300444
3	.5	.0300444
4	.5	.0300444
5	.5	.0300444
6	.5	.0300444
7	.5	.0300444
8	.5	.0300444
9	.5	.0300444
10	.5	.0300444
11	.5	.0300444
12	.5	.0300444
13	3.1	5.888711
14	.5	.0300444
15	.5	.0300444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .6733333 Std. Dev.: .6713171

Upper 95% confidence limit on mean: 1.045133

Representative Concentration: 1.045133

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2	6610.232
2	359	76008.65
3	11.2	5198.891
4	36.9	2153.269
5	2	6610.232
6	218	18143.19
7	48.4	1218.243
8	23.6	3564.488
9	8.45	5603.022
10	2	6610.232
11	2	6610.232
12	419	112692.3
13	6.6	5883.401
14	77.1	38.48134
15	33.3	2500.333
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 83.30333 Std. Dev.: 136.1315

Upper 95% confidence limit on mean: 158.6980 Representative Concentration: 158.6980

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Zinc
Enter Matrix: Current Groundwater--unfiltered

Enter number of samples: 14
Degrees of Freedom: 13

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	25.35	915.8189
2	104	2341.350
3	38	310.2002
4	72.8	295.4102
5	217	26045.93
6	123	4541.075
7	34.025	466.0202
8	35.8	392.5352
9	49.4	38.59516
10	3.55	2710.504
11	5.15	2546.464
12	28.95	710.8889
13	16.75	1510.294
14	24.8	949.4102
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 55.6125 Std. Dev.: 53.02817

Upper 95% confidence limit on mean: 89.11125

Representative Concentration: 89.11125

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cyanide
Enter Matrix: Current Groundwater--Unfiltered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2.5	37215.55
2	2.5	37215.55
3	2.5	37215.55
4	2.5	37215.55
5	2.5	37215.55
6	2690	6222963.
7	2.5	37215.55
8	2.5	37215.55
9	2.5	37215.55
10	2.5	37215.55
11	19.8	30840.04
12	144.5	2592.168
13	2.5	37215.55
14	2.5	37215.55
15	49.4	21319.89
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 195.4133 Std. Dev.: 691.1215

Upper 95% confidence limit on mean: 578.1818

Representative Concentration: 578.1818

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Arsenic
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.85	23.74938
2	.5	27.28321
3	1.2	20.46054
4	10.4	21.87121
5	.5	27.28321
6	.5	27.28321
7	.5	27.28321
8	11	27.84321
9	1.35	19.12604
10	.5	27.28321
11	.5	27.28321
12	.5	27.28321
13	43.2	1404.501
14	.5	27.28321
15	13.85	66.04271
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.723333 Std. Dev.: 11.34479

Upper 95% confidence limit on mean: 12.00649

Representative Concentration: 12.00649

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Aluminum
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects

Sample No.	Sample Results	(Xi-Xbar)**2
1	12.5	1998.537
2	12.5	1998.537
3	108	2580.132
4	25.1	1030.731
5	12.5	1998.537
6	12.5	1998.537
7	12.5	1998.537
8	288	53266.33
9	12.5	1998.537
10	12.5	1998.537
11	12.5	1998.537
12	12.5	1998.537
13	293	55599.25
14	12.5	1998.537
15	18.975	1461.533
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 57.205 Std. Dev.: 97.80570

Upper 95% confidence limit on mean: 111.3734

Representative Concentration: 111.3734

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Barium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	17.1	1.8225
2	89.1	5380.223
3	4	138.0625
4	18.2	6.0025
5	4	138.0625
6	9	45.5625
7	4	138.0625
8	4	138.0625
9	8.65	50.41
10	15.9	.0225
11	17.4	2.7225
12	23.9	66.4225
13	4	138.0625
14	13	7.5625
15	4	138.0625
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 15.75 Std. Dev.: 21.36273

Upper 95% confidence limit on mean: 27.58146 Representative Concentration: 27.58146

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Cadmium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	39.4384
2	.5	39.4384
3	.5	39.4384
4	.5	39.4384
5	2.8	15.8404
6	91	7093.008
7	.5	39.4384
8	.5	39.4384
9	1.9	23.8144
10	.5	39.4384
11	.5	39.4384
12	.5	39.4384
13	.5	39.4384
14	.5	39.4384
15	.5	39.4384
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 6.78 Std. Dev.: 23.30837

Upper 95% confidence limit on mean: 19.68903

Representative Concentration: 19.68903

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Calcium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4370	14628075
2	31100	5.2465e8
3	5340	8149122.
4	13300	26064428
5	6920	1624775.
6	6230	3859915.
7	5620	6628908.
8	5490	7315222.
9	7485	503626.8
10	6390	3256822.
11	6350	3402795.
12	11200	9032028.
13	2730	29862582
14	5190	9028022.
15	5205	8938107.
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 8194.667 Std. Dev.: 6850.176

Upper 95% confidence limit on mean: 11988.54

Representative Concentration: 11988.54

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Chromium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	32.35	502.9554
2	4	35.08588
3	56.7	2188.057
4	4	35.08588
5	4	35.08588
6	4	35.08588
7	4	35.08588
8	11.8	3.521878
9	4	35.08588
10	4	35.08588
11	4	35.08588
12	4	35.08588
13	4	35.08588
14	4	35.08588
15	4	35.08588
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 9.923333 Std. Dev.: 14.91779

Upper 95% confidence limit on mean: 18.18535

Representative Concentration: 18.18535

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Copper
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	4	2.454444
2	1	2.054444
3	1	2.054444
4	1	2.054444
5	2.3	.0177778
6	2	.1877778
7	1	2.054444
8	3.1	.4444444
9	3.25	.6669444
10	1	2.054444
11	1	2.054444
12	1	2.054444
13	6.3	14.95111
14	1	2.054444
15	7.55	26.18028
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 2.433333 Std. Dev.: 2.093158

Upper 95% confidence limit on mean: 3.592601

Representative Concentration: 3.592601

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Iron
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(xi-xbar)**2
1	24.15	3370.770
2	10.5	5142.085
3	34	2324.043
4	25.6	3204.503
5	10.5	5142.085
6	25.4	3227.187
7	10.5	5142.085
8	150	4595.710
9	25.3	3238.558
10	568	235993.5
11	46	1311.043
12	10.5	5142.085
13	214	17369.04
14	10.5	5142.085
15	68.175	196.9344
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 82.20833 Std. Dev.: 146.5171

Upper 95% confidence limit on mean: 163.3549

Representative Concentration: 163.3549

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Lead
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	.1344444
2	.5	.1344444
3	.5	.1344444
4	.5	.1344444
5	.5	.1344444
6	.5	.1344444
7	.5	.1344444
8	.5	.1344444
9	.5	.1344444
10	.5	.1344444
11	6	26.35111
12	.5	.1344444
13	.5	.1344444
14	.5	.1344444
15	.5	.1344444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .8666667 Std. Dev.: 1.420094

Upper 95% confidence limit on mean: 1.653167

Representative Concentration: 1.653167

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Magnesium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	1600	82694.59
2	8330	41504947
3	906	963473.1
4	1270	381388.6
5	1320	322131.9
6	1660	51786.59
7	1410	228069.9
8	1360	278326.6
9	2120	54025.25
10	1910	503.2544
11	1520	135105.3
12	2380	242490.6
13	22.5	3478474.
14	1300	345234.6
15	1205	465897.3
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1887.567 Std. Dev.: 1861.922

Upper 95% confidence limit on mean: 2918.767 Representative Concentration: 2918.767

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Manganese
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5.9	2292.814
2	42.7	122.8403
3	1.2	2765.007
4	.5	2839.114
5	21.2	1061.674
6	16.5	1390.047
7	35.4	337.9469
8	2.5	2629.980
9	8.2	2077.840
10	572	268548.5
11	.5	2839.114
12	68.5	216.5803
13	1.6	2723.100
14	7.9	2105.280
15	22.15	1000.668
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 53.78333 Std. Dev.: 144.6549

Upper 95% confidence limit on mean: 133.8985

Representative Concentration: 133.8985

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Potassium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	5130	3534400
2	4410	6760000
3	12000	24900100
4	1580	29484900
5	5500	2280100
6	1100	34928100
7	4800	4884100
8	8050	1081600
9	1160	34222500
10	1810	27040000
11	35300	8.0032e8
12	1800	27144100
13	6260	562500
14	12400	29052100
15	3850	9985600
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 7010 Std. Dev.: 8603.090

Upper 95% confidence limit on mean: 11774.71

Representative Concentration: 11774.71

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Selenium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.5	.0300444
2	.5	.0300444
3	.5	.0300444
4	.5	.0300444
5	.5	.0300444
6	.5	.0300444
7	.5	.0300444
8	.5	.0300444
9	.5	.0300444
10	.5	.0300444
11	.5	.0300444
12	.5	.0300444
13	3.1	5.888711
14	.5	.0300444
15	.5	.0300444
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: .6733333 Std. Dev.: .6713171

Upper 95% confidence limit on mean: 1.045133

Representative Concentration: 1.045133

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Sodium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	16450	6.7878e8
2	40000	6265678.
3	21200	4.5383e8
4	16900	6.5553e8
5	18700	5.6660e8
6	19500	5.2915e8
7	15900	7.0774e8
8	19200	5.4305e8
9	12800	8.8229e8
10	18500	5.7616e8
11	41600	816011.1
12	12100	9.2436e8
13	230000	3.516e10
14	18700	5.6660e8
15	136000	8.7416e9
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 42503.33 Std. Dev.: 60348.86

Upper 95% confidence limit on mean: 75926.74

Representative Concentration: 75926.74

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Thallium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	.75	.9735111
2	1	.5426778
3	17.1	236.0320
4	.5	1.529344
5	.5	1.529344
6	.5	1.529344
7	.5	1.529344
8	.5	1.529344
9	.5	1.529344
10	.5	1.529344
11	.5	1.529344
12	.5	1.529344
13	1.7	.0013444
14	.5	1.529344
15	.5	1.529344
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 1.736667 Std. Dev.: 4.262564

Upper 95% confidence limit on mean: 4.097431

Representative Concentration: 4.097431

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UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Vanadium
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 15
Degrees of Freedom: 14

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	2	9.4864
2	2	9.4864
3	2	9.4864
4	2	9.4864
5	2	9.4864
6	2	9.4864
7	2	9.4864
8	8.1	9.1204
9	2	9.4864
10	2	9.4864
11	2	9.4864
12	2	9.4864
13	34.3	853.8084
14	2	9.4864
15	9.8	22.2784
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 5.08 Std. Dev.: 8.447502

Upper 95% confidence limit on mean: 9.758536

Representative Concentration: 9.758536

UPPER 95% CONFIDENCE LIMIT ON THE ARITHMETIC MEAN

Enter Chemical: Zinc
Enter Matrix: Current Groundwater--Filtered

Enter number of samples: 14
Degrees of Freedom: 13

Enter sample results (use 1/2 CRDL for non-detects)

Sample No.	Sample Results	(Xi-Xbar)**2
1	16.5	1331.207
2	46.1	47.41306
3	33.5	379.6931
4	29.7	542.2245
5	168	13228.29
6	7.7	2050.796
7	25.2	772.0459
8	16.75	1313.027
9	5.1	2293.042
10	96.05	1854.533
11	19.85	1097.976
12	175	15629.57
13	19.35	1131.361
14	80	729.7716
15		0
16		0
17		0
18		0
19		0
20		0
21		0
22		0
23		0
24		0
25		0
26		0
27		0
28		0
29		0
30		0

Arith. Mean: 52.98571 Std. Dev.: 57.10984

Upper 95% confidence limit on mean: 85.95433

Representative Concentration: 85.95433

I.12

RISK ASSESSMENT SPREADSHEETS

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RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME:        BETHPAGE
LOCATION:         BETHPAGE, NY
DATE:             AUG/SETP, 1991

EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE
------------------------------------------------------------------------------------------------------------------------
RELEVANT EQUATIONS:        DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT  x 1E6)

------------------------------------------------------------------------------------------------------------------------
ASSUMPTIONS:      ADULT:

                  C    = CONCENTRATION IN SOIL (MG/KG)

                  SA   = EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):          2950

                  AF   = ADHERENCE FACTOR (MG/SQ CM):                       1.45

                  ABS  = ABSORPTION FRACTION:       VOCS:                     .1
                         (DECIMAL FRACTION)         BNAS/PESTICIDES:         .05
                                                    PCBS:                    .03

                  EF1  = YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)                  0
                  EF2  = ADULT EXPOSURE FREQUENCY (DAYS/YEAR):                30
                  ED   = ADULT EXPOSURE DURATION (YEARS):                     25
                  BW1  = BODY WEIGHT ADOLESCENT (KG):                          0
                  BW2  = BODY WEIGHT ADULT (KG):                              70
                  AT   = AVERAGING TIME (DAYS/YEAR):                         365
                  LT   = LIFETIME (YEARS):                                    70

DETERMINE CONVERSION FACTORS:
  DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

  DOSEyouth = (CF1)*(C)*(ABS)      CF1 =          0        * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
  DOSEadult = (CF2)*(C)*(ABS)      CF2 =    5.023e-9         (NOT USED IN CONVERSION FACTORS)
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RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Tetrachloroethene	27.4	.1	0	1.378e-8	4.915e-9	1e-2	5.1e-2
Trichloroethene	7.4	.1	0	3.717e-9	1.327e-9		1.1e-2
Bis(2-ethylhexyl)phthalate	179	.05	0	4.495e-8	1.605e-8	2e-2	1.4e-2
Butylbenzylphthalate	180	.05	0	4.520e-8	1.614e-8	.2	
Acenaphthene	53	.05	0	1.331e-8	4.753e-9	.06	
Anthracene	66	.05	0	1.657e-8	5.919e-9	.3	
Benz(a)anthracene	439	.05	0	1.102e-7	3.937e-8		1.6675e0
Benzo(b)fluoranthene	575	.05	0	1.444e-7	5.157e-8		1.61
Benzo(k)fluoranthene	477	.05	0	1.198e-7	4.278e-8		7.59e-1
Benzo(g,h,i)perylene	350	.05	0	8.789e-8	3.139e-8		
Benzo(a)pyrene	502	.05	0	1.261e-7	4.502e-8		11.5
Chrysene	473	.05	0	1.188e-7	4.242e-8		.0506
Dibenz(a,h)anthracene	150	.05	0	3.767e-8	1.345e-8		12.765
Eluoranthene	837	.05	0	2.102e-7	7.507e-8	.04	
Fluorene	44	.05	0	1.105e-8	3.946e-9	.04	
Indeno(1,2,3-cd)pyrene	349	.05	0	8.764e-8	3.130e-8		2.688
Naphthalene	53	.05	0	1.331e-8	4.753e-9	4e-3	
Pyrene	793	.05	0	1.991e-7	7.112e-8	.03	
Chlordane	240	.05	0	6.027e-8	2.153e-8	.00006	1.3
4,4'-DDT	170	.05	0	4.269e-8	1.525e-8	.0005	.34
Arsenic	33100	0	0	0	0	1e-3	
Barium	48600	0	0	0	0	.05	
Cadmium	0	0	0	0	0	5e-4	
Chromium (VI)	49100	0	0	0	0	5e-3	
Copper	0	0	0	0	0	4e-2	
Lead	0	0	0	0	0	1.4e-3	
Manganese	0	0	0	0	0	.1	
Mercury	0	0	0	0	0	.0003	
Nickel	16100	0	0	0	0	2e-2	
Silver	3500	0	0	0	0	.003	
Vanadium	30400	0	0	0	0	7e-3	
Zinc	0	0	0	0	0	2e-1	
Cyanide	3200	0	0	0	0	2e-2	
Aroclor-1248	7900	.03	0	1.190e-6	4.251e-7		7.7
Phenanthrene	554	.05	0	1.391e-7	4.969e-8	2.9e-2	
4,4'-DDE	270	.05	0	6.780e-8	2.422e-8	5e-4	3.4e-1
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Tetrachloroethene	0	1.375e-6	2.51e-10
Trichloroethene	0	0	1.46e-11
Bis(2-ethylhexyl)phthalate	0	2.248e-6	2.25e-10
Butylbenzylphthalate	0	2.260e-7	0
Acenaphthene	0	2.218e-7	0
Anthracene	0	5.525e-8	0
Benz(a)anthracene	0	0	6.565e-8
Benzo(b)fluoranthene	0	0	8.303e-8
Benzo(k)fluoranthene	0	0	3.247e-8
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	5.178e-7
Chrysene	0	0	2.147e-9
Dibenz(a,h)anthracene	0	0	1.717e-7
Fluoranthene	0	5.255e-6	0
Fluorene	0	2.762e-7	0
Indeno(1,2,3-cd)pyrene	0	0	8.351e-8
Naphthalene	0	3.327e-6	0
Pyrene	0	6.638e-6	0
Chlordane	0	1.005e-3	2.798e-8
4,4'-DDT	0	8.538e-5	5.184e-9
Arsenic	0	0	0
Barium	0	0	0
Cadmium	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	0	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	0	0
Zinc	0	0	0
Cyanide	0	0	0
Aroclor-1248	0	0	3.273e-6
Phenanthrene	0	0	0
4,4'-DDE	0	0	8.233e-9
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	1.110e-3	4.272e-6

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME:	BETHPAGE
LOCATION:	BETHPAGE, NY
DATE:	AUG/SEPT, 1991

EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE

RELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

ASSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2930
AF	= ADHERENCE FACTOR (MG/SQ CM):		.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

DETERMINE CONVERSION FACTORS:

DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS)   CF1 = 0   * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.

DOSEadult = (CF2)*(C)*(ABS)   CF2 = 5.023e-9   (NOT USED IN CONVERSION FACTORS)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	2.8	.1	0	1.406e-9	5.02e-10	2e-1	
Trichlcroethene	2.25	.1	0	1.130e-9	4.04e-10		1.1e-2
Chloroform	1	.1	0	5.02e-10	1.79e-10	1e-2	6.1e-3
Bis(2-ethylhexyl)phthalate	188	.05	0	4.721e-8	1.686e-8	2e-2	1.4e-2
Butylbenzylphthalate	354	.05	0	8.890e-8	3.175e-8	.2	
Acenaphthene	278	.05	0	6.981e-8	2.493e-8	.06	
Anthracene	314	.05	0	7.885e-8	2.816e-8	.3	
Benz(a)anthracene	446	.05	0	1.120e-7	4.000e-8		1.6675e0
Benzo(b)fluoranthene	411	.05	0	1.032e-7	3.686e-8		1.81
Benzo(k)fluoranthene	454	.05	0	1.140e-7	4.072e-8		7.59e-1
Benzo(g,h,i)perylene	305	.05	0	7.659e-8	2.735e-8		
Benzo(a)pyrene	463	.05	0	1.163e-7	4.153e-8		11.5
Chrysene	433	.05	0	1.087e-7	3.883e-8		.0506
Dibenz(a,h)anthracene	210	.05	0	5.274e-8	1.883e-8		12.765
Fluoranthene	1091	.05	0	2.740e-7	9.785e-8	.04	
Fluorene	221	.05	0	5.550e-8	1.982e-8	.04	
Indeno(1,2,3-cd)pyrene	313	.05	0	7.860e-8	2.807e-8		2.668
Naphthalene	186	.05	0	4.671e-8	1.668e-8	4e-3	
Pyrene	815	.05	0	2.047e-7	7.310e-8	.03	
Arsenic	6400	0	0	0	0	1e-3	
Cadmium	0	0	0	0	0	5e-4	
Chromium (VI)	128000	0	0	0	0	5e-3	
Copper	61200	0	0	0	0	4e-2	
Lead	0	0	0	0	0	1.4e-3	
Nickel	7800	0	0	0	0	2e-2	
Silver	820	0	0	0	0	.003	
Vanadium	32200	0	0	0	0	7e-3	
Zinc	0	0	0	0	0	2e-1	
Cyanide	1500	0	0	0	0	2e-2	
Aroclor-1248	1900	.03	0	2.863e-7	1.022e-7		7.7e0
Phenanthrene	1041	.05	0	2.614e-7	9.336e-8	2.9e-2	
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	7.032e-9	0
Trichloroethene	0	0	4.44e-12
Chloroform	0	5.023e-8	1.09e-12
Bis(2-ethylhexyl)phthalate	0	2.361e-6	2.36e-10
Butylbenzylphthalate	0	4.445e-7	0
Acenaphthene	0	1.164e-6	0
Anthracene	0	2.628e-7	0
Benz(a)anthracene	0	0	6.670e-8
Benzo(b)fluoranthene	0	0	5.935e-8
Benzo(k)fluoranthene	0	0	3.091e-8
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	4.775e-7
Chrysene	0	0	1.965e-9
Dibenz(a,h)anthracene	0	0	2.404e-7
Fluoranthene	0	6.849e-6	0
Fluorene	0	1.387e-6	0
Indeno(1,2,3-cd)pyrene	0	0	7.490e-8
Naphthalene	0	1.168e-5	0
Pyrene	0	6.822e-6	0
Arsenic	0	0	0
Cadmium	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	0	0
Zinc	0	0	0
Cyanide	0	0	0
Aroclor-1248	0	0	7.873e-7
Phenanthrene	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	3.103e-5	1.739e-6

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RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME:        BETHPAGE
LOCATION:         BETHPAGE, NY
DATE:             AUG.SEPT. 1991

EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
-----------------------------------------------------------------------------------------------------------
RELEVANT EQUATIONS:        DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT  x 1E6)

-----------------------------------------------------------------------------------------------------------
ASSUMPTIONS:      ADULT:

                  C    : CONCENTRATION IN SOIL (MG/KG)

                  SA   : EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):            2950

                  AF   : ADHERENCE FACTOR (MG/SQ CM):                         1.45

                  ABS  : ABSORPTION FRACTION:        VOCS:                      .1
                         (DECIMAL FRACTION)          BNAS/PESTICIDES:          .05
                                                     PCBS:                     .03

                  EF1  : YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)                    0
                  EF2  : ADULT EXPOSURE FREQUENCY (DAYS/YEAR):                  30
                  ED   : ADULT EXPOSURE DURATION (YEARS):                       25
                  BW1  : BODY WEIGHT ADOLESCENT (KG):                            0
                  BW2  : BODY WEIGHT ADULT (KG):                                70
                  AT   : AVERAGING TIME (DAYS/YEAR):                          .365
                  LT   : LIFETIME (YEARS):                                      70

DETERMINE CONVERSION FACTORS:
  DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

  DOSEyouth = (CF1)*(C)*(ABS)      CF1 =          0        * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
  DOSEadult = (CF2)*(C)*(ABS)      CF2 =     5.023e-9        (NOT USED IN CONVERSION FACTORS)
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RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 2, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	4.9	.1	0	2.411e-9	8.61e-10	2e-1	
Chloroform	1	.1	0	5.02e-10	1.79e-10	1e-2	6.1e-3
Bis(2-ethylhexyl)phthalate	1293	.05	0	3.260e-7	1.164e-7	2e-2	1.4e-2
Di-n-butylphthalate	340	.05	0	8.538e-8	3.049e-8	1e-1	
Butylbenzylphthalate	508	.05	0	1.276e-7	4.556e-8	.2	
Dimethylphthalate	190	.05	0	4.771e-8	1.704e-8	1	
Acenaphthene	160	.05	0	4.018e-8	1.435e-8	.06	
Anthracene	446	.05	0	1.120e-7	4.000e-8	.3	
Benz(a)anthracene	637	.05	0	1.600e-7	5.713e-8		1.6675e0
Benzo(b)fluoranthene	716	.05	0	1.798e-7	6.422e-8		1.61
Benzo(k)fluoranthene	857	.05	0	2.152e-7	7.686e-8		7.59e-1
Benzo(g,h,i)perylene	636	.05	0	1.597e-7	5.704e-8		
Benzo(a)pyrene	784	.05	0	1.969e-7	7.032e-8		11.5
Chrysene	739	.05	0	1.856e-7	6.628e-8		.0506
Fluoranthene	1052	.05	0	2.642e-7	9.435e-8	.04	
Fluorene	180	.05	0	4.520e-8	1.614e-8	.04	
Indeno(1,2,3-cd)pyrene	580	.05	0	1.457e-7	5.202e-8		2.669
Pyrene	1462	.05	0	3.671e-7	1.311e-7	.03	
Aroclor-1254	530	.03	0	7.986e-8	2.852e-8		7.7
Arsenic	26100	0	0	0	0	1e-3	
Barium	76200	0	0	0	0	.05	
Beryllium	1100	0	0	0	0	5e-3	4.3e0
Cadmium	0	0	0	0	0	5e-4	
Chromium (VI)	258030	0	0	0	0	5e-3	
Copper	400000	0	0	0	0	4e-2	
Lead	0	0	0	0	0	1.4e-3	
Manganese	0	0	0	0	0	.1	
Mercury	210	0	0	0	0	.0003	
Nickel	0	0	0	0	0	2e-2	
Silver	0	0	0	0	0	.003	
Vanadium	89900	0	0	0	0	7e-3	
Zinc	0	0	0	0	0	2e-1	
Cyanide	2300	0	0	0	0	2e-2	
Aroclor-1248	830	.03	0	1.251e-7	4.468e-8		7.7e0
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	1.205e-3	0
Chloroform	0	5.023e-8	1.09e-12
Bis(2-ethylhexyl)phthalate	0	1.630e-5	1.630e-9
Di-n-butylphthalate	0	8.539e-7	0
Butylbenzylphthalate	0	6.379e-7	0
Dimethylphthalate	0	4.771e-9	0
Acenaphthene	0	6.597e-7	0
Anthracene	0	2.733e-7	0
Benz(a)anthracene	0	0	3.537e-8
Benzo(b)fluoranthene	0	0	1.034e-7
Benzo(k)fluoranthene	0	0	5.334e-8
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	5.096e-7
Chrysene	0	0	2.354e-9
Fluoranthene	0	5.505e-5	0
Fluorene	0	1.130e-6	0
Indeno(1,2,3-cd)pyrene	0	0	1.333e-7
Pyrene	0	1.224e-5	0
Aroclor-1254	0	0	2.135e-7
Arsenic	0	0	0
Barium	0	0	0
Beryllium	0	0	0
Cadmium	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	0	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	0	0
Zinc	0	0	0
Cyanide	0	0	0
Aroclor-1249	0	0	2.433e-7
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	3.892e-5	1.773e-6

NYSDEC 032753

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEES

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEX = (C x IR x Fi x EF x ED)/(BW x LT x 365 x 1E6)

WHERE:
C = MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
IR = SOIL INGESTION RATE (MG/EVENT)
EF = EXPOSURE FREQUENCY (EVENTS/YEAR)
Fi = FRACTION FROM CONTAMINATED SOURCE
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
Fi:	.1	Fi:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:	YOUTH:
CF: 5.871e-9 (AVG ANNUAL DOSE)	CF: 0 (AVG ANNUAL DOSE)

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEES
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Tetrachloroethene	.0274	0	1.51e-10	5.75e-11	1e-2	5.1e-2
Trichloroethene	.0074	0	4.34e-11	1.55e-11		1.1e-2
Bis(2-ethylhexyl)phthalate	.179	0	1.051e-9	3.75e-10	2e-2	1.4e-2
Butylbenzylphthalate	.18	0	1.057e-9	3.77e-10	.2	
Acenaphthene	.053	0	3.11e-10	1.11e-10	.06	
Anthracene	.066	0	3.87e-10	1.38e-10	.3	
Benz(a)anthracene	.439	0	2.577e-9	9.20e-10		1.6575e0
Benzo(b)fluoranthene	.575	0	3.376e-9	1.206e-9		1.61
Benzo(k)fluoranthene	.477	0	2.800e-9	1.000e-9		7.59e-1
Benzo(g,h,i)perylene	.35	0	2.055e-9	7.34e-10		
Benzo(a)pyrene	.502	0	2.947e-9	1.053e-9		11.5
Chrysene	.473	0	2.777e-9	9.92e-10		.0506
Dibenz(a,h)anthracene	.15	0	8.81e-10	3.15e-10		12.765
Fluoranthene	.837	0	4.914e-9	1.755e-9	.04	
Fluorene	.044	0	2.58e-10	9.23e-11	.04	
Indeno(1,2,3-cd)pyrene	.349	0	2.049e-9	7.32e-10		2.668
Naphthalene	.053	0	3.11e-10	1.11e-10	4e-1	
Pyrene	.793	0	4.655e-9	1.663e-9	.03	
Chlordane	.24	0	1.409e-9	5.03e-10	.00006	1.3
4,4'-DDT	.17	0	9.38e-10	3.56e-10	.0005	.34
Arsenic	33.1	0	1.943e-7	6.940e-8	1e-3	
Barium	46.6	0	2.736e-7	9.771e-8	.05	
Cadmium	0	0	0	0	5e-4	
Chromium (VI)	49.1	0	2.883e-7	1.029e-7	5e-3	
Copper	0	0	0	0	4e-2	
Lead	0	0	0	0	1.4e-3	
Manganese	0	0	0	0	.1	
Mercury	0	0	0	0	.0003	
Nickel	16.1	0	9.452e-8	3.376e-8	2e-2	
Silver	3.5	0	2.055e-8	7.339e-9	.003	
Vanadium	30.4	0	1.785e-7	6.374e-8	7e-3	
Zinc	0	0	0	0	2e-1	
Cyanide	3.2	0	1.879e-8	6.710e-9	2e-2	
Aroclor-1248	7.9	0	4.638e-8	1.656e-8		7.7
Phenanthrene	.554	0	3.252e-9	1.162e-9	2.9e-2	
4,4'-DDE	.27	0	1.585e-9	5.66e-10	5e-4	3.4e-1
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEES
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Tetrachloroethene	0	1.609e-8	2.93e-12
Trichloroethene	0	0	1.71e-13
Bis(2-ethylhexyl)phthalate	0	5.254e-8	5.25e-12
Butylbenzylphthalate	0	5.284e-9	0
Acenaphthene	0	5.186e-9	0
Anthracene	0	1.292e-9	0
Benz(a)anthracene	0	0	1.535e-9
Benzo(b)fluoranthene	0	0	1.941e-9
Benzo(k)fluoranthene	0	0	7.59e-10
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	1.210e-8
Chrysene	0	0	5.02e-11
Dibenz(a,h)anthracene	0	0	4.015e-9
Fluoranthene	0	1.228e-7	0
Fluorene	0	6.458e-9	0
Indeno(1,2,3-cd)pyrene	0	0	1.952e-9
Naphthalene	0	7.779e-8	0
Pyrene	0	1.552e-7	0
Chlordane	0	2.348e-5	6.54e-10
4,4'-DDT	0	1.996e-6	1.21e-10
Arsenic	0	1.943e-4	0
Barium	0	5.472e-6	0
Cadmium	0	0	0
Chromium (VI)	0	5.765e-5	0
Copper	0	0	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	0	0
Nickel	0	4.726e-6	0
Silver	0	6.849e-6	0
Vanadium	0	2.550e-5	0
Zinc	0	0	0
Cyanide	0	9.393e-7	0
Aroclor-1248	0	0	1.275e-7
Phenanthrene	0	1.122e-7	0
4,4'-DDE	0	3.170e-6	1.92e-10
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	3.247e-4	1.509e-7

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL, ADULT EMPLOYEE

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEX = (C x IR x Fi x EF x ED)/(BW x LT x 365 x 1E6)

WHERE:
C = MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
IR = SOIL INGESTION RATE (MG/EVENT)
EF = EXPOSURE FREQUENCY (EVENTS/YEAR)
Fi = FRACTION FROM CONTAMINATED SOURCE
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
Fi:	.1	Fi:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:
CF: 5.871e-9 (AVG ANNUAL DOSE)

YOUTH:
CF: 0 (AVG ANNUAL DOSE)

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	.0028	0	1.64e-11	5.87e-12	2e-1	
Trichloroethene	.00225	0	1.32e-11	4.72e-12		1.1e-2
Chloroform	.001	0	5.87e-12	2.10e-12	1e-2	6.1e-3
Bis(2-ethylhexyl)phthalate	.188	0	1.104e-9	3.94e-10	2e-2	1.4e-2
Butylbenzylphthalate	.354	0	2.078e-9	7.42e-10	.2	
Acenaphthene	.278	0	1.632e-9	5.83e-10	.06	
Anthracene	.314	0	1.843e-9	6.58e-10	.3	
Benz(a)anthracene	.446	0	2.618e-9	9.35e-10		1.6675e0
Benzo(b)fluoranthene	.411	0	2.413e-9	8.62e-10		1.61
Benzo(k)fluoranthene	.454	0	2.665e-9	9.52e-10		7.59e-1
Benzo(g,h,i)perylene	.305	0	1.791e-9	6.40e-10		
Benzo(a)pyrene	.463	0	2.718e-9	9.71e-10		11.5
Chrysene	.433	0	2.542e-9	9.08e-10		.0506
Dibenz(a,h)anthracene	.21	0	1.233e-9	4.40e-10		12.765
Fluoranthene	1.091	0	6.405e-9	2.288e-9	.04	
Fluorene	.221	0	1.297e-9	4.63e-10	.04	
Indeno(1,2,3-cd)pyrene	.313	0	1.838e-9	6.56e-10		2.668
Naphthalene	.186	0	1.092e-9	3.90e-10	4e-3	
Pyrene	.815	0	4.785e-9	1.709e-9	.03	
Arsenic	6.4	0	3.757e-8	1.342e-8	1e-3	
Cadmium	0	0	0	0	5e-4	
Chromium (VI)	128	0	7.515e-7	2.684e-7	5e-3	
Copper	61.2	0	3.593e-7	1.283e-7	4e-2	
Lead	0	0	0	0	1.4e-3	
Nickel	7.8	0	4.579e-8	1.635e-8	2e-2	
Silver	.82	0	4.814e-9	1.719e-9	.003	
Vanadium	32.2	0	1.890e-7	6.751e-8	7e-3	
Zinc	0	0	0	0	2e-1	
Cyanide	1.5	0	8.806e-9	3.145e-9	2e-2	
Aroclor-1248	1.9	0	1.115e-8	3.984e-9		7.7e0
Phenanthrene	1.041	0	6.112e-9	2.183e-9	2.9e-2	
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		

RISK ASSESSMENT SPPEADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	8.22e-11	0
Trichloroethene	0	0	5.19e-14
Chloroform	0	5.87e-10	1.28e-14
Bis(2-ethylhexyl)phthalate	0	5.519e-8	5.52e-12
Butylbenzylphthalate	0	1.039e-8	0
Acenaphthene	0	2.720e-8	0
Anthracene	0	6.145e-9	0
Benz(a)anthracene	0	0	1.559e-9
Benzo(b)fluoranthene	0	0	1.387e-9
Benzo(k)fluoranthene	0	0	7.23e-10
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	1.116e-8
Chrysene	0	0	4.59e-11
Dibenz(a,h)anthracene	0	0	5.621e-9
Fluoranthene	0	1.601e-7	0
Fluorene	0	3.244e-8	0
Indeno(1,2,3-cd)pyrene	0	0	1.751e-9
Naphthalene	0	2.730e-7	0
Pyrene	0	1.595e-7	0
Arsenic	0	3.757e-5	0
Cadmium	0	0	0
Chromium (VI)	0	1.503e-4	0
Copper	0	8.982e-6	0
Lead	0	0	0
Nickel	0	2.290e-6	0
Silver	0	1.605e-6	0
Vanadium	0	2.701e-5	0
Zinc	0	0	0
Cyanide	0	4.403e-7	0
Aroclor-1248	0	0	3.088e-8
Phenanthrene	0	2.107e-7	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	2.291e-4	5.293e-8

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEX = (C x IR x FI x EF x ED) / (BW x LT x 365 x 1E6)

WHERE:
- C = MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
- IR = SOIL INGESTION RATE (MG/EVENT)
- EF = EXPOSURE FREQUENCY (EVENTS/YEAR)
- FI = FRACTION FROM CONTAMINATED SOURCE
- ED = EXPOSURE DURATION (YEARS)
- BW = BODY WEIGHT (KG)
- LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
FI:	.1	FI:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:		YOUTH:	
CF:	5.871e-9 (AVG ANNUAL DOSE)	CF:	0 (AVG ANNUAL DOSE)

NYSDEC 032760

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	.0049	0	2.82e-11	1.01e-11	2e-1	
Chloroform	.001	0	5.87e-12	2.10e-12	1e-2	6.1e-3
Bis(2-ethylhexyl)phthalate	1.293	0	7.620e-9	2.722e-9	2e-2	1.4e-2
Di-n-butylphthalate	.34	0	1.996e-9	7.13e-10	1e-1	
Butylbenzylphthalate	.508	0	2.982e-9	1.065e-9	.2	
Dimethylphthalate	.19	0	1.115e-9	3.98e-10	1	
Acenaphthene	.16	0	9.39e-10	3.35e-10	.06	
Anthracene	.446	0	2.618e-9	9.35e-10	.3	
Benz(a)anthracene	.637	0	3.740e-9	1.336e-9		1.6675e0
Benzo(b)fluoranthene	.716	0	4.204e-9	1.501e-9		1.61
Benzo(k)fluoranthene	.857	0	5.031e-9	1.797e-9		7.53e-1
Benzo(g,h,i)perylene	.636	0	3.734e-9	1.334e-9		
Benzo(a)pyrene	.784	0	4.603e-9	1.644e-9		11.5
Chrysene	.739	0	4.339e-9	1.549e-9		.0506
Fluoranthene	1.052	0	6.176e-9	2.206e-9	.04	
Fluorene	.18	0	1.057e-9	3.77e-10	.04	
Indeno(1,2,3-cd)pyrene	.58	0	3.405e-9	1.216e-9		2.568
Pyrene	1.462	0	8.583e-9	3.065e-9	.03	
Aroclor-1254	.53	0	3.112e-9	1.111e-9		7.7
Arsenic	26.1	0	1.532e-7	5.472e-8	1e-3	
Barium	76.2	0	4.474e-7	1.598e-7	.05	
Beryllium	1.1	0	6.458e-9	2.306e-9	5e-3	4.3e0
Cadmium	0	0	0	0	5e-4	
Chromium (VI)	258	0	1.515e-6	5.410e-7	5e-3	
Copper	400	0	2.348e-6	8.387e-7	4e-2	
Lead	0	0	0	0	1.4e-3	
Manganese	0	0	0	0	.1	
Mercury	.21	0	1.233e-9	4.40e-10	.0003	
Nickel	0	0	0	0	2e-2	
Silver	0	0	0	0	.003	
Vanadium	89.9	0	5.279e-7	1.885e-7	7e-3	
Zinc	0	0	0	0	2e-1	
Cyanide	2.3	0	1.350e-8	4.822e-9	2e-2	
Aroclor-1248	.83	0	4.873e-9	1.740e-9		7.7e0
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		
		0	0	0		

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	1.41e-10	0
Chloroform	0	5.87e-10	1.28e-14
Bis(2-ethylhexyl)phthalate	0	3.810e-7	3.91e-11
Di-n-butylphthalate	0	1.336e-8	0
Butylbenzylphthalate	0	1.431e-8	0
Dimethylphthalate	0	1.115e-9	0
Acenaphthene	0	1.566e-8	0
Anthracene	0	8.723e-9	0
Benz(a)anthracene	0	0	2.227e-9
Benzo(b)fluoranthene	0	0	2.417e-9
Benzo(k)fluoranthene	0	0	1.364e-9
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	1.820e-8
Chrysene	0	0	7.84e-11
Fluoranthene	0	1.544e-7	0
Fluorene	0	2.542e-8	0
Indeno(1,2,3-cd)pyrene	0	0	3.245e-9
Pyrene	0	2.361e-7	0
Aroclor-1254	0	0	3.557e-9
Arsenic	0	1.532e-4	0
Barium	0	8.947e-6	0
Beryllium	0	1.292e-6	3.918e-9
Cadmium	0	0	0
Chromium (VI)	0	3.029e-4	0
Copper	0	5.871e-5	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	4.110e-6	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	7.540e-5	0
Zinc	0	0	0
Cyanide	0	6.751e-7	0
Aroclor-1248	0	0	1.340e-8
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	6.062e-4	6.015e-8

NYSDEC 032762

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
CALCULATE ACTION LEVELS
CARCINOGENIC RISK 1e-4

CHEMICAL	NUMBER OF CARCINOGENS	TARGET RISK	ACTION LEVEL (UG/KG)
Toluene	0	0	0
Chloroform	0	0	0
Bis(2-ethylhexyl)phthalate	1	1.111e-5	3.7852e5
Di-n-butylphthalate	0	0	0
Butylbenzylphthalate	0	0	0
Dimethylphthalate	0	0	0
Acenaphthene	0	0	0
Anthracene	0	0	0
Benz(a)anthracene	1	1.111e-5	3.1[illegible]e3
Benzo(b)fluoranthene	1	1.111e-5	3.2315e3
Benzo(k)fluoranthene	1	1.111e-5	6.3[illegible]9e3
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	1	1.111e-5	4.5031e2
Chrysene	1	1.111e-5	1.0[illegible]3e5
Fluoranthene	0	0	0
Fluorene	0	0	0
Indeno(1,2,3-cd)pyrene	1	1.111e-5	1.3862e3
Pyrene	0	0	0
Aroclor-1254	1	1.111e-5	6.8322e2
Arsenic	0	0	0
Barium	0	0	0
Beryllium	1	1.111e-5	1.2324e3
Cadmium	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	0	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	0	0
Zinc	0	0	0
Cyanide	0	0	0
Aroclor-1248	1	1.111e-5	6.8322e2
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	9	1e-4	

NYSDEC 032763

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEX = (C x IR x FI x EF x ED)/(BW x LT x 365 x 1E6)

WHERE:
C : MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
IR : SOIL INGESTION RATE (MG/EVENT)
EF : EXPOSURE FREQUENCY (EVENTS/YEAR)
FI : FRACTION FROM CONTAMINATED SOURCE
ED : EXPOSURE DURATION (YEARS)
BW : BODY WEIGHT (KG)
LT : LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
FI:	.1	FI:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:
CF: 5.871e-9 (AVG ANNUAL DOSE)

YOUTH:
CF: 0 (AVG ANNUAL DOSE)

NYSDEC 032764

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
1,1,1-Trichloroethane	.0145	0	8.51e-11	3.04e-11	9e-2	
Tetrachloroethene	.834	0	4.896e-9	1.749e-9	1e-2	5.1e-2
Trichloroethene	.0365	0	2.14e-10	7.65e-11		1.1e-2
1,2-Dichloroethene, trans	.0031	0	1.82e-11	6.50e-12	2e-2	
Di-n-butylphthalate	.016	0	9.39e-11	3.35e-11	1e-1	
Butylbenzylphthalate	.0975	0	5.72e-10	2.04e-10	.2	
Arsenic	1244	0	7.303e-6	2.608e-6	1e-3	
Cadmium	2	0	1.174e-8	4.193e-9	5e-4	
Copper	7.9	0	4.638e-8	1.656e-8	4e-2	
Cyanide	6	0	3.523e-8	1.258e-8	2e-2	
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RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK.

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
1,1,1-Trichloroethane	0	9.46e-10	0
Tetrachloroethene	0	4.896e-7	8.92e-11
Trichloroethene	0	0	8.42e-13
1,2-Dichloroethene, trans	0	9.10e-10	0
Di-n-butylphthalate	0	9.39e-10	0
Butylbenzylphthalate	0	2.852e-9	0
Arsenic	0	7.303e-3	0
Cadmium	0	2.348e-5	0
Copper	0	1.159e-6	0
Cyanide	0	1.761e-6	0
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	0	0	0
TOTAL	0	7.330e-3	9.00e-11

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2. ADULT EMPLOYEE

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEX = (C x IR x Fi x EF x ED)/(BW x LT x 365 x 1E6)

WHERE:
C = MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
IR = SOIL INGESTION RATE (MG/EVENT)
EF = EXPOSURE FREQUENCY (EVENTS/YEAR)
Fi = FRACTION FROM CONTAMINATED SOURCE
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
Fi:	.1	Fi:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:		YOUTH:	
CF:	5.871e-9 (AVG ANNUAL DOSE)	CF:	0 (AVG ANNUAL DOSE)

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Tetrachloroethene	.0038	0	2.23e-11	7.97e-12	1e-2	5.1e-2
Trichloroethene	.0138	0	8.10e-11	2.89e-11		1.1e-2
Bis(2-ethylhexyl)phthalate	.062	0	3.64e-10	1.30e-10	2e-2	1.4e-2
Di-n-butylphthalate	.04	0	2.35e-10	8.39e-11	1e-1	
Acenaphthene	.213	0	1.250e-9	4.47e-10	.06	
Anthracene	.196	0	1.151e-9	4.11e-10	.3	
Benz(a)anthracene	.379	0	2.225e-9	7.95e-10		1.6675e0
Benzo(b)fluoranthene	.462	0	2.712e-9	9.69e-10		1.61
Benzo(k)fluoranthene	.369	0	2.166e-9	7.74e-10		7.59e-1
Benzo(g,h,i)perylene	.281	0	1.650e-9	5.89e-10		
Benzo(a)pyrene	.397	0	2.331e-9	8.32e-10		11.5
Chrysene	.444	0	2.607e-9	9.31e-10		.0506
Fluoranthene	.805	0	4.726e-9	1.638e-9	.04	
Fluorene	.18	0	1.057e-9	3.77e-10	.04	
Indeno(1,2,3-cd)pyrene	.062	0	3.64e-10	1.30e-10		2.668
Naphthalene	.086	0	5.05e-10	1.80e-10	4e-3	
Pyrene	.76	0	4.462e-9	1.594e-9	.03	
Arsenic	5.9	0	3.464e-8	1.237e-8	1e-3	
Chromium (VI)	0	0	0	0	5e-3	
Copper	0	0	0	0	4e-2	
Lead	0	0	0	0	1.4e-3	
Mercury	.18	0	1.057e-9	3.77e-10	.0003	
Silver	1.3	0	7.632e-9	2.726e-9	.003	
Zinc	0	0	0	0	2e-1	
Aroclor-1248	6.8	0	3.992e-8	1.428e-8		7.7e0
Phenanthrene	.564	0	3.311e-9	1.183e-9	2.9e-2	
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RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Tetrachloroethene	0	2.231e-9	4.06e-13
Trichloroethene	0	0	3.18e-13
Bis(2-ethylhexyl)phthalate	0	1.820e-8	1.82e-12
Di-n-butylphthalate	0	2.348e-9	0
Acenaphthene	0	2.084e-8	0
Anthracene	0	3.836e-9	0
Benz(a)anthracene	0	0	1.325e-9
Benzo(b)fluoranthene	0	0	1.560e-9
Benzo(k)fluoranthene	0	0	5.87e-10
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	9.573e-9
Chrysene	0	0	4.71e-11
Fluoranthene	0	1.182e-7	0
Fluorene	0	2.642e-8	0
Indeno(1,2,3-cd)pyrene	0	0	3.47e-10
Naphthalene	0	1.262e-7	0
Pyrene	0	1.487e-7	0
Arsenic	0	3.464e-5	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Mercury	0	3.523e-6	0
Silver	0	2.544e-6	0
Zinc	0	0	0
Aroclor-1248	0	0	1.098e-7
Phenanthrene	0	1.142e-7	0
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TOTAL	0	4.129e-5	1.232e-7

RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH PICA INGESTION ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT EMPLOYEE

REFERENCE: EPA, DECEMBER 1989

RELEVANT EQUATION: IEx = (C x IR x Fi x EF x ED)/(BW x LT x 365 x 1E6)

WHERE:
C = MEAN CONCENTRATION IN SOIL SAMPLE (MG/KG)
IR = SOIL INGESTION RATE (MG/EVENT)
EF = EXPOSURE FREQUENCY (EVENTS/YEAR)
Fi = FRACTION FROM CONTAMINATED SOURCE
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

ADULT:		YOUTH:	
IR:	50	IR:	0
EF:	30	EF:	10
Fi:	.1	Fi:	.1
ED:	25	ED:	0
BW:	70	BW:	50
LT:	70	LT:	0

DETERMINE CONVERSION FACTORS:

ADULT:		YOUTH:	
CF:	5.871e-9 (AVG ANNUAL DOSE)	CF:	0 (AVG ANNUAL DOSE)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SETP, 1991

EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE

RELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

ASSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2350
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION: (DECIMAL FRACTION)	VOCS:	.1
		BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

DETERMINE CONVERSION FACTORS:
DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS)   CF1 = 0   * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS)   CF2 = 5.023e-9   (NOT USED IN CONVERSION FACTORS)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Tetrachloroethene	41.7	.1	0	2.034e-8	7.480e-9	1e-2	5.1e-2
Trichloroethene	10.3	.1	0	5.173e-9	1.848e-9		1.1e-2
Bis(2-ethylhexyl)phthalate	179	.05	0	4.495e-8	1.605e-8	2e-2	1.4e-2
Butylbenzylphthalate	180	.05	0	4.520e-8	1.614e-8	.2	
Acenaphthene	53	.05	0	1.331e-8	4.753e-9	.06	
Anthracene	66	.05	0	1.657e-8	5.919e-9	.3	
Benz(a)anthracene	439	.05	0	1.102e-7	3.937e-8		1.6675e0
Benzo(b)fluoranthene	575	.05	0	1.444e-7	5.157e-8		1.61
Benzo(k)fluoranthene	477	.05	0	1.198e-7	4.278e-8		7.59e-1
Benzo(g,h,i)perylene	350	.05	0	8.783e-8	3.139e-8		
Benzo(a)pyrene	502	.05	0	1.261e-7	4.502e-8		11.5
Chrysene	473	.05	0	1.188e-7	4.242e-8		.0506
Dibenz(a,h)anthracene	150	.05	0	3.767e-8	1.345e-8		12.765
Fluoranthene	837	.05	0	2.102e-7	7.507e-8	.04	
Fluorene	44	.05	0	1.105e-8	3.946e-9	.04	
Indeno(1,2,3-cd)pyrene	343	.05	0	8.764e-8	3.130e-8		2.655
Naphthalene	53	.05	0	1.331e-8	4.753e-9	4e-3	
Pyrene	793	.05	0	1.991e-7	7.112e-8	.03	
Chlordane	240	.05	0	6.027e-8	2.153e-8	.00006	1.3
4,4'-DDT	440	.05	0	1.105e-7	3.946e-8	.0005	.34
Arsenic	33100	0	0	0	0	1e-3	
Barium	46600	0	0	0	0	.05	
Cadmium	14800	0	0	0	0	5e-4	
Chromium (VI)	49100	0	0	0	0	5e-3	
Copper	79300	0	0	0	0	4e-2	
Lead	118400	0	0	0	0	1.4e-3	
Manganese	184000	0	0	0	0	.1	
Mercury	2300	0	0	0	0	.0003	
Nickel	16100	0	0	0	0	2e-2	
Silver	3500	0	0	0	0	.003	
Vanadium	30400	0	0	0	0	7e-3	
Zinc	214000	0	0	0	0	2e-1	
Cyanide	3200	0	0	0	0	2e-2	
Aroclor-1248	7990	.03	0	1.190e-6	4.251e-7		7.7
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RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (MG/KG)	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	.001	0	5.87e-12	2.10e-12	2e-1	
Tetrachloroethene	.0139	0	8.16e-11	2.91e-11	1e-2	5.1e-2
Trichloroethene	.003	0	1.76e-11	6.29e-12		1.1e-2
1,2-Dichloroethene, trans	.0028	0	1.64e-11	5.87e-12	2e-2	
Bis(2-ethylhexyl)phthalate	.14	0	8.22e-10	2.94e-10	2e-2	1.4e-2
Butylbenzylphthalate	.041	0	2.41e-10	8.60e-11	.2	
Benzo(b)fluoranthene	.046	0	2.70e-10	9.64e-11		1.61
Benzo(k)fluoranthene	.043	0	2.52e-10	9.02e-11		7.59e-1
Benzo(g,h,i)perylene	.041	0	2.41e-10	8.60e-11		
Benzo(a)pyrene	.05	0	2.94e-10	1.05e-10		11.5
Chrysene	.043	0	2.52e-10	9.02e-11		.0506
Fluoranthene	.057	0	3.35e-10	1.20e-10	.04	
Pyrene	.07	0	4.11e-10	1.47e-10	.03	
Copper	8.9	0	5.166e-8	1.845e-8	4e-2	
Manganese	195	0	1.145e-6	4.089e-7	.1	
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RISK ASSESSMENT SPREADSHEET - INCIDENTAL INGESTION OF SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTUPE SURFACE SOIL SITE 3. ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX ADOLESCENT	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	2.94e-11	0
Tetrachloroethene	0	8.160e-9	1.49e-12
Trichloroethene	0	0	6.92e-14
1,2-Dichloroethene, trans	0	8.22e-10	0
Bis(2-ethylhexyl)phthalata	0	4.110e-8	4.11e-12
Butylbenzylphthalate	0	1.204e-9	0
Benzo(b)fluoranthene	0	0	1.55e-10
Benzo(k)fluoranthene	0	0	6.84e-11
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	1.206e-9
Chrysene	0	0	4.56e-12
Fluoranthene	0	8.366e-9	0
Pyrene	0	1.370e-8	0
Copper	0	1.292e-6	0
Manganese	0	1.145e-5	0
	0	0	0
	0	0	0
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TOTAL	0	1.281e-5	1.440e-9

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
RETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Tetrachloroethene	0	2.094e-6	3.81e-10
Trichloroethene	0	0	2.03e-11
Bis(2-ethylhexyl)phthalate	0	2.248e-6	2.25e-10
Butylbenzylphthalate	0	2.260e-7	0
Acenaphthene	0	2.218e-7	0
Anthracene	0	5.525e-8	0
Benz(a)anthracene	0	0	6.565e-8
Benzo(b)fluoranthene	0	0	8.303e-8
Benzo(k)fluoranthene	0	0	3.247e-8
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	5.178e-7
Chrysene	0	0	2.147e-9
Dibenz(a,h)anthracene	0	0	1.717e-7
Fluoranthene	0	5.255e-6	0
Fluorene	0	2.762e-7	0
Indeno(1,2,3-cd)pyrene	0	0	8.351e-8
Naphthalene	0	3.327e-6	0
Pyrene	0	6.638e-6	0
Chlordane	0	1.005e-3	2.798e-8
4,4'-DDT	0	2.210e-4	1.342e-8
Arsenic	0	0	0
Barium	0	0	0
Cadmium	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Manganese	0	0	0
Mercury	0	0	0
Nickel	0	0	0
Silver	0	0	0
Vanadium	0	0	0
Zinc	0	0	0
Cyanide	0	0	0
Aroclor-1248	0	0	3.273e-6
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	1.246e-3	4.272e-6

?ISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

:ITE NAME:	BETHPAGE
.OCATION:	BETHPAGE, NY
:ATE:	AUG/SEPT, 1991

:XPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE

?ELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

'SSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2950
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

:ETERMINE CONVERSION FACTORS:
DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS)	CF1 =	0	* ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS)	CF2 =	5.023e-9	(NOT USED IN CONVERSION FACTORS)

NYSDEC 032776

ISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
ETHPAGE
XPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE
ALCULATE DOSES:

HEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
oluene	3.2	.1	0	1.607e-9	5.74e-10	2e-1	
richloroethene	2.25	.1	0	1.130e-9	4.04e-10		1.1e-2
hloroform	2	.1	0	1.005e-9	3.59e-10	1e-2	6.1e-3
is(2-ethylhexyl)phthalate	188	.05	0	4.721e-8	1.686e-8	2e-2	1.4e-2
utylbenzylphthalate	354	.05	0	8.890e-8	3.175e-8	.2	
cenaphthene	278	.05	0	6.981e-8	2.493e-8	.06	
nthracene	314	.05	0	7.885e-8	2.816e-8	.3	
enz(a)anthracene	446	.05	0	1.120e-7	4.000e-8		1.6675e0
enzo(b)fluoranthene	411	.05	0	1.032e-7	3.686e-8		1.61
enzo(k)fluoranthene	454	.05	0	1.140e-7	4.072e-8		7.59e-1
enzo(g,h,i)perylene	305	.05	0	7.659e-8	2.735e-8		
enzo(a)pyrene	463	.05	0	1.163e-7	4.153e-8		11.5
hrysene	433	.05	0	1.087e-7	3.883e-8		.0506
ibenz(a,h)anthracene	210	.05	0	5.274e-8	1.883e-8		12.765
luoranthene	1091	.05	0	2.740e-7	9.785e-8	.04	
luorene	221	.05	0	5.550e-8	1.982e-8	.04	
ndeno(1,2,3-cd)pyrene	313	.05	0	7.860e-8	2.807e-8		2.668
aphthalene	186	.05	0	4.671e-2	1.668e-8	4e-3	
yrene	815	.05	0	2.047e-7	7.310e-8	.03	
rsenic	5400	0	0	0	0	1e-3	
admium	2200	0	0	0	0	5e-4	
hromium (VI)	128000	0	0	0	0	5e-3	
opper	50100	0	0	0	0	4e-2	
ead	32200	0	0	0	0	1.4e-3	
ickel	8500	0	0	0	0	2e-2	
ilver	1200	0	0	0	0	.003	
anadium	32200	0	0	0	0	7e-3	
inc	52800	0	0	0	0	2e-1	
yanide	1500	0	0	0	0	2e-2	
roclor-1248	1900	.03	0	2.863e-7	1.022e-7		7.7e0
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

ISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
ETHPAGE
XPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT EMPLOYEE
ETERMINE HAZARD INDICES AND CANCER RISK:

HEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
oluene	0	8.036e-9	0
richloroethene	0	0	4.44e-12
hloroform	0	1.005e-7	2.19e-12
is(2-ethylhexyl)phthalate	0	2.361e-6	2.36e-10
utylbenzylphthalate	0	4.445e-7	0
cenaphthene	0	1.154e-6	0
nthracene	0	2.628e-7	0
enz(a)anthracene	0	0	6.673e-8
enzo(b)fluoranthene	0	0	5.935e-8
enzo(k)fluoranthene	0	0	3.091e-8
enzo(g,h,i)perylene	0	0	0
enzo(a)pyrene	0	0	4.775e-7
hrysene	0	0	1.965e-9
ibenz(a,h)anthracene	0	0	2.404e-7
luoranthene	0	6.849e-6	0
luorene	0	1.387e-6	0
ndeno(1,2,3-cd)pyrene	0	0	7.490e-8
aphthalene	0	1.168e-5	0
yrene	0	6.822e-6	0
rsenic	0	0	0
admium	0	0	0
hromium (VI)	0	0	0
opper	0	0	0
ead	0	0	0
ickel	0	0	0
ilver	0	0	0
anadium	0	0	0
inc	0	0	0
yanide	0	0	0
roclor-1248	0	0	7.873e-7
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
OTAL	0	3.108e-5	1.739e-6

NYSDEC 032778

:SK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

ITE NAME: BETHPAGE
OCATION: BETHPAGE, NY
ATE: AUG/SEPT, 1991

XPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE

ELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

SSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2950
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

ETERMINE CONVERSION FACTORS:
DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)*(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS)   CF1 : 0   * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS)   CF2 : 5.023e-9   (NOT USED IN CONVERSION FACTORS)

ISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
ETHPAGE
XPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
ALCULATE DOSES:

HEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
oluene	9	.1	0	4.520e-9	1.614e-9	2e-1	
hloroform	2	.1	0	1.005e-9	3.59e-10	1e-2	6.1e-3
is(2-ethylhexyl)phthalate	1234	.05	0	3.099e-7	1.107e-7	2e-2	1.4e-2
i-n-butylphthalate	340	.05	0	8.538e-8	3.049e-8	1e-1	
utylbenzylphthalate	508	.05	0	1.276e-7	4.556e-8	.2	
imethylphthalate	190	.05	0	4.771e-8	1.704e-8	1	
cenaphthene	160	.05	0	4.018e-8	1.435e-8	.06	
nthracene	446	.05	0	1.120e-7	4.000e-8	.3	
enz(a)anthracene	636	.05	0	1.597e-7	5.704e-8		1.6675e0
enzo(b)fluoranthene	715	.05	0	1.798e-7	6.422e-8		1.61
enzo(k)fluoranthene	864	.05	0	2.170e-7	7.749e-8		7.59e-1
enzo(g,h,i)perylene	636	.05	0	1.597e-7	5.704e-8		
enzo(a)pyrene	784	.05	0	1.969e-7	7.032e-8		11.5
hrysene	739	.05	0	1.856e-7	6.628e-8		.0506
luoranthene	1151	.05	0	2.890e-7	1.032e-7	.04	
luorene	180	.05	0	4.520e-8	1.614e-8	.04	
ndeno(1,2,3-cd)pyrene	580	.05	0	1.457e-7	5.202e-8		2.668
yrene	1545	.05	0	3.880e-7	1.386e-7	.03	
roclor-1254	530	.03	0	7.986e-8	2.852e-8		7.7
rsenic	24500	0	0	0	0	1e-3	
arium	76200	0	0	0	0	.05	
eryllium	1130	0	0	0	0	5e-3	4.3e0
admium	8200	0	0	0	0	5e-4	
hromium (VI)	258000	0	0	0	0	5e-3	
opper	216000	0	0	0	0	4e-2	
ead	352000	0	0	0	0	1.4e-3	
anganese	509000	0	0	0	0	.1	
ercury	290	0	0	0	0	.0003	
ickel	416000	0	0	0	0	2e-2	
ilver	2000	0	0	0	0	.003	
anadium	39900	0	0	0	0	7e-3	
inc	416000	0	0	0	0	2e-1	
yanide	2300	0	0	0	0	2e-2	
roclor-1248	830	.03	0	1.251e-7	4.465e-8		7.7e0
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

?ISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
3ETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT EMPLOYEE
:ETERMINE HAZARD INDICES AND CANCER RISK:

HEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	2.260e-8	0
:hloroform	0	1.005e-7	2.19e-12
3is(2-ethylhexyl)phthalate	0	1.549e-5	1.549e-9
)i-n-butylphthalate	0	8.538e-7	0
3utylbenzylphthalate	0	6.379e-7	0
:imethylphthalate	0	4.771e-8	0
cenaphthene	0	6.697e-7	0
nthracene	0	3.733e-7	0
enz(a)anthracene	0	0	9.512e-8
enzo(b)fluoranthene	0	0	1.034e-7
enzo(k)fluoranthene	0	0	5.881e-8
enzo(g,h,i)perylene	0	0	0
enzo(a)pyrene	0	0	8.086e-7
hrysene	0	0	3.354e-9
luoranthene	0	7.226e-6	0
luorene	0	1.130e-6	0
ndeno(1,2,3-cd)pyrene	0	0	1.388e-7
yrene	0	1.233e-5	0
roclor-1254	0	0	2.196e-7
rsenic	0	0	0
arium	0	0	0
eryllium	0	0	0
admium	0	0	0
hromium (VI)	0	0	0
opper	0	0	0
ead	0	0	0
anganese	0	0	0
ercury	0	0	0
ickel	0	0	0
ilver	0	0	0
anadium	0	0	0
inc	0	0	0
yanide	0	0	0
roclor-1248	0	0	3.433e-7
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
OTAL	0	3.949e-5	1.773e-6

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE

RELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

ASSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2950
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

DETERMINE CONVERSION FACTORS:
DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS) CF1 = 0 * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS) CF2 = 5.023e-9 (NOT USED IN CONVERSION FACTORS)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
1,1,1-Trichlcroethane	14.5	.1	0	7.283e-9	2.801e-9	3e-2	
Tetrachloroethene	834	.1	0	4.189e-7	1.436e-7	1e-2	5.1e-2
Trichloroethene	36.5	.1	0	1.833e-8	6.547e-9		1.1e-2
1,2-Dichloroethene, trans	3.1	.1	0	1.557e-9	5.56e-10	2e-2	
Di-n-butylphthalate	16	.05	0	4.018e-9	1.435e-9	1e-1	
Butylbenzylphthalate	37.5	.05	0	2.448e-8	8.745e-9	.2	
Arsenic	1244000	0	0	0	0	1e-3	
Cadmium	2000	0	0	0	0	5e-4	
Copper	7300	0	0	0	0	4e-2	
Cyanide	6000	0	0	0	0	2e-2	
			0	0	0		
			0	0	0		
			0	0	0		
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			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
1,1,1-Trichloroethane	0	8.092e-8	0
Tetrachloroethene	0	4.189e-5	7.630e-9
Trichloroethene	0	0	7.20e-11
1,2-Dichloroethene, trans	0	7.785e-8	0
Di-n-butylphthalate	0	4.018e-8	0
Butylbenzylphthalate	0	1.224e-7	0
Arsenic	0	0	0
Cadmium	0	0	0
Copper	0	0	0
Cyanide	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
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	0	0	0
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	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	4.221e-5	7.702e-9

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT EMPLOYEE

RELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

ASSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2950
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

DETERMINE CONVERSION FACTORS:
DEX : (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS) CF1 = 0 * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS) CF2 = 5.023e-9 (NOT USED IN CONVERSION FACTORS)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Tetrachloroethene	3.8	.1	0	1.909e-9	6.82e-10	1e-2	5.1e-2
Trichloroethene	13.8	.1	0	6.931e-9	2.475e-9		1.1e-2
Bis(2-ethylhexyl)phthalate	62	.05	0	1.557e-8	5.561e-9	2e-2	1.4e-2
Di-n-butylphthalate	40	.05	0	1.005e-8	3.588e-9	1e-1	
Acenaphthene	213	.05	0	5.349e-8	1.910e-8	.06	
Anthracene	196	.05	0	4.922e-8	1.758e-8	.3	
Benz(a)anthracene	379	.05	0	9.518e-8	3.399e-8		1.6675e0
Benzo(b)fluoranthene	462	.05	0	1.160e-7	4.144e-8		1.61
Benzo(k)fluoranthene	369	.05	0	9.267e-8	3.309e-8		7.59e-1
Benzo(g,h,i)perylene	281	.05	0	7.057e-8	2.520e-8		
Benzo(a)pyrene	397	.05	0	9.970e-8	3.561e-8		11.5
Chrysene	444	.05	0	1.115e-7	3.982e-8		.0506
Fluoranthene	805	.05	0	2.022e-7	7.220e-8	.04	
Fluorene	180	.05	0	4.520e-8	1.614e-8	.04	
Indeno(1,2,3-cd)pyrene	62	.05	0	1.557e-8	5.561e-9		2.668
Naphthalene	86	.05	0	2.160e-8	7.713e-9	4e-3	
Pyrene	760	.05	0	1.909e-7	6.816e-8	.03	
Arsenic	5900	0	0	0	0	1e-3	
Chromium (VI)	0	0	0	0	0	5e-3	
Copper	0	0	0	0	0	4e-2	
Lead	0	0	0	0	0	1.4e-3	
Mercury	180	0	0	0	0	.0003	
Silver	1300	0	0	0	0	.003	
Zinc	0	0	0	0	0	2e-1	
Aroclor-1248	6800	.03	0	1.025e-6	3.859e-7		7.7e0
Phenanthrene	564	.05	0	1.416e-7	5.058e-8	2.9e-2	
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Tetrachloroethene	0	1.909e-7	3.48e-11
Trichloroethene	0	0	2.72e-11
Bis(2-ethylhexyl)phthalate	0	7.785e-7	7.78e-11
Di-n-butylphthalate	0	1.005e-7	0
Acenaphthene	0	8.915e-7	0
Anthracene	0	1.641e-7	0
Benz(a)anthracene	0	0	5.669e-8
Benzo(b)fluoranthene	0	0	6.671e-8
Benzo(k)fluoranthene	0	0	2.512e-8
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	4.095e-7
Chrysene	0	0	2.015e-9
Fluoranthene	0	5.054e-6	0
Fluorene	0	1.130e-6	0
Indeno(1,2,3-cd)pyrene	0	0	1.484e-8
Naphthalene	0	5.399e-6	0
Pyrene	0	6.362e-6	0
Arsenic	0	0	0
Chromium (VI)	0	0	0
Copper	0	0	0
Lead	0	0	0
Mercury	0	0	0
Silver	0	0	0
Zinc	0	0	0
Aroclor-1248	0	0	2.818e-6
Phenanthrene	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	2.007e-5	3.393e-6

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT. 1991

EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT EMPLOYEE

RELEVANT EQUATIONS: DEX = (C x SA x AF x ABS x EF x ED)/(BW x AT x LT x 1E6)

ASSUMPTIONS: ADULT:

C	= CONCENTRATION IN SOIL (MG/KG)		
SA	= EXPOSED SURFACE AREA OF SKIN (SQ CM/DAY):		2950
AF	= ADHERENCE FACTOR (MG/SQ CM):		1.45
ABS	= ABSORPTION FRACTION:	VOCS:	.1
	(DECIMAL FRACTION)	BNAS/PESTICIDES:	.05
		PCBS:	.03
EF1	= YOUTH EXPOSURE FREQUENCY (DAYS/YEAR)		0
EF2	= ADULT EXPOSURE FREQUENCY (DAYS/YEAR):		30
ED	= ADULT EXPOSURE DURATION (YEARS):		25
BW1	= BODY WEIGHT ADOLESCENT (KG):		0
BW2	= BODY WEIGHT ADULT (KG):		70
AT	= AVERAGING TIME (DAYS/YEAR):		365
LT	= LIFETIME (YEARS):		70

DETERMINE CONVERSION FACTORS:
DEX = (C)*(1MG/1000 UG)*(SA SQ CM)*(AF MG/SQ CM)*(ABS)*(EF DAYS/YEAR)/(AT DAYS/YEAR)/(BW KG)/(1 KG/1E6 MG)*

DOSEyouth = (CF1)*(C)*(ABS)   CF1 = 0   * ED AND LT ARE USED FOR CARCINOGENIC RISK CALCULATION ONLY.
DOSEadult = (CF2)*(C)*(ABS)   CF2 = 5.023e-9   (NOT USED IN CONVERSION FACTORS)

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT EMPLOYEE
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ABSORPTION FRACTION	YOUTH DOSE (MG/KG/DAY)	ADULT DOSE (MG/KG/DAY)	TIME-WEIGHTED DOSE (MG/KG/DAY)	RFD (MG/KG/DAY)	CSF (KG-DAY/MG)
Toluene	1	.1	0	5.02e-10	1.79e-10	2e-1	
Tetrachloroethene	13.9	.1	0	6.981e-9	2.493e-9	1e-2	5.1e-2
Trichloroethene	3	.1	0	1.507e-9	5.38e-10		1.1e-2
1,2-Dichloroethene, trans	2.8	.1	0	1.406e-9	5.02e-10	2e-2	
Bis(2-ethylhexyl)phthalate	140	.05	0	3.516e-8	1.256e-8	2e-2	1.4e-2
Butylbenzylphthalate	41	.05	0	1.030e-8	3.677e-9	.2	
Benzo(b)fluoranthene	46	.05	0	1.155e-8	4.126e-9		1.61
Benzo(k)fluoranthene	43	.05	0	1.080e-8	3.857e-9		7.59e-1
Benzo(g,h,i)perylene	41	.05	0	1.030e-8	3.677e-9		
Benzo(a)pyrene	50	.05	0	1.256e-8	4.484e-9		11.5
Chrysene	43	.05	0	1.080e-8	3.857e-9		.0506
Fluoranthene	57	.05	0	1.431e-8	5.112e-9	.04	
Pyrene	70	.05	0	1.758e-8	6.278e-9	.03	
Copper	8800	0	0	0	0	4e-2	
Manganese	195000	0	0	0	0	.1	
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
			0	0	0		
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			0	0	0		
			0	0	0		
			0	0	0		

RISK ASSESSMENT SPREADSHEET - DIRECT DERMAL CONTACT WITH SOIL (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3. ADULT EMPLOYEE
DETERMINE HAZARD INDICES AND CANCER RISK:

CHEMICAL	HAZARD INDEX YOUTH	HAZARD INDEX ADULT	CANCER RISK LIFETIME
Toluene	0	2.511e-9	0
Tetrachloroethene	0	6.981e-7	1.27e-10
Trichloroethene	0	0	5.92e-12
1,2-Dichloroethene, trans	0	7.032e-8	0
Bis(2-ethylhexyl)phthalate	0	1.758e-6	1.76e-10
Butylbenzylphthalate	0	5.148e-8	0
Benzo(b)fluoranthene	0	0	6.642e-9
Benzo(k)fluoranthene	0	0	2.327e-9
Benzo(g,h,i)perylene	0	0	0
Benzo(a)pyrene	0	0	5.157e-8
Chrysene	0	0	1.95e-10
Fluoranthene	0	3.579e-7	0
Pyrene	0	5.860e-7	0
Copper	0	0	0
Manganese	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
TOTAL	0	3.524e-6	6.164e-8

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS

REFERENCES: COWHERD, ET AL., 1984

RELEVANT EQUATIONS: E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(7/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F =	20	(EVENTS/MONTH)
V =	.2	(DECIMAL FRACTION)
U+ =	22.5	(M/SEC)
PE =	139	(DIMENSIONLESS)
UT =	6.372743	(M/SEC) (CALCULATED)
A =	15000	(SQ M)
PR =	.296	(DIMENSIONLESS)
Fi =	3.837	(UG/G/CU M/SEC)
U*t =	.8	(M/SEC)
Zo =	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X = THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.63	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

INTERMEDIATE CALCULATIONS:
P(U+) = 108.0526
E10 = 5.158e-5

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	R10 (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
Tetrachloroethene	27.4	2.74e-8	2.120e-8	2.748e-7	2.66e-10	7.50e-11	3.21e-11
Trichloroethene	7.4	7.4e-9	5.725e-9	7.421e-8	7.17e-11	2.03e-11	8.68e-12
Bis(2-ethylhexyl)phthalate	179	1.79e-7	1.385e-7	1.795e-6	1.735e-9	4.90e-10	2.10e-10
Butylbenzylphthalate	180	1.8e-7	1.393e-7	1.805e-6	1.745e-9	4.93e-10	2.11e-10
Acenaphthene	53	5.3e-8	4.100e-8	5.315e-7	5.14e-10	1.45e-10	6.22e-11
Anthracene	66	6.6e-8	5.106e-8	6.619e-7	6.40e-10	1.81e-10	7.74e-11
Benz(a)anthracene	439	4.39e-7	3.396e-7	4.402e-6	4.255e-9	1.201e-9	5.15e-10
Benzo(b)fluoranthene	575	5.75e-7	4.448e-7	5.766e-6	5.574e-9	1.574e-9	6.74e-10
Benzo(k)fluoranthene	477	4.77e-7	3.690e-7	4.784e-6	4.624e-9	1.305e-9	5.59e-10
Benzo(g,h,i)perylene	350	3.5e-7	2.708e-7	3.510e-6	3.393e-9	9.58e-10	4.10e-10
Benzo(a)pyrene	502	5.02e-7	3.884e-7	5.034e-6	4.866e-9	1.374e-9	5.89e-10
Chrysene	473	4.73e-7	3.659e-7	4.743e-6	4.585e-9	1.294e-9	5.55e-10
Dibenz(a,h)anthracene	150	1.5e-7	1.160e-7	1.504e-6	1.454e-9	4.10e-10	1.76e-10
Fluoranthene	837	8.37e-7	6.475e-7	8.394e-6	8.113e-9	2.290e-9	9.82e-10
Fluorene	44	4.4e-8	3.404e-8	4.413e-7	4.27e-10	1.20e-10	5.16e-11
Indeno(1,2,3-cd)pyrene	349	3.49e-7	2.700e-7	3.500e-6	3.383e-9	9.55e-10	4.09e-10
Naphthalene	53	5.3e-8	4.100e-8	5.315e-7	5.14e-10	1.45e-10	6.22e-11
Pyrene	793	7.93e-7	6.135e-7	7.953e-6	7.687e-9	2.170e-9	9.30e-10
Chlordane	240	2.4e-7	1.857e-7	2.407e-6	2.326e-9	6.57e-10	2.81e-10
4,4'-DDT	170	1.7e-7	1.315e-7	1.705e-6	1.648e-9	4.65e-10	1.99e-10
Arsenic	33100	3.31e-5	2.561e-5	3.319e-4	3.208e-7	9.058e-8	3.882e-8
Barium	46600	4.66e-5	3.605e-5	4.673e-4	4.517e-7	1.275e-7	5.465e-8
Cadmium	0	0	0	0	0	0	0
Chromium (VI)	49100	4.91e-5	3.799e-5	4.924e-4	4.759e-7	1.344e-7	5.758e-8
Copper	0	0	0	0	0	0	0
Lead	0	0	0	0	0	0	0
Manganese	0	0	0	0	0	0	0
Mercury	0	0	0	0	0	0	0
Nickel	16100	1.61e-5	1.246e-5	1.615e-4	1.561e-7	4.406e-8	1.886e-8
Silver	3500	3.5e-6	2.708e-6	3.510e-5	3.393e-8	9.578e-9	4.105e-9
Vanadium	30400	3.04e-5	2.352e-5	3.049e-4	2.947e-7	8.319e-8	3.565e-8
Zinc	0	0	0	0	0	0	0
Cyanide	3200	3.2e-6	2.476e-6	3.209e-5	3.102e-8	8.757e-9	3.753e-9
Aroclor-1248	7900	7.9e-6	6.112e-6	7.922e-5	7.658e-8	2.162e-8	9.265e-9
Phenanthrene	554	5.54e-7	4.286e-7	5.556e-6	5.370e-9	1.516e-9	6.50e-10
4,4'-DDE	270	2.7e-7	2.089e-7	2.708e-6	2.617e-9	7.39e-10	3.17e-10
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
Tetrachloroethene	2.66e-10	7.50e-11	3.21e-11		1e-2	1.8e-3	5.1e-2	1.660e-8	4.686e-9	1.03e-12
Trichloroethene	7.17e-11	2.03e-11	8.68e-12			1.7e-2	1.1e-2	0	0	7.81e-14
Bis(2-ethylhexyl)phthalate	1.735e-9	4.90e-10	2.10e-10		2e-2		1.4e-2	5.422e-8	1.531e-8	1.84e-12
Butylbenzylphthalate	1.745e-9	4.93e-10	2.11e-10		.2			5.452e-9	1.539e-9	0
Acenaphthene	5.14e-10	1.45e-10	6.22e-11		.06			5.351e-9	1.511e-9	0
Anthracene	6.40e-10	1.81e-10	7.74e-11		.3			1.333e-9	3.76e-10	0
Benz(a)anthracene	4.255e-9	1.201e-9	5.15e-10			8.845e-1	1.6675e0	0	0	5.94e-10
Benzo(b)fluoranthene	5.574e-9	1.574e-9	6.74e-10			.854	1.61	0	0	7.51e-10
Benzo(k)fluoranthene	4.624e-9	1.305e-9	5.59e-10			4.028e-1	7.59e-1	0	0	2.94e-10
Benzo(g,h,i)perylene	3.393e-9	9.58e-10	4.10e-10					0	0	0
Benzo(a)pyrene	4.866e-9	1.374e-9	5.89e-10			6.1	11.5	0	0	4.681e-9
Chrysene	4.585e-9	1.294e-9	5.55e-10			.02684	.0508	0	0	1.94e-11
Dibenz(a,h)anthracene	1.454e-9	4.10e-10	1.76e-10			6.771	12.765	0	0	1.552e-9
Fluoranthene	8.113e-9	2.290e-9	9.82e-10		.04			1.268e-7	3.579e-8	0
Fluorene	4.27e-10	1.20e-10	5.16e-11		.04			6.664e-9	1.881e-9	0
Indeno(1,2,3-cd)pyrene	3.383e-9	9.55e-10	4.09e-10			1.4152	2.668	0	0	7.55e-10
Naphthalene	5.14e-10	1.45e-10	6.22e-11		4e-3			8.027e-8	2.266e-8	0
Pyrene	7.687e-9	2.170e-9	9.30e-10		.03			1.601e-7	4.521e-8	0
Chlordane	2.326e-9	6.57e-10	2.81e-10		.00006	1.3	1.3	2.423e-5	6.841e-6	2.74e-10
4,4'-DDT	1.648e-9	4.65e-10	1.99e-10		.0005	.34	.34	2.060e-6	5.815e-7	5.08e-11
Arsenic	3.208e-7	9.058e-8	3.882e-8		1e-3	5e1		2.005e-4	5.661e-5	2.426e-7
Barium	4.517e-7	1.275e-7	5.465e-8	.0001	.05			5.703e-4	1.610e-4	0
Cadmium	0	0	0		5e-4	6.1e0		0	0	0
Chromium (VI)	4.759e-7	1.344e-7	5.758e-8	6e-7	5e-3	4.1e1		9.921e-2	2.801e-2	2.951e-7
Copper	0	0	0		4e-2			0	0	0
Lead	0	0	0	4.3e-4	1.4e-3			0	0	0
Manganese	0	0	0	.0001	.1			0	0	0
Mercury	0	0	0	.00009	.0003			0	0	0
Nickel	1.561e-7	4.406e-8	1.888e-8		2e-2	8.4e-1		4.877e-6	1.377e-6	1.983e-9
Silver	3.393e-8	9.578e-9	4.105e-9		.003			7.068e-6	1.995e-6	0
Vanadium	2.947e-7	8.319e-8	3.565e-8		7e-3			2.631e-5	7.428e-6	0
Zinc	0	0	0		2e-1			0	0	0
Cyanide	3.102e-8	8.757e-9	3.753e-9		2e-2			9.693e-7	2.737e-7	0
Aroclor-1248	7.658e-8	2.162e-8	9.265e-9				7.7	0	0	4.459e-8
Phenanthrene	5.370e-9	1.516e-9	6.50e-10		2.9e-2			1.157e-7	3.287e-8	0
4,4'-DDE	2.617e-9	7.39e-10	3.17e-10		5e-4		3.4e-1	3.271e-6	9.236e-7	1.35e-11
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								1.001e-1	2.825e-2	5.933e-7

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS

REFERENCES: COWHERD, ET AL., 1984

RELEVANT EQUATIONS:

E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(7/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F =	20	(EVENTS/MONTH)
V =	.2	(DECIMAL FRACTION)
U+ =	22.5	(M/SEC)
PE =	139	(DIMENSIONLESS)
UT =	6.372743	(M/SEC)
A =	8000	(SQ M)
PR =	.296	(DIMENSIONLESS)
Fi =	3.837	(UG/G/CU M/SEC)
U*t =	.6	(M/SEC)
Zo =	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X = THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.83	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

INTERMEDIATE CALCULATIONS:

P(U+) = 108.0526
E10 = 5.158e-5

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	R10 (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
Toluene	2.8	2.8e-9	1.155e-9	1.498e-8	1.45e-11	4.09e-12	1.75e-12
Trichloroethene	2.25	2.25e-9	9.28e-10	1.203e-8	1.16e-11	3.28e-12	1.41e-12
Chloroform	1	1e-9	4.13e-10	5.348e-9	5.17e-12	1.46e-12	6.25e-13
Bis(2-ethylhexyl)phthalate	188	1.88e-7	7.757e-8	1.006e-6	9.72e-10	2.74e-10	1.18e-10
Butylbenzylphthalate	354	3.54e-7	1.461e-7	1.893e-6	1.830e-9	5.17e-10	2.21e-10
Acenaphthene	278	2.78e-7	1.147e-7	1.487e-6	1.437e-9	4.06e-10	1.74e-10
Anthracene	314	3.14e-7	1.296e-7	1.679e-6	1.623e-9	4.58e-10	1.96e-10
Benz(a)anthracene	446	4.46e-7	1.840e-7	2.385e-6	2.306e-9	6.51e-10	2.79e-10
Benzo(b)fluoranthene	411	4.11e-7	1.696e-7	2.198e-6	2.125e-9	6.00e-10	2.57e-10
Benzo(k)fluoranthene	454	4.54e-7	1.873e-7	2.428e-6	2.347e-9	6.63e-10	2.84e-10
Benzo(g,h,i)perylene	305	3.05e-7	1.258e-7	1.631e-6	1.577e-9	4.45e-10	1.91e-10
Benzo(a)pyrene	463	4.63e-7	1.910e-7	2.476e-6	2.394e-9	6.76e-10	2.90e-10
Chrysene	433	4.33e-7	1.787e-7	2.316e-6	2.238e-9	6.32e-10	2.71e-10
Dibenz(a,h)anthracene	210	2.1e-7	8.665e-8	1.123e-6	1.086e-9	3.06e-10	1.31e-10
Fluoranthene	1091	1.091e-6	4.501e-7	5.835e-6	5.640e-9	1.592e-9	6.82e-10
Fluorene	221	2.21e-7	9.119e-8	1.182e-6	1.143e-9	3.23e-10	1.38e-10
Indeno(1,2,3-cd)pyrene	313	3.13e-7	1.291e-7	1.674e-6	1.618e-9	4.57e-10	1.96e-10
Naphthalene	186	1.86e-7	7.674e-8	9.948e-7	9.62e-10	2.71e-10	1.16e-10
Pyrene	815	8.15e-7	3.363e-7	4.359e-6	4.213e-9	1.189e-9	5.10e-10
Arsenic	6400	6.4e-6	2.641e-6	3.423e-5	3.309e-8	9.341e-9	4.003e-9
Cadmium	0	0	0	0	0	0	0
Chromium (VI)	128000	1.28e-4	5.281e-5	6.846e-4	6.617e-7	1.868e-7	8.006e-8
Copper	61200	6.12e-5	2.525e-5	3.273e-4	3.164e-7	8.932e-8	3.828e-8
Lead	0	0	0	0	0	0	0
Nickel	7800	7.8e-6	3.218e-6	4.172e-5	4.032e-8	1.138e-8	4.879e-9
Silver	820	8.2e-7	3.383e-7	4.386e-6	4.239e-9	1.197e-9	5.13e-10
Vanadium	32200	3.22e-5	1.329e-5	1.722e-4	1.665e-7	4.700e-8	2.014e-8
Zinc	0	0	0	0	0	0	0
Cyanide	1500	1.5e-6	6.189e-7	8.023e-6	7.755e-9	2.189e-9	9.38e-10
Aroclor-1248	1900	1.9e-6	7.839e-7	1.016e-5	9.822e-9	2.773e-9	1.188e-9
Phenanthrene	1041	1.041e-6	4.295e-7	5.568e-6	5.382e-9	1.519e-9	6.51e-10
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
Toluene	1.45e-11	4.09e-12	1.75e-12	6e-1	2e-1			4.83e-11	1.36e-11	0
Trichloroethene	1.16e-11	3.28e-12	1.41e-12			1.7e-2	1.1e-2	0	0	1.27e-14
Chloroform	5.17e-12	1.46e-12	6.25e-13		1e-2	8.1e-2	6.1e-3	3.23e-10	9.12e-11	8.72e-15
Bis(2-ethylhexyl)phthalate	9.72e-10	2.74e-10	1.18e-10		2e-2		1.4e-2	3.037e-8	8.574e-9	1.03e-12
Butylbenzylphthalate	1.830e-9	5.17e-10	2.21e-10		.2			5.719e-9	1.615e-9	0
Acenaphthene	1.437e-9	4.06e-10	1.74e-10		.06			1.497e-8	4.226e-9	0
Anthracene	1.623e-9	4.58e-10	1.96e-10		.3			3.382e-9	9.55e-10	0
Benz(a)anthracene	2.306e-9	6.51e-10	2.79e-10			8.345e-1	1.6675e0	0	0	3.22e-10
Benzo(b)fluoranthene	2.125e-9	6.00e-10	2.57e-10			.854	1.61	0	0	2.86e-10
Benzo(k)fluoranthene	2.347e-9	6.63e-10	2.84e-10			4.026e-1	7.59e-1	0	0	1.49e-10
Benzo(g,h,i)perylene	1.577e-9	4.45e-10	1.91e-10					0	0	0
Benzo(a)pyrene	2.394e-9	6.76e-10	2.90e-10			6.1	11.5	0	0	2.302e-9
Chrysene	2.238e-9	6.32e-10	2.71e-10			.02684	.0506	0	0	9.47e-12
Dibenz(a,h)anthracene	1.086e-9	3.06e-10	1.31e-10			6.771	12.765	0	0	1.159e-9
Fluoranthene	5.640e-9	1.592e-9	6.82e-10		.04			8.613e-8	2.486e-8	0
Fluorene	1.143e-9	3.23e-10	1.38e-10		.04			1.786e-8	5.040e-9	0
Indeno(1,2,3-cd)pyrene	1.618e-9	4.57e-10	1.96e-10			1.4152	2.666	0	0	3.61e-10
Naphthalene	9.62e-10	2.71e-10	1.16e-10		4e-3			1.502e-7	4.242e-8	0
Pyrene	4.213e-9	1.189e-9	5.10e-10		.03			8.778e-8	2.478e-8	0
Arsenic	3.309e-8	9.341e-9	4.003e-9		1e-3	5e1		2.068e-5	5.838e-6	2.502e-8
Cadmium	0	0	0		5e-4	6.1e0		0	0	0
Chromium (VI)	6.617e-7	1.868e-7	8.006e-8	6e-7	5e-3	4.1e1		1.379e-1	3.894e-2	4.103e-7
Copper	3.164e-7	8.932e-8	3.828e-8		4e-2			4.944e-6	1.396e-6	0
Lead	0	0	0	4.3e-4	1.4e-3			0	0	0
Nickel	4.032e-8	1.138e-8	4.879e-9		2e-2	4.4e-1		1.260e-6	3.557e-7	5.12e-10
Silver	4.239e-9	1.197e-9	5.13e-10		.003			8.832e-7	2.493e-7	0
Vanadium	1.665e-7	4.700e-8	2.014e-8		7e-3			1.486e-5	4.196e-6	0
Zinc	0	0	0		2e-1			0	0	0
Cyanide	7.755e-9	2.189e-9	9.38e-10		2e-2			2.423e-7	6.841e-8	0
Aroclor-1248	9.822e-9	2.773e-9	1.188e-9				7.7e0	0	0	5.719e-9
Phenanthrene	5.382e-9	1.519e-9	6.51e-10		2.9e-2			1.180e-7	3.274e-8	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								1.380e-1	3.896e-2	4.462e-7

NYSDEC 032796

ISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

ITE NAME: BETHPAGE
OCATION: BETHPAGE, NY
ATE: AUG/SEPT, 1991

AZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
XPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

XPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS

EFERENCES: COWHERD, ET AL., 1984

ELEVANT EQUATIONS:

E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(T/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F :	20	(EVENTS/MONTH)
V :	.75	(DECIMAL FRACTION)
U+ :	22.5	(M/SEC)
PE :	139	(DIMENSIONLESS)
UT :	6.372743	(M/SEC)
A :	22000	(SQ M)
PR :	.296	(DIMENSIONLESS)
Fi :	1.735	(UG/G/CU M/SEC)
U*t :	.6	(M/SEC)
Zo :	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X = THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.63	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

NTERMEDIATE CALCULATIONS:
P(U+) = 108.0526
E10 = 1.612e-5

ISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
IETHPAGE
XPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS
ALCULATE DOSES:

HEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	R10 (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
oluene	9	9e-9	3.191e-9	1.871e-8	1.81e-11	5.10e-12	2.19e-12
hloroform	2	2e-9	7.09e-10	4.157e-9	4.02e-12	1.13e-12	4.86e-13
is(2-ethylhexyl)phthalate	1234	1.234e-6	4.376e-7	2.565e-6	2.479e-9	7.00e-10	3.00e-10
i-n-butylphthalate	340	3.4e-7	1.206e-7	7.066e-7	6.83e-10	1.93e-10	8.26e-11
utylbenzylphthalate	508	5.08e-7	1.801e-7	1.056e-6	1.021e-9	2.88e-10	1.23e-10
imethylphthalate	190	1.9e-7	6.737e-8	3.949e-7	3.82e-10	1.09e-10	4.62e-11
cenaphthene	160	1.6e-7	5.673e-8	3.325e-7	3.21e-10	9.07e-11	3.89e-11
nthracene	446	4.45e-7	1.581e-7	9.270e-7	8.96e-10	2.53e-10	1.08e-10
enz(a)anthracene	636	6.36e-7	2.255e-7	1.322e-6	1.278e-9	3.61e-10	1.55e-10
enzo(b)fluoranthene	716	7.16e-7	2.539e-7	1.488e-6	1.438e-9	4.06e-10	1.74e-10
enzo(k)fluoranthene	864	8.64e-7	3.064e-7	1.796e-6	1.736e-9	4.90e-10	2.10e-10
enzo(g,h,i)perylene	636	6.36e-7	2.255e-7	1.322e-6	1.278e-9	3.61e-10	1.55e-10
enzo(a)pyrene	784	7.84e-7	2.780e-7	1.629e-6	1.575e-9	4.45e-10	1.91e-10
hrysene	739	7.39e-7	2.620e-7	1.536e-6	1.485e-9	4.19e-10	1.80e-10
luoranthene	1151	1.151e-6	4.081e-7	2.392e-6	2.312e-9	6.53e-10	2.80e-10
luorene	180	1.8e-7	6.382e-8	3.741e-7	3.62e-10	1.02e-10	4.38e-11
ndeno(1,2,3-cd)pyrene	580	5.8e-7	2.057e-7	1.205e-6	1.165e-9	3.29e-10	1.41e-10
yrene	1545	1.545e-6	5.478e-7	3.211e-6	3.104e-9	8.76e-10	3.76e-10
roclor-1254	530	5.3e-7	1.879e-7	1.102e-6	1.065e-9	3.01e-10	1.29e-10
rsenic	24500	2.45e-5	8.687e-6	5.092e-5	4.922e-8	1.389e-8	5.955e-9
arium	76200	7.62e-5	2.702e-5	1.584e-4	1.531e-7	4.322e-8	1.852e-8
eryllium	1100	1.1e-6	3.900e-7	2.286e-6	2.210e-9	6.24e-10	2.67e-10
admium	8200	8.2e-6	2.908e-6	1.704e-5	1.647e-8	4.651e-9	1.993e-9
hromium (VI)	258000	2.58e-4	9.149e-5	5.362e-4	5.183e-7	1.453e-7	6.271e-8
opper	216000	2.16e-4	7.659e-5	4.489e-4	4.339e-7	1.225e-7	5.250e-8
ead	352000	3.52e-4	1.248e-4	7.316e-4	7.071e-7	1.996e-7	8.556e-8
anganese	589000	5.09e-4	1.805e-4	1.058e-3	1.023e-6	2.887e-7	1.237e-7
ercury	290	2.9e-7	1.028e-7	6.027e-7	5.83e-10	1.64e-10	7.05e-11
ickel	255000	2.55e-4	9.042e-5	5.300e-4	5.123e-7	1.446e-7	6.198e-8
ilver	2000	2e-6	7.092e-7	4.157e-6	4.018e-9	1.134e-9	4.86e-10
anadium	89900	8.99e-5	3.188e-5	1.868e-4	1.806e-7	5.099e-8	2.185e-8
inc	416000	4.16e-4	1.475e-4	8.645e-4	8.357e-7	2.359e-7	1.011e-7
yanide	2300	2.3e-6	8.155e-7	4.780e-6	4.620e-9	1.304e-9	5.59e-10
roclor-1248	830	8.3e-7	2.943e-7	1.725e-6	1.667e-9	4.71e-10	2.02e-10
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

NYSDEC 032798

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
Toluene	9.64e-12	2.72e-12	1.17e-12	6e-1	2e-1			3.21e-11	9.07e-12	0
Chloroform	2.01e-12	5.67e-13	2.43e-13		1e-2	8.1e-2	6.1e-3	1.26e-10	3.54e-11	3.39e-15
Bis(2-ethylhexyl)phthalate	2.608e-9	7.36e-10	3.15e-10		2e-2		1.4e-2	9.149e-9	2.300e-8	2.76e-12
Di-n-butylphthalate	6.83e-10	1.33e-10	8.26e-11		1e-1			4.269e-9	1.205e-9	0
Butylbenzylphthalate	1.021e-9	2.88e-10	1.23e-10		.2			3.199e-9	9.00e-10	0
Dimethylphthalate	3.92e-10	1.08e-10	4.62e-11		1			2.39e-10	6.73e-11	0
Acenaphthene	3.21e-10	9.07e-11	3.89e-11		.06			3.348e-9	9.45e-10	0
Anthracene	8.96e-10	2.53e-10	1.08e-10		.3			1.867e-9	5.27e-10	0
Benz(a)anthracene	1.280e-9	3.61e-10	1.55e-10			8.645e-1	1.6675e0	0	0	1.78e-10
Benzo(b)fluoranthene	1.433e-9	4.06e-10	1.74e-10			.854	1.61	0	0	1.94e-10
Benzo(k)fluoranthene	1.722e-9	4.86e-10	2.08e-10			4.026e-1	7.59e-1	0	0	1.09e-10
Benzo(g,h,i)perylene	1.278e-9	3.61e-10	1.55e-10					0	0	0
Benzo(a)pyrene	1.575e-9	4.45e-10	1.31e-10			6.1	11.5	0	0	1.515e-9
Chrysene	1.435e-9	4.19e-10	1.80e-10			.02684	.0506	0	0	6.28e-12
Fluoranthene	2.113e-9	5.97e-10	2.56e-10		.04			3.302e-8	9.322e-9	0
Fluorene	3.62e-10	1.02e-10	4.39e-11		.04			5.650e-9	1.595e-9	0
Indeno(1,2,3-cd)pyrene	1.165e-9	3.29e-10	1.41e-10			1.4152	2.568	0	0	2.60e-10
Pyrene	2.937e-9	8.29e-10	3.55e-10		.03			6.119e-8	1.727e-8	0
Aroclor-1254	1.055e-9	3.01e-10	1.29e-10				7.7	0	0	8.20e-10
Arsenic	5.243e-8	1.480e-8	6.344e-9		1e-3	5e1		3.277e-5	9.251e-6	3.965e-8
Barium	1.531e-7	4.322e-8	1.852e-8	.0001	.05			1.933e-4	5.456e-5	0
Beryllium	2.210e-9	6.24e-10	2.67e-10		5e-3	8.4e0	4.3e0	2.762e-7	7.739e-8	9.99e-10
Cadmium	0	0	0		5e-4	6.1e0		0	0	0
Chromium (VI)	5.183e-7	1.463e-7	6.271e-8	6e-7	5e-3	4.1e1		1.080e-1	3.050e-2	3.214e-7
Copper	8.036e-7	2.259e-7	9.722e-8		4e-2			1.256e-5	3.545e-6	0
Lead	0	0	0	4.3e-4	1.4e-3			0	0	0
Manganese	0	0	0	.0001	.1			0	0	0
Mercury	4.22e-10	1.19e-10	5.10e-11	.00009	.0003			1.465e-6	4.135e-7	0
Nickel	0	0	0		2e-2	8.4e-1		0	0	0
Silver	0	0	0		.003			0	0	0
Vanadium	1.806e-7	5.099e-8	2.185e-8		7e-3			1.612e-5	4.552e-6	0
Zinc	0	0	0		2e-1			0	0	0
Cyanide	4.620e-9	1.304e-9	5.59e-10		2e-2			1.444e-7	4.076e-8	0
Aroclor-1248	1.667e-9	4.71e-10	2.02e-10				7.7e0	0	0	9.71e-10
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								1.083e-1	3.057e-2	3.559e-7

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS

REFERENCES: COWHERD, ET AL., 1984

RELEVANT EQUATIONS:

E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(7/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F =	20	(EVENTS/MONTH)
V =	.2	(DECIMAL FRACTION)
U+ =	22.5	(M/SEC)
PE =	139	(DIMENSIONLESS)
UT =	6.372743	(M/SEC)
A =	15000	(SQ M)
PR =	.296	(DIMENSIONLESS)
Fi =	3.837	(UG/G/CU M/SEC)
U*t =	.6	(M/SEC)
Zo =	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X = THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.83	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

INTERMEDIATE CALCULATIONS:

P(U+) = 108.0526
E10 = 5.158e-5

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	R10 (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
1,1,1-Trichloroethane	14.5	1.45e-8	1.122e-8	1.454e-7	1.41e-10	3.97e-11	1.70e-11
Tetrachloroethene	834	8.34e-7	6.452e-7	8.364e-6	8.084e-9	2.282e-9	9.78e-10
Trichloroethene	36.5	3.65e-8	2.824e-8	3.660e-7	3.54e-10	9.99e-11	4.28e-11
1,2-Dichloroethene, trans	3.1	3.1e-9	2.398e-9	3.109e-8	3.00e-11	8.48e-12	3.64e-12
Di-n-butylphthalate	16	1.6e-8	1.238e-8	1.605e-7	1.55e-10	4.38e-11	1.88e-11
Butylbenzylphthalate	97.5	9.75e-8	7.543e-8	9.778e-7	9.45e-10	2.67e-10	1.14e-10
Arsenic	1244000	1.244e-3	9.624e-4	1.248e-2	1.206e-5	3.404e-6	1.459e-6
Cadmium	2000	2e-6	1.547e-6	2.006e-5	1.939e-8	5.473e-9	2.346e-9
Copper	7900	7.9e-6	6.112e-6	7.922e-5	7.658e-8	2.162e-8	9.265e-9
Cyanide	6000	6e-6	4.642e-6	6.017e-5	5.816e-8	1.642e-8	7.037e-9
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: FUTURE SURFACE SOIL SITE 1, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
1,1,1-Trichloroethane	1.41e-10	3.97e-11	1.70e-11	3e-1	9e-2			1.035e-9	2.92e-10	0
Tetrachloroethene	8.084e-9	2.282e-9	9.78e-10		1e-2	1.8e-3	5.1e-2	5.053e-7	1.426e-7	3.14e-11
Trichloroethene	3.54e-10	9.99e-11	4.28e-11			1.7e-2	1.1e-2	0	0	3.85e-13
1,2-Dichloroethene, trans	3.00e-11	8.48e-12	3.64e-12		2e-2			9.39e-10	2.65e-10	0
Di-n-butylphthalate	1.55e-10	4.38e-11	1.88e-11		1e-1			9.69e-10	2.74e-10	0
Butylbenzylphthalate	9.45e-10	2.67e-10	1.14e-10		.2			2.953e-9	8.34e-10	0
Arsenic	1.206e-5	3.404e-6	1.459e-6		1e-3	5e1		7.538e-3	2.128e-3	9.118e-6
Cadmium	1.939e-8	5.473e-9	2.346e-9		5e-4	6.1e0		2.423e-5	6.841e-6	1.789e-9
Copper	7.658e-8	2.162e-8	9.265e-9		4e-2			1.197e-6	3.378e-7	0
Cyanide	5.816e-8	1.642e-8	7.037e-9		2e-2			1.817e-6	5.131e-7	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								7.584e-3	2.135e-3	9.120e-6

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS

REFERENCES: COWHERD, ET AL., 1984

RELEVANT EQUATIONS:

E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(7/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F =	20	(EVENTS/MONTH)
V =	.2	(DECIMAL FRACTION)
U+ =	22.5	(M/SEC)
PE =	139	(DIMENSIONLESS)
UT =	6.372743	(M/SEC)
A =	8000	(SQ M)
PR =	.296	(DIMENSIONLESS)
Fi =	3.837	(UG/G/CU M/SEC)
U*t =	.6	(M/SEC)
Zo =	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X = THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.83	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

INTERMEDIATE CALCULATIONS:
P(U+) = 108.0526
E10 = 5.158e-5

NYSDEC 032803

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	RIO (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
Tetrachloroethene	3.8	3.8e-9	1.568e-9	2.032e-8	1.96e-11	5.55e-12	2.38e-12
Trichloroethene	13.8	1.38e-8	5.694e-9	7.381e-8	7.13e-11	2.01e-11	8.63e-12
Bis(2-ethylhexyl)phthalate	62	6.2e-8	2.558e-8	3.316e-7	3.21e-10	9.05e-11	3.88e-11
Di-n-butylphthalate	40	4e-8	1.650e-8	2.139e-7	2.07e-10	5.84e-11	2.50e-11
Acenaphthene	213	2.13e-7	8.788e-8	1.139e-6	1.101e-9	3.11e-10	1.33e-10
Anthracene	196	1.96e-7	8.087e-8	1.048e-6	1.013e-9	2.86e-10	1.23e-10
Benz(a)anthracene	379	3.79e-7	1.564e-7	2.027e-6	1.959e-9	5.53e-10	2.37e-10
Benzo(b)fluoranthene	462	4.62e-7	1.906e-7	2.471e-6	2.388e-9	6.74e-10	2.89e-10
Benzo(k)fluoranthene	369	3.69e-7	1.523e-7	1.974e-6	1.908e-9	5.39e-10	2.31e-10
Benzo(g,h,i)perylene	281	2.81e-7	1.159e-7	1.503e-6	1.453e-9	4.10e-10	1.76e-10
Benzo(a)pyrene	397	3.97e-7	1.638e-7	2.123e-6	2.052e-9	5.79e-10	2.48e-10
Chrysene	444	4.44e-7	1.832e-7	2.375e-6	2.295e-9	6.48e-10	2.78e-10
Fluoranthene	805	8.05e-7	3.321e-7	4.306e-6	4.162e-9	1.175e-9	5.04e-10
Fluorene	180	1.8e-7	7.427e-8	9.627e-7	9.31e-10	2.63e-10	1.13e-10
Indeno(1,2,3-cd)pyrene	62	6.2e-8	2.558e-8	3.316e-7	3.21e-10	9.05e-11	3.88e-11
Naphthalene	86	8.6e-8	3.548e-8	4.600e-7	4.45e-10	1.26e-10	5.38e-11
Pyrene	760	7.6e-7	3.136e-7	4.065e-6	3.929e-9	1.109e-9	4.75e-10
Arsenic	5900	5.9e-6	2.434e-6	3.156e-5	3.050e-8	8.611e-9	3.690e-9
Chromium (VI)	0	0	0	0	0	0	0
Copper	0	0	0	0	0	0	0
Lead	0	0	0	0	0	0	0
Mercury	180	1.8e-7	7.427e-8	9.627e-7	9.31e-10	2.63e-10	1.13e-10
Silver	1300	1.3e-6	5.364e-7	6.953e-6	6.721e-9	1.897e-9	8.13e-10
Zinc	0	0	0	0	0	0	0
Aroclor-1248	6800	6.8e-6	2.806e-6	3.637e-5	3.515e-8	9.924e-9	4.253e-9
Phenanthrene	564	5.64e-7	2.327e-7	3.017e-6	2.916e-9	8.23e-10	3.53e-10
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE SURFACE SOIL SITE 2, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
Tetrachloroethene	1.96e-11	5.55e-12	2.38e-12		1e-2	1.8e-3	5.1e-2	1.228e-9	3.47e-10	7.63e-14
Trichloroethene	7.13e-11	2.01e-11	8.63e-12			1.7e-2	1.1e-2	0	0	7.77e-14
Bis(2-ethylhexyl)phthalate	3.21e-10	9.05e-11	3.88e-11		2e-2		1.4e-2	1.002e-8	2.823e-9	3.39e-13
Di-n-butylphthalate	2.07e-10	5.84e-11	2.50e-11		1e-1			1.292e-9	3.65e-10	0
Acenaphthene	1.101e-9	3.11e-10	1.33e-10		.06			1.147e-8	3.238e-9	0
Anthracene	1.013e-9	2.86e-10	1.23e-10		.3			2.111e-9	5.96e-10	0
Benz(a)anthracene	1.959e-9	5.53e-10	2.37e-10			8.845e-1	1.6675e0	0	0	2.73e-10
Benzo(b)fluoranthene	2.388e-9	6.74e-10	2.89e-10			.854	1.61	0	0	3.22e-10
Benzo(k)fluoranthene	1.908e-9	5.39e-10	2.31e-10			4.026e-1	7.59e-1	0	0	1.21e-10
Benzo(g,h,i)perylene	1.453e-9	4.10e-10	1.76e-10					0	0	0
Benzo(a)pyrene	2.052e-9	5.79e-10	2.48e-10			6.1	11.5	0	0	1.974e-9
Chrysene	2.295e-9	6.48e-10	2.78e-10			.02684	.0506	0	0	9.71e-12
Fluoranthene	4.162e-9	1.175e-9	5.04e-10		.04			6.503e-8	1.836e-8	0
Fluorene	9.31e-10	2.63e-10	1.13e-10		.04			1.454e-8	4.105e-9	0
Indeno(1,2,3-cd)pyrene	3.21e-10	9.05e-11	3.88e-11			1.4152	2.668	0	0	7.15e-11
Naphthalene	4.45e-10	1.26e-10	5.38e-11		4e-3			6.947e-8	1.961e-8	0
Pyrene	3.929e-9	1.109e-9	4.75e-10		.03			8.185e-8	2.311e-8	0
Arsenic	3.050e-8	8.611e-9	3.690e-9		1e-3	5e1		1.906e-5	5.382e-6	2.306e-8
Chromium (VI)	0	0	0	6e-7	5e-3	4.1e1		0	0	0
Copper	0	0	0		4e-2			0	0	0
Lead	0	0	0	4.3e-4	1.4e-3			0	0	0
Mercury	9.31e-10	2.63e-10	1.13e-10	.00009	.0003			3.231e-6	9.122e-7	0
Silver	6.721e-9	1.897e-9	8.13e-10		.003			1.400e-6	3.953e-7	0
Zinc	0	0	0		2e-1			0	0	0
Aroclor-1248	3.515e-8	9.924e-9	4.253e-9				7.7e0	0	0	2.047e-8
Phenanthrene	2.916e-9	8.23e-10	3.53e-10		2.9e-2			6.284e-8	1.774e-8	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								2.401e-5	6.780e-6	4.631e-8

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: AUG/SEPT, 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET. EXPOSURE THROUGH INHALATION OF FUGITIVE DUST IS CONSIDERED.

EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS

REFERENCES: COWHERD, ET AL., 1984

RELEVANT EQUATIONS:

E10 = 0.83*F*P(U+)*(1-V)/PE/50)**2

UT = U*ln(7/Zo)/0.4

P(U+) = 6.7*(U+ - UT)

R10 = ALPHA*E10*A

X = Q*Fi

Q = R10/PR

F =	20	(EVENTS/MONTH)
V =	.75	(DECIMAL FRACTION)
U+ =	22.5	(M/SEC)
PE =	139	(DIMENSIONLESS)
UT =	6.372743	(M/SEC)
A =	22000	(SQ M)
PR =	.296	(DIMENSIONLESS)
Fi =	1.735	(UG/G/CU M/SEC)
U*t =	.6	(M/SEC)
Zo =	10	(CM)

IEX = (X x IR x ET x EF x ED)/(BW x LT x 365)

WHERE:
X : THE DOWNWIND AIR CONCENTRATION (MG/CU M)
IR = THE INHALATION RATE (CU M/HR)
ET = THE EXPOSURE TIME (HRS/DAY)
EF = THE EXPOSURE FREQUENCY (DAYS/YEAR)
ED = THE EXPOSURE DURATION (YEARS)
BW = THE RECEPTOR BODY WEIGTH (KG)
LT = THE RECEPTOR LIFETIME (YEARS)
365 = A CONVERSION FACTOR (DAYS/YEAR)

IR1 (CHILD):	.63	ED:	30
IR2 (ADULT):	.83	LT:	70
ET:	24	AF1: *	.125
EF:	350	AF2: *	.625
BW1 (CHILD):	15		
BW2 (ADULT):	70		

* THE ABSORPTION FRACTIONS ACCOUNT FOR DEPOSITION IN THE GASTROINTESTINAL VERSUS THE RESPIRATORY TRACT

INTERMEDIATE CALCULATIONS:

P(U+) = 108.0526
E10 = 1.612e-5

NYSDEC 032806

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	C (UG/KG)	ALPHA (MASS FRACTION)	R10 (G/S)	X (UG/M3)	TOTAL DOSE (MG/KG/DAY) CHILD	TOTAL DOSE (MG/KG/DAY) ADULT	TOTAL DOSE (MG/KG/DAY) TIME-WEIGHTED
Toluene	1	1e-9	3.55e-10	2.078e-9	2.01e-12	5.87e-13	2.43e-13
Tetrachloroethene	13.9	1.39e-8	4.929e-9	2.889e-8	2.79e-11	7.88e-12	3.38e-12
Trichloroethene	3	3e-9	1.064e-9	6.235e-9	6.03e-12	1.70e-12	7.29e-13
1,2-Dichloroethene, trans	2.8	2.8e-9	9.93e-10	5.819e-9	5.62e-12	1.59e-12	6.81e-13
Bis(2-ethylhexyl)phthalate	140	1.4e-7	4.964e-8	2.910e-7	2.81e-10	7.94e-11	3.40e-11
Butylbenzylphthalate	41	4.1e-8	1.454e-8	8.521e-8	8.24e-11	2.33e-11	9.97e-12
Benzo(b)fluoranthene	46	4.6e-8	1.631e-8	9.560e-8	9.24e-11	2.61e-11	1.12e-11
Benzo(k)fluoranthene	43	4.3e-8	1.525e-8	8.937e-8	8.64e-11	2.44e-11	1.05e-11
Benzo(g,h,i)perylene	41	4.1e-8	1.454e-8	8.521e-8	8.24e-11	2.33e-11	9.97e-12
Benzo(a)pyrene	50	5e-8	1.773e-8	1.039e-7	1.00e-10	2.84e-11	1.22e-11
Chrysene	43	4.3e-8	1.525e-8	8.937e-8	8.64e-11	2.44e-11	1.05e-11
Fluoranthene	57	5.7e-8	2.021e-8	1.185e-7	1.15e-10	3.23e-11	1.39e-11
Pyrene	70	7e-8	2.482e-8	1.455e-7	1.41e-10	3.97e-11	1.70e-11
Copper	8800	8.8e-6	3.120e-6	1.829e-5	1.768e-8	4.991e-9	2.139e-9
Manganese	195000	1.95e-4	8.914e-5	4.053e-4	3.917e-7	1.106e-7	4.740e-8
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0

RISK ASSESSMENT SPREADSHEET - INHALATION OF FUGITIVE DUST (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE SURFACE SOIL SITE 3, ADULT AND CHILD RESIDENTS
CALCULATE HAZARD INDICES AND CANCER RISKS:

CHEMICAL	DOSE CHILD	DOSE ADULT	DOSE TIME-WEIGHTED	RFD (INHAL) (MG/KG/DAY)	RFD (INGES) (MG/KG/DAY)	CSF (INHAL) (KG-DAY/MG)	CSF (INGES) (KG-DAY/MG)	HAZARD INDEX CHILD	HAZARD INDEX ADULT	CANCER RISK ADULT
Toluene	2.01e-12	5.67e-13	2.43e-13	6e-1	2e-1			6.70e-12	1.89e-12	0
Tetrachloroethene	2.79e-11	7.88e-12	3.38e-12		1e-2	1.8e-3	5.1e-2	1.745e-9	4.93e-10	1.08e-13
Trichloroethene	6.03e-12	1.70e-12	7.29e-13			1.7e-2	1.1e-2	0	0	6.56e-15
1,2-Dichloroethene, trans	5.62e-12	1.59e-12	6.81e-13		2e-2			1.76e-10	4.96e-11	0
Bis(2-ethylhexyl)phthalate	2.81e-10	7.94e-11	3.40e-11		2e-2		1.4e-2	8.769e-9	2.481e-9	2.98e-13
Butylbenzylphthalate	8.24e-11	2.33e-11	9.97e-12		.2			2.57e-10	7.27e-11	0
Benzo(b)fluoranthene	9.24e-11	2.61e-11	1.12e-11			.854	1.61	0	0	1.24e-11
Benzo(k)fluoranthene	8.64e-11	2.44e-11	1.05e-11			4.026e-1	7.59e-1	0	0	5.48e-12
Benzo(g,h,i)perylene	8.24e-11	2.33e-11	9.97e-12					0	0	0
Benzo(a)pyrene	1.00e-10	2.84e-11	1.22e-11			6.1	11.5	0	0	9.66e-11
Chrysene	9.54e-11	2.44e-11	1.05e-11			.02684	.0506	0	0	3.66e-13
Fluoranthene	1.15e-10	3.23e-11	1.39e-11		.04			1.769e-9	5.05e-10	0
Pyrene	1.41e-10	3.97e-11	1.70e-11		.03			2.930e-9	8.27e-10	0
Copper	1.768e-8	4.991e-9	2.139e-9		4e-2			2.762e-7	7.798e-8	0
Manganese	3.917e-7	1.106e-7	4.740e-8	.0001	.1			4.921e-4	1.389e-4	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
TOTAL								4.924e-4	1.390e-4	1.15e-10

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED: INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING. ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 1: CURRENT GROUNDWATER EXPOSURE, ADULT EMPLOYEES

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE:
S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

ENTER INPUT PARAMETERS:

INGESTION: ADULT EXPOSURE

IR:	1	CONVERSION FACTOR =	9.785e-3
EF:	250		
ED:	25		
BW:	70		
LT:	70		

DERMAL CONTACT: ADULT EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	0
AV:	19400		
ET:	0		
EF:	0		
ED:	0		
BW:	70		
LT:	70		

INHALATION: ADULT EXPOSURE

IR:	0	d:	1
BW:	70	Ts:	2
Ds:	15	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
ED:	0	T:	293
R:	.000082	FR:	10

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: CURRENT GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KAl)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
Toluene	.0115	92.13	6.66e-3	1.7521e1	1.125e-4	0	0
Ethylbenzene	.0026	106.16	6.6e-3	1.6317e1	2.544e-5	0	0
Xylenes	.006	106.16	4.33e-3	1.6010e1	5.871e-5	0	0
1,1,1-Trichloroethane	2.113	133.41	3e-2	1.4983e1	2.068e-2	0	0
1,1-Dichloroethane	.188	98.96	4.26e-3	1.6568e1	1.840e-3	0	0
Tetrachloroethene	.788	165.83	1.53e-2	1.3333e1	7.710e-3	0	0
Trichloroethene	12.285	131.39	9.1e-3	1.4816e1	1.202e-1	0	0
1,1-Dichloroethene	.0547	96.94	1.9e-1	1.7700e1	5.352e-4	0	0
1,2-Dichloroethene, trans	.772	96.94	6.7e-2	1.7658e1	7.554e-3	0	0
Carbon tetrachloride	.0037	153.82	2.3e-2	1.3918e1	3.620e-5	0	0
Bis(2-ethylhexyl)phthalate	.0215	390.62	3e-7	1.056e-2	2.104e-4	0	0
Di-n-octylphthalate	.0077	391	.000017	5.610e-1	7.534e-5	0	0
Di-n-butylphthalate	0	278.3	2.8e-7	1.168e-2	0	0	0
Benzo(b)fluoranthene	.002	252.3	.0000122	5.103e-1	1.957e-5	0	0
Fluoranthene	.002	202.3	.0000065	3.104e-1	1.957e-5	0	0
Naphthalene	.003	128.2	4.6e-4	9.9792e0	2.935e-5	0	0
Pyrene	.002	202.3	.0000051	2.449e-1	1.957e-5	0	0
2-Methylphenol	.002	108.1	.0000039	2.587e-1	1.957e-5	0	0
4-Methylphenol	.002	108.1	.0000013	8.601e-2	1.957e-5	0	0
2,4-Dimethylphenol	.0057	122.2	.000017	1.0035e0	5.577e-5	0	0
Arsenic	.0117	74.92		0	1.145e-4	0	0
Beryllium	.0013	9.0122		0	1.272e-5	0	0
Cadmium	.0829	112.4		0	8.112e-4	0	0
Chromium (III)	.0713			0	6.977e-4	0	0
Chromium (VI)	.0211	51.996		0	2.065e-4	0	0
Lead	.0369	207.19		0	3.611e-4	0	0
Manganese	.402	55		0	3.933e-3	0	0
Nickel	.0202	58.71		0	1.977e-4	0	0
Thallium	.001	204		0	9.785e-6	0	0
Vanadium	.159	50.942		0	1.556e-3	0	0
Cyanide	.578			0	5.656e-3	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: CURRENT GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
Toluene	1.125e-4	0	2e-1	6e-1	5.626e-4	0	5.626e-4
Ethylbenzene	2.544e-5	0	1e-1	3e-1	2.544e-4	0	2.544e-4
Xylenes	5.871e-5	0	2e0	9e-2	2.935e-5	0	2.935e-5
1,1,1-Trichloroethane	2.068e-2	0	9e-2	3e-1	2.297e-1	0	2.297e-1
1,1-Dichloroethane	1.840e-3	0	1e-1	1e-1	1.840e-2	0	1.840e-2
Tetrachloroethene	7.710e-3	0	1e-2		7.710e-1	0	7.710e-1
Trichloroethene	1.202e-1	0			0	0	0
1,1-Dichloroethene	5.352e-4	0	9e-3		5.947e-2	0	5.947e-2
1,2-Dichloroethene, trans	7.554e-3	0	2e-2		3.777e-1	0	3.777e-1
Carbon tetrachloride	3.620e-5	0	7e-4		5.172e-2	0	5.172e-2
Bis(2-ethylhexyl)phthalate	2.104e-4	0	2e-2		1.052e-2	0	1.052e-2
Di-n-octylphthalate	7.534e-5	0	.02		3.767e-3	0	3.767e-3
Di-n-butylphthalate	0	0	1e-1		0	0	0
Benzo(b)fluoranthene	1.957e-5	0			0	0	0
Fluoranthene	1.957e-5	0	.04		4.892e-4	0	4.892e-4
Naphthalene	2.935e-5	0	4e-3		7.339e-3	0	7.339e-3
Pyrene	1.957e-5	0	.03		6.523e-4	0	6.523e-4
2-Methylphenol	1.957e-5	0	.05		3.914e-4	0	3.914e-4
4-Methylphenol	1.957e-5	0	.05		3.914e-4	0	3.914e-4
2,4-Dimethylphenol	5.577e-5	0	.02		2.789e-3	0	2.789e-3
Arsenic	1.145e-4	0	1e-3		1.145e-1	0	1.145e-1
Beryllium	1.272e-5	0	5e-3		2.544e-3	0	2.544e-3
Cadmium	8.112e-4	0	5e-4		1.6223e0	0	1.6223e0
Chromium (III)	6.977e-4	0	1	.0000006	6.977e-4	0	6.977e-4
Chromium (VI)	2.065e-4	0	5e-3	6e-7	4.129e-2	0	4.129e-2
Lead	3.611e-4	0	1.4e-3	4.3e-4	2.579e-1	0	2.579e-1
Manganese	3.933e-3	0	.1	.0001	3.933e-2	0	3.933e-2
Nickel	1.977e-4	0	2e-2		9.883e-3	0	9.883e-3
Thallium	9.785e-6	0	.00007		1.398e-1	0	1.398e-1
Vanadium	1.556e-3	0	7e-3		2.223e-1	0	2.223e-1
Cyanide	5.656e-3	0	2e-2		2.828e-1	0	2.828e-1
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					4.2685e0	0	4.2685e0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 1: CURRENT GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE INCREMENTAL CANCER RISK:

CHEMICAL	TIME-WEIGHTED ING & DERM DOSE	TIME-WEIGHTED INHALATION DOSE	CANCER SLOPE FACTOR ING	CANCER SLOPE FACTOR INH	CANCER RISK ING/DERM	CANCER RISK INH	CANCER RISK
Toluene	4.019e-5	0			0	0	0
Ethylbenzene	9.086e-6	0			0	0	0
Xylenes	2.097e-5	0			0	0	0
1,1,1-Trichloroethane	7.384e-3	0			0	0	0
1,1-Dichloroethane	8.570e-4	0			0	0	0
Tetrachloroethene	2.754e-3	0	5.1e-2	1.8e-3	1.404e-4	0	1.404e-4
Trichloroethene	4.293e-2	0	1.1e-2	1.7e-2	4.722e-4	0	4.722e-4
1,1-Dichloroethene	1.912e-4	0	6e-1	1.2e0	1.147e-4	0	1.147e-4
1,2-Dichloroethene, trans	2.898e-3	0			0	0	0
Carbon tetrachloride	1.293e-5	0	1.3e-1	1.3e-1	1.681e-6	0	1.681e-6
Bis(2-ethylhexyl)phthalate	7.513e-5	0	1.4e-2		1.052e-6	0	1.052e-6
Di-n-octylphthalate	2.691e-5	0			0	0	0
Di-n-butylphthalate	0	0			0	0	0
Benzo(b)fluoranthene	6.989e-6	0	1.61	.854	1.125e-5	0	1.125e-5
Fluoranthene	6.989e-6	0			0	0	0
Naphthalene	1.048e-5	0			0	0	0
Pyrene	6.989e-6	0			0	0	0
2-Methylphenol	6.989e-6	0			0	0	0
4-Methylphenol	6.989e-6	0			0	0	0
2,4-Dimethylphenol	1.992e-5	0			0	0	0
Arsenic	4.089e-5	0	1.75e0	5e1	7.155e-5	0	7.155e-5
Beryllium	4.543e-6	0	4.3e0	8.4e0	1.953e-5	0	1.953e-5
Cadmium	2.897e-4	0		6.1e0	0	0	0
Chromium (III)	2.492e-4	0			0	0	0
Chromium (VI)	7.373e-5	0		4.1e1	0	0	0
Lead	1.289e-4	0			0	0	0
Manganese	1.405e-3	0			0	0	0
Nickel	7.059e-5	0		8.4e-1	0	0	0
Thallium	3.495e-6	0			0	0	0
Vanadium	5.558e-4	0			0	0	0
Cyanide	2.020e-3	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL RISK					8.324e-4	0	8.324e-4

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED: INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING. ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 2: FUTURE GROUNDWATER EXPOSURE, ADULT EMPLOYEES

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE: S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

ENTER INPUT PARAMETERS:

INGESTION: ADULT EXPOSURE

IR:	1	CONVERSION FACTOR =	9.785e-3
EF:	250		
ED:	25		
BW:	70		
LT:	70		

DERMAL CONTACT: ADULT EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	5.543e-5
AV:	19400		
ET:	.25		
EF:	365		
ED:	0		
BW:	70		
LT:	70		

INHALATION: ADULT EXPOSURE

IR:	0	d:	1
BW:	70	Ts:	2
Ds:	15	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
ED:	0	T:	293
R:	.000082	FR:	10

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: FUTURE GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KAI)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
1,1,1-Trichloroethane	.0198	133.41	3e-2	1.4983e1	1.931e-4	0	1.097e-6
Tetrachloroethene	.4754	165.83	1.53e-2	1.3333e1	4.652e-3	0	2.635e-5
Trichloroethene	.0601	131.39	9.1e-3	1.4816e1	5.881e-4	0	3.331e-6
1,2-Dichloroethene, trans	.0109	96.94	6.7e-2	1.7658e1	1.067e-4	0	6.042e-7
Butylbenzylphthalate	.0001	312	.0000083	3.169e-1	9.785e-7	0	5.543e-9
Acenaphthene	.0034	154.2	.000091	3.7454e0	3.327e-5	0	1.885e-7
Anthracene	.001	178.2	.000086	3.3416e0	9.785e-6	0	5.543e-8
Benz(a)anthracene	.0001	228.28	1e-6	4.594e-2	9.785e-7	0	5.543e-9
Chrysene	.0002	228.3	.0000011	4.822e-2	1.957e-6	0	1.109e-8
Fluoranthene	.0016	202.3	.0000065	3.104e-1	1.566e-5	0	8.869e-8
Fluorene	.0018	116.2	.000064	3.2950e0	1.761e-5	0	9.977e-8
Naphthalene	.0067	128.2	4.6e-4	9.9792e0	6.556e-5	0	3.714e-7
Pyrene	.0015	202.3	.0000051	2.449e-1	1.468e-5	0	8.314e-8
Aroclor-1248	.0033	299.5	4.4e-4	6.4260e0	3.229e-5	0	1.829e-7
Phenanthrene	.003	178.2	2.3e-4	6.2582e0	2.935e-5	0	1.663e-7
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: FUTURE GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
1,1,1-Trichloroethane	1.948e-4	0	9e-2	3e-1	2.165e-3	0	2.165e-3
Tetrachloroethene	4.678e-3	0	1e-2		4.678e-1	0	4.678e-1
Trichloroethene	5.914e-4	0			0	0	0
1,2-Dichloroethene, trans	1.073e-4	0	2e-2		5.363e-3	0	5.363e-3
Butylbenzylphthalate	9.840e-7	0	.2		4.920e-6	0	4.920e-6
Acenaphthene	3.346e-5	0	.06		5.578e-4	0	5.578e-4
Anthracene	9.840e-8	0	.3		3.280e-5	0	3.280e-5
Benz(a)anthracene	9.840e-7	0			0	0	0
Chrysene	1.968e-6	0			0	0	0
Fluoranthene	1.574e-5	0	.04		3.936e-4	0	3.936e-4
Fluorene	1.771e-5	0	.04		4.428e-4	0	4.428e-4
Naphthalene	6.593e-5	0	4e-3		1.648e-2	0	1.648e-2
Pyrene	1.476e-5	0	.03		4.920e-4	0	4.920e-4
Aroclor-1248	3.247e-5	0			0	0	0
Phenanthrene	2.952e-5	0	2.9e-2		1.018e-3	0	1.018e-3
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					4.948e-1	0	4.948e-1

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 2: FUTURE GROUNDWATER EXPOSURE, ADULT EMPLOYEES
CALCULATE INCREMENTAL CANCER RISK:

CHEMICAL	TIME-WEIGHTED ING & DERM DOSE	TIME-WEIGHTED INHALATION DOSE	CANCER SLOPE FACTOR ING	CANCER SLOPE FACTOR INH	CANCER RISK ING/DERM	CANCER RISK INH	CANCER RISK
1,1,1-Trichloroethane	6.919e-5	0			0	0	0
Tetrachloroethene	1.661e-3	0	5.1e-2	1.8e-3	8.473e-5	0	8.473e-5
Trichloroethene	2.100e-4	0	1.1e-2	1.7e-2	2.310e-6	0	2.310e-6
1,2-Dichloroethene, trans	3.809e-5	0			0	0	0
Butylbenzylphthalate	3.495e-7	0			0	0	0
Acenaphthene	1.188e-5	0			0	0	0
Anthracene	3.495e-6	0			0	0	0
Benz(a)anthracene	3.495e-7	0	1.6675e0	8.845e-1	5.827e-7	0	5.827e-7
Chrysene	6.989e-7	0	.0506	.02884	3.536e-8	0	3.536e-8
Fluoranthene	5.591e-6	0			0	0	0
Fluorene	6.290e-6	0			0	0	0
Naphthalene	2.341e-5	0			0	0	0
Pyrene	5.242e-6	0			0	0	0
Aroclor-1248	1.153e-5	0	7.7e0		8.880e-5	0	8.880e-5
Phenanthrene	1.048e-5	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL RISK					1.785e-4	0	1.785e-4

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED:
INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS

REFERENCES: - EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 155)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE: S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS.

INGESTION: ADULT EXPOSURE

IR:	2	CONVERSION FACTOR =	2.740e-3
EF:	350		
ED:	30		
BW:	70		
LT:	70		

DERMAL CONTACT: ADULT EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	4.252e-5
AV:	19400		
ET:	.2		
EF:	350		
ED:	30		
BW:	70		
LT:	70		

INHALATION: ADULT EXPOSURE

IR:	10.4	d:	1
BW:	70	Ts:	2
Ds:	12	Tl:	293
Dt:	20	Ts:	318
Ra:	.0093	K1:	.982
SV:	12	K2:	.616
ED:	30	T:	293
R:	.000082	FR:	10
EF:	1	LT:	70

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KAl)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
Toluene	.0115	92.13	6.66e-3	1.7521e1	3.151e-4	9.956e-5	4.890e-7
Ethylbenzene	.0026	106.16	6.6e-3	1.6317e1	7.123e-5	2.135e-5	1.106e-7
Xylenes	.006	106.16	4.33e-3	1.6010e1	1.644e-4	4.856e-5	2.551e-7
1,1,1-Trichloroethane	2.113	133.41	3e-2	1.4983e1	5.789e-2	1.626e-2	8.985e-5
1,1-Dichloroethane	.189	98.96	4.26e-3	1.6568e1	5.151e-3	1.561e-3	7.994e-6
Tetrachloroethene	.788	165.83	1.53e-2	1.3333e1	2.159e-2	5.534e-3	3.351e-5
Trichloroethene	12.295	131.39	9.1e-3	1.4816e1	3.366e-1	9.371e-2	5.224e-4
1,1-Dichloroethene	.0547	96.94	1.9e-1	1.7700e1	1.499e-3	4.771e-4	2.326e-6
1,2-Dichloroethene, trans	.772	96.94	6.7e-2	1.7658e1	2.115e-2	6.722e-3	3.283e-5
Carbon tetrachloride	.0037	153.82	2.3e-2	1.3918e1	1.014e-4	2.688e-5	1.573e-7
Bis(2-ethylhexyl)phthalate	.0841	390.62	3e-7	1.056e-2	2.304e-3	5.795e-7	3.576e-6
Di-n-octylphthalate	.0077	391	.000017	5.610e-1	2.110e-4	2.792e-6	3.274e-7
Di-n-butylphthalate	.0056	278.3	2.8e-7	1.168e-2	1.534e-4	4.267e-8	2.381e-7
Benzo(b)fluoranthene	.002	252.3	.0000122	5.103e-1	5.479e-5	6.602e-7	8.504e-8
Fluoranthene	.002	202.3	.0000065	3.104e-1	5.479e-5	4.029e-7	8.504e-8
Naphthalene	.003	128.2	4.6e-4	9.9792e0	8.219e-5	1.661e-5	1.275e-7
Pyrene	.002	202.3	.0000051	2.449e-1	5.479e-5	3.182e-7	8.504e-8
2-Methylphenol	.002	108.1	.0000039	8.587e-1	5.479e-5	3.360e-7	8.504e-8
4-Methylphenol	.002	108.1	.0000013	8.601e-2	5.479e-5	1.121e-7	8.504e-8
2,4-Dimethylphenol	.0057	122.2	.000017	1.0035e0	1.562e-4	3.670e-6	2.424e-7
Arsenic	.0267	74.92		0	7.315e-4	0	1.135e-6
Beryllium	.0013	9.0122		0	3.562e-5	0	5.529e-8
Cadmium	.083	112.4		0	2.274e-3	0	3.529e-6
Chromium (III)	.0597			0	1.636e-3	0	2.538e-6
Chromium (VI)	.0211	51.996		0	5.781e-4	0	8.972e-7
Lead	.0369	207.19		0	1.011e-3	0	1.569e-6
Manganese	.402	55		0	1.101e-2	0	1.709e-5
Nickel	.0202	58.71		0	5.534e-4	0	8.589e-7
Thallium	.001	204		0	2.740e-5	0	4.252e-8
Vanadium	.159	50.942		0	4.356e-3	0	6.761e-6
Cyanide	.578			0	1.584e-2	0	2.458e-5
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
Toluene	3.156e-4	9.956e-5	2e-1	6e-1	1.578e-3	1.659e-4	1.744e-3
Ethylbenzene	7.134e-5	2.135e-5	1e-1	3e-1	7.134e-4	7.116e-5	7.846e-4
Xylenes	1.646e-4	4.856e-5	2e0	9e-2	8.232e-5	5.396e-4	6.219e-4
1,1,1-Trichloroethane	5.798e-2	1.626e-2	9e-2	3e-1	6.442e-1	5.419e-2	6.984e-1
1,1-Dichloroethane	5.159e-3	1.561e-3	1e-1	1e-1	5.159e-2	1.561e-2	6.720e-2
Tetrachloroethene	2.162e-2	5.534e-3	1e-2		2.1623e0	0	2.1623e0
Trichloroethene	3.371e-1	9.371e-2			0	0	0
1,1-Dichloroethene	1.501e-3	4.771e-4	9e-3		1.668e-1	0	1.668e-1
1,2-Dichloroethene, trans	2.118e-2	6.722e-3	2e-2		1.0592e0	0	1.0592e0
Carbon tetrachloride	1.015e-4	2.688e-5	7e-4		1.450e-1	0	1.450e-1
Bis(2-ethylhexyl)phthalate	2.308e-3	5.795e-7	2e-2		1.154e-1	0	1.154e-1
Di-n-octylphthalate	2.113e-4	2.792e-6	.02		1.056e-2	0	1.056e-2
Di-n-butylphthalate	1.537e-4	4.267e-8	1e-1		1.537e-3	0	1.537e-3
Benzo(b)fluoranthene	5.488e-5	6.602e-7			0	0	0
Fluoranthene	5.488e-5	4.029e-7	.04		1.372e-3	0	1.372e-3
Naphthalene	8.232e-5	1.661e-5	4e-3		2.058e-2	0	2.058e-2
Pyrene	5.488e-5	3.182e-7	.03		1.829e-3	0	1.829e-3
2-Methylphenol	5.488e-5	3.360e-7	.05		1.098e-3	0	1.098e-3
4-Methylphenol	5.488e-5	1.121e-7	.05		1.098e-3	0	1.098e-3
2,4-Dimethylphenol	1.564e-4	3.670e-6	.02		7.820e-3	0	7.820e-3
Arsenic	7.326e-4	0	1e-3		7.326e-1	0	7.326e-1
Beryllium	3.567e-5	0	5e-3		7.134e-3	0	7.134e-3
Cadmium	2.278e-3	0	5e-4		4.5550e0	0	4.5550e0
Chromium (III)	1.638e-3	0	1	.0000006	1.638e-3	0	1.638e-3
Chromium (VI)	5.790e-4	0	5e-3	6e-7	1.158e-1	0	1.158e-1
Lead	1.013e-3	0	1.4e-3	4.3e-4	7.232e-1	0	7.232e-1
Manganese	1.103e-2	0	.1	.0091	1.103e-1	0	1.103e-1
Nickel	5.543e-4	0	2e-2		2.771e-2	0	2.771e-2
Thallium	2.744e-5	0	.00007		3.920e-1	0	3.920e-1
Vanadium	4.363e-3	0	7e-3		6.233e-1	0	6.233e-1
Cyanide	1.586e-2	0	2e-2		7.930e-1	0	7.930e-1
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					1.2474e1	7.058e-2	1.2545e1

NYSDEC 032819

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE INCREMENTAL CANCER RISK:

CHEMICAL	TIME-WEIGHTED ING & DERM DOSE	TIME-WEIGHTED INHALATION DOSE	CANCER SLOPE FACTOR ING	CANCER SLOPE FACTOR INH	CANCER RISK ING/DERM	CANCER RISK INH	CANCER RISK
Toluene	1.352e-4	4.267e-5			0	0	0
Ethylbenzene	3.058e-5	9.149e-6			0	0	0
Xylenes	7.056e-5	2.081e-5			0	0	0
1,1,1-Trichloroethane	2.465e-2	6.967e-3			0	0	0
1,1-Dichloroethane	2.211e-3	6.691e-4			0	0	0
Tetrachloroethene	9.267e-3	2.372e-3	5.1e-2	1.8e-3	4.726e-4	4.269e-6	4.769e-4
Trichloroethene	1.445e-1	4.016e-2	1.1e-2	1.7e-2	1.589e-3	6.827e-4	2.272e-3
1,1-Dichloroethene	6.433e-4	2.045e-4	6e-1	1.2e0	3.860e-4	2.454e-4	6.313e-4
1,2-Dichloroethene, trans	9.079e-3	2.881e-3			0	0	0
Carbon tetrachloride	4.351e-5	1.152e-5	1.3e-1	1.3e-1	5.657e-6	1.498e-6	7.154e-6
Bis(2-ethylhexyl)phthalate	9.890e-4	2.484e-7	1.4e-2		1.385e-5	0	1.385e-5
Di-n-octylphthalate	9.055e-5	1.196e-6			0	0	0
Di-n-butylphthalate	6.586e-5	1.829e-8			0	0	0
Benzo(b)fluoranthene	2.352e-5	2.830e-7	1.61	.854	3.787e-5	2.416e-7	3.811e-5
Fluoranthene	2.352e-5	1.727e-7			0	0	0
Naphthalene	3.529e-5	7.120e-6			0	0	0
Pyrene	2.352e-5	1.354e-7			0	0	0
2-Methylphenol	2.352e-5	1.440e-7			0	0	0
4-Methylphenol	2.352e-5	4.803e-8			0	0	0
2,4-Dimethylphenol	6.703e-5	1.573e-6			0	0	0
Arsenic	3.140e-4	0	1.75e0	5e1	5.495e-4	0	5.495e-4
Beryllium	1.529e-5	0	4.3e0	8.4e0	6.574e-5	0	6.574e-5
Cadmium	9.761e-4	0		6.1e0	0	0	0
Chromium (III)	7.021e-4	0			0	0	0
Chromium (VI)	2.481e-4	0		4.1e1	0	0	0
Lead	4.339e-4	0			0	0	0
Manganese	4.727e-3	0			0	0	0
Nickel	2.376e-4	0		8.4e-1	0	0	0
Thallium	1.176e-5	0			0	0	0
Vanadium	1.870e-3	0			0	0	0
Cyanide	6.797e-3	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL RISK					3.120e-3	9.311e-4	4.056e-3

NYSDEC 032820

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED: INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING. ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE:
S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

INGESTION: ADULT EXPOSURE

IR:	2	CONVERSION FACTOR =	2.740e-2
EF:	350		
ED:	30		
BW:	70		
LT:	70		

DERMAL CONTACT: ADULT EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	4.252e-5
AV:	19400		
ET:	.2		
EF:	350		
ED:	30		
BW:	70		
LT:	70		

INHALATION: ADULT EXPOSURE

IR:	10.4	d:	1
BW:	70	Ts:	2
Ds:	12	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
ED:	30	T:	293
R:	.000082	FR:	10
EF:	1	LT:	70

JRH 2/27/92

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KA)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
Toluene	.0116	92.13	6.66e-3	1.7521e1	3.151e-4	9.956e-5	4.890e-7
Ethylbenzene	.0026	106.16	6.6e-3	1.6317e1	7.123e-5	2.135e-5	1.106e-7
Xylenes	.006	106.16	4.33e-3	1.6010e1	1.644e-4	4.856e-5	2.551e-7
1,1,1-Trichloroethane	2.113	133.41	3e-2	1.4983e1	5.783e-2	1.628e-2	8.985e-5
1,1-Dichloroethane	.188	98.96	4.26e-3	1.6568e1	5.151e-3	1.561e-3	7.994e-6
Tetrachloroethene	.788	165.83	1.53e-2	1.3333e1	2.159e-2	5.534e-3	3.351e-5
Trichloroethene	12.285	131.39	9.1e-3	1.4816e1	3.366e-1	9.371e-2	5.224e-4
1,1-Dichloroethene	.0547	96.94	1.9e-1	1.7700e1	1.499e-3	4.771e-4	2.326e-6
1,2-Dichloroethene, trans	.772	96.94	6.7e-2	1.7658e1	2.115e-2	6.722e-3	3.283e-5
Carbon tetrachloride	.0037	153.82	2.3e-2	1.3918e1	1.014e-4	2.688e-5	1.573e-7
Bis(2-ethylhexyl)phthalate	.0215	390.62	3e-7	1.056e-2	5.890e-4	1.481e-7	9.142e-7
Di-n-octylphthalate	.0077	391	.000017	5.610e-1	2.110e-4	2.792e-6	3.274e-7
Di-n-butylphthalate	0	278.3	2.8e-7	1.168e-2	0	0	0
Benzo(b)fluoranthene	.002	252.3	.0000122	5.103e-1	5.479e-5	6.602e-7	8.504e-8
Fluoranthene	.002	202.3	.0000065	3.104e-1	5.479e-5	4.029e-7	8.504e-8
Naphthalene	.003	128.2	4.6e-4	9.9792e0	8.219e-5	1.661e-5	1.276e-7
Pyrene	.002	202.3	.0000051	2.449e-1	5.479e-5	3.182e-7	8.504e-8
2-Methylphenol	.002	108.1	.0000039	2.587e-1	5.479e-5	3.360e-7	8.504e-8
4-Methylphenol	.002	108.1	.0000013	8.601e-2	5.479e-5	1.121e-7	8.504e-8
2,4-Dimethylphenol	.0057	122.2	.000017	1.0035e0	1.562e-4	3.870e-6	2.424e-7
Arsenic	.0117	74.92		0	3.205e-4	0	4.975e-7
Beryllium	.0013	9.0122		0	3.562e-5	0	5.528e-8
Cadmium	.0829	112.4		0	2.271e-3	0	3.525e-6
Chromium (III)	.0713			0	1.953e-3	0	3.032e-6
Chromium (VI)	.0211	51.996		0	5.781e-4	0	8.972e-7
Lead	.0369	207.19		0	1.011e-3	0	1.569e-6
Manganese	.402	55		0	1.101e-2	0	1.709e-5
Nickel	.0202	58.71		0	5.534e-4	0	8.589e-7
Thallium	.001	204		0	2.740e-5	0	4.252e-8
Vanadium	.159	50.942		0	4.356e-3	0	6.761e-6
Cyanide	.578			0	1.584e-2	0	2.458e-5
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
Toluene	3.156e-4	9.956e-5	2e-1	6e-1	1.578e-3	1.659e-4	1.744e-3
Ethylbenzene	7.134e-5	2.135e-5	1e-1	3e-1	7.134e-4	7.116e-5	7.846e-4
Xylenes	1.645e-4	4.856e-5	2e0	9e-2	8.232e-5	5.396e-4	6.219e-4
1,1,1-Trichloroethane	5.798e-2	1.626e-2	9e-2	3e-1	6.442e-1	5.419e-2	6.984e-1
1,1-Dichloroethane	5.159e-3	1.561e-3	1e-1	1e-1	5.159e-2	1.561e-2	6.720e-2
Tetrachloroethene	2.162e-2	5.534e-3	1e-2		2.1623e0	0	2.1623e0
Trichloroethene	3.371e-1	9.371e-2			0	0	0
1,1-Dichloroethene	1.501e-3	4.171e-4	9e-3		1.668e-1	0	1.668e-1
1,2-Dichloroethene, trans	2.118e-2	6.722e-3	2e-2		1.0592e0	0	1.0592e0
Carbon tetrachloride	1.015e-4	2.689e-5	7e-4		1.450e-1	0	1.450e-1
Bis(2-ethylhexyl)phthalate	5.900e-4	1.481e-7	2e-2		2.950e-2	0	2.950e-2
Di-n-octylphthalate	2.113e-4	2.792e-6	.02		1.056e-2	0	1.056e-2
Di-n-butylphthalate	0	0	1e-1		0	0	0
Benzo(b)fluoranthene	5.488e-5	6.602e-7			0	0	0
Fluoranthene	5.488e-5	4.029e-7	.04		1.372e-3	0	1.372e-3
Naphthalene	8.232e-5	1.661e-5	4e-3		2.058e-2	0	2.058e-2
Pyrene	5.486e-5	3.182e-7	.03		1.829e-3	0	1.829e-3
2-Methylphenol	5.488e-5	3.360e-7	.05		1.098e-3	0	1.098e-3
4-Methylphenol	5.486e-5	1.121e-7	.05		1.098e-3	0	1.098e-3
2,4-Dimethylphenol	1.564e-4	3.670e-6	.02		7.820e-3	0	7.820e-3
Arsenic	3.210e-4	0	1e-3		3.210e-1	0	3.210e-1
Beryllium	3.567e-5	0	5e-3		7.134e-3	0	7.134e-3
Cadmium	2.275e-3	0	5e-4		4.5495e0	0	4.5495e0
Chromium (III)	1.956e-3	0	1	.0000006	1.956e-3	0	1.956e-3
Chromium (VI)	5.790e-4	0	5e-3	6e-7	1.158e-1	0	1.158e-1
Lead	1.013e-3	0	1.4e-3	4.3e-4	7.232e-1	0	7.232e-1
Manganese	1.103e-2	0	.1	.0001	1.103e-1	0	1.103e-1
Nickel	5.543e-4	0	2e-2		2.771e-2	0	2.771e-2
Thallium	2.744e-5	0	.00007		3.920e-1	0	3.920e-1
Vanadium	4.363e-3	0	7e-3		6.233e-1	0	6.233e-1
Cyanide	1.586e-2	0	2e-2		7.930e-1	0	7.930e-1
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					1.1970e1	7.058e-2	1.2041e1

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 3: CURRENT GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE INCREMENTAL CANCER RISK:

CHEMICAL	TIME-WEIGHTED ING & DERM DOSE	TIME-WEIGHTED INHALATION DOSE	CANCER SLOPE FACTOR ING	CANCER SLOPE FACTOR INH	CANCER RISK ING/DERM	CANCER RISK INH	CANCER RISK
Toluene	1.352e-4	4.267e-5			0	0	0
Ethylbenzene	3.058e-5	9.149e-6			0	0	0
Xylenes	7.056e-5	2.081e-5			0	0	0
1,1,1-Trichloroethane	2.485e-2	6.987e-3			0	0	0
1,1-Dichloroethane	2.211e-3	6.691e-4			0	0	0
Tetrachloroethene	9.267e-3	2.372e-3	5.1e-2	1.8e-3	4.726e-4	4.269e-6	4.769e-4
Trichloroethene	1.445e-1	4.016e-2	1.1e-2	1.7e-2	1.589e-3	6.827e-4	2.272e-3
1,1-Dichloroethene	6.433e-4	2.045e-4	6e-1	1.2e0	3.860e-4	2.454e-4	6.313e-4
1,2-Dichloroethene, trans	9.079e-3	2.881e-3			0	0	0
Carbon tetrachloride	4.351e-5	1.152e-5	1.3e-1	1.3e-1	5.657e-6	1.498e-6	7.154e-6
Bis(2-ethylhexyl)phthalate	2.528e-4	6.349e-8	1.4e-2		3.540e-6	0	3.540e-6
Di-n-octylphthalate	9.055e-5	1.195e-6			0	0	0
Di-n-butylphthalate	0	0			0	0	0
Benzo(b)fluoranthene	2.352e-5	2.930e-7	1.61	.854	3.787e-5	2.416e-7	3.811e-5
Fluoranthene	2.352e-5	1.727e-7			0	0	0
Naphthalene	3.528e-5	7.120e-6			0	0	0
Pyrene	2.352e-5	1.364e-7			0	0	0
2-Methylphenol	2.352e-5	1.440e-7			0	0	0
4-Methylphenol	2.352e-5	4.803e-8			0	0	0
2,4-Dimethylphenol	6.703e-5	1.573e-6			0	0	0
Arsenic	1.376e-4	0	1.75e0	5e1	2.408e-4	0	2.408e-4
Beryllium	1.529e-5	0	4.3e0	8.4e0	6.574e-5	0	6.574e-5
Cadmium	9.749e-4	0		6.1e0	0	0	0
Chromium (III)	8.385e-4	0			0	0	0
Chromium (VI)	2.481e-4	0		4.1e1	0	0	0
Lead	4.339e-4	0			0	0	0
Manganese	4.727e-3	0			0	0	0
Nickel	2.376e-4	0		8.4e-1	0	0	0
Thallium	1.176e-5	0			0	0	0
Vanadium	1.870e-3	0			0	0	0
Cyanide	5.797e-3	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL RISK					2.801e-3	9.341e-4	3.735e-3

NYSDEC 032824

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED:
INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 4: CURRENT GROUNDWATER EXPOSURE, CHILD RESIDENTS

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEx = (C x IR x EF x ED)/(BW x LT x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE: S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

DERMAL CONTACT: DEx = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE: C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

INGESTION: CHILD EXPOSURE

IR:	1	CONVERSION FACTOR =	6.333e-2
EF:	350		
ED:	6		
BW:	15		
LT:	0		

DERMAL CONTACT: CHILD EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	7.448e-5
AV:	7280		
ET:	.2		
EF:	350		
ED:	6		
BW:	15		
LT:	0		

INHALATION: CHILD EXPOSURE

IR:	0	d:	1
BW:	70	Ts:	2
Ds:	12	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.992
SV:	12	M2:	.816
ED:	0	T:	293
R:	.000082	FP:	10
EF:	1	LT:	0

NYSDEC 032825

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: CURRENT GROUNDWATER EXPOSURE, CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KA1)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
Toluene	.0115	92.13	6.66e-3	1.7521e1	7.352e-4	0	8.563e-7
Ethylbenzene	.0026	106.16	6.6e-3	1.6317e1	1.662e-4	0	1.936e-7
Xylenes	.006	106.16	4.33e-3	1.6010e1	3.836e-4	0	4.468e-7
1,1,1-Trichloroethane	2.113	133.41	3e-2	1.4983e1	1.351e-1	0	1.573e-4
1,1-Dichloroethane	.188	98.96	4.26e-3	1.6568e1	1.202e-2	0	1.400e-5
Tetrachloroethene	.788	165.83	1.53e-2	1.3333e1	5.037e-2	0	5.868e-5
Trichloroethene	12.285	131.39	9.1e-3	1.4816e1	7.853e-1	0	9.148e-4
1,1-Dichloroethene	.0547	96.94	1.9e-1	1.7700e1	3.497e-3	0	4.073e-6
1,2-Dichloroethene, trans	.772	96.94	6.7e-2	1.7658e1	4.935e-2	0	5.748e-5
Carbon tetrachloride	.0037	153.82	2.3e-2	1.3918e1	2.365e-4	0	2.755e-7
Bis(2-ethylhexyl)phthalate	.0215	390.62	3e-7	1.056e-2	1.374e-3	0	1.601e-6
Di-n-octylphthalate	.0077	391	.000017	5.610e-1	4.922e-4	0	5.734e-7
Di-n-butylphthalate	0	278.3	2.8e-7	1.168e-2	0	0	0
Benzo(b)fluoranthene	.002	252.3	.0000122	5.103e-1	1.279e-4	0	1.489e-7
Fluoranthene	.002	202.3	.0000065	3.104e-1	1.279e-4	0	1.489e-7
Naphthalene	.003	128.2	4.6e-4	9.9792e0	1.918e-4	0	2.234e-7
Pyrene	.002	202.3	.0000051	2.449e-1	1.279e-4	0	1.489e-7
2-Methylphenol	.002	108.1	.0000039	2.587e-1	1.279e-4	0	1.489e-7
4-Methylphenol	.002	108.1	.0000013	8.601e-2	1.279e-4	0	1.489e-7
2,4-Dimethylphenol	.0057	122.2	.000017	1.0035e0	3.644e-4	0	4.244e-7
Arsenic	.0117	74.92		0	7.479e-4	0	8.712e-7
Beryllium	.0013	9.0122		0	8.311e-5	0	9.680e-8
Cadmium	.0829	112.4		0	5.300e-3	0	6.173e-6
Chromium (III)	.0713			0	4.558e-3	0	5.309e-6
Chromium (VI)	.0211	51.996		0	1.349e-3	0	1.571e-6
Lead	.0369	207.19		0	2.359e-3	0	2.748e-6
Manganese	.402	55		0	2.570e-2	0	2.993e-5
Nickel	.202	58.71		0	1.291e-2	0	1.504e-5
Thallium	.001	204		0	6.393e-5	0	7.446e-8
Vanadium	.159	50.942		0	1.016e-2	0	1.184e-5
Cyanide	.578			0	3.695e-2	0	4.304e-5
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 4: CURRENT GROUNDWATER EXPOSURE, CHILD RESIDENTS
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
Toluene	7.360e-4	0	2e-1	6e-1	3.680e-3	0	3.680e-3
Ethylbenzene	1.664e-4	0	1e-1	3e-1	1.664e-3	0	1.664e-3
Xylenes	3.840e-4	0	2e0	9e-2	1.920e-4	0	1.920e-4
1,1,1-Trichloroethane	1.352e-1	0	9e-2	3e-1	1.5026e0	0	1.5026e0
1,1-Dichloroethane	1.203e-2	0	1e-1	1e-1	1.203e-1	0	1.203e-1
Tetrachloroethene	5.043e-2	0	1e-2		5.0433e0	0	5.0433e0
Trichloroethene	7.883e-1	0			0	0	0
1,1-Dichloroethene	3.501e-3	0	9e-3		3.890e-1	0	3.890e-1
1,2-Dichloroethene, trans	4.941e-2	0	2e-2		2.4705e0	0	2.4705e0
Carbon tetrachloride	2.368e-4	0	7e-4		3.383e-1	0	3.383e-1
Bis(2-ethylhexyl)phthalate	1.376e-3	0	2e-2		6.880e-2	0	6.880e-2
Di-n-octylphthalate	4.928e-4	0	.02		2.464e-2	0	2.464e-2
Di-n-butylphthalate	0	0	1e-1		0	0	0
Benzo(b)fluoranthene	1.280e-4	0			0	0	0
Fluoranthene	1.280e-4	0	.04		3.200e-3	0	3.200e-3
Naphthalene	1.920e-4	0	4e-3		4.800e-2	0	4.800e-2
Pyrene	1.280e-4	0	.03		4.267e-3	0	4.267e-3
2-Methylphenol	1.280e-4	0	.05		2.560e-3	0	2.560e-3
4-Methylphenol	1.280e-4	0	.05		2.560e-3	0	2.560e-3
2,4-Dimethylphenol	3.648e-4	0	.02		1.824e-2	0	1.824e-2
Arsenic	7.488e-4	0	1e-3		7.488e-1	0	7.488e-1
Beryllium	8.320e-5	0	5e-3		1.664e-2	0	1.664e-2
Cadmium	5.306e-3	0	5e-4		1.0611e1	0	1.0611e1
Chromium (III)	4.563e-3	0	1	.0000008	4.563e-3	0	4.563e-3
Chromium (VI)	1.350e-3	0	5e-3	6e-7	2.701e-1	0	2.701e-1
Lead	2.362e-3	0	1.4e-3	4.3e-4	1.6869e0	0	1.6869e0
Manganese	2.573e-2	0	.1	.0001	2.573e-1	0	2.573e-1
Nickel	1.293e-2	0	2e-2		6.464e-1	0	6.464e-1
Thallium	6.400e-5	0	.00007		9.143e-1	0	9.143e-1
Vanadium	1.018e-2	0	7e-3		1.4537e0	0	1.4537e0
Cyanide	3.699e-2	0	2e-2		1.8498e0	0	1.8498e0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					2.8502e1	0	2.8502e1

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED: INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING. ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 5: FUTURE GROUNDWATER EXPOSURE, ADULT RESIDENTS

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE:
S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

ENTER INPUT PARAMETERS:

INGESTION: ADULT EXPOSURE

IR:	2	CONVERSION FACTOR =	2.740e-2
EF:	350		
ED:	30		
BW:	70		
LT:	70		

DERMAL CONTACT: ADULT EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	4.252e-5
AV:	19400		
ET:	.2		
EF:	350		
ED:	30		
BW:	70		
LT:	70		

INHALATION: ADULT EXPOSURE

IR:	10.4	d:	1
BW:	70	Ts:	2
Ds:	12	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
ED:	30	T:	293
R:	.000082	FR:	10

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KAI)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
1,1,1-Trichloroethane	.0198	133.41	3e-2	1.4983e1	5.425e-4	1.523e-4	8.419e-7
Tetrachloroethene	.4754	165.83	1.53e-2	1.3333e1	1.302e-2	3.338e-3	2.021e-5
Trichloroethene	.0601	131.39	9.1e-3	1.4816e1	1.647e-3	4.584e-4	2.555e-6
1,2-Dichloroethene, trans	.0109	96.94	6.7e-2	1.7658e1	2.986e-4	9.491e-5	4.635e-7
Butylbenzylphthalate	.0001	312	.0000083	3.169e-1	2.740e-6	2.057e-8	4.252e-9
Acenaphthene	.0034	154.2	.000091	3.7454e0	9.315e-5	7.810e-6	1.446e-7
Anthracene	.001	178.2	.000086	3.3416e0	2.740e-5	2.063e-6	4.252e-8
Benz(a)anthracene	.0001	228.28	1e-6	4.594e-2	2.740e-6	2.994e-9	4.252e-9
Chrysene	.0002	228.3	.0000011	4.822e-2	5.479e-6	6.287e-9	8.504e-9
Fluoranthene	.0016	202.3	.0000065	3.104e-1	4.384e-5	3.223e-7	6.803e-8
Fluorene	.0018	116.2	.000064	3.2950e0	4.932e-5	3.664e-6	7.654e-8
Naphthalene	.0067	128.2	4.6e-4	9.9792e0	1.836e-4	3.711e-5	2.849e-7
Pyrene	.0015	202.3	.0000051	2.449e-1	4.110e-5	2.386e-7	6.378e-8
Aroclor-1248	.0033	299.5	4.4e-4	6.4260e0	9.041e-5	1.245e-5	1.403e-7
Phenanthrene	.003	178.2	2.3e-4	6.2582e0	8.219e-5	1.105e-5	1.276e-7
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
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				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
1,1,1-Trichloroethane	5.433e-4	1.523e-4	9e-2	3e-1	6.037e-3	5.078e-4	6.545e-3
Tetrachloroethene	1.304e-2	3.338e-3	1e-2		1.3045e0	0	1.3045e0
Trichloroethene	1.649e-3	4.584e-4			0	0	0
1,2-Dichloroethene, trans	2.991e-4	9.491e-5	2e-2		1.495e-2	0	1.495e-2
Butylbenzylphthalate	2.744e-6	2.057e-8	.2		1.372e-5	0	1.372e-5
Acenaphthene	9.330e-5	1.810e-6	.06		1.555e-3	0	1.555e-3
Anthracene	2.744e-5	2.063e-6	.3		9.147e-5	0	9.147e-5
Benz(a)anthracene	2.744e-6	2.994e-9			0	0	0
Chrysene	5.488e-6	8.287e-9			0	0	0
Fluoranthene	4.390e-5	3.223e-7	.04		1.098e-3	0	1.098e-3
Fluorene	4.939e-5	3.664e-6	.04		1.235e-3	0	1.235e-3
Naphthalene	1.838e-4	3.711e-5	4e-3		4.596e-2	0	4.596e-2
Pyrene	4.116e-5	2.386e-7	.03		1.372e-3	0	1.372e-3
Aroclor-1248	9.055e-5	1.245e-5			0	0	0
Phenanthrene	8.232e-5	1.105e-5	2.9e-2		2.839e-3	0	2.839e-3
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					1.3796e0	5.078e-4	1.3802e0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE FOUR)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE GROUNDWATER EXPOSURE, ADULT RESIDENTS
CALCULATE INCREMENTAL CANCER RISK:

CHEMICAL	TIME-WEIGHTED ING & DERM DOSE	TIME-WEIGHTED INHALATION DOSE	CANCER SLOPE FACTOR ING	CANCER SLOPE FACTOR INH	CANCER RISK ING/DERM	CANCER RISK INH	CANCER RISK
1,1,1-Trichloroethane	2.328e-4	6.529e-5			0	0	0
Tetrachloroethene	5.591e-3	1.431e-3	5.1e-2	1.8e-3	2.851e-4	2.575e-6	2.877e-4
Trichloroethene	7.068e-4	1.965e-4	1.1e-2	1.7e-2	7.774e-6	3.340e-6	1.111e-5
1,2-Dichloroethene, trans	1.282e-4	4.067e-5			0	0	0
Butylbenzylphthalate	1.176e-6	8.814e-9			0	0	0
Acenaphthene	3.998e-5	3.347e-6			0	0	0
Anthracene	1.176e-5	8.841e-7			0	0	0
Benz(a)anthracene	1.176e-6	1.283e-9	1.6675e0	8.845e-1	1.961e-6	1.135e-9	1.962e-6
Chrysene	2.352e-6	2.694e-9	.0506	.02684	1.190e-7	7.23e-11	1.191e-7
Fluoranthene	1.882e-5	1.381e-7			0	0	0
Fluorene	2.117e-5	1.570e-6			0	0	0
Naphthalene	7.879e-5	1.590e-5			0	0	0
Pyrene	1.764e-5	1.023e-7			0	0	0
Aroclor-1248	3.881e-5	5.337e-8	7.7e0		2.988e-4	0	2.988e-4
Phenanthrene	3.528e-5	4.738e-6			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL RISK					5.938e-4	5.916e-6	5.997e-4

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED:
INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING.
ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 6: FUTURE GROUNDWATER EXPOSURE, CHILD RESIDENTS

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE:
- C = GROUNDWATER CONCENTRATION (MG/L)
- IR = INGESTION RATE (LITERS/DAY)
- EF = EXPOSURE FREQUENCY (DAYS/YEAR)
- ED = EXPOSURE DURATION (YEARS)
- BW = BODY WEIGHT (KG)
- LT = LIFETIME (YEARS)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE:
- C = GROUNDWATER CONCENTRATION (MG/L)
- PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
- AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
- ET = EXPOSURE TIME (HRS/DAY)
- EF = EXPOSURE FREQUENCY (DAYS/YEAR)
- ED = EXPOSURE DURATION (YEARS)
- BW = BODY WEIGHT (KG)
- LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE:
- S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
- IR = INHALATION RATE (LITERS/MIN)
- Ds = SHOWER DURATION (MIN)
- Ra = AIR EXCHANGE RATE (1/MIN)
- Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
- BW = BODY WEIGHT (KG)
- SV = SHOWER ROOM AIR VOLUME (m**3)
- R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

ENTER INPUT PARAMETERS:

INGESTION: CHILD EXPOSURE

IR:	1	CONVERSION FACTOR =	6.393e-2
EF:	350		
ED:	6		
BW:	15		
LT:	0		

DERMAL CONTACT: CHILD EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	7.440e-5
AV:	7280		
ET:	.2		
EF:	350		
ED:	6		
BW:	15		
LT:	0		

INHALATION: CHILD EXPOSURE

IR:	0	d:	1
BW:	70	Ts:	2
Ds:	12	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
E0:	0	T:	293
R:	.000082	FR:	10
EF:	1	LT:	0

RISK ASSESSMENT SPREADSHEET - EXPOSURES THROUGH HOUSEHOLD USE OF GROUNDWATER

SITE NAME: BETHPAGE
LOCATION: BETHPAGE, NY
DATE: DEC 1991

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY ON THE FOLLOWING SPREADSHEETS. THREE EXPOSURE ROUTES ARE CONSIDERED: INGESTION OF GROUNDWATER, INHALATION OF VOLATILES DURING SHOWERING/BATHING, AND DERMAL CONTACT WHILE SHOWERING/BATHING. ASSUMPTIONS ARE OUTLINED BELOW.

EXPOSURE SCENARIO NUMBER 6: FUTURE GROUNDWATER EXPOSURE, CHILD RESIDENTS

REFERENCES: EPA, DECEMBER 1989
FOSTER AND CHROSTOWSKI, 1987

INGESTION: IEX = (C x IR x EF x ED)/(BW x LT x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
IR = INGESTION RATE (LITERS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

DERMAL CONTACT: DEX = (C x PC x AV x ET x EF x ED)/(BW x LT x 1000 x 365)

WHERE:
C = GROUNDWATER CONCENTRATION (MG/L)
PC = THE PERMEABILITY CONSTANT OF WATER (CM/HR)
AV = THE SKIN SURFACE AREA AVAILABLE FOR CONTACT (CM**2)
ET = EXPOSURE TIME (HRS/DAY)
EF = EXPOSURE FREQUENCY (DAYS/YEAR)
ED = EXPOSURE DURATION (YEARS)
BW = BODY WEIGHT (KG)
LT = LIFETIME (YEARS)

INHALATION: IEX = (S x IR x EF x ED)/(BW x LT x Ra x 1E6)x(Ds + EXP(-Ra x Dt)/Ra - EXP(Ra x (Ds-Dt))/Ra)

WHERE:
S = VOLATILE ORGANIC CHEMICAL GENERATION RATE (UG/CUBIC METER/MIN)
IR = INHALATION RATE (LITERS/MIN)
Ds = SHOWER DURATION (MIN)
Ra = AIR EXCHANGE RATE (1/MIN)
Dt = TOTAL DURATION IN SHOWER ROOM (MIN)
BW = BODY WEIGHT (KG)
SV = SHOWER ROOM AIR VOLUME (m**3)
R = IDEAL GAS LAW CONSTANT (ATM-M**3/MOL/K)

ENTER INPUT PARAMETERS:

INGESTION: CHILD EXPOSURE

IR:	1	CONVERSION FACTOR =	6.393e-2
EF:	350		
ED:	6		
BW:	15		
LT:	0		

DERMAL CONTACT: CHILD EXPOSURE

PC:	8e-4	CONVERSION FACTOR =	7.440e-5
AV:	7200		
ET:	.2		
EF:	350		
ED:	6		
BW:	15		
LT:	0		

INHALATION: CHILD EXPOSURE

IR:	0	d:	1
BW:	70	Ts:	2
Ds:	12	T1:	293
Dt:	20	Ts:	318
Ra:	.0083	M1:	.982
SV:	12	M2:	.616
ED:	0	T:	293
R:	.000082	FR:	10
EF:	1	LT:	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE TWO)
BETHPAGE
EXPOSURE SCENARIO NUMBER 6: FUTURE GROUNDWATER EXPOSUPE, CHILD RESIDENTS
CALCULATE DOSES:

CHEMICAL	GW CONC. (MG/L)	MOLECULAR WEIGHT	HENRYS LAW CONSTANT	MASS TRANSFER COEFFICIENT (KA1)	INGESTION DOSE	INHALATION DOSE	DERMAL DOSE
1,1,1-Trichloroethane	.0198	133.41	3e-2	1.4983e1	1.266e-3	0	1.474e-6
Tetrachloroethene	.4754	165.83	1.53e-2	1.3333e1	3.039e-2	0	3.540e-5
Trichloroethene	.0601	131.39	9.1e-3	1.4816e1	3.842e-3	0	4.475e-6
1,2-Dichloroethene, trans	.0109	96.94	6.7e-2	1.7658e1	6.968e-4	0	8.118e-7
Butylbenzylphthalate	.0001	312	.0000083	3.169e-1	6.393e-6	0	7.448e-9
Acenaphthene	.0034	154.2	.000091	3.7454e0	2.174e-4	0	2.532e-7
Anthracene	.001	178.2	.000086	3.3416e0	6.393e-5	0	7.446e-8
Benz(a)anthracene	.0001	228.28	1e-6	4.594e-2	6.393e-6	0	7.446e-9
Chrysene	.0002	228.3	.0000011	4.822e-2	1.279e-5	0	1.489e-8
Fluoranthene	.0016	202.3	.0000065	3.104e-1	1.023e-4	0	1.191e-7
Fluorene	.0018	116.2	.000064	3.2950e0	1.151e-4	0	1.340e-7
Naphthalene	.0067	128.2	4.6e-4	9.9792e0	4.283e-4	0	4.989e-7
Pyrene	.0015	202.3	.0000051	2.449e-1	9.589e-5	0	1.117e-7
Aroclor-1248	.0033	299.5	4.4e-4	6.4260e0	2.110e-4	0	2.457e-7
Phenanthrene	.003	178.2	2.3e-4	6.2582e0	1.918e-4	0	2.234e-7
				0	0	0	0
				0	0	0	0
				0	0	0	0
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				0	0	0	0
				0	0	0	0
				0	0	0	0

RISK ASSESSMENT SPREADSHEET - HOUSEHOLD USE OF GROUNDWATER (PAGE THREE)
BETHPAGE
EXPOSURE SCENARIO NUMBER 5: FUTURE GROUNDWATER EXPOSURE, CHILD RESIDENTS
CALCULATE HAZARD INDICES:

CHEMICAL	ING+DERM DOSE	INHALATION DOSE	REFERENCE DOSE ING.	REFERENCE DOSE INH.	HAZARD IND ING./DERM	HAZARD IND. INH.	HAZARD INDEX
1,1,1-Trichloroethane	1.267e-3	0	9e-2	3e-1	1.408e-2	0	1.408e-2
Tetrachloroethene	3.043e-2	0	1e-2		3.0426e0	0	3.0426e0
Trichloroethene	3.846e-3	0			0	0	0
1,2-Dichloroethene, trans	6.976e-4	0	2e-2		3.488e-2	0	3.488e-2
Butylbenzylphthalate	6.400e-6	0	.2		3.200e-5	0	3.200e-5
Acenaphthene	2.176e-4	0	.06		3.627e-3	0	3.627e-3
Anthracene	6.400e-5	0	.3		2.133e-4	0	2.133e-4
Benz(a)anthracene	6.400e-6	0			0	0	0
Chrysene	1.280e-5	0			0	0	0
Fluoranthene	1.024e-4	0	.04		2.560e-3	0	2.560e-3
Fluorene	1.152e-4	0	.04		2.880e-3	0	2.880e-3
Naphthalene	4.288e-4	0	4e-3		1.072e-1	0	1.072e-1
Pyrene	9.600e-5	0	.03		3.200e-3	0	3.200e-3
Aroclor-1248	2.112e-4	0			0	0	0
Phenanthrene	1.920e-4	0	2.9e-2		6.621e-3	0	6.621e-3
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
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	0	0			0	0	0
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	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
	0	0			0	0	0
TOTAL HAZARD INDEX					3.2179e0	0	3.2179e0

I.13

DILUTION RATIO'S

HALLIBURTON NUS Environmental Corporation and Subsidiaries	STANDARD CALCULATION SHEET

CLIENT: Navy	FILE NO.: 3281	BY: JJB	PAGE 1 OF 1
SUBJECT: I.13 - Dilution Ratio's		CHECKED BY: PLN	DATE: 3/20/92

Basis of Assumptions

Net Infiltration Rate

Mean Annual Precipitation : 45 inches/yr*
Mean Evaporation Rate : -22 inches/yr*
23

Net Infiltration varies from site to site, with a range of about 5% to 80% infiltrating. Use an average infiltration rate of 60%

0.60 x 23"/yr = 13.8"/yr

Hydraulic Conductivity**
420 GPD/ft² = 0.02 cm/sec

Hydraulic Gradient

Across Site 1 (See Figure 3-7)

~2'/870 ft = 0.0023

Mixing Zone of 30' assumed.

* Isbister 1966
** CDM, 1990

HALLIBURTON NUS 155 REVISED 0791

I.14

TOX PROFILE

TRICHLOROETHENE (TCE) (Clement Associates, Inc.)

HEALTH EFFECTS

TCE is carcinogenic (Class B2) to mice after oral administration, producing hepatocellular carcinomas. It was found to be mutagenic using several microbial assay systems. TCE does not appear to cause reproductive toxicity or teratogenicity. TCE has been shown to cause renal toxicity, hepatotoxicity, neurotoxicity, and dermatological reactions in animals following chronic exposure to levels greater than 2,000 mg/m^3 for 6 months. TCE has low acute toxicity; the acute oral LD_{50} value in several species ranged from 6,000 to 7,000 mg/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

There was only limited data on the toxicity of TCE to aquatic organisms. The acute toxicity to freshwater species was similar in the three species tested, with LC_{50} values of about 50 mg/L. No LC_{50} values were available for saltwater species. However, a dose of 2 mg/L caused erratic swimming and loss of equilibrium in the grass shrimp. No chronic toxicity tests were reported. No information on the toxicity of TCE to domestic animals or terrestrial wildlife was available.

TETRACHLOROETHENE (PCE) (Clement Associates, Inc.)

HEALTH EFFECTS

PCE was found to produce liver cancer in male and female mice when administered orally by gavage. It is a Class B2 carcinogen. Unpublished gavage studies in rats and mic performed by the National Toxicology Program (NTP) showe hepatocellular carcinomas in mice and a slight, statistically insignificant increase in a rare type of kidney tumor. Elevated mutagenic activity was found in Salmonella strains treated with PCE. Delayed ossification of skull bones and sternebrae were reported in offspring of pregnant mice exposed to 2,000 mg/m^3 of PCE for 7 hours/day on days 6-15 of gestation. Increased fetal resorptions were observed after exposure of pregnant rats to tetrachloroethene. Renal toxicity and hepatotoxicity have been noted following chronic inhalation exposure of rats to PCE levels of 1,356 mg/m^3. During the first 2 weeks of a subchronic inhalation study, exposure to concentrations of 10,867 mg/m^3 of PCE produced signs of central nervous system depression, and cholinergic stimulation was observed among rabbits, monkeys, rats and guinea pigs.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

PCE is the most toxic of the chloroethenes to aquatic organisms but is only moderately toxic relative to other types of compounds. The limited acute toxicity data indicate that the LC_{50} value for saltwater and freshwater species are similar, around 10,000 µg/L; the trout was the most sensitive (LC_{50} = 4,800 µg/L). Chronic values were 840 and 450 µg/L for freshwater and saltwater species, respectively, and an acute-chronic ratio of 19 was calculated. No information on the toxicity of PCE to terrestrial wildlife or domestic animals was available.

CHLOROFORM (Clement Associates, Inc.)

HEALTH EFFECTS

Chronic administration of chloroform by gavage is reported to produce a dose-related increase in the incidence of kidney epithelial tumors in rats and a dose-related increase in the incidence of hepatocellular carcinomas in mice. It is a Class B carcinogen. Epidemiological studies suggest that higher concentrations of chloroform and other trihalomethanes in water supplies may be associated with an increased frequency of bladder cancer in humans. However, these results are not sufficient to establish causality. An increased incidence of fetal abnormalities was reported in offspring of pregnant rats exposed to chloroform by inhalation. Oral doses of chloroform that caused maternal toxicity produced relatively mild fetal toxicity in the form of reduced birth weights. There are limited data suggesting that chloroform has mutagenic activity in some test systems. However, negative results have been reported for bacterial mutagenesis assays.

Humans may be exposed to chloroform by inhalation, ingestion, or skin contact. Toxic effects include local irritation of the skin or eyes, central nervous system depression, gastrointestinal irritation, liver and kidney damage, cardiac arrhythmia, ventricular tachycardia, and brachycardia. Death from chloroform overdosing can occur and is attributed to ventricular fibrillation. Chloroform anesthesia can produce delayed death as a result of liver necrosis.

Exposure to chloroform by inhalation, intragastric administration, or intraperitoneal injection produces liver and kidney damage in laboratory animals. The oral LD_{50} and inhalation LC_{LO} values for the rat are 908 mg/kg and 39,000 mg/m^3 per 4 hours, respectively.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Limited information is available concerning the toxicity of chloroform to organisms exposed at known concentrations. Median effect concentrations for two freshwater and one invertebrate species range from 28,900 to 115,000 µg/L. Twenty-seven day LC_{50} values of 2,030 and 1,240 µg/L were reported for embryo-larval tests with rainbow trout in water at two levels of hardness. The only reliable result concerning the toxicity of chloroform to saltwater aquatic life is a 96-hour LC_{50} value of 81,500 µg/L for pink shrimp.

An equilibrium bioconcentration factor of six with a tissue half-life of less than 1 day was determined for the bluegill. Although chloroform is not strongly bioaccumulated, it is thought to be widely distributed in the environment and can be detected in fish, water birds, marine mammals, and various crops.

TOLUENE (Clement Associates, Inc.)

HEALTH EFFECTS

There is no conclusive evidence that toluene is carcinogenic or mutagenic in animals or humans. Oral administration of toluene at doses as low at 260 mg/kg produced a significant increase in embryonic lethality in mice. Decreased fetal weight was observed at doses as low as 434 mg/kg, and an increased incidence of cleft palate was seen at doses as low as 867 mg/kg. However, other researchers have reported that toluene is embryotoxic but not teratogenic in laboratory animals. There are no accounts of teratogenic effects in humans after exposure to toluene.

Acute exposure to toluene at concentrations of 375 to 1,500 mg/m^3 produces central nervous system depression and narcosis in humans. However, even exposure to quantities sufficient to produce unconsciousness fail to produce residual organ damage. The rat oral LD_{50} value and inhalation LC_{LO} value are 5,000 mg/kg and 15,000 mg/m^3, respectively. Chronic inhalation exposure to toluene at relatively high concentrations produces cerebellar degeneration and an irreversible encephalopathy in mammals.

Toluene in sufficient amounts appears to have the potential to significantly alter the metabolism and resulting bioactivity of certain chemicals. For example, coadministration of toluene along with benzene or styrene has been shown to suppress the metabolism of benzene or styrene in rats.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Of five freshwater species tested with toluene, the cladoceran Daphnia magna was not resistant to any acute effects. The EC_{50} and LC_{50} values for all five species range from 12,700 to 313,000 µg/L. No chronic tests are available for freshwater species. The two freshwater algal species tested are relatively insensitive to toluene with EC_{50} values of 245,000 µg/L or greater being reported. For saltwater species, EC_{50} and LC_{50} values range from 3,700 µg/L for the bay shrimp to 1,050 mg/L for the Pacific oyster. The chronic value in an embryo-larval test for the sheepshead minnow is reported to be between 3,200 and 7,700 µg/L, and the acute-chronic ratio is between 55 and 97. In several saltwater algal species and kelp, effects occur at toluene concentrations from 8,000 to more than 433,000 µg/L.

4-METHYLPHENOL

HEALTH EFFECTS

Data regarding the subchronic and chronic oral toxicity of 4-methylphenol (o-cresol) in humans or experimental animals were not available in the literature reviewed. Subchronic inhalation studies indicate that an exposure level of 9 mg o-cresol/m^3, 6 hours/day, 5 days/week for 2 months and then for 4 hours/day, 5 days/week for 2 subsequent months, produced unspecified changes in EKGs in guinea pigs and CNS and blood changes in rats (U.S. EPA, September 1984). Rats exposed to a 0.05 mg/m^3 mixture of three cresol isomers for 90 days exhibited CNS excitation, lung protein denaturation, and decreased body weight gain (U.S. EPA, September, 1984).

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Information regarding the toxicity of 4-methylphenol to aquatic or terrestrial biota were not available in the literature reviewed.

BIS(2-CHLOROETHYL)ETHER (Clement Associates, Inc.)

HEALTH EFFECTS

Bis(2-chloroethyl)ether caused an increased incidence of hepatomas in male mice following oral administration. It is also reported to be mutagenic in salmonella tester strains. No data concerning teratogenic or reproductive effects are available.

Bis(2-chloroethyl)ether concentrations of 100 ppm ($600\ mg/m^3$) and possibly lower are irritating to the eyes and nasal passages, and may cause coughing and nausea. Exposure to concentrations above 550 ppm ($3,300\ mg/m^3$) is considered to be intolerable. Concentrations of 500 ppm and 250 ppm are reported to be fatal in guinea pigs and rats, respectively. The most severe toxic effects are seen in the lungs, although the kidneys, liver, and brain may also be affected. No serious toxic effects were noted following chronic exposure of guinea pigs and rats to 69 ppm ($420\ mg/m^3$) of bis(2-chloroethyl)ether.

Bis(2-chloroethyl)ether is a mild skin irritant. However, acutely toxic and lethal amounts may be absorbed through the skin. An oral LD_{50} of 75 mg/kg is reported for the rat.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Data adequate to characterize the toxicity of bis(2-chloroethyl)ether to wildlife and domestic animals are not available.

DDT (Clement Associates, Inc.)

HEALTH EFFECTS

DDT, DDE, and DDD have been shown to be carcinogenic to mice, primarily causing liver tumors, but also causing lung tumors and lymphomas. DDT does not appear to be mutagenic, but it has caused chromosomal damage. There is no evidence that DDT is a teratogen; but it is a reproductive toxin, causing reduced fertility, reduced growth of offspring, and fetal mortality.

Chronic exposure to DDT causes a number of adverse effects, especially to the liver and central nervous system (CNS). DDT induces various microsomal enzymes and therefore probably affects the metabolism of steriod hormones and exogenous chemicals. Other effects on the liver include hypertrophy of the parenchymal cells and increased fat deposition. In the CNS, exposure to DDT causes behavioral effects such as decreased aggression and decreased conditional reflexes. Acute exposure to large doses or chronic exposure to lower doses cause seizures. The oral LD_{50} is between 113 and 450 mg/kg for the rat and is generally higher for other animals.

DDT, DDD, and DDE are bioconcentrated and stored in the adipose tissues of most animals.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

DDT has been extensively studied in freshwater invertebrates and fishes and is quite toxic to most species. The range of toxicities was 0.18 to 1,800 µg/L and the freshwater final acute value for DDT and its isomers was determined by EPA to be 1.1 µg/L. Saltwater species were somewhat more sensitive to DDT; the saltwater final acute value for the DDT isomers was 0.13 µg/L. Only one chronic toxicity test on aquatic species was reported. This test indicated that the acute-chronic ratio for DDT might be high (65 in the reported study), but the data were insufficient to allow calculation of a final acute-chronic ratio. DDT, DDD, and DDE are bioconcentrated by a factor of 10^3 to 10^5.

DDT, DDD, DDE, and the other persistent organochlorine pesticides are primarily responsible for the great decrease in the reproductive capabilities and consequently in the populations of fish-eating birds, such as the bald eagle, brown pelican, and osprey. DDT has also been shown to decrease the populations of numerous other species of water birds, raptors, and passerines significantly.

CHLORDANE

Health Effects

Mixtures of cis-chlordane and trans-chlordane produce liver cancer in mice. Chlordane also has mutagenic effects in at least one test system. Reproductive effects, including developmental defects and neonatal metabolic and biochemical disorders, are observed in the offspring of mice exposed to chlordane. Tests with laboratory animals, primarily rodents, demonstrate acute and chronic toxic effects. Either isomer alone, or a mixture of the two, appears to exhibit approximately equal toxicity. Acute effects include anorexia, weight loss, tremors, convulsions, and death. Chronic exposure to chlordane causes liver changes and induces or suppresses a variety of enzyme systems. In addition, chlordane may act as a cumulative neurotoxin. The oral LD_{50} in the rat is 283 mg/kg. Oxychlordane, an epoxide metabolite formed from either chlordane isomer, is significantly more acutely toxic than chlordane. The oral LD_{50} of oxychlordane administered to rats in corn oil is 19 mg/kg, and it is 43 mg/kg when administered in an aqueous suspension.

Acute oral or skin exposure to chlordane can cause vomiting, seizures, electroencephalographic dysrhythmia, convulsions, and death in humans. However, most reports of human toxicity are inconclusive. Oxychlordane has been found in a high percentage of human adipose tissue samples and also in human milk samples.

Toxicity to Wildlife and Domestic Animals

The toxic effects of chlordane are seen at relatively low concentrations in some fish and invertebrate species. Chlordane also shows strong tendencies for bioaccumulation in some aquatic and terrestrial organisms. It can concentrate at levels thousands of times greater than the surrounding water medium in a variety of aquatic organisms, including bacteria, algae, daphnids, and fish. The EPA criteria for acute exposure to freshwater species is 2.4 µg/liter, and it is 0.17 µg/liter for chronic exposure. The corresponding Acute and Chronic Values for saltwater species are 0.09 µg/liter, 0.0064 µg/liter, and 0.0040 µg/liter. The Final Acute-Chronic Ratio is 14. Very little information exists concerning the biotransformation of chlordane. Although biotransformations may be important for the ultimate degradation of chlordane, these processes are likely to be very slow.

Chlordane or oxychlordane residues have been found in a wide variety of wildlife and domestic animal species, but usually at relatively low levels. Chlordane does not appear to be extensively concentrated in the higher members of the terrestrial food chain. Studies indicate that chlordane may produce toxic effects in certain soil invertebrates after surface application. Although little information concerning bioaccumulation in these organisms is available, the potential bioconcentration of chlordane or oxychlordane by terrestrial insectivores is of concern. Little information on the toxic effects of chlordane to mammalian wildlife and domestic animal species is available. Chlordane or oxychlordane residues have been found in crops, meat, fish and poultry, dairy products, and eggs. Oral LD_{50} values for chlordane ranging from 331 to 858 ppm in the diet (approximately 25-50 mg/kg) are reported for a variety of wild bird species. Oral LD_{50} values ranging from 100 to 1,000 mg/kg are reported for a variety of animals, including rodents, goats, sheep, and chickens.

POLYCHLORINATED BIPHENYLS (PCBs)
(Clement Associates, Inc., 1985)

Health Effects

In humans exposed to polychlorinated biphenyls (PCBs) (in the workplace or via accidental contamination of food), reported adverse effects include chloracne (a long-lasting, disfiguring skin disease), impairment of liver function, a variety of neurobehavioral and affective symptoms, menstrual disorders, minor birth abnormalities, and probably increased incidence of cancer. Animals experimentally exposed to PCBs have shown most of the same symptoms, as well as impaired reproduction; pathological changes in the liver, stomach, skin, and other organs; and suppression of immunological functions. PCBs are carcinogenic in rats and mice and, in appropriate circumstances, enhance the effects of other carcinogens. Reproductive and neurobiological effects of PCBs have been reported in rhesus monkeys at the lowest dose level tested, 11 mg/kg body weight/day over a period of several months.

Toxicity to Wildlife and Domestic Animals

Polychlorinated biphenyls are bioaccumulated and can be biomagnified. Therefore, their toxicity increases with length of exposure and position of the exposed species on the food chain. The toxicity of the various PCB mixtures is also dependent on their composition. Because of the complexity of PCB toxicity, only general effects will be discussed here.

The 96-hour LC_{50} values for rainbow trout, bluegills, and channel catfish were around 20 mg/liter. The same species exposed for 10 to 20 days had LC_{50} values of about 0.1 mg/liter. Invertebrate species were also adversely affected, with some species having 7-day LC_{50} values as low as 1 mg/liter. In general, juvenile organisms appeared more susceptible to the effects of PCBs than either eggs or adults.

Three primary ways in which PCBs can affect terrestrial wildlife are outright mortality, adversely affecting reproduction, and changing behavior. PCB doses greater than 200 ppm in the diet or 10 mg/kg body weight (bw) caused some mortality in sensitive bird species exposed for several days. Doses around 1,500 ppm (diet) or about 100 mg/kg bw caused extensive mortality in these sensitive species. They generally caused some mortality in all species, with the level being dependent on the length of exposure and the particular PCB mixture. Some mammalian species are especially susceptible to PCBs. For example, mink died when fed as little as 5 ppm in the diet (equivalent to less than 1 mg/kg bw/day). PCBs caused lower egg production; deformities; decreased hatchability, growth, and survival; and some eggshell thinning in reproductive studies on chickens fed doses of 20 ppm in the diet (1 mg/kg bw). Mink fed 1 ppm in the diet (0.2 mg/kg bw) had lower reproductive success, and there are indications that an increased incidence of premature births in some marine animals was linked to PCB exposure. Behavioral effects on wildlife include increased activity, decreased avoidance response, and decreased nesting, all of which could significantly influence survival in the wild.

No toxic effects on domestic animals other than chickens were reported in the sources reviewed, but susceptible species would probably be affected in a similar manner to laboratory animals and wildlife.

BIS(2-ETHYLHEXYL)PHTHALATE (BEHP)
(Clement Associates, Inc.)

HEALTH EFFECTS

BEHP is reported to be carcinogenic in rats and mice, causing increased incidences of hepatocellular carcinomas or neoplastic nodules after oral administration. Its status as a human carcinogen (Class B2) is considered indeterminate by the International Agency for Research on Cancer (IARC). The results of dominant lethal experiments with mice suggest that BEHP is mutagenic when injected intraperitoneally. However, most experiments conducted with microorganisms and mammalian cells have failed to demonstrate genotoxic activity. Teratogenic and fetotoxic effects have been observed in experimental animals after oral and intraperitoneal administration. Other reproductive effects, including testicular changes in rats and mice, have also been reported.

BEHP appears to have a relatively low toxicity in experimental animals. The oral, intraperitoneal, and intravenous LD_{50} values reported for BEHP in rats are 31 g/kg, 30.7 g/kg, and 0.25 g/kg, respectively. BEHP is poorly absorbed through the skin, and no irritant response or sensitizing potential from dermal application has been noted in experimental animals or humans.

Chronic exposure to relatively high concentrations of BEHP in the diet has caused retardation of growth and increased liver and kidney weights in experimental animals.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Acute median effect values ranged from 1,000 to 11,100 µg/L BEHP for the freshwater cladoceran *Daphnia magna*. The LC_{50} values for the midge, scud, and bluegill all exceeded the highest concentrations tested, which were 18,000, 32,000, and 770,000 µg/L, respectively. As these values are greater than the water solubility of the chemical, it is unlikely that BEHP will be acutely toxic to organisms in natural waters. In a chronic toxicity test with *Daphnia magna*, significant reproductive impairment was found at the lowest concentration tested, 3 µg/L. A chronic toxicity value of 8.4 µg/L was reported for the rainbow trout. No acute or chronic values were reported for saltwater invertebrates or vertebrates. Reported bioconcentration factors for BEHP in fish and invertebrates range from 14 to 2,680.

Although insufficient data were presented to calculate the acute-chronic ratio for BEHP, it is apparently on the order of 100 to 1,000. Therefore, acute exposure to the chemical is unlikely to affect aquatic organisms adversely, but chronic exposure may have detrimental effects on the environment.

BUTYLBENZYLPHTHALATE

HEALTH EFFECTS

In general, the phthalate esters are described as having a very low order of acute toxicity. Central and peripheral neuropathies (diseases of the nerves) have been observed in animals exposed to butylbenzylphthalate. A report by a Russian scientist suggests that the compound may have caused polyneuritis (disorder affecting the peripheral nerves) in an exposed worker (Casarett and Doull, 1980). Butylbenzylphthalate is described as moderately toxic via ingestion (Sax, 1989). The current reference dose (U.S. EPA, October 1989) is based on observed adverse effects in rats (testes, liver, kidney) exposed to the compound in the diet. Butylbenzylphthalate is an experimental carcinogen (Sax, 1989).

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Chronic toxicity testing revealed that 2.32 mg/L (LC_{50} value) of butylbenzylphthalate is toxic to fathead minnows exposed for 4 days in a flow-through test (Verschueren, 1983).

DI-N-BUTYLPHTHALATE (DNBP) (U.S. EPA, October 1980b)

HEALTH EFFECTS

Most of the detailed toxicological studies for phthalates focused on BEHP. There is no evidence of carcinogenicity of DNBP. Rats fed 0.25 percent DNBP in their food experienced no adverse effects after 1 year. A dose of 1.25 percent resulted in death for 50 percent of the test population, while the rest grew normally. Rats exposed by inhalation to concentrations of 0.98 mg/m^3 experienced no behavioral changes or weight, but an increase in gamma globulin was found to be dose-related. The intraperitoneal LD_{50} for rats was found to be 3.05 g/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Four fish and two invertebrate species were exposed to DNBP. The LC_{50} values ranged from 730 to 6,470 µg/L. Bluegills were found to be the most sensitive fish and the scud was the most sensitive invertebrate.

NAPHTHALENE (Clement Associates, Inc.)

HEALTH EFFECTS

There are no epidemiological or case studies available suggesting that naphthalene is carcinogenic in humans, and it is not generally considered to be carcinogenic in experimental animals. However, there is equivocal evidence suggesting weak carcinogenic activity in rats after subcutaneous injection. Naphthalene is reported to produce DNA damage in mice after intraperitoneal injection. Retarded cranial ossification and heart development are reported among offspring of rats injected intraperitoneally with naphthalene on days 1 to 15 of gestation.

Little information concerning acute and chronic toxic effects is available. Inhalation exposure to naphthalene may cause headache, loss of appetite, nausea, and kidney damage in humans and experimental animals. Acute hemolytic effects are reportedly caused by ingestion or inhalation of relatively large quantities of naphthalene. Optical neuritis, injuries to the cornea, and opacities of the lens also may result after inhalation exposure or ingestion. Naphthalene is a mild eye irritant in rabbits, and cataracts can be induced after oral administration. Application to the skin produces erythema and slight edema in rabbits. Somnolence and changes in motor activity are observed after ingestion of naphthalene by rats and mice. Oral LD_{50} values of 1,250 mg/kg and 580 mg/kg are reported for the rat and the mouse, respectively.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

The median effect concentrations for freshwater invertebrate species and three fish species are all reported to be greater than 2,300 µg/L. Acute values reported for saltwater polychaete, oyster, and shrimp species are all greater than 2,350 µg/L. A chronic value of 620 µg/L and an acute-chronic ratio of 11 is reported for the fathead minnow, a freshwater species. No chronic values are available for saltwater species. Freshwater algae appear to be less sensitive to the effects of naphthalene than animal species. No information concerning saltwater plant species is available. The weighted average bioconcentration factor for the edible portion of all freshwater and estuarine aquatic organisms consumed by Americans is 10.5.

ACENAPHTHENE

Health Effects

Negative results are reported for a test of acenaphthene carcinogenicity based upon neoplastic induction in the newt *Triturus cristatus*, but the reliability of the test system for predicting mammalian carcinogenicity is not established. Other carcinogenicity studies involving exposure to acenaphthene as one component of complex mixtures of PAHs and other substances report both positive and negative results. However, the relative importance of individual components in the mixtures tested cannot be determined, and no conclusions involving acenaphthene can be drawn. Studies using several different bacterial test systems provide no evidence of mutagenicity. No information concerning its teratogenicity or reproductive toxicity is available.

The most thoroughly investigated effect of acenaphthene is its ability to produce nuclear and cytological changes in a variety of microbial and plant species. Most of these changes, such as increases in cell size and DNA content, are associated with a disruption of the spindle mechanism during mitosis and the resulting induction of polyploidy. However, there is no known correlation between these effects and the biological impact of acenaphthene on mammalian cells.

Very little is known about the human toxicity of acenaphthene. It has been shown to be irritating to the skin and mucous membranes and to cause vomiting if swallowed in large quantities.

In both rats and mice, subchronic oral exposure causes loss of body weight, changes in peripheral blood, increased aminotransferase levels in blood serum, and mild morphological damage to the liver and kidneys. The oral LD_{50} is 10 g/kg for rats and 2.1 g/kg for mice. Kidney and liver damage is greater after subchronic exposure to acenaphthene than after acute exposure.

Toxicity to Wildlife and Domestic Animals

In acute toxicity tests for freshwater organisms, EC_{50} values of 41,200 and 1,700 μg/liter are reported for the cladoceran *Daphnia magna* and the bluegill, respectively. In saltwater species, 96-hour LC_{50} concentrations for the mysid shrimp and the sheepshead minnow are 970 and 2,230 μg/liter, respectively. A chronic value of 710 μg/liter is reported for the sheepshead minnow, and the acute-chronic ratio for this species is 3.1. No other aquatic life chronic data are available. The freshwater alga *Selenastrum capricornutum* and the saltwater alga *Skeletonema costatum* are both relatively sensitive to acenaphthene exposure, with 96-hour EC_{50} values for chlorophyll *a* and cell number of approximately 525 μg/liter and 500 μg/liter, respectively.

ANTHRACENE

Health Effects

There are no epidemiologic studies available suggesting that anthracene is carcinogenic in humans. This compound generally is not considered to be carcinogenic in experimental animals (IARC 1983). However, there is equivocal evidence suggesting weak carcinogenic potential. In rats, tumors were reported to develop at the injection site after subcutaneous administration, and in the liver after oral administration. Anthracene exhibits mutagenic activity in some test systems but not in others. There are no reports of teratogenic or reproductive effects due to exposure.

Little information concerning acute and chronic toxic effects is available. Specific data concerning exposure to anthracene are not available, but workers exposed to materials containing this compound may exhibit dermatitis, hyperkeratoses, and other skin disorders. Anthracene produces mild erythema and edema after application to the skin of mice. An intraperitoneal LD_{50} of 430 mg/kg is reported.

Toxicity to Wildlife and Domestic Animals

Adequate data for characterization of toxicity to domestic animals and wildlife are not available. A 1-hour 90% lethal photodynamic response concentration of 0.1 µg/liter is reported for the freshwater protozoan Paramecium caudatum. The weighted average bioconcentration factor for the edible portion of all freshwater and estuarine aquatic organisms consumed by Americans is 478.

The steady state bioconcentration factor for acenaphthene in the bluegill is 387, with a tissue half-life of less than 1 day. By using the bluegill data and an adjustment factor to allow for differences in lipid content, the bioconcentration factor for acenaphthene and the edible portions of all freshwater and estuarine aquatic organisms consumed by Americans is estimated to be 242. Reports of acenaphthene in foods is limited. One study reports levels of 3.2 μg/kg (the detection limit) or greater in the tissues of shellfish of an unspecified species and location.

A study summarizing the toxicity of a variety of compounds to wild and domestic bird species indicates that the LD_{50} of acenaphthene for the redwinged blackbird is greater than 100 mg/kg.

Furthermore, the study reports that acenaphthene did not significantly deter feeding by the blackbird even when it was present in food at relatively high concentrations.

FLUORANTHENE

Health Effects

There is no information concerning the carcinogenicity of fluoranthene in humans, and fluoranthene shows no activity as a complete carcinogen in experimental animals. However, fluoranthene appears to possess potent cocarcinogenic activity in test animals. Fluoranthene has displayed no mutagenic activity in in vitro bacterial test systems. No other information is available concerning its potential mutagenic or teratogenic effects, nor with regard to its acute or chronic toxicity to humans. Results from animal studies indicate that fluoranthene has relatively low acute toxicity. Where deaths of experimental animals have occurred, no information concerning target organs or specific causes of death has been reported. Descriptions of chronic toxicity are limited to reports of mortality produced in mice by repeated dermal application or subcutaneous injection.

Toxicity to Wildlife and Domestic Animals

Among freshwater species, the bluegill, with a 96-hour LC_{50} value of 3,980 μg/liter, is more sensitive to fluoranthene than the cladoceran Daphnia magna, with a 48-hour EC_{50} value of 325,000 μg/liter. No chronic data are available for freshwater organisms. Among saltwater species, the 96-hour LC_{50} values for the mysid shrimp and a polychaete are 40 and 500 μg/liter respectively. The 96-hour LC_{50} value for the sheepshead minnow is greater than 560,000 μg/liter. The chronic value and acute-chronic ratio for the mysid shrimp are 16 μg/liter and 2.5, respectively. The freshwater and saltwater algal species tested exhibit similar sensitivities to fluoranthene, with EC_{50} values of about 50,000 μg/liter. There is evidence of fluoranthene accumulation in edible aquatic organisms, although no measured, steady-state bioconcentration factors are available for freshwater or saltwater organisms.

POLYCYCLIC AROMATIC HYDROCARBONS
(Clement Associates, Inc., 1985)

Health Effects

The potential for polycyclic aromatic hydrocarbons (PAHs) to induce malignant transformation dominates the consideration of health hazards resulting from exposure, because there often are no overt signs of toxicity until the dose is high enough to produce a high tumor incidence.

No case reports or epidemiological studies concerning the significance of human exposure to individual PAHs are available. However, coal tar and other materials known to be carcinogenic to humans contain PAHs.

PAHs administered by various routes have been found to be carcinogenic in several animal species and to have both local and systemic carcinogenic effects. On oral administration, carcinogenic PAHs produce tumors of the forestomach in mice. Lung tumors are produced in hamsters after intratracheal administration and in mice after intravenous administration. In skin painting experiments with mice, carcinogenic PAHs produced skin carcinomas. Other observed effects include induction of local sarcomas and an increased incidence of lung adenomas in mice following single, subcutaneous injections. Studies in other species, while indicating the PAHs have universal carcinogenic effects, are less complete. Carcinogenic PAHs are reported to be mutagenic in a variety of test systems. The limited available information suggests that PAHs are not very potent teratogens or reproductive toxins.

There is very little information regarding nonmalignant changes caused by exposure to PAHs. Application of carcinogenic PAHs to mouse skin is reported to cause destruction of sebaceous glands, hyperplasia, hyperkeratosis, and ulceration. Many carcinogenic PAHs also have immunosuppressive effects. Subcutaneous injections of some PAHs for several weeks reportedly caused hemolymphatic changes in the lymph nodes in rats. Workers exposed to PAH-containing materials have exhibited chronic dermatitis, hyperkeratoses, and other skin disorders.

Toxicity to Wildlife and Domestic Animals

There is very little information on the environmental toxicity of PAHs; they probably are not very toxic to aquatic organisms.

CHRYSENE

Health Effects

The potential for polycyclic aromatic hydrocarbons to induce malignant transformation dominates the consideration given to health hazards resulting from exposure. This is because overt signs of toxicity are often not produced until the dose is sufficient to produce a high tumor incidence.

No case reports or epidemiological studies on the significance of chrysene exposure to humans are available. However, coal tar and other materials known to be carcinogenic to humans may contain chrysene. Chrysene produces skin tumors in mice following repeated dermal application. High subcutaneous doses are reported to result in a low incidence of tumors with a long induction time in mice. Chrysene is considered to have weak carcinogenic activity compared to benzo(a)pyrene. Chrysene is reported to be mutagenic in a variety of test systems. No information concerning the teratogenic effects of chrysene in humans or experimental animals is available.

Although there is little information concerning other toxic effects of chrysene, it is reported that applying the carcinogenic PAHs to mouse skin leads to the destruction of sebaceous glands, hyperplasia, hyperkeratosis, and ulceration. Workers exposed to materials containing these compounds may exhibit chronic dermatitis, hyperkeratoses, and other skin disorders. Although specific results with chrysene are not reported, it has been shown that many carcinogenic PAHs have an immunosuppressive effect.

Toxicity to Wildlife and Domestic Animals

Adequate data for characterization of the toxicity of chrysene to domestic animals and wildlife are not available.

TRANS,1-2-DICHLOROETHENE (CLEMENT ASSOCIATES, INC., 1985)

HEALTH EFFECTS

Very little information concerning exposure only to trans(1,2-dichloroethene) (1,2-trans-DCE) is available. There are no reports of carcinogenic or teratogenic activity by 1,2-trans-DCE in animals or humans. It is reportedly nonmutagenic in a variety of test systems. Like other members of the chlorinated ethylene series, 1,2-trans-DCE has anesthetic properties. Exposure to high vapor concentrations has been found to cause nausea, vomiting, weakness, tremor, and cramps in humans. Repeated exposure via inhalation of 800 mg/m3 (8 hours/day, 5 days/week, for 16 weeks) was reported to produce fatty degenerationof the liver in rates. The intraperitoneal injection LD50 value for the rat is 7,536 mg/kg.

Although nephrotoxic and cardiac sensitizing effects are associated with exposure to 1,1-dichloroethylene, the 1,2-DCE isomers have not been investigated with respect to these type of effects. 1,2-trans-Dichloroethylene can inhibit aminopyrine demethylation in rat liver microsomes in vitro, and it may thus interact with the hepatic drum-metabolizing monooxygenase system.

Toxicity to Woldlife and Domestic Animals

Practically no information concerning the toxicity of 1,2-trans-DCE to wildlife and domestic animals exists. The reported 96-hour LC50 value under static conditions is 135,000 ug/liter for the bluegill. Under the same test conditions, the LC50 value for 1,1-dichloroethylene is 73,900 ug/liter. Recommended criteria for protection of aquatic life are based primarily on data concerning 1,1-dichloroethyelene.

1,1,1-TRICHLOROETHANE (1,1,1-TCA)
(Clement Associates, Inc.)

HEALTH EFFECTS

1,1,1-TCA was re-tested for carcinogenicity because early lethality in a previous study precluded an assessment of carcinogenicity. Preliminary results indicate that 1,1,1-TCA increased the incidence of combined hepatocellular carcinomas and adenomas in female mice when administered by gavage. There is evidence that 1,1,1-TCA is mutagenic in *Salmonella typhimurium* and causes transformation in cultured rat embryo cells. These data suggest that the chemical may be carcinogenic.

Other toxic effects of 1,1,1-TCA are seen only at concentrations well above those likely in an open environment. The most notable toxic effects of 1,1,1-TCA in humans and animals are central nervous system depression, including anesthesia, at very high concentrations and impairment of coordination, equilibrium, and judgment at lower concentrations (350 ppm and above); cardiovascular effects, including premature ventricular contractions, decreased blood pressure, and sensitization to epinephrine-induced arrhythmia; and adverse effects on the lungs, liver, and kidneys. Irritation of the skin and mucous membranes resulting from exposure to 1,1,1-TCA has also been reported. The oral LD_{50} value of 1,1,1-TCA in rats is about 11,000 mg/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

The acute toxicity of 1,1,1-TCA to aquatic species is rather low, with the LC_{50} concentration for the most sensitive species tested being 52.8 mg/L. No chronic toxicity studies have been done on 1,1,1-TCA, but acute-chronic ratios for the other chlorinated ethanes ranged from 2.8 to 8.7. 1,1,1-TCA was only slightly bioaccumulated with a steady-state bioconcentration factor of 9 and an elimination half-life of 2 days.

No information on the toxicity of 1,1,1-TCA to terrestrial wildlife or domestic animals was available in the literature reviewed.

CARBON DISULFIDE

Health Effects

Toxic effects to humans via inhalation of carbon disulfide have been reported in the literature. Inhalation of 50 mg/m^3 for 7 years was associated with central nervous effects (Registry of Toxic Effects for Chemical Substances (RTECs), 1975 in NAS, 1977). The lowest reported lethal concentration in humans is 4,000 ppm in 30 minutes (RTECs, 1975 in NAS, 1977). Moderate chronic exposure at less than 65 mg/m^3 for several years was reported to cause polyneuropathy (Cooper, 1976 in NAS, 1977).

Oral administration of carbon disulfide in rats produced toxic effects at 1 ppm (Freundt et al., 1974 in NAS, 1977). One ppm in drinking water was nontoxic to rabbits; 70 ppm was lethal (Vinogradov, 1966 in NAS, 1977).

In chronic studies, 6 mg/mg-day produced toxic effects in rats (Paterni et al., 1958 in NAS, 1977). Carbon disulfide applied topically produced a higher incidence of anemia in female than in male rats, and teratogenic effects were observed (Gut, 1969 in NAS, 1977). When rats inhaled carbon disulfide at 10 mg/m^3, abnormalities of the genitourinary and skeletal systems, disturbances of ossification and blood formation, and dystrophic changes in the ________ and kidney were noted (Bariliak et al., 1975 in NAS, 1977).

Carbon disulfide has been demonstrated to cause disturbances in reproduction as well as teratogenic effects in animals when inhaled (NAS, 1977). Bariliak et al. (1975) observed that inhalation of 10 mg/m^3 was lethal to embryos before and after implantation. Bariliak et al. (1975) reported that inhalation of 10 mg/m^3 by male rats before copulation by male rats resulted in embryo lethality (NAS, 1977). Inhalation of 2.2 g/m^3 for 4 hours/day proved embryotoxic if given to females during gestation (Salnikova and Chirkova, 1974). Inhalation of lower concentrations (0.34 mg/l for 210 days) caused disturbances during estrus (Rozcwiski et al., 1973 in NAS, 1977).

Toxicity to Wildlife and Domestic Animals

Data regarding the toxicity of carbon disulfide to aquatic and terrestrial biota were not available in the literature reviewed.

1,1-DICHLOROETHANE (Clement Associates, Inc.)

HEALTH EFFECTS

Limited toxicological testing of 1,1-dichloroethane has been conducted, although the literature indicates that 1,1-dichloroethane is one of the least toxic of the chlorinated ethanes. An NCI bioassay on 1,1-dichloroethane was limited by poor survival of test animals, but some marginal tumorigenic effects were seen. Inhalation exposure to high doses of 1,1-dichloroethane (over 16,000 mg/m^3) caused retarded fetal development in rats. 1,1-Dichloroethane was not found to be mutagenic, using the Ames assay. 1,1-Dichloroethane causes central nervous system depression when inhaled at high concentrations, and evidence suggests that the compound is hepatotoxic in humans. Kidney and liver damage was seen in animals exposed to high levels of 1,1-dichloroethane. The oral LD_{50} value in the rat is 725 mg/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

No information on the toxicity of 1,1-dichloroethane to aquatic species was reported in the literature reviewed. However, the available information on the chloroethanes indicates that toxicity declines with decreases in chlorination, and that the 1,1,1-isomer is less active than the 1,1,2-isomer. Therefore, 1,1-dichloroethane is probably no more toxic than 1,2-dichloroethane, which is acutely toxic at levels of 100-500 mg/L and has a chronic toxicity beginning at about 20 mg/L.

No information on the toxicity of 1,1-dichloroethane to terrestrial wildlife or domestic animals was found in the sources reviewed.

1,1-DICHLOROETHENE (Clement Associates, Inc., 1985)

Health Effects

1,1-Dichloroethene caused kidney tumors in males and leukemia in males and females in one study of mice exposed by inhalation, gave equivocal results in other inhalation studies, and gave negative results in rats and mice following oral exposure and in hamsters following inhalation exposure. 1,1-Dichloroethene was mutagenic in several bacterial assays. 1,1-Dichloroethene did not appear to be teratogenic but did cause embryotoxicity and fetotoxicity when administered to rats and rabbits by inhalation. Chronic exposure to oral doses of 1,1-dichloroethene as low as 5 mg/kg/day caused liver changes in rats. Acute exposure to high doses causes central nervous system depression, but neurotoxicity has not been associated with low-level chronic exposure. The oral LD_{50} value for the rat is 1,500 mg/kg, and for the mouse it is 200 mg/kg.

Toxicity to Wildlife and Domestic Animals

1,1-Dichloroethene is not very toxic to freshwater or saltwater species, with acute LC_{50} values generally ranging from 80 to 200 mg/liter. A chronic study in which no adverse effects were observed indicated that the acute-chronic ratio was less than 40; a 13-day study that produced an LC_{50} of 29 mg/liter indicated that the acute-chronic ratio is greater than 4.

No reports of the toxicity of 1,1-dichloroethene to terrestrial wildlife or domestic animals were found in the literature reviewed.

CARBON TETRACHLORIDE

Health Effects

Carbon tetrachloride was carcinogenic in mice, rats, and hamsters; in all cases liver tumors were induced (IARC 1979, USEPA 1980). In addition, mice also displayed a high incidence of tumors of the adrenal gland (Weisburger 1977). Studies discussed by EPA (1980) on the mutagenic and teratogenic effects of carbon tetrachloride and its impact on reproduction are inconclusive. Carbon tetrachloride also causes both liver and kidney damage in animals and humans. One study in which guinea pigs were repeatedly exposed to carbon tetrachloride vapor for several months provided evidence of damage to the optic nerve and degeneration of the myelin sheath of the sciatic nerve (Smyth et al. 1936).

Toxicity to Wildlife and Domestic Animals

Carbon tetrachloride has been shown to be acutely toxic to aquatic species at concentrations as low as 35 mg/liter. No data on chronic toxicity to aquatic life were reported in the literature reviewed. Fish bioconcentrate carbon tetrachloride by a factor of less than 50. No studies on the toxicity of carbon tetrachloride to domestic animals or terrestrial wildlife were found in the literature reviewed.

ETHYLBENZENE (Clement Associates, Inc.)

HEALTH EFFECTS

Ethylbenzene has been selected by the National Toxicology Program to be tested for possible carcinogenicity, although negative results were obtained in mutagenicity assays in Salmonella typhimurim and Saccharomyces cerevisiae. There is recent animal evidence that ethylbenzene causes adverse reproductive effects. Ethylbenzene is a skin irritant, and its vapor is irritating to the eyes at a concentration of 870 mg/m^3 and above. When experimental animals were exposed to ethylbenzene by inhalation, 7 hours/day for 6 months, adverse effects were produced at concentrations of 2,610 mg/m^3 and above, but not at 1,740 mg/m^3. At 2,610 mg/m^3, rats and guinea pigs showed slight changes in liver and kidney weights, monkeys had slight changes in liver weight, and monkeys and rabbits experienced histopathologic changes in the testes. Similar effects on the liver and kidney were observed in rats fed ethylbenzene at 408 and 680 mg/kg/day for 6 months.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Ethylbenzene was acutely toxic to freshwater species at levels greater than 32 mg/L. No chronic toxicity was reported, but the highest test dose (440 µg/L) was only one-hundredth of the 96-hour LC_{50} for the particular species being tested. No studies on the bioaccumulation of ethylbenzene were reported in the information reviewed, but a bioconcentration factor of 95 was calculated using the log octanol/water partition coefficient. No information on the toxicity of ethylbenzene to domestic animals and terrestrial wildlife was available.

XYLENES (Clement Associates, Inc.)

HEALTH EFFECTS

The National Toxicology Program (NTP) tested xylene for carcinogenicity by administering it orally to rats and mice. Xylene does not appear to be carcinogenic in rats. Results have not been reported for mice. Xylene was not found to be mutagenic or teratogenic in a battery of short-term assays, but has caused fetotoxicity in rats and mice. Acute exposure to rather high levels of xylene affects the central nervous system and irritates the mucous membranes. There is limited evidence of effects on other organ systems, but it was not possible to attribute these effects solely to xylene as other solvents were present. The oral LD_{50} value of xylene in rats is 5,000 mg/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Xylene adversely affected adult trout at concentrations as low as 3.6 mg/L in a continuous flow system and trout fry avoided xylene at concentrations greater than 0.1 mg/L. The LC_{50} value in adult trout was determined to be 13.5 mg/L. LC_{50} values for other freshwater fish were around 30 mg/L in a static system, which probably underestimated toxicity. Only a few studies have been done on the toxicity of xylene to saltwater species. These indicated that the m- and o-xylene isomers probably have similar toxicities and are probably less toxic than p-xylene, and that saltwater species are generally more susceptible than freshwater species to the detrimental effects of xylene (LC_{50} = 10 mg/L for m- and o-xylene and LC_{50} = 2 mg/L for p-xylene). However, it should be stressed that these generalizations are based on limited data.

No information on the toxicity of xylenes to terrestrial wildlife and domestic animals was available. However, because of the low acute toxicity of xylenes it is unlikely that they would be toxic to wild or domestic birds or animals.

2-METHYLPHENOL (Clement Associates, Inc.)

HEALTH EFFECTS

None of the cresol isomers is regarded as a carcinogenic initiator. However, it has been reported that o-, p-, and m-cresol administered to mice as 20 percent solutions in benzene twice weekly for 20 weeks promoted papillomas initiated by a single dermal application of 9,10-dimethyl-1,2-benzanthracene (DMBA). The mutagenicity and teratogenicity of the cresols have not been adequately assessed.

Cresols are highly irritating to the skin, mucous membranes, and eyes. Occupational exposure to cresols has caused severe burns and eczema. Although cresol isomers have relatively low vapor pressure, airborne cresols have reportedly caused headache, vomiting, and digestive disorders.

In addition to being strong irritants, cresols may impair kidney and liver functioning and cause central nervous system and cardiovascular disturbances. The rat oral LD_{50} values for o-, p-, and m-cresol are 135 mg/kg, 180 mg/kg, and 202 mg/kg, respectively. The dermal LD_{50} values for rabbits are 1,380 mg/kg and 2,050 mg/kg for the o- and m-isomers of cresol, respectively.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Waterborne cresol isomers are toxic to fish and other forms of aquatic life. Trout embryos are one of the most sensitive species, with 24-hour median threshold limits (TL_m) of 2 mg/L for o-cresol, 7 mg/L for p-cresol, and 4 mg/L for m-cresol. The 24- to 96-hour TL_m for the bluegill is approximately 21.5 mg/L for o-cresol and 11.8 mg/L for the p-isomer. The LD_0 value for the alga Scenedesmus is 40 mg/L for o- and p-isomers but 6 mg/L for m-cresol. There is no evidence available that the cresols bioaccumulate in the tissues of wildlife species. No alterations in reproduction capabilities or other subtle changes in wildlife species have been attributed to these compounds.

CRESOLS

Health Effects

None of the cresol isomers is regarded as a carcinogenic initiator. However, it has been reported that o-, p-, and m-cresol administered to mice as 20% solutions in benzene twice weekly for 20 weeks promoted papillomas initiated by a single dermal application of 9,10-dimethyl-1,2-benzanthracene (DMBA) (Boutwell and Bosch 1959). The mutagenicity and teratogenicity of the cresols have not been adequately assessed.

Cresols are highly irritating to the skin, mucous membranes, and eyes. Occupational exposure to cresols has caused severe burns and eczema. Although cresol isomers have relatively low vapor pressures, airborne cresols have reportedly caused headache, vomiting, and digestive disorders.

In addition to being strong irritants, cresols may impair kidney and liver functioning and cause central nervous system and cardiovascular disturbances. The rat oral LD_{50} values for o-, p-, and m-cresol are 135 mg/kg, 180 mg/kg, and 202 mg/kg, respectively. The dermal LD_{50} values for rabbits are 1,380 mg/kg and 2,050 mg/kg for the o- and m- isomers of cresol, respectively.

Toxicity to Wildlife and Domestic Animals

Waterborne cresol isomers are toxic to fish and other forms of aquatic life. Trout embryos are one of the most sensitive species, with 24-hour median threshold limits (TL_m) of 2 mg/liter for o-cresol, 7 mg/liter for p-cresol, and 4 mg/liter for m-cresol. The 24- to 96-hour TL_m for the bluegill is approximately 21.5 mg/liter for o-cresol and 11.8 mg/liter for the p- isomer. The LD_0 value for the alga Scenedesmus is 40 mg/liter for o- and p- isomers but 6 mg/liter for m-cresol. There is no evidence available that the cresols bioaccumulate in the tissues of wildlife species. No alterations in reproductive capabilities or other subtle changes in wildlife species have been attributed to these compounds.

Health Effects

Phenol appears to have tumor-promoting activity in many strains of mice when repeatedly applied to the shaved skin after initiation with known carcinogens. Although there is equivocal evidence that phenol may be weakly carcinogenic when applied to the skin of one sensitive strain of mice, it does not appear to be carcinogenic when applied to the skin of standard strains of mice. NCI reported that phenol was not carcinogenic when administered in drinking water to rats and mice. There is equivocal evidence that phenol may have mutagenic effects, although further evaluation is needed. There are no reports of teratogenic effects caused by exposure to phenol.

Subchronic inhalation exposure to phenol is reported to cause liver, kidney, lung, and heart damage in guinea pigs. Slight liver and kidney damage was seen in rats exposed by gavage to 100 mg/kg/day for 20 days. The oral and skin LD_{50}s for the rat are 414 and 669 mg/kg, respectively, and the inhalation LC_{50} is 316 mg/m^3. Phenol is an eye, nose, and throat irritant and can cause systemic damage to the nervous system in humans following dermal, oral, or inhalation exposure.

Toxicity to Wildlife and Domestic Animals

The acute toxicity of phenol to freshwater species is expressed over a range of 2 to 3 orders of magnitude. Acute values for fish species range from 5,020 µg/liter for juvenile rainbow trout to 67,500 µg/liter for the fathead minnow. The acute value for the rainbow trout, and a value of 5,000 µg/liter for *Daphnia magna* are the lowest acute values observed. An early life stage test on the fathead minnow resulted in a chronic value of 2,560 µg/liter, with an acute-chronic ratio of 14. Median effect concentrations for oyster and clam embryos are approximately 55,000 µg/liter. For the grass shrimp and the mountain bass, LC_{50} values of 5,800 and 11,000 µg/liter, respectively, are reported. No chronic effects are available for saltwater species. Reported bioconcentration factors of 1.2 to 2.3 for goldfish suggest that no residue problem should occur from exposure to phenol. No appropriate data concerning effects of phenol on other wildlife or domestic animals are available.

ACENAPHTHYLENE

Health Effects

There are no epidemiological or case studies suggesting that acenaphthylene is carcinogenic in humans. There are no reports of carcinogenic, teratogenic, or reproductive effects in experimental animals. Acenaphthylene is reported to have weak mutagenic activity in a Salmonella typhimurium test system (Kaden et al. 1979).

No information concerning acute or chronic toxicity is available. Like many other PAHs, acenaphthylene may be a skin irritant, but little specific information is available.

Toxicity to Wildlife and Domestic Animals

Adequate data for characterization of toxicity to domestic animals and wildlife are not available. The weighted average bioconcentration factor for the edible portion of all freshwater and estuarine aquatic organisms consumed by Americans is 119.

PHENANTHRENE

Health Effects

There are no epidemiological or case studies available suggesting that phenanthrene is carcinogenic in humans. This compound generally is not considered to be carcinogenic in experimental animals. However, at least two skin painting studies report development of tumors at the site of application in mice. Phenanthrene exhibits mutagenic activity in some test systems, but not in others. There are no reports of teratogenic or reproductive effects due to phenanthrene exposure.

Little information concerning acute and chronic toxic effects is available. Although specific data concerning exposure to phenanthrene are not available, workers exposed to materials containing this compound may exhibit chronic dermatitis, hyperkeratoses, and other skin disorders.

Toxicity to Wildlife and Domestic Animals

Adequate data for characterization of toxicity to domestic animals and wildlife are not available. A 96-hour LC_{50} value of 600 µg/liter is reported for a saltwater polychaete worm exposed to a crude oil fraction containing phenanthrene. The weighted average bioconcentration factor for the edible portion of all freshwater and estuarine aquatic organisms consumed by Americans is 486.

Clement Associates

TOX PROFILE: Prometon

This herbicide is considered to be moderately toxic via inhalation, ingestion, and skin contact. An oral rat LD50 of 1750 mg/kg has been reported. Prometon can be irritating to the skin and eyes. As an herbicide, it is non-selective and can be used to control annual and perennial broadleaf weeds and grasses.

Sax, N.I., and R. J. Lewis, Sr., 1989. Dangerous Properties of Industrial Materials, Seventh Edition, Van Nostrand Reinhold Company, N.Y.

Meister, R.T., 1985, Farm Chemicals Handbook '85, Meister Publishing Company, Willoghby, Ohio

ARSENIC (Clement Associates, Inc.)

HEALTH EFFECTS

Arsenic has been implicated in the production of skin cancer in humans. There is also extensive evidence that inhalation of arsenic compounds causes lung cancer in workers. Arsenic compounds cause chromosome aberrations. Arsenic compounds have been reported to be teratogenic, fetotoxic, and embryotoxic in several animal species, and an increased incidence of multiple malformations among children born to women occupationally exposed to arsenic has been reported. Arsenic compounds also cause noncancerous, possibly precancerous, skin changes in exposed individuals. Several cases of progressive polyneuropathy involving motor and sensory nerves and particularly affecting the extremities and myelinated long-axon neurons have been reported in individuals occupationally exposed to inorganic arsenic. Polyneuropathies have also been reported after the ingestion of arsenic-contaminated foods.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Various inorganic forms of arsenic appear to have similar levels of toxicity; they all seem to be much more toxic than organic forms. Acute toxicity to adult freshwater animals occurs at levels of arsenic trioxide as low as 812 μg/L and at levels as low as 40 μg/L in early life stages of aquatic organisms. Acute toxicity to saltwater fish occurs at levels around 15 mg/L, while some invertebrates are affected at much lower levels (508 μg/L). Arsenic toxicity does not appear to increase greatly with chronic exposure, and it does not seem that arsenic is bioconcentrated to a great degree.

Arsenic poisoning is a rare but not uncommon toxic syndrome among domestic animals. Arsenic causes hyperemia and edema of the gastrointestinal tract, hemorrhage of the cardiac serosal surfaces and peritoneum, and pulmonary congestion and edema; and it may cause liver necrosis. Information on arsenic toxicity to terrestrial wildlife was not reported in the literature reviewed.

ANTIMONY

Health Effects

Antimony production has been associated with an increase in lung cancer among exposed workers, and one inhalation study in rats also indicated that antimony trioxide might produce lung and liver tumors. Several studies in bacterial test systems report that various antimony compounds, including antimony trioxide, antimony trichloride, and antimony pentachloride, may be mutagenic. Reports of effects on reproduction are limited. Among the effects on reproduction reported for humans are impairments to the female reproductive system. Female workers exposed to metallic antimony dust, antimony trioxide, and antimony pentoxide had an increased incidence of gynecological disorders and late spontaneous abortions. Antimony was found in the breast milk, placental tissue, amniotic fluid, and blood of the umbilical cord in exposed workers. Decreased weight gain was observed in children born of workers exposed to antimony. The same paper reports a study in which intraperitoneal administration of antimony produced changes in rats that support the findings of human reproductive effects.

Cardiovascular changes associated with exposure to antimony represent a serious health effect. Exposure to either trivalent or pentavalent antimonial compounds can produce electrocardiogram (ECG) changes in humans. Histopathological evidence of cardiac edema, myocardial fibrosis, and other signs of myocardial structural damage indicates that antimony may produce even more severe, possibly permanent myocardial damage in humans. Parallel findings of functional changes in ECG patterns and of histopathological evidence of myocardial structural damage have also been obtained in animal toxicity studies. Pneumoconiosis in response to inhalation exposure and dermatitis in response to skin exposure have also been observed among individuals exposed to antimony or its compounds.

Toxicity to Wildlife and Domestic Animals

Tests with antimony potassium tartrate and antimony trichloride in *Daphnia magna* reveal no difference in the toxicity of these two compounds. The LC_{50} and EC_{50} values for *Daphnia magna* and the fathead minnow, both freshwater species, range from 9,000 to 21,900 µg/liter. Chronic values for the fathead minnow and *Daphnia magna* are 1,600 and 5,400 µg/liter, respectively. Acute-chronic ratios for the fathead minnow and *Daphnia magna* are 14 and 3.5, respectively. The freshwater alga *Selenastrum capricornutum* is more sensitive than the animal species tested, with a 96-hour EC_{50} of 610 µg/liter for inhibition of the synthesis of chlorophyll *a*. No detectable bioconcentration of antimony by the bluegill was observed. No definitive data concerning the toxicity of antimony to saltwater species or to other wildlife or domestic animals are available.

BARIUM (Clement Associates, Inc.)

HEALTH EFFECTS

There are no reports of carcinogenicity, mutagenicity, or teratogenicity associated with exposure to barium or its compounds. Effects on gametogenesis and on the reproductive organs are reported in male and female rats after inhalation of barium carbonate; intratesticular injection of barium chloride affects the male reproductive organs.

Insoluble forms of barium, particularly barium sulfate, are not toxic by ingestion or inhalation because only minimal amounts are absorbed. However, soluble barium compounds are highly toxic in humans after exposure by either route. The most important effect of acute barium poisoning is a strong, prolonged stimulant action on muscle. Smooth, cardiac, and skeletal muscles are all affected, and a transient increase in blood pressure due to vasoconstriction can occur. Effects on the hematopoietic system and cerebral cortex have also been reported in humans. Accidental ingestion of soluble barium salts has resulted in gastroenteritis, muscular paralysis, and ventricular fibrillation and extra systoles. Potassium deficiency can occur in cases of acute poisoning. Doses of barium carbonate and barium chloride of 57 mg/kg and 11.4 mg/kg, respectively, have been reported to be fatal in humans. Digitalis-like toxicity, muscle stimulation, and effects on the hematopoietic and central nervous systems have been confirmed in experimental animals. There are no adequate animal data available for determining the chronic effects of low level exposure to barium by ingestion.

Baritosis, a benign pneumoconiosis, is an occupational disease arising from the inhalation of barium sulfate dust, barium oxide dust, and barium carbonate. The radiologic changes produced in the lungs are reversible with cessation of exposure. Other reports of industrial exposure to barium compounds describe pulmonary nodulation with or without a decrease in lung function. Dusts of barium oxide are considered potential agents of dermal and nasal irritation. The biological half-life for barium is less than 24 hours.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Adequate data for characterization of toxicity to wildlife and domestic animals are not available.

BERYLLIUM (Clement Associates, Inc.)

HEALTH EFFECTS

The results of some epidemiological studies of workers occupationally exposed to beryllium indicate that beryllium may cause lung cancer in humans. Although this evidence is equivocal, beryllium and many of its compounds are known to be carcinogenic in several animal species. Inhalation exposure to beryllium has resulted in the development of lung or bone cancer in animals, and exposure by injection has produced bone cancer. Although beryllium compounds may impair DNA polymerization, there is no other evidence of mutagenic or clastogenic activity. However, the number of compounds tested and the types of tests conducted have been limited. There is little information concerning the possible teratogenic effects of beryllium. It is reported to inhibit embryonic development of the snail and regeneration of the limbs of the salamander.

Acute respiratory effects due to beryllium exposure include rhinitis, pharyngitis, tracheobronchitis, and acute pneumonitis. Dermal exposure to soluble beryllium compounds can cause contact dermatitis. Ocular effects include inflammation of the conjunctiva from splash burns or in association with contact dermatitis. The most common clinical symptoms caused by chronic beryllium exposure are granulomatous lung inflammation, with accompanying cough, chest pain, and general weakness. Systemic effects include right heart enlargement with accompanying cardiac failure, liver and spleen enlargement, cyanosis, digital clubbing,and kidney stone development.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Data for several freshwater fish species indicate that the acute toxicity of beryllium decreases by about two orders of magnitude with an increase in hardness from about 20 to 400 mg/L calcium carbonate. For example, acute values for the fathead minnow range from 150 to 20,000 µg/L over this range of hardness. There does not appear to be much variation in sensitivity among the fish species tested at similar levels of hardness. Acute and chronic values for the invertebrate *Daphnia magna* in the same test water (hardness equal to 220 mg/L) were reported to be 2,500 and 5.3 µg/L, respectively, indicating a very large difference between acute and chronic toxicity. Only limited, inconclusive data exist concerning beryllium toxicity in saltwater species. Growth of the green alga *Chlorella vannieli* is inhibited at a beryllium concentration of 100,000 µg/L. A bioconcentration factor of 19 with a half-life of one day in the whole body is reported for the bluegill.

Some toxicity due to beryllium has been seen in domestic animals. One of the earliest observed effects of beryllium toxicity was the development of rachitic bone changes after the addition of soluble beryllium salts to the diet of poultry and livestock. Approximately 0.125 percent beryllium carbonate in the food or water is required to produce a mild case.

CADMIUM (Clement Associates, Inc.)

HEALTH EFFECTS

There is suggestive evidence linking cadmium with cancer of the prostate in humans. In animal studies, inhalation exposure to cadmium caused lung tumors in rats, and exposure by injection produced injection-site sarcomas and/or Leydig-cell tumors. An increased incidence of tumors has not been seen in animals exposed to cadmium orally, but four of the five available studies were inadequate by current standards.

The evidence from a large number of studies on the mutagenicity of cadmium is equivocal, and it has been hypothesized that cadmium is not directly mutagenic but impedes repair. Cadmium is a known animal teratogen and reproductive toxin. It has been shown to cause renal dysfunction in both humans and animals. Other toxic effects attributed to cadmium include immunosuppression (in animals), anemia (in humans), pulmonary disease (in humans), possible effects on the endocrine system, defects in sensory function, and bone damage. The oral LD_{50} in the rat was 225 mg/kg.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Laboratory experiments suggest that cadmium may have adverse effects on reproduction in fish at levels present in lightly to moderately polluted waters.

The acute LC_{50} for freshwater fish and invertebrates generally ranged form 100 to 1,000 µg/L; salmonids are much more sensitive than other organisms. Saltwater species were in general 10-fold more tolerant to the acute effects of cadmium. Chronic tests have been performed and show that cadmium has cumulative toxicity and acute-chronic ratios that range from 66 to 431. Bioconcentration factors were generally less than 1,000 but were as high as 10,000 for some freshwater fish species.

No adverse effects on domestic or wild animals were reported.

CHROMIUM (Clement Associates, Inc.)

HEALTH EFFECTS

The hexavalent form of chromium is of major toxicological importance in higher organisms. A variety of chromate (Cr VI) salts are carcinogenic in rats and an excess of lung cancer has been observed among workers in the chromate-producing industry. Cr VI compounds can cause DNA and chromosome damage in animals and humans, and Cr (VI) trioxide is teratogenic in the hamster. Inhalation of hexavalent chromium salts causes irritation and inflammation of the nasal mucosa, and ulceration and perforation of the nasal septum. Cr VI also produces kidney damage in animals and humans. The liver is also sensitive to the toxic effects of hexavalent Cr, but apparently less so than the kidneys or respiratory system. Cr III is less toxic than Cr VI; its main effect in humans is a form of contact dermatitis in sensitive individuals.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Chromium is an essential nutrient and is accumulated in a variety of aquatic and marine biota, especially benthic organisms, to levels much higher than in ambient water. Levels in biota, however, usually are lower than levels in the sediments. Passage of chromium through the food chain can be demonstrated. The food chain appears to be a more efficient pathway for chromium uptake than direct uptake from seawater.

Water hardness, temperature, dissolved oxygen, species, and age of the test organism all modify the toxic effects of chromium on aquatic life. Cr III appears to be more acutely toxic to fish than Cr VI; the reverse is true in long term chronic exposure studies.

None of the plants normally used as food or animal feed are chromium accumulators. Chromium absorbed by plants tends to remain primarily in the roots and is poorly translocated to the leaves. There is little tendency for chromium to accumulate along food chains in the trivalent inorganic form. Organic chromium compounds, about which little is known, can have significantly different bioaccumulation tendencies. Little information concerning the toxic effects of chromium on mammalian wildlife and domestic animal species is available.

COPPER (Clement Associates, Inc.)

HEALTH EFFECTS

Copper appears to increase the mutagenic activity of triose reductone and ascorbic acid in bacterial test systems. However, copper itself does not appear to have mutagenic, teratogenic, or carcinogenic effects in animals or humans. Dietary levels of trace elements such as molybdenum, sulfur, zinc, and iron can affect the level of copper that produces certain deficiency or toxicity symptoms. In general, more attention is given to the problems associated with copper deficiency than to problems of excess copper in the environment. However, high levels of copper can be toxic to humans.

Exposure to metallic copper dust can cause a short-term illness similar to metal fume fever that is characterized by chills, fever, aching muscles, dryness of mouth and throat, and headache. Exposure to copper fumes can produce upper respiratory tract irritation, a metallic or sweet taste, nausea, metal fume fever, and sometimes discoloration of skin and hair. Individuals exposed to dusts and mists of copper salts may exhibit congestion of nasal mucous membranes, sometimes of the pharynx, and occasionally ulceration and perforation of the nasal septum.

If sufficient concentrations of copper salts reach the gastrointestinal tract, they act as irritants and can produce salivation, nausea, vomiting, gastritis, and diarrhea. Elimination of ingested ionic copper by vomiting and diarrhea generally protects the patient from more serious systemic toxic effects, which can include hemolysis, hepatic necrosis, gastrointestinal bleeding, oliguria, azotemia, hemoglobinuria, hematuria, proteinuria, hypotension, tachycardia, convulsions, and death. Chronic exposure may result in anemia.

Copper salts act as skin irritants producing an itching eczema. Conjunctivitis or even ulceration and turbidity of the cornea may result from direct contact of ionic copper with the eye.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Mean acute toxicity values for a large number of freshwater animals range from 7.2 µg/L for <u>Daphnia pulicaria</u> to 10,200 µg/L for the bluegill. Toxicity tends to decrease as hardness, alkalinity, and total organic carbon increase. Chronic values for a variety of freshwater species range from 3.9 µg/L for brook trout to 60.4 µg/L for northern pike. Hardness does not appear to affect chronic toxicity. The acute-chronic ratios for different species range from 3 to 156. The more sensitive species tend to have lower ratios than the less sensitive species. In addition, the ratio seems to increase with hardness. Acute toxicity values for saltwater organisms range from 17 µg/L for a calanoid copepod to 600 µg/L for the shore crab. A chronic value of 54 µg/L and an acute-chronic ratio of 3.4 is reported for the mysid shrimp. Long-term exposure to 5 µg/L is fatal to the bay scallop.

Bioconcentration factors in freshwater species range from zero for the bluegill to 2,000 for the alga Chlorella regularis. Among saltwater species, the highest bioaccumulation factors are those for the bivalve molluscs. Oysters can bioaccumulate copper up to 28,200 times without any significant mortality.

Sheep are very susceptible to copper toxicosis, and poisoning may be acute or chronic. Acute poisoning is caused by direct action of copper salts on the gastrointestinal tract, resulting in gastroenteritis, shock, and death. The toxic dose is about 200 mg/kg and is usually obtained through an accidental overdose of an antihelminthic. Ingestion of excess copper over a long period of time results in absorption and accumulation of copper by the liver. This type of chronic cumulative poisoning may suddenly develop into an acute hemolytic crisis. Copper intake of 1.5 g/day for 30 days is known to be fatal for many breeds of sheep. Excessive copper may be stored in the liver as a result of excess copper ingestion, as a consequence of impaired liver function, or in connection with a deficiency or excess of other trace elements. Sheep eliminate accumulated copper very slowly after cessation of exposure.

Swine develop copper poisoning at levels of 250 mg/kg in the diet unless zinc and iron levels are increased. Toxicosis develops with hypochromic microcytic anemia, jaundice, and marked increases in liver and serum copper levels as well as serum aspartate amino transferase. High copper levels may be found in swine because of the practice of feeding them high copper diets in order to increase daily weight gain. However, swine rapidly eliminate copper once it is removed from the diet. Cattle are much more resistant to copper in the diet than sheep or swine. Copper toxicity in ruminants can be counteracted by including molybdenum and sulfate in the diet.

LEAD (Clement Associates, Inc.)

HEALTH EFFECTS

There is evidence that several lead salts are carcinogenic in mice or rats, causing tumors of the kidneys after either oral or parenteral administration. Data concerning the carcinogenicity of lead in humans are inconclusive. The available data are not sufficient to evaluate the carcinogenicity of organic lead compounds or metallic lead. There is equivocal evidence that exposure to lead causes genotoxicity in humans and animals. The available evidence indicates that lead presents a hazard to reproduction and exerts a toxic effect on conception, pregnancy, and the fetus in humans and experimental animals.

Many lead compounds are sufficiently soluble in body fluids to be toxic. Exposure of humans or experimental animals to lead can result in toxic effects in the brain and central nervous system, the peripheral nervous system, the kidneys, and the hematopoietic system. Chronic exposure to inorganic lead by ingestion or inhalation can cause lead encephalopathy, and severe cases can result in permanent brain damage. Lead poisoning may cause peripheral neuropathy in adults and children, and permanent learning disabilities that are clinically undetectable in children may be caused by exposure to relatively low levels. Short-term exposure to lead can cause reversible kidney damage, but prolonged exposure at high concentrations may result in progressive kidney damage and possibly kidney failure. Anemia, due to inhibition of hemoglobin synthesis and a reduction in the life span of circulating red blood cells, is an early manifestation of lead poisoning. Several studies with experimental animals suggest that lead may interfere with various aspects of the immune response.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Freshwater vertebrates and invertebrates are more sensitive to lead in soft water than in hard water. At a hardness of about 50 mg/L $CaCO_3$, the median effect concentrations for nine families range from 140 µg/L to 236,600 µg/L. Chronic values for Daphnia magna and the rainbow trout are 12.26 and 83.08 µg/L, respectively, at a hardness of about 50 mg/L. Acute-chronic ratios calculated for three freshwater species ranged from 18 to 62. Bioconcentration factors, ranging from 42 for young brook trout to 1,700 for a snail, were reported. Freshwater algae show an inhibition of growth at concentrations above 500 µg/L.

Acute values for twelve saltwater species range from 476 µg/L for the common mussel to 27,000 µg/L for the soft-shell clam. Chronic exposure to lead causes adverse effects in mysid shrimp at 37 µg/L, but not at 17 µg/L. The acute-chronic ratio for this species is 118. Reported bioconcentration factors range from 17.5 for the Quahog clam to 2,570 for the blue mussel. Saltwater algae are adversely affected at approximate lead concentrations as low as 15.8 µg/L.

Although lead is known to occur in the tissue of many free-living wild animals, including birds, mammals, fishes, and invertebrates, reports of poisoning usually involve waterfowl. There is evidence that lead, at concentrations occasionally found near roadsides and smelters, can eliminate or reduce populations of bacteria and fungi on leaf surfaces and in soil. Many of these microorganisms play key roles in the decomposer food chain.

Cases of lead poisoning have been reported for a variety of domestic animals, including cattle, horses, dogs, and cats. Several types of anthropogenic sources are cited as the source of lead in these reports. Because of their curiosity and their indiscriminate eating habits, cattle experience the greatest incidence of lead toxicity among domestic animals.

MANGANESE

Health Effects

There are no epidemiological studies suggesting that ma ganese or its compounds are carcinogenic or have teratogenic reproductive effects in humans. Exposure to manganese chlor by intraperitoneal or subcutaneous routes was reported to ca lymphomas in mice. Manganese sulfate was found to produce tumors after intraperitoneal administration in mice. No oth reports of unequivocal carcinogenic activity are available f common manganese compounds. Some manganese compounds, notat manganese chloride, have exhibited mutagenic activity in a variety of test systems. Manganese compounds do not appear to be teratogenic, however.

In humans, manganese dusts and compounds have relative low oral and dermal toxicity, but they can cause a variety of toxic effects after inhalation exposure. Acute exposure to very high concentrations can cause manganese pneumoni increased susceptibility to respiratory disease, and pat changes including epithelial necrosis and mononuclear pro tion. Chronic manganese poisoning is more common, but gene occurs only among persons occupationally exposed to mangane compounds. Degenerative changes in the central nervous sys are the major toxic effects. Early symptoms include emotio changes, followed by a masklike face, retropulsion or propu and a Parkinson's-like syndrome. Liver changes are also fr seen. Individuals with an iron deficiency may be more susc ible to chronic poisoning.

Duplication of human exposure symptoms in experimental animals has only been partially successful. In rabbits exp by inhalation to manganese dust, manganese pneumonitis did not develop, but fibrotic changes in the lungs were observe Central nervous system effects characteristic of chronic ex sure in humans have only been reproduced in monkeys.

Toxicity to Wildlife and Domestic Animals

Adequate data for characterization of the toxicity of manganese to wildlife or domestic animals are not available

A 48-hour LC_{50} value of 16 mg/liter of manganese is reported for embryos of the oyster Crassostrea virginica. For the softshell clam Mya arenaria a 168-hour LC_{50} value of 300 mg/liter is reported.

MERCURY (Clement Associates, Inc.)

HEALTH EFFECTS

When administered by intraperitoneal injection, metallic mercury produces implantation site sarcomas in rats. No other studies were found connecting mercury exposure with carcinogenic effects in animals or humans. Several mercury compounds exhibit a variety of genotoxic effects in eukaryotes. In general, organic mercury compounds are more toxic than inorganic compounds. Although brain damage due to prenatal exposure to methylmercury has occurred in human populations, no conclusive evidence is available to suggest that mercury causes anatomical defects in humans. Embryotoxicity and teratogenicity of methylmercury has been reported for a variety of experimental animals. Mercuric chloride is reported to be teratogenic in experimental animals. No conclusive results concerning the teratogenic effects of mercury vapor are available.

In humans, alkyl mercury compounds pass through the blood brain barrier and the placenta very rapidly, in contrast to inorganic mercury compounds. Major target organs are the central and peripheral nervous systems, and the kidney. Methylmercury is particularly hazardous because of the difficulty of eliminating it from the body. In experimental animals, organic mercury compounds can produce toxic effects in the gastrointestinal tract, pancreas, liver, heart, and gonads, with involvement of the endocrine, immunocompetent, and central nervous systems.

Elemental mercury is not highly toxic as an acute poison. However, inhalation of high concentrations of mercury vapor can cause pneumonitis, bronchitis, chest pains, dyspnea, coughing, stomatitis, gingivitis, salivation, and diarrhea. Soluble mercuric salts are highly poisonous on ingestion, with oral LD_{50} values of 20 to 60 mg/kg reported. Mercurous compounds are less toxic when administered orally. Acute exposure to mercury compounds at high concentrations causes a variety of gastrointestinal symptoms and severe anuria with uremia. Signs and symptoms associated with chronic exposure involve the central nervous system and include behavioral and neurological disturbances.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

The toxicity of mercury compounds has been tested in a wide variety of aquatic organisms. Although methylmercury appears to be more toxic than inorganic mercuric salts, few acute or chronic toxicity tests have been conducted with it. Among freshwater species, the 96-hour LC_{50} values for inorganic mercuric salts range from 0.02 µg/L for crayfish to 2,000 µg/L for caddisfly larvae. Acute values for methylmercuric compounds and other mercury compounds are only available for fishes. In rainbow trout, methylmercuric chloride is about ten times more toxic to rainbow trout than mercuric chloride, which is acutely toxic at about 300 µg/L at 10°C. Methylmercury is the most chronically toxic of the tested compounds, with chronic values for _Daphnia magna_ and brook trout of 1.00 and 0.52 µg/L, respectively. The acute-chronic ratio for _Daphnia magna_ is 3.2.

Mean acute values for saltwater species range from 3.5 to 1,680 µg/L. In general, molluscs and crustaceans are more sensitive than fish to the acute toxic effects of mercury. A life-cycle experiment with the mysid shrimp showed that inorganic mercury at a concentration of 1.6 µg/L significantly influences time of appearance of first brook, time of first spawn, and productivity. The acute-chronic ratio for the mysid shrimp is 2.9.

NICKEL (Clement Associates, Inc.)

HEALTH EFFECTS

There is extensive epidemiological evidence indicating excess cancer of the lung and nasal cavity for workers at nickel refineries and smelters, and weaker evidence for excess risk in workers at nickel electroplating and polishing operations. Nickel is a Class A carcinogen. Respiratory tract cancers have occurred in excess at industrial facilities that are metallurgically diverse in their operations. The nickel compounds that have been implicated as having carcinogenic potential are insoluble dusts of nickel subsulfide and nickel oxides, the vapor of nickel carbonyl, and soluble aerosols of nickel sulfate, nitrate, or chloride. Inhalation studies with experimental animals suggest that nickel subsulfide and nickel carbonyl are carcinogenic in rats. Evidence for the carcinogenicity of nickel metal and other compounds is relatively weak or inconclusive. Studies with experimental animals indicate that nickel compounds can also produce various types of malignant tumors in experimental animals after administration by other routes, including subcutaneous, intramuscular, implantation, intravenous, intrarenal, and intrapleural. Carcinogenic potential is not strongly dependent on route or site of administration, but appears to be inversely related to the solubility of the compounds in aqueous media. Insoluble compounds, such as nickel dust, nickel sulfide, nickel carbonate, nickel oxide, nickel carbonyl, and nickelocene are carcinogenic, whereas soluble nickel salts such as nickel chloride, nickel sulfate, and nickel ammonium sulfate, are not.

Mammalian cell transformation data indicate that several nickel compounds are mutagenic and can cause chromosomal alterations. The available information is inadequate for assessing teratogenic and reproductive effects of nickel in humans and experimental animals.

Dermatitis and other dermatological effects are the most frequent effects of exposure to nickel and nickel-containing compounds. The dermatitis is a sensitization reaction. Most information regarding acute toxicity of nickel involves inhalation exposure to nickel carbonyl. Clinical manifestations of acute poisoning include both immediate and delayed symptoms. Acute chemical pneumonitis is produced, and death may occur at exposures of 107 mg/m^3 for 30 minutes. Rhinitis, nasal sinusitis, and nasal mucosal injury are among the effects reported among workers chronically exposed to various nickel compounds. Studies with experimental animals suggest that nickel and nickel compounds have relatively low acute and chronic oral toxicity.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

In freshwater, toxicity depends on hardness; nickel tends to be more toxic in softer water. Acute values for exposure to a variety of nickel salts, expressed as nickel, range from

510 µg/L for *Daphnia magna* to 46,200 µg/L for banded killifish at comparable hardness levels. Chronic values range from 14.8 µg/L for *Daphnia magna* in soft water to 530 µg/L for the fathead minnow in hard water. Acute-chronic ratios for *Daphnia magna* range from 14 in hard water to 83 in soft water, and are approximately 50 in both hard and soft water for the fathead minnow. Residue data for the fathead minnow indicate a bioconcentration factor of 61. Freshwater algae experience reduced growth at nickel concentrations as low as 100 µg/L.

Acute values for saltwater species range from 152 µg/L for mysid shrimp to 350,000 µg/L for the mummichog. A chronic value of 92.7 µg/L is reported for the mysid shrimp, which gives an acute-chronic ratio of 5.5 for the species. Reduced growth is seen in saltwater algae at concentrations as low as 1,000 µg/L.

Bioconcentration factors ranging from 299 to 416 have been reported for the oyster and mussel.

SILVER

Health Effects

Only equivocal evidence exists to suggest that silver has carcinogenic activity in experimental animals. Silver implants and injected colloidal suspensions are reported to produce tumors or hyperplasia at the site of application in several studies. However, it is suggested that the effects are due to the physical form of the metal or to its action as an exogenous irritant. There are no studies to suggest that silver is carcinogenic in humans. Silver does not appear to have significant mutagenic or teratogenic activity in humans or experimental animals.

Silver can be absorbed in humans by inhalation or ingestion. The most common and most noticeable effects of excessive absorption are a local or generalized impregnation of the tissues referred to as argyria. In cases of argyria, accumulation of silver can result in a blue-gray pigmentation of the skin, hair, internal organs, and conjunctiva of the eye. Large oral doses of silver compounds may produce serious effects in humans. For example, silver nitrate can cause violent abdominal pain, vomiting, and convulsions, and ingestion of 10 grams is reported to usually be fatal. Lesions of the liver, kidney, bone marrow, and lungs have also been attributed to industrial or medicinal exposure.

Intravenous administration of silver nitrate is reported to produce pulmonary edema and congestion in experimental animals. Liver and kidney damage, central nervous system effects, and death have also been reported in experimental animals exposed to various silver compounds. The intraperitoneal LD_{50} (30 days) for Ag^+ as the nitrate in male Swiss albino mice is 13.9 mg/kg. Rats exposed to silver in their drinking water for 11 months showed no toxic effects at concentrations less than 0.4 mg/liter. Hemorrhaging occurred in the kidneys at 0.4 mg/liter. Conditioned reflex activity and immunological resistance were lowered, and brain nucleic acid content was increased at 0.5 mg/liter. Numerous physiological changes, including growth depression, and pathomorphological changes in the liver, kidney, stomach, and small intestine were evident in rats exposed to 20 mg/liter for 5 months.

Toxicity to Wildlife and Domestic Animals

Acute toxicity values for freshwater invertebrates range from 0.25 μg/liter for *Daphnia magna* to 4,500 μg/liter for the scud *Gammarus pseudolimnaeus*. Acute values for fish range from 3.9 μg/liter for the fathead minnow in soft water to 280 μg/liter for rainbow trout in hard water. In fresh water, the acute toxicity of silver appears to decrease as hardness increases. Soluble compounds, such as silver nitrate, are generally much more toxic than insoluble compounds. Chronic values ranging from 2.6 to 29 μg/liter are reported for Daphnia magna. Two early life stage studies with rainbow trout report chronic values of 0.12 μg/liter. Acute-chronic ratios for Daphnia magna and rainbow trout are 2.0 and 54, respectively. Fresh water aquatic plants appear to be more resistant to silver than the more sensitive animals.

Acute values for saltwater organisms range from 4.7 μg/liter for the summer flounder to 1,400 μg/liter for the sheepshead minnow. A chronic value of 18 μg/liter, and an acute-chronic ratio of 14 is reported for the mysid shrimp.

Reduced cell numbers are observed in the saltwater alga Skeletonema costatum after exposure to 130 μg/liter of silver.

Excess silver can induce selenium, vitamin E, and copper deficiency symptoms in animals fed adequate diets, and can aggravate deficiency symptoms in animals whose diets lack one or more of these nutrients. These effects are reported in dogs, sheep, pigs, chicks, turkey poults, and ducklings.

VANADIUM (Clement Associates, Inc.)

HEALTH EFFECTS

There are no data available to suggest that vanadium has carcinogenic, mutagenic, teratogenic, or reproductive effects in humans or experimental animals. Occupational exposure to airborne vanadium compounds can produce eye and skin irritation. Oral exposure may produce gastrointestinal disturbances and discoloration of the oral mucosa and tongue. There is no evidence of chronic oral toxicity. The most important toxic effects of vanadium are associated with inhalation exposure. Symptoms include acute upper and lower respiratory irritation with mucous discharge and bronchitis, cough, bronchospasm, and chest pain. Acute effects are reported to occur at concentrations as low as 0.1 mg/m^3. Effects on various enzyme systems may also occur, especially after chronic exposure.

Vanadium is toxic to experimental animals by all routes of administration. Its toxicity generally increases with valence number. The pentavalent chemical forms, such as vanadium pentoxide and the vanadates, are the the most toxic compounds. In albino mice, an oral LD_{50} of 130 mg/kg vanadium trioxide is reported; a value of 23 mg/kg is reported for vanadium trichloride.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Only limited information was available on the toxicity of vanadium to aquatic organisms. Freshwater fish had 96-hour LC_{50} values ranging from 5,000 to 100,000 µg/L and generally around 10,000 µg/L. Daphnids were the only invertebrates studied; a 96-hour LC_{50} value of less than 0.16 µg/L was reported. Chronic toxicity (5 to 28 day LC_{50} values) was generally seen at around 2,000 µg/L; the lowest value reported was 500 µg/L for a 6-day LC_{50} value in the guppy.

Adequate data are not available for characterization of toxicity to wildlife and domestic animals. Calcium vanadate was fatal to a group of chicks fed a diet containing 200 to 600 ppm for 11 to 32 days.

ZINC (Clement Associates, Inc.)

HEALTH EFFECTS

Testicular tumors have been produced in rats and chickens when zinc salts are injected intratesticularly, but not when other routes of administration are used. Zinc may be indirectly important with regard to cancer since its presence seems to be necessary for the growth of tumors. Laboratory studies suggest that although zinc-deficient animals may be more susceptible to chemical induction of cancer, tumor growth is slower in these animals. There is no evidence that zinc deficiency has any etiological role in human cancer. There are no data available to suggest that zinc is mutagenic or teratogenic in animals or humans.

Zinc is an essential trace element that is involved in enzyme functions, protein synthesis, and carbohydrate metabolism. Ingestion of excessive amounts of zinc may cause fever, vomiting, stomach cramps, and diarrhea. Fumes of freshly formed zinc oxide can penetrate deep into the alveoli and cause metal fume fever. Zinc oxide dust does not produce this disorder. Contact with zinc chloride can cause skin and eye irritation. Inhalation of mists or fumes may irritate the respiratory and gastrointestinal tracts. Zinc in excess of 0.25 percent in the diet of rats causes growth retardation, hypochromic anemia, and defective mineralization of bone. No zinc toxicity is observed at dietary levels below 0.25 percent.

Studies with animals and humans indicate that metabolic changes may occur due to the interaction of zinc and other metals in the diet. Exposure to cadmium can cause changes in the distribution of zinc, with increases in the liver and kidneys, organs where cadmium also accumulates. Excessive intake of zinc may cause copper deficiencies and result in anemia. Interaction of zinc with iron or lead may also lead to changes that are not produced when the metals are ingested individually.

TOXICITY TO WILDLIFE AND DOMESTIC ANIMALS

Zinc produces acute toxicity in freshwater organisms over a range of concentrations from 90 to 58,100 µg/L and appears to be less toxic in harder water. Acute toxicity is similar for freshwater fish and invertebrates. Chronic toxicity values range from 47 to 852 µg/L and appear to be relatively unaffected by hardness. A final acute-chronic ratio for freshwater species of 3.0 has been reported. Although most freshwater plants appear to be insensitive to zinc, one species, the alga Selenastrum capricornutum, exhibited toxic effects at concentrations from 30 to 700 µg/L. Reported acute toxicity values range from 2,730 to 83,000 µg/L for saltwater fish and from 166 to 55,000 µg/L for invertebrate saltwater species. Zinc produces chronic toxicity in the mysid shrimp at 166 µg/L. The final acute-chronic ratio for saltwater species is 3.0. Toxic effects are observed in saltwater plant species at zinc concentrations of 50 to 25,000 µg/L. Bioconcentration factors of edible portions of aquatic organisms range from 43 for the soft-shell clam to 16,700 for the oyster.

Zinc poisoning has occurred in cattle. In one outbreak, poisoning was caused by food accidentally contaminated with zinc at a concentration of 20 g/kg. An estimated intake of 140 g of zinc per cow per day for about 2 days was reported. The exposed cows exhibited severe enteritis, and some died or had to be slaughtered. Postmortem findings showed severe pulmonary emphysema with changes in the myocardium, kidneys, and liver. Zinc concentrations in the liver were extremely high. Based on relatively limited data, some researchers have speculated that exposure to excessive amounts of zinc may constitute a hazard to horses. Laboratory studies and findings in foals living near lead-zinc smelters suggest that excessive exposure to zinc may produce bone changes, joint afflictions, and lameness. In pigs given dietary zinc at concentrations greater than 1,000 mg/kg, decreased food intake and weight gain were observed. At dietary levels greater than 2,000 mg/kg, deaths occurred as soon as 2 weeks after exposure. Severe gastrointestinal changes and brain damage, both of which were accompanied by hemorrhages, were observed, as well as changes in the joints. High concentrations of zinc were found in the liver.

Clement Associates

CYANIDE

Health Effects

Hydrogen cyanide and its simple salts, such as sodium cyanide, are highly toxic by all routes. Many reports are available regarding acute poisoning in humans. Hydrogen cyanide vapor is irritating at very low concentrations, is considered dangerous at 20 ppm (20 mg/m^3), and is fatal at concentrations of 100 ppm (100 mg/m^3) for one hour. NIOSH notes reports of chronic poisoning resulting in fatigue, weariness and other subjective symptoms in workers, but these findings have been disputed by other investigators. Chronic exposure to low levels of cyanide salts has been reported to cause enlargement of the thyroid gland in humans, apparently due to inefficient elimination of the cyanide metabolite thiocyanate. NIOSH (1976) concluded that there was no evidence of carcinogenicity, mutagenicity, or teratogenicity for cyanides. Cyanide has been shown to produce chromosome breaks in a plant, *Vicia faba*. Because of its mechanism of action, inhibition of the election transport system in oxidative phosphorylation, cyanide is acutely toxic to almost all forms of life. A reduction in the TLV for HCN from 10 mg/m^3 to a ceiling value of 3 mg/m^3 has been recommended by several investigators, to prevent the various nonspecific effects noted by several investigators (ACGIH 1980).

Toxicity to Wildlife and Domestic Animals

Cyanide is acutely toxic to both freshwater and saltwater organisms, causing death at levels of about 50 μg/liter in sensitive species and being fatal to many species at levels above 200 μg/liter. Final acute values were determined to be 44.7 μg/liter for freshwater species and 2.03 μg/liter for saltwater species. Effects such as reduced survival and reduced reproduction were seen in fish chronically exposed to free cyanide concentrations of from 10 to 50 μg/liter. The final acute chronic ratios were determined to be 10.7 and 3.5 for freshwater and saltwater organisms, respectively. The final chronic values were determined by dividing the acute values by the acute-chronic ratio, and were determined to be 4.2 for freshwater species and 0.57 for saltwater organisms. An accidental spill of cyanide caused the death of 4,800 fish in Oak Ridge, Tennessee. The long-term effects of this spill were not reported. Livestock death and environmental damage were caused by high levels of cyanide leaching from a drum disposal site in Illinois.

SELENIUM

Health Effects

There is no evidence that selenium is carcinogenic in humans. Selenium has been tested by the oral route in experimental animals, but the available data are insufficient to allow unequivocal evaluation of its carcinogenic potential. However, recent reports suggest that selenium is not carcinogenic. Several studies have shown that selenium may actually reduce the incidence of tumors under certain conditions. Mutagenicity, teratogenicity, and reproductive effects have not been adequately tested.

Selenium is an essential element in animals and probably in humans. However, exposure to amounts only slightly above the required levels can produce acute and chronic toxic effects. Acute toxicities of selenium compounds vary greatly, while the chronic effects of most forms are similar. Exposure may be by oral, inhalation, or dermal routes, and effects in humans and experimental animals are similar. Acute effects include degeneration of liver, kidneys, and myocardia, hemorrhages in the digestive tract, and brain damage. Eye, nose, and throat irritation may also occur with inhalation exposure. The acute oral LD_{50} value of sodium selenite in rats was approximately 10 mg/kg. Chronic toxicity in humans appears to occur only in areas where foods containing excessive concentrations of selenium are ingested. Signs of chronic intoxication include depression, nervousness, dermatitis, gastrointestinal disturbances, dental caries and discoloration, lassitude, and partial loss of hair and nails.

Toxicity to Wildlife and Domestic Animals

Some food and forage crops growing on certain seleniferous soils can accumulate selenium to concentrations as high as 1,000 ppm. Chronic selenium toxicity can occur in grazing animals that consume plants containing 3 to 25 ppm over a long period of time. Symptoms of chronic poisoning ("alkali" disease) include lack of vitality, loss of hair, sterility, hoof deformity, lameness, anemia, and fatty necrosis of the liver. Acute toxic effects including impairment of vision, weakness of limbs, and respiratory failure may occur in livestock consuming 100 to 1,000 ppm of selenium. There are reports that consumption of plants containing 400 to 800 ppm has been lethal to sheep, hogs, and calves. There are no reports of increased cancer rates among livestock in seleniferous areas.

THALLIUM

Health Effects

There is no evidence that thallium is carcinogenic in humans or experimental animals, and it does not appear to have significant mutagenic activity. Exposure to thallium salts during critical developmental stages is reported to produce achondioplasia in chickens and rats. No other significant teratogenic effects are reported.

Thallium, in the form of soluble compounds, is readily absorbed through the skin and gastrointestinal tract. Symptoms associated with acute poisoning in humans include gastrointestinal irritation; liver and kidney damage; pulmonary edema; degenerative changes in the adrenals, peripheral nervous system, and central nervous system; and ocular effects, including optic neuritis and, rarely, cataracts. The estimated lethal dose for humans is 8 to 12 mg/kg. In experimental animals, thallium compounds produce effects similar to those seen in humans. Rats appear to be particularly sensitive to the cataractogenic activity of thallium. Regardless of the specific thallium compound tested, rate of intake, or route of administration, LD_{50} values for a variety of species range from about 3 to 92 mg/kg.

Toxicity to Wildlife and Domestic Animals

Acute and chronic toxicity of thallium to freshwater aquatic life occurs at concentrations as low as 1,400 and 40 μg/liter, respectively. Acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,130 μg/liter. Toxic effects would be expected to occur at lower concentrations among species more sensitive than those tested. Bioconcentration factors ranged from about 11 for the mussel *Mytilus edulis* to about 1.5×10^5 for other freshwater and marine invertebrates. Values of about 1×10^5 are reported for marine and freshwater fish.

REFERENCES

The toxicological profiles presented in this document were prepared by several agencies and contractors. The best available information is summarized. For more detailed information, the reader is referred to the references provided.

Clement Associates, Inc., September 27, 1985. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites. Prepared for U.S. Environmental Protection Agency under subcontract to GCA Corporation, Bedford, Massachusetts.