US EPA RECORDS CENTER REGION 5
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Sauget Area 2 Sites Group
St. Louis, Missouri

Sauget Area 2

Human Health Risk Assessment
Sauget Area 2
Sauget, Illinois

Volume II: Appendices

ENSR Corporation
August 31, 2003
Document Number 06105-009-300

APPENDIX G

EVALUATION OF AMBIENT AIR MONITORING DATA

APPENDIX G
AMBIENT AIR MODELING DATA

This appendix provides the screening of the ambient air monitoring data collected at Sites P, Q, and R. Air samples were collected in the vicinity of Sites P, Q, and R and analyzed for VOCs, SVOCs, PCBs, dioxins, and metals. Air samples were collected over a 24-hour period during hot, dry conditions (August, 2002) conducive to air emissions of dust and volatiles. These data are compared to chronic screening levels as discussed in the HHRA Workplan (Appendix A). However, due to the one-time sample collection, these data are not quantitatively evaluated in the HHRA. As noted in the HHRA Workplan, the air pathway is addressed in the HHRA by modeling potential sources in soil, waste and groundwater (see Section 5.0). Ambient air sampling was conducted in the vicinity of Sites P, Q, and R to determine the tendency of site constituents to enter the atmosphere and local wind patterns. Figure 3-1 identifies the ambient air sampling locations.

Table G-1 presents the air concentrations and the comparison of each sample concentration to the PRGs for ambient air (USEPA, 2002b). Table G-2 presents the relatively few COPCs identified for the air samples. Benzene was identified as a COPC in every air sample. The screening level for benzene in air is very low (the Region 9 PRG is 0.23 ug/m^3). The site sample results range from 0.37 ug/m^3 to 7.8 ug/m^3. These results are consistent with average outdoor air levels of benzene across the US of 9.1 ug/m^3 (Shah and Singh, 1988).

References sited in this appendix are presented in Section 8 of the main text.

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-P-1									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.70E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.24E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	5.46E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	1.20E+00	1.10E+00	Yes	Yes	>Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	1.78E+00	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	2.50E-01	1.70E+00	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.98E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	2.40E-02	2.20E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	1.70E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	4.70E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	5.20E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	9.80E-05	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	9.80E-04	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	6.16E-11	4.50E-08	No	No	</=Screening Level
Metals									
Sodium	7440-23-5	ug/m3	1 : 1 : 1	100	1.10E+00	NA	--	No	Screening Level NA

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-P-2									
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/m3	1 : 1 : 1	100	1.40E-01	2.30E+02	No	No	</=Screening Level
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.41E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.01E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	4.22E-01	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	2.65E-01	3.10E-01	No	No	</=Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.48E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	2.13E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	1.86E-01	1.70E+00	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	5.04E-01	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.84E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	6.00E-02	2.20E+01	No	No	</=Screening Level
Fluoranthene	206-44-0	ug/m3	1 : 1 : 1	100	2.50E-02	1.50E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	4.00E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	7.40E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	1.20E-01	1.10E+02	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	9.60E-05	1.50E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	6.17E-09	4.50E-08	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-P-3									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.70E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.37E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	4.89E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.54E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	5.77E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	2.81E-01	1.70E+00	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	7.73E-01	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	2.34E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	1.90E-02	2.20E+01	No	No	</=Screening Level
Fluoranthene	206-44-0	ug/m3	1 : 1 : 1	100	2.00E-02	1.50E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	1.90E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	3.30E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	1.00E-01	1.10E+02	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	2.00E-04	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	1.89E-09	4.50E-08	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-P-4									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.45E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.26E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	3.77E-01	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	3.15E-01	3.10E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.70E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	3.72E+00	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	1.61E-01	1.70E+00	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.56E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	2.90E-02	2.20E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	2.00E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	4.70E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	5.00E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
alpha-BHC	319-84-6	ug/m3	1 : 1 : 1	100	1.30E-04	1.10E-03	No	No	</=Screening Level
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	1.10E-04	1.50E-03	No	No	</=Screening Level
Heptachlor Epoxide	1024-57-3	ug/m3	1 : 1 : 1	100	8.30E-05	7.40E-04	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	2.10E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	6.19E-11	4.50E-08	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-1									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	3.60E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	2.24E+00	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.63E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	2.08E+00	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	1.00E+00	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	7.95E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	6.10E-01	1.70E+00	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	7.40E-01	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.92E+00	1.10E+01	No	No	</=Screening Level
Styrene (Monomer)	100-42-5	ug/m3	1 : 1 : 1	100	1.18E+00	1.10E+02	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	6.40E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	2.90E-02	2.20E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	1.70E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	7.40E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	2.90E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
delta-BHC	319-86-8	ug/m3	1 : 1 : 1	100	1.10E-04	5.20E-03	No	No	</=Screening Level
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	8.30E-05	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	1.10E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	8.44E-09	4.50E-08	No	No	</=Screening Level
Metals									
Barium	7440-39-3	ug/m3	1 : 1 : 1	100	3.60E-02	5.20E-02	No	No	</=Screening Level
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	2.00E-01	NA	--	No	Screening Level NA

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-2									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.97E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	2.99E+00	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.33E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	1.29E+00	2.30E-01	Yes	Yes	>Screening Level
Chlorobenzene	108-90-7	ug/m3	1 : 1 : 1	100	1.65E+00	6.20E+00	No	No	</=Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.00E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	1.50E+00	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	3.70E-01	1.70E+00	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.03E+00	1.10E+01	No	No	</=Screening Level
Styrene (Monomer)	100-42-5	ug/m3	1 : 1 : 1	100	1.34E+00	1.10E+02	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	4.11E+00	4.00E+01	No	No	</=Screening Level
Trichloroethylene	79-01-6	ug/m3	1 : 1 : 1	100	1.51E+00	1.70E-02	Yes	Yes	>Screening Level
Pesticide									
beta-BHC	319-85-7	ug/m3	1 : 1 : 1	100	9.90E-05	3.70E-03	No	No	</=Screening Level
Endrin Aldehyde	7421-93-4	ug/m3	1 : 1 : 1	100	1.50E-04	1.10E-01	No	No	</=Screening Level
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	1.10E-04	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	8.20E-04	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	4.46E-09	4.50E-08	No	No	</=Screening Level
Metals									
Barium	7440-39-3	ug/m3	1 : 1 : 1	100	3.50E-02	5.20E-02	No	No	</=Screening Level
Copper	7440-50-8	ug/m3	1 : 1 : 1	100	5.40E-02	1.46E+01	No	No	</=Screening Level
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.50E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.50E-02	1.50E+00	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-3									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.48E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.63E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	5.34E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	8.71E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	4.72E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	3.69E-01	1.70E+00	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	4.95E-01	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.20E+00	1.10E+01	No	No	</=Screening Level
Styrene (Monomer)	100-42-5	ug/m3	1 : 1 : 1	100	4.01E-01	1.10E+02	No	No	</=Screening Level
Tetrachloroethene	127-18-4	ug/m3	1 : 1 : 1	100	2.77E-01	6.70E-01	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	1.10E-04	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	5.40E-04	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	6.00E-09	4.50E-08	No	No	</=Screening Level
Metals									
Barium	7440-39-3	ug/m3	1 : 1 : 1	100	3.70E-02	5.20E-02	No	No	</=Screening Level
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.90E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.50E-02	1.50E+00	No	No	</=Screening Level

TABLE G-1
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HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-4									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.57E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	5.37E-01	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	8.77E+00	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	9.94E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	8.82E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	5.87E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	2.32E-01	1.70E+00	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	7.34E-01	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	2.32E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	2.70E-02	2.20E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	2.00E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	6.30E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	3.40E-02	1.10E+02	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	2.76E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	1.02E-08	4.50E-08	No	No	</=Screening Level
Metals									
Barium	7440-39-3	ug/m3	1 : 1 : 1	100	3.15E-02	5.20E-02	No	No	</=Screening Level
Copper	7440-50-8	ug/m3	1 : 1 : 1	100	6.30E-02	1.46E+01	No	No	</=Screening Level
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	2.80E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.25E-02	1.50E+00	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-5									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.24E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.26E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	1.59E+00	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	8.76E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	4.90E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	2.18E-01	1.70E+00	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	2.17E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	1.60E-01	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	2.20E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
gamma-Chlordane	5103-74-2	ug/m3	1 : 1 : 1	100	9.10E-05	1.90E-02	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	9.00E-03	3.40E-03	Yes	Yes	>Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	3.00E-09	4.50E-08	No	No	</=Screening Level
Metals									
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.40E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.60E-02	1.50E+00	No	No	</=Screening Level
Zinc	7440-66-6	ug/m3	1 : 1 : 1	100	5.40E-02	1.10E+02	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-6									
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/m3	1 : 1 : 1	100	1.43E-01	2.30E+02	No	No	</=Screening Level
1,2-Dichloroethane	107-06-2	ug/m3	1 : 1 : 1	100	1.77E-01	7.40E-02	Yes	Yes	>Screening Level
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	2.63E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	7.29E-01	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.28E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	8.42E-01	2.30E-01	Yes	Yes	>Screening Level
Chlorobenzene	108-90-7	ug/m3	1 : 1 : 1	100	2.38E-01	6.20E+00	No	No	</=Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	8.97E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	1.47E+00	4.10E+00	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	5.56E-01	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.96E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	4.15E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	3.30E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
beta-BHC	319-85-7	ug/m3	1 : 1 : 1	100	1.11E-04	3.70E-03	No	No	</=Screening Level
Endrin Aldehyde	7421-93-4	ug/m3	1 : 1 : 1	100	1.75E-04	1.10E-01	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	1.13E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	4.84E-09	4.50E-08	No	No	</=Screening Level
Metals									
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.60E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.30E-02	1.50E+00	No	No	</=Screening Level
Zinc	7440-66-6	ug/m3	1 : 1 : 1	100	5.00E-02	1.10E+02	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-7									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.08E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	3.33E-01	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	9.05E+00	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	6.00E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	7.81E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	4.50E-01	4.10E+00	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.34E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	6.40E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	2.00E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	8.80E-05	1.50E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	8.38E-09	4.50E-08	No	No	</=Screening Level
Metals									
Calcium	7440-70-2	ug/m3	1 : 1 : 1	100	3.10E+00	NA	--	No	Screening Level NA
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	2.30E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.10E-02	1.50E+00	No	No	</=Screening Level
Zinc	7440-66-6	ug/m3	1 : 1 : 1	100	5.80E-02	1.10E+02	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-Q-8									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.80E+00	1.00E+02	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.27E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	5.14E-01	2.30E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	7.60E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	5.04E-01	4.10E+00	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	1.24E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	1.70E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	1.50E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	9.90E-05	1.50E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	2.47E-09	4.50E-08	No	No	</=Screening Level
Metals									
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	2.00E-01	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.20E-02	1.50E+00	No	No	</=Screening Level
Zinc	7440-66-6	ug/m3	1 : 1 : 1	100	5.00E-02	1.10E+02	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-R-1									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	1.90E+01	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	6.19E+00	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.01E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	1.35E+00	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	4.39E-01	3.10E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	8.18E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	4.65E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	4.39E-01	1.70E+00	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	4.95E-01	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.29E+00	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	4.60E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	1.80E-02	2.20E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	3.60E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	4.50E-02	1.10E+02	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	9.80E-04	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	9.61E-09	4.50E-08	No	No	</=Screening Level
Metals									
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.20E-01	NA	--	No	Screening Level NA
Sodium	7440-23-5	ug/m3	1 : 1 : 1	100	1.20E+00	NA	--	No	Screening Level NA

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-R-2									
VOCs									
1,1,1-Trichloroethane	71-55-6	ug/m3	1 : 1 : 1	100	2.48E-01	2.30E+02	No	No	</=Screening Level
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	2.91E+01	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	8.68E+00	8.30E+00	Yes	Yes	>Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.20E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	2.00E+00	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	4.66E-01	3.10E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.11E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	4.65E-01	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	5.04E-01	1.70E+00	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	5.91E-01	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.59E+00	1.10E+01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	4.97E+00	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	3.00E-02	2.20E+01	No	No	</=Screening Level
Fluoranthene	206-44-0	ug/m3	1 : 1 : 1	100	2.70E-02	1.50E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	2.00E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	4.10E-02	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	1.10E-01	1.10E+02	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	4.20E-03	3.40E-03	Yes	Yes	>Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	3.09E-09	4.50E-08	No	No	</=Screening Level
Metals									
Copper	7440-50-8	ug/m3	1 : 1 : 1	100	5.00E-02	1.46E+01	No	No	</=Screening Level
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	2.70E+00	NA	--	No	Screening Level NA
Lead	7439-92-1	ug/m3	1 : 1 : 1	100	1.20E-02	1.50E+00	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-R-3									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	2.00E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	1.31E+00	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.40E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	7.80E+00	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	6.98E-01	3.10E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.54E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	1.04E+00	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	2.90E+00	1.70E+00	Yes	Yes	>Screening Level
Methyl tert-butyl ether (MTBE)	1634-04-4	ug/m3	1 : 1 : 1	100	6.71E-01	1.92E+01	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	3.55E+00	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	9.77E+00	1.10E+01	No	No	</=Screening Level
Styrene (Monomer)	100-42-5	ug/m3	1 : 1 : 1	100	5.88E-01	1.10E+02	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	2.59E+01	4.00E+01	No	No	</=Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	4.00E-02	2.20E+01	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	2.70E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	2.20E-01	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	6.30E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
alpha-BHC	319-84-6	ug/m3	1 : 1 : 1	100	9.00E-05	1.10E-03	No	No	</=Screening Level
beta-BHC	319-85-7	ug/m3	1 : 1 : 1	100	8.20E-05	3.70E-03	No	No	</=Screening Level
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	1.00E-04	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	2.00E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	3.38E-09	4.50E-08	No	No	</=Screening Level
Metals									

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
Iron	7439-89-6	ug/m3	1 : 1 : 1	100	1.00E-01	NA	--	No	Screening Level NA

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason
AIR-R-4									
VOCs									
2-Butanone (MEK)	78-93-3	ug/m3	1 : 1 : 1	100	6.49E+00	1.00E+02	No	No	</=Screening Level
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/m3	1 : 1 : 1	100	9.05E-01	8.30E+00	No	No	</=Screening Level
Acetone	67-64-1	ug/m3	1 : 1 : 1	100	1.84E+01	3.70E+01	No	No	</=Screening Level
Benzene	71-43-2	ug/m3	1 : 1 : 1	100	3.67E+00	2.30E-01	Yes	Yes	>Screening Level
Chloroform	67-66-3	ug/m3	1 : 1 : 1	100	4.97E-01	3.10E-01	Yes	Yes	>Screening Level
Chloromethane	74-87-3	ug/m3	1 : 1 : 1	100	9.16E-01	1.10E+00	No	No	</=Screening Level
Dichloromethane	75-09-2	ug/m3	1 : 1 : 1	100	1.14E+00	4.10E+00	No	No	</=Screening Level
Ethylbenzene	100-41-4	ug/m3	1 : 1 : 1	100	5.40E-01	1.70E+00	No	No	</=Screening Level
o-Xylene	95-47-6	ug/m3	1 : 1 : 1	100	6.10E-01	1.10E+01	No	No	</=Screening Level
p-Xylene/m-Xylene	106-42-3	ug/m3	1 : 1 : 1	100	1.59E+00	1.10E+01	No	No	</=Screening Level
Styrene (Monomer)	100-42-5	ug/m3	1 : 1 : 1	100	4.94E-01	1.10E+02	No	No	</=Screening Level
Tetrachloroethene	127-18-4	ug/m3	1 : 1 : 1	100	3.36E-01	6.70E-01	No	No	</=Screening Level
Toluene	108-88-3	ug/m3	1 : 1 : 1	100	5.62E+00	4.00E+01	No	No	</=Screening Level
Trichloroethylene	79-01-6	ug/m3	1 : 1 : 1	100	4.70E-01	1.70E-02	Yes	Yes	>Screening Level
SVOCs									
Acenaphthene	83-32-9	ug/m3	1 : 1 : 1	100	2.80E-02	2.20E+01	No	No	</=Screening Level
Anthracene	120-12-7	ug/m3	1 : 1 : 1	100	3.82E-02	1.10E+02	No	No	</=Screening Level
Fluorene	86-73-7	ug/m3	1 : 1 : 1	100	2.13E-02	1.50E+01	No	No	</=Screening Level
Naphthalene	91-20-3	ug/m3	1 : 1 : 1	100	1.40E-01	3.10E-01	No	No	</=Screening Level
Phenanthrene	85-01-8	ug/m3	1 : 1 : 1	100	5.20E-02	1.10E+02	No	No	</=Screening Level
Pesticide									
Heptachlor	76-44-8	ug/m3	1 : 1 : 1	100	6.70E-05	1.50E-03	No	No	</=Screening Level
PCBs									
Total PCBs	1336-36-3	ug/m3	1 : 1 : 1	100	1.03E-03	3.40E-03	No	No	</=Screening Level
Dioxin									
2,3,7,8-TCDD-TEQ	1746-01-6	ug/m3	1 : 1 : 1	100	2.92E-09	4.50E-08	No	No	</=Screening Level

TABLE G-1
AMBIENT AIR SCREEN
HUMAN HEALTH RISK ASSESSMEN
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	Units	FOD (a)	% FOD (b)	Detected Concentration (c)	Ambient Air Screening Level (d)	Is Detected Concentration > Screening Value?	COPC? (e)	Reason

Notes:

BKG - Background concentration.
CAS - Chemical Abstracts Service.
COPC - Constituent of potential concern.
FOD - Frequency of detection.
NA - Not available.
PCB - Polychlorinated Biphenyl.
-- Not applicable.
SVOC - Semivolatile organic compound.
TCDD-TEQ - 2,3,7,8-Tetrachlorodibenzo-p-dioxin Toxic Equivalence Concentration.
USEPA - United States Environmental Protection Agency.
VOC - Volatile Organic Compound.
(a) Frequency of Detection = Number of detected samples: Number of samples used to calculate statistics: Total number of samples.
(b) Percent of detected samples out of samples used to calculate statistics. Constituents detected in fewer than 5 percent of samples, provided 20 samples are available, will not be included as COPCs.
(c) The detected concentration for a constituent for each medium/area combination after sample/duplicate pairs were averaged.
(d) USEPA, 2002. *Region 9 Preliminary Remediation Goal (PRG) Table. October 1, 2002. Value for Ambient Air. If no PRG is available, the* USEPA, 2003. *Region 3 Risk-Based Concentration (RBC) Table, Value for* Ambient air is used. The screening value for lead is the primary standard from the National Ambient Air Quality Standards (NAAQS), 2003.
(e) A constituent is identified as a COPC if it is detected in greater than 5 percent of samples, provided 20 samples are available, if the maximum detected concentration is greater than the background concentration and if the detected concentration is greater than the ambient air screening level.

TABLE G-2
SUMMARY OF COPCS IN AMBIENT AIR
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Constituent	CAS	P-1	P-2	P-3	P-4	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	R-1	R-2	R-3	R-4
VOCs																	
1,2-Dichloroethane	107-06-2										X						
4-Methyl-2-pentanone (MIBK)	108-10-1														X		
Benzene	71-43-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chloroform	67-66-3				X									X	X	X	X
Chloromethane	74-87-3	X															
Ethylbenzene	100-41-4															X	
Trichloroethylene	79-01-6						X										X
PCBs																	
Total PCBs	1336-36-3									X					X		
Total:		**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**4**	**3**	**3**

Notes:

CAS - Chemical Abstracts Service.
COPC - Constituent of Potential Concern.
PCB - Polychlorinated Biphenyl.
VOC - Volatile organic compound.

APPENDIX H

ABSORPTION ADJUSTMENT FACTORS

Default **2**
Volatile Organic Constituents **4**
BENZENE 5
CHLOROFORM 6
METHYLENE CHLORIDE 9
Semi-Volatile Organic Constituents **10**
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) 11
BIS(2-ETHYLHEXYL)PHTHALATE (BEHP) 15
HEXACHLOROBENZENE 17
POLYCHLORINATED BIPHENYLS **18**
POLYCHLORINATED BIPHENYLS 19
Dioxins **26**
Dioxins 27
Metals **33**
ANTIMONY 34
ARSENIC 35
BARIUM 41
BERYLLIUM 42
CADMIUM 43
CHROMIUM VI 48
Cobalt 56
COPPER 57
MANGANESE 58
INORGANIC MERCURY 59
NICKEL 66
THALLIUM 70
VANADIUM 71
ZINC 72

DEFAULT

For the majority of constituents, specific information regarding absorption in humans is lacking. For these constituents, it is assumed that absorption is complete (i.e., 100%) and is the same in humans and study animals for drinking water, diet, and soil ingestion exposures. Therefore, the AAF (oral-water), AAF (oral-diet), and the AAF (oral-soil) are all (100%)/(100%) = 1.

A recommended default value for organics of 1% absorption from dermal exposures to soil and sediment has been used (USEPA, 2000). Thus, the default AAF for organic constituents (dermal-soil/sediment) is (1%/100%) = 0.01.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For constituents lacking specific information, the default AAF (dermal-water) is 100%/100% = 1.

It is assumed that absorption in humans is similar to that of study animals. Therefore, the default AAF (inhalation) is 1.

Summary of Default AAFs for Organic Constituents

Oral-water	1
Oral-diet	1
Oral-soil	1
Dermal-soil	0.01
Dermal-water	1
Inhalation	1

References

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

Default AAFs apply to the following Constituents of Potential Concern (COPCs):

Volatile Organic Constituents
1,1,2-Trichloroethane
1,2-Dichloroethane
1,2-Dichloroethene (total)
2-Butanone (MEK)
4-Methyl-2-pentanone (MIBK)
Acetone
Chlorobenzene
Chloromethane
Ethylbenzene
Tetrachloroethene
Toluene
Trichloroethylene
Xylenes, Total

Semi-Volatile Constituents
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2-Chlorophenol
2-Nitroaniline
3-Methylphenol/4-Methylphenol
4-Chloroaniline
4-Nitroaniline
bis(2-Chloroethyl)ether
Nitrobenzene
Phenol

Pesticides
4,4'-DDE
4,4'-DDT
Aldrin
alpha-BHC
alpha-Chlordane
beta-BHC
delta-BHC
Dieldrin
Endrin Ketone
gamma-BHC (Lindane)
Heptachlor
Heptachlor epoxide

Herbicides
2,4,5-T
2,4-D
MCPA
MCPP
Pentachlorophenol

VOLATILE ORGANIC CONSTITUENTS

BENZENE

The oral cancer slope factor range for benzene (0.015 to 0.055 $(mg/kg\text{-}day)^{-1}$) is based on inhalation data from an occupational epidemiological study. (USEPA, 2003) The oral RfD for benzene of 4E-03 mg/kg-day is also based on inhalation data from an occupational epidemiological study (USEPA, 2003). Therefore, it is assumed that 47% of an ingested dose will be absorbed, as determined below for an inhaled dose. Based on absorption information on other volatile organic compounds, it is assumed that absorption is the same in humans for inhalation and drinking water, diet, and soil or sediment ingestion exposures. Thus the AAF (oral-water), the AAF (oral-diet), and the AAF (oral-soil) are all 1 for potential carcinogenic and noncarcinogenic effects.

ENSR has used a recommended default value for organics of 1% for dermal absorption of benzene from soil and sediment (USEPA, 2000). Thus, the AAF (dermal-soil) is (1%)/(47%) = 0.02 for both potential carcinogenic and noncarcinogenic effects.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For benzene, the AAF (dermal-water) is (100%)/(47%) = 2.13 for both potential carcinogenic and noncarcinogenic effects.

The inhalation CSF range for benzene of 0.0077 to 0.0273 $(mg/kg\text{-}day)^{-1}$ is based on epidemiological studies of humans exposed by inhalation (USEPA, 2003). The inhalation RfC of 0.03 mg/m^3, which is equivalent to an inhalation RfD of 0.00857 mg/kg-day, is also based on inhalation data from an occupational epidemiological study (USEPA, 2003). Several studies in humans indicate that about 47% of an inhalation dose is absorbed, with a range between 28% to 60% (Owen, 1990). Since both the study used to derive the CSF and the exposure pathway of concern are inhalation of benzene by humans, the AAF (inhalation) for carcinogenic and noncarcinogenic effects is 1.

Summary of AAFs for Benzene

Oral-water	1
Oral-diet	1
Oral-soil	1
Dermal-soil	0.02
Dermal-water	2.13
Inhalation	1

References

Owen, B.A. 1990. Literature-Derived Absorption Coefficients for 39 Chemicals via Oral and Inhalation Routes of Exposure. Reg. Toxicol. Pharmacol. 11:237-252.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

CHLOROFORM

The oral RfD (1E-02 mg/kg-day) is based on a feeding study in dogs with the chloroform in a toothpaste matrix. The oral RfD is protective of both noncarcinogenic and potentially carcinogenic effects via the oral route of exposure (USEPA, 2003). ATSDR (1988) and USEPA (1984) both report that absorption of chloroform by the gastrointestinal tract is complete regardless of vehicle. Thus, absorption in the dose-response studies is assumed to be 100%. Therefore, it is assumed that absorption is the same in animals and humans for gavage, drinking water, diet, soil, and sediment ingestion exposures. Thus, the AAF (oral-water), the AAF (oral-diet), and the AAF (oral-soil) are all 1.

ENSR has used a recommended default value for VOCs of 1% for dermal absorption from soil (USEPA, 2000). Thus, the AAF (dermal-soil/sediment) is (1%)/(100%) = 0.01.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For chloroform, the AAF (dermal-water) is (100%)/(100%) = 1.

The inhalation CSF for chloroform (8.1E-02 $(mg/kg\text{-}day)^{-1}$) provided in IRIS (USEPA, 2003) is based on a corn oil gavage study in mice. The CSF is defined in units of metabolized dose. Thus, the exposure dose of the risk assessment must be adjusted to a metabolized dose. In this case, the AAF is defined as the fraction of an inhalation exposure dose that is metabolized by humans. Adjusting the exposure dose by multiplying it by this AAF will yield an estimated human metabolized dose. This estimate can be multiplied by the cancer slope factor to yield an estimate of cancer risk.

Experimental data show that humans inhaling chloroform absorb and metabolize it differently than do rodents who receive it by gavage or by drinking water. First, although 100% absorption of chloroform in humans upon inhalation is assumed by USEPA (USEPA, 2003), the uptake of chloroform from inspired air in humans is less than 100%. Astrand and Gamberale (1978) measured the uptake of several fat soluble gases in 45 humans and found that the uptake of the gas into the body approaches zero as the alveolar concentration approaches the concentration in the inspired air. Morgan et al. (1970) found a similar result. In their experiments, they gave humans a single breath of radiolabelled chloroform, which was held for 20 seconds. Subjects were instructed to exhale twice before measurements were taken. Absorption would be expected to be high in such an experiment because the blood chloroform and alveolar concentrations of chloroform were zero. Indeed, 5.5% of the dose was exhaled immediately and 94.5% was taken up. After one hour, 10% of the dose had been exhaled unchanged. Thus, the metabolized dose could have been no higher than 90% and was probably substantially lower due to fat storage.

Retention and metabolism of inhaled chloroform would be expected to be lower in cases of continuous or intermittent exposures, versus the single exposure as studied by Morgan et al. (1970). The net rate of absorption will be reduced as the concentration of chloroform builds up in the blood. This was also demonstrated with exposure of humans to methylene chloride at a constant concentration (Morgan et al., 1970). The concentration in the expired air increased rapidly during the first hour and then plateaued. Thus, after equilibrium had been attained, the rate of absorption was low.

Two studies are available that measured the amount of chloroform retained in the body after continuous exposures. Davidson et al. (1982) reported the results of Lehmann and Hasegawa who measured the retention of chloroform during anaesthetic exposures. The method of analysis was a measurement of chloride in inspired and expired air. The average reported retention was 64% of the administered dose at 20 minutes, which was reported to be an equilibrium value. Retention in this case is a measure of metabolism and storage. Thus, using retention as a surrogate for metabolism will overestimate metabolized dose.

Smith et al. (1973) presented similar data. They measured chloroform in arterial blood and venous blood by a gas chromatographic method. Davidson et al. (1982) calculated from these data that retention was 67%. The average of these two values (65.5%) can be taken as an estimate of the retention of chloroform in humans who are inhaling it continuously or intermittently.

As noted above, human experimental data indicates that approximately 66% of an inhaled dose is retained and therefore that a maximum of 66% of a continuously inhaled dose of chloroform is metabolized. Thus, the AAF (inhalation) for potential carcinogenic effects is 0.66 and exposure doses in risk assessments must be multiplied by 0.66 to convert the exposure dose into an appropriate estimate of the metabolized dose.

The NCEA (1/22/03) provides an inhalation RfC for chloroform of 0.05 mg/m^3 (0.0143 mg/kg-day). Due to a lack of information on what the value is based on, it is assumed that the AAF (inhalation) for noncarcinogenic effects is 1.

Summary of AAFs for Chloroform

Oral-Water	1
Oral-Diet	1
Oral-Soil	1
Dermal-Soil	0.01
Dermal-Water	1
Inhalation	0.66 (carcinogenic effects) 1 (noncarcinogenic effects)

REFERENCES

ATSDR. 1988. Toxicological Profile for Chloroform. U.S. Agency for Toxic Substances and Disease Registry, Atlanta, GA. PB89-160360.

Astrand, I. and F. Gamberale. 1978. Effects on Humans of Solvents in the Inspiratory Air: A Method for Estimation of Uptake. Environmental Research, Vol. 15: 1-4.

Morgan, A., A. Black, and D.R. Belcher. 1970. The Excretion in Breath of some Aliphatic Halogenated Hydrocarbons Following Administration by Inhalation. Ann. Occup. Hyg., Vol. 13: 219-233.

NCEA. 1997. Derivation of a Provisional RfC for Chloroform. December 1, 1997.

Davidson, T.W.F., D.D. Sumner and J.C. Parker. 1982. Chloroform: A review of its metabolism, teratogenic, mutagenic, and carcinogenic potential. Drug Chem. Toxicol., Vol. 5(1): 1-87.

Smith, A.A., P.O. Volpitto, Z.W. Gramling, M.B. DeVore, A.R. Glassman. 1973. Chloroform halothane, and regional anesthesia. A comparative study. Anesth Analg (Cleveland), Vol. 52:1-11.

USEPA. 1984. Health Assessment Document for Chloroform.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00. May 2000. [URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

METHYLENE CHLORIDE

The oral CSF for methylene chloride (7.5E-03 $(mg/kg/day)^{-1}$) is based on drinking water and inhalation studies in mice. The oral RfD (6E-02 mg/kg/day) is based on a drinking water study in rats. Therefore, the derived AAFs for oral and dermal exposure routes will be the same for evaluating both carcinogenic and noncarcinogenic effects. The USEPA (1985) reports that absorption of methylene chloride by the gastrointestinal tract is high regardless of vehicle. Based on this information and other absorption information on other volatile organic compounds, it is assumed that absorption is the same in animals and humans for gavage, drinking water, inhalation, and soil or sediment ingestion exposures. Thus, the AAF (oral-water), the AAF (oral-diet), and the AAF (oral-soil) are 1.

A recommended default value for VOCs of 1% was assumed for dermal absorption of methylene chloride from soil and sediment (USEPA, 2000). An estimate of the gastrointestinal absorption of methylene chloride in the dose-response studies was derived from the USEPA (1985) in which several absorption estimates were listed. The average of four estimates was 63%. Thus, the AAF (dermal-soil) is (1%/63%) = 0.016.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. Be definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined (100%)/(estimated absorption in the dose-response study). For methylene chloride, the AAF (dermal-water) is (100%)/(63%) = 1.6.

The inhalation RfC, 3.0 mg/m^3 (8.57E-01 mg/kg/day), is derived from an inhalation study in rats. It is assumed that absorption of methylene chloride in humans is the same as in the rats used in the dose-response study. Thus the AAF (inhalation) is 1 for noncarcinogenic effects. The inhalation cancer unit risk factor for methylene chloride is 4.7E-07 per $(\mu g/m^3)^{-1}$, equivalent to 1.65E-03 $(mg/kg/day)^{-1}$). It is derived from an inhalation study in mice. This value was derived by incorporating a physiologically based pharmacokinetic model to account for extrapolation of metabolism at high doses to low doses. It is assumed that no further adjustments are required, so the AAF (inhalation-vapor, inhalation) is 1 for cancer risk.

Summary of AAFs for Methylene Chloride

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	1.0
Dermal-Soil	0.016
Dermal-Water	1.6
Inhalation	1.0 (for both carcinogenic and noncarcinogenic effects)

REFERENCES

U.S. EPA. 1985. Health Assessment Document for Dichloromethane (Methylene Chloride). Final Report. Office of Health and Environmental Assessment, Washington, D.C. EPA/600/8-82/004F.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00. [URL:http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

SEMI-VOLATILE ORGANIC CONSTITUENTS

POLYCYCLIC AROMATIC HYDROCARBONS (PAH)

The majority of the information presented below was derived from a paper entitled Absorption Adjustment Factor (AAF) Distributions for Polycyclic Aromatic Hydrocarbons (PAHs) (Magee et al., 1996).

These AAFs are appropriate for use with the following dose-response values for PAH:

- The oral cancer slope factor (CSF) for benzo(a)pyrene (BAP) of 7.3 $(mg/kg\text{-}day)^{-1}$ (USEPA, 2003) and the adjusted CSF for the remaining potentially carcinogenic PAH (cPAH) using the following relative potency factors (USEPA, 1993):

PAH	Relative Potency Factor
Benzo(a)pyrene	1
Benzo(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenzo(a,h)anthracene	1
Indeno(1,2,3-cd)pyrene	0.1

- The inhalation CSF for BAP of 3.1 $(mg/kg\text{-}day)^{-1}$ (USEPA, 1994) and the adjusted CSF for the remaining potentially carcinogenic PAH using the relative potency factors listed above.

- The oral reference doses (RfDs) available from USEPA (2003) for the noncarcinogenic PAHs (ncPAHs): acenaphthene (0.06 mg/kg-day), anthracene (0.3 mg/kg-day), fluoranthene (0.04 mg/kg-day), fluorene (0.04 mg/kg-day), naphthalene (0.02 mg/kg-day) and pyrene (0.03 mg/kg-day).

- The inhalation reference concentration (RfC) available from USEPA (2003) for naphthalene of 3E-3 mg/m^3, which is equivalent to an RFD of 9E-04 mg/kg-day.

Absorption in the Dose-Response Studies

In the studies used to develop the CSF for BAP, BAP was administered in the diet. Corn oil gavage was used to administer doses in the RfD studies. The Magee et al. (1996) paper summarizes studies on the gastrointestinal absorption of PAHs, and develops a point estimate for gastrointestinal absorption in the dose-response studies of 92%, which is the average of 13 data points from six studies.

Oral-Soil AAF

cPAHs. An oral-soil AAF of 0.29 is used for cPAHs. This value is based on a review of six available studies of PAHs performed in vivo, as summarized in Magee et al. (1996). Three studies that evaluated gastrointestinal (oral) absorption of PAHs from a soil matrix (Goon et al., 1991; Rozett at al., 1996; and Weyand et al., 1996) were deemed appropriate for use for developing an oral-soil AAF. The Rozett et al. (1996) study evaluated the bioavailability of pyrene from aged soil from manufactured gas plant residue (coal tar). The oral AAFs based on this study range from 0.07 to 0.76, with an average of 0.26. Weyand et al. (1996) also evaluated the oral bioavailability of pyrene from manufactured gas plant residue. The oral AAFs based on this study range from 0.11 to 0.36, with an average of 0.23. The last study, Goon et al. (1991) evaluated the bioavailability of BAP adsorbed to "aged" soil (clay-based and sand-based soils). These aged soils were treated with BAP and allowed to age 1 to 30 days, and 6 months to 1 year. The oral AAF for clay-based soil is 0.37

and that for sand-based soils is 0.57. A probabilistic (Monte Carlo) analysis, using 12 estimates of the AAF from all three studies, results in a 50th percentile oral-soil AAF of 0.27, with an upper 90th percentile value of 0.57. The Magee et al. (1996) paper recommends the use of a point-estimate oral-soil AAF of 0.29, which is the arithmetic mean of the point estimates used to develop the distribution.

ncPAHs. Magee et al. (1996) states that the oral absorption of cPAH and ncPAH is similar, therefore, it is appropriate to use the value derived above, 0.29, for the risk evaluation for ncPAHs.

Dermal-Soil AAF

cPAHs. A dermal-soil AAF of 0.02 is used for cPAHs. This value is based on the data from two studies (Yang et al., 1989; Wester et al., 1990). Yang et al. (1989) evaluated the percutaneous absorption of BAP from petroleum crude-fortified soils in vivo in rats and in vitro using excised rat skin. Estimates of absorption were made at 24, 48, 72 and 96 hours. In vivo absorption ranged from 1.1% to 9.2%, and in vitro absorption ranged from 1.5% to 8.4%. Wester et al. (1990) evaluated the percutaneous absorption of BAP added to soil (unaged) in vivo in Rhesus monkeys and in vitro using human cadaver skin, both for 24-hour exposures. Absorption in monkey skin ranged from 10.8% to 18.0% with an average of 13.2%. Absorption in human skin ranged from 0.31% to 3.01% and averaged 1.45%. Because the 24+ hour exposures are not directly relevant to human health risk assessment the data points were adjusted to reflect a 12-hour exposure period assuming absorption is linear between 0 and 24 hours. A probabilistic (Monte Carlo) analysis, using the in vivo and in vitro 24-hour data points (four), adjusted for a 12-hour exposure, from both studies, results in a 50th percentile dermal-soil AAF of 0.02, and an upper 90th percentile value of 0.06. The Magee et al. (1996) paper recommends the use of a point-estimate dermal-soil AAF of 0.02, which is the arithmetic mean of the point estimates used to develop the distribution. It should be noted that one of the authors of the Wester et al. (1990) study, and a well recognized expert in dermatotoxicology, Dr. Howard I. Maibach, M.D., believes that human skin in vitro is a better model of human exposures than any in vivo animal model. If the human skin data were used alone, an AAF of 0.015 would result.

ncPAHs. Dermal absorption data for ncPAHs are summarized by Magee et al. (1996). Although the dermal absorption efficiency of ncPAHs varies from 1x to 100x that of BAP, these data are from studies of ncPAHs applied in solution, not in a soil matrix. The authors have applied a uniform distribution for a standard USEPA default uncertainty factor of 10 that ranges from 1 to 10, to the distribution of dermal-soil AAF for cPAHs. A probabilistic (Monte Carlo) analysis results in a 50th percentile dermal-soil AAF of 0.09, and an upper 90th percentile value of 0.36. The Magee et al. (1996) paper recommends a point estimate value of 0.1 for the dermal-soil AAF for ncPAHs.

Oral-Water AAF

The oral-water AAF for ingestion of PAHs in water is derived from the study of Kawamura et al. (1988). Kawamura and co-workers studied the effects of various foods on the absorption of BAP in rats. The absorption ratio was defined as the ratio of the blood levels of BAP and its metabolites at 25 hours after oral dosing compared to the blood levels following an intravenous injection of the BAP. The "absorption ratio" in this study is an example of a relative bioavailability estimate, not a measure of absolute absorption, therefore, these values cannot be compared to the absorption information based on fecal excretion data presented in the Magee et al. (1996) paper. The absorption ratio for a suspension of BAP in water was found to be 25.7% in the Kawamura study. The absorption efficiency observed with solid foods such as cellulose, lignin, bread, rice flake, starch, potato flake, spinach, dried bonito, ovalbumin and soybean oil were observed to be very similar, varying from 20% to 29%, with a mean of 24.3%. The differences in absorption between the foodstuffs and water is not statistically different. BAP was also administered in two oil preparations in this experiment: triolein and soybean oil. The absorption ratios of 50.5% and 39.4%, respectively, were determined to be significantly different from the absorption ratios for the water and foodstuff

preparations. The average of these two values is 45%. However, none of the studies reviewed in Magee et al. (1996) observed a difference between absolute absorption of BAP in food and oils (corn, peanut, and olive).

cPAHs. The oral CSF for BAP is derived from rodent feeding studies. Because of the similarity in absorption of BAP from water and food in the Kawamura study, an oral-water AAF of 1.0 is recommended for use in the risk assessment for cPAHs.

ncPAHs. The RfD dose-response studies are all based on corn oil gavage administration. The Kawamura study demonstrates that absorption in oils is greater than absorption in food, and the following AAF can be calculated from this study: 25.7% / 45% = 0.6. However, because this is the only study of several reviewed that observed a difference in absorption between foodstuffs and oils, it will be assumed here that absorption is the same from water, oils and foodstuffs. Therefore, an oral-water AAF of 1.0 is recommended for use in the risk assessment for ncPAHs.

Oral-Diet AAF

The oral CSF and RfDs for PAHs are based on dietary and corn oil gavage studies in mice and rats. Hecht and coworkers (Hecht et al., 1979) fed BAP to both humans and rats and measured the unchanged BAP in the feces to obtain an estimate of the amount of the chemical absorbed. Because unchanged BAP in the feces can be due to absorbed material that is excreted unchanged in the bile, these studies reveal the minimum amount of BAP that was absorbed. It is known, however, that BAP is extensively metabolized. For rats, at least 87% of the BAP was absorbed for a low single dose in peanut oil (0.037 mg/kg) and at least 94% was absorbed for a high single dose in peanut oil (3.7 mg/kg). When rats were fed charcoal-broiled hamburger containing BAP, at least 89% was absorbed. In humans, a high percentage of BAP present in charcoal-broiled meat was also absorbed, because no unchanged BAP was detected in the feces. This study indicates that there is no difference in absorption between two dietary vehicles in rats. That is, absorption of BAP from peanut oil and meat was essentially the same. The results with rats and humans also indicates that there is no major difference in the gastrointestinal absorption of BAP between rats and humans. Therefore, the oral-diet AAF for both cPAHs and ncPAHs is 1.0, i.e., there are assumed to be no differences in absorption, not that absorption is 100%.

Dermal Water AAF

The Magee et al. (1996) paper summarizes studies on the gastrointestinal absorption of PAHs, and develops a point estimate for gastrointestinal absorption in the dose-response studies of 92%. The methodology used to evaluate dermal-water exposures calculates and absorbed dose (i.e., equivalent to 100% absorption). Thus gastrointestinal absorption of 92% is similar to the 100% dermal-water "absorption" for the PAHs. Therefore, a dermal-water AAF of 1 is recommended for use in the risk assessment for both cPAHs and ncPAHs.

Inhalation AAF

cPAHs.

The USEPA inhalation CSF for BaP of 3.1 $(mg/kg\text{-}day)^{-1}$ is a provisional value developed by the NCEA (USEPA, 1994); and the derivation of the value is not available. Due to a lack of information, it is assumed that the inhalation AAF is 1.

ncPAHs.

The RfC for naphthalene is based on an inhalation study in mice, where exposure occurred to a naphthalene aerosol. This study is likely to overestimate potential absorption and risk from exposure to naphthalene-containing soil particulates. However, due to lack of specific information, it is assumed that absorption in mice and humans is equivalent; therefore, the inhalation AAF is 1.

Summary of AAFs for PAHs

Oral-Water	cPAHs 1	ncPAHs	1
Oral-Diet	cPAHs 1	ncPAHs	1
Oral-Soil	cPAHs 0.29	ncPAHs	0.29
Dermal-Soil	cPAHs 0.02	ncPAHs	0.1
Inhalation	cPAHs 1	ncPAHs	1

References

Goon, D., N.S. Hatoum, J.D. Jernigan, S.L. Schmidt., and P.J. Garvin. 1990. Pharmacokinetics and Oral Bioavailability of Soil-Adsorbed Benzo(a)pyrene (B(a)P) in Rats. Toxicologist 10:218.

Hecht, S.S., W. Grabowski and K. Groth. 1979. Analysis of Feces for Benzo(a)pyrene After Consumption of Charcoal-Broiled Beef by Rats and Humans. Cosmet. Toxicol. 17:223-227.

Kawamura, J., E. Kamata, Y. Ogawa, T. Kaneko, S. Uchiyama and Y. Saito. 1988. The Effect of Various Foods on the Intestinal Absorption of Benzo(a)pyrene in Rats. J. Food Hyg. Soc. Japan 29:21-25.

Magee, B., P. Anderson, and D. Burmaster. 1996. Absorption Adjustment Factor (AAF) Distributions for Polycyclic Aromatic Hydrocarbons (PAHs). Human and Ecological Risk Assessment. 2(4):841-873.

Rozette, K. R. Singh, T. Roy, W. Neal, and E.H. Weyand. 1996. Bioavailability of chemical components of soil contaminated with manufactured gas plant residue. Fundam. Appl. Toxicol. 30, 1, Part 2.1

USEPA. 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.

USEPA. 1994. Risk Assessment Issue Paper: Status Of Inhalation Cancer Unit Risk For Benzo[a]Pyrene (CAS No. 50-32-8).

USEPA. 2003. Integrated Risk Information System. [URL: http://www.epa.gov/ngispgm3/iris/]

Wester, R.D., H.I. Maibach, D.A. Bucks, L. Sedik, J. Melendres, C. Liao, and S. DiZio. 1990. Percutaneous Absorption of [^{14}C]DDT and [^{14}C]benzo(a)pyrene from soil. Fundam. Appl. Toxicol. 15:510-516.

Weyand. E.H. K. Rozett, A. Koganit, and R. Singh. 1996. Effect of soil on the genotoxicity of manufactured gas plant residue. Fundam. Appl. Toxicol. 30, 1, Part 2.

Yang, J.J., T.A. Roy, A.J. Kreueger, W. Neil, and D.R. Mackerer. 1989. In vitro and In vivo Percutaneous Absorption of Benzo(a)pyrene from Petroleum Crude-fortified Soil in the Rat. Bull. Environ. Contam. Toxicol. 43:207-214.

BIS(2-ETHYLHEXYL)PHTHALATE (BEHP)

The U.S. EPA oral CSF for BEHP (1.4E-02 $(mg/kg\text{-}day)^{-1}$) is based on a dietary study in mice, and the U.S. EPA oral RfD (2E-02 mg/kg-day) is based on a dietary study in guinea pigs. Several studies indicate that gastrointestinal absorption of BEHP is high (Williams and Blanchfield, 1974; Schulz and Rubin, 1973; Pollack et al., 1985). ENSR assumes that absorption from diet or corn oil gavage is 100%. ENSR also assumes that the gastrointestinal absorption of BEHP from diet, drinking water, corn oil gavage, and ingestion of soil is the same. Thus, the AAF (oral-water), the AAF (oral-soil/sediment), and the AAF (oral-diet) are all 1.0 for both carcinogenic and noncarcinogenic effects.

Dermal absorption of BEHP was studied by Scott et al. (1987). The absorption of BEHP was measured in vitro through human and rat skin. Absorption rates were determined after an observable lag time. For human skin the lag time was 3.1 hours. The steady state absorption rate was found to be 1.1 $ug/cm^2/hr$ for human skin. As a fraction of the total dose, the amount of absorption observed over eight hours was 0.008%. Rat skin was found to be more permeable to BEHP, with an absorption rate of 2.2 $ug/cm^2/hr$.

Elsisi et al. (1989) also studied the dermal absorption of BEHP in rats in vivo. They dosed the animals dermally and used urinary and fecal excretion as an index of absorption. This method is valid, because phthalate esters are rapidly excreted from the body and are not bioaccumulated. For BEHP, 0.4% of the dose was found in the urine or the feces after 24 hours. The absorption efficiency of BEHP on soil after a six hour exposure is expected to be less than this amount. To be protective of human health, however, the value for absorption of pure BEHP after 24 hours in the rat will be used for AAF derivation. Thus, the dermal AAF for BEHP in soil relative to dietary administration is 0.4%/100% = 0.004.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For BEHP, the AAF (dermal-water) is (100%)/(100%) = 1.0.

Summary of AAFs for BEHP (for both carcinogenic and noncarcinogenic effects)

Oral-water	1.0
Oral-diet	1.0
Oral-soil	1.0
Dermal-soil	0.004
Dermal-water	1.0

REFERENCES

Elsisi, A.E., D.E. Carter, and E.G. Sipes. 1989. Dermal Absorption of phthalate diesters in rates. Fundamental and Applied Toxicology 12:70-77.

Pollack, G.M., R.C.K. Li, J.C. Ermer and D.D. Shen. 1985. Effects of route of administration and repetitive dosing on the disposition kinetics of di(2-ethylhexyl)phthalate and its mono-de-esterified metabolite in rats. Toxicology and Applied Pharmacology 79:246-256.

Schultz, C.E. and R.J. Rubin. 1973. Distribution, metabolism, and excretion of di-2-ethylhexyl phthalate in the rat. Environmental Health Perspectives. ___:123-129.

Scott, R.C., P.H. Dugard, H.D. Ramsey, and C. Rhodes. 1987. In vitro absorption of some o phthalate diesters through human and rat skin. Environmental Health Perspectives 74:223-227.

Williams, D.T. and B.J. Blanchfield. 1984. Retention, excretion and metabolism of de-(2 ethylhexyl)phthalate administered orally to the rat. Bulletin of Environmental Contamination and Toxicology 11:371-378.

HEXACHLOROBENZENE

The oral and inhalation cancer slope factor of 1.6 $(mg/kg\text{-}day)^{-1}$ and the oral reference dose of 8E-04 mg/kg-day are based on dietary studies in rats. Therefore, the AAFs are the same for carcinogenic and noncarcinogenic risk assessment. Limited information was available concerning the absorption of hexachlorobenzene, so information on the structurally related constituent polychlorinated biphenyls was used to derive appropriate AAFs. The detailed derivations of the AAFs are presented under polychlorinated biphenyls. As for PCBs, absorption of hexachlorobenzene from oil gavage has been show to be about 80% (ATSDR, 1989). The AAFs (oral-water and oral-diet) are 1. The AAF (oral-soil) is 0.83. The absorption factor for dermal-soil is 0.04 and for dermal-water is 1.1. The inhalation AAF is 1.

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1989. Draft Toxicological Profile for hexachlorobenzene. ATSDR: Atlanta, GA.

POLYCHLORINATED BIPHENYLS

POLYCHLORINATED BIPHENYLS

The CSFs for PCBs range from 0.04 to 2.0 $(mg/kg\text{-}day)^{-1}$ (USEPA, 2003) and are based on the results from five chronic dietary studies in rats (Brunner et al., 1996; Kimbrough et al., 1975; NCI, 1978; Schaeffer et al., 1984; and Norback and Weltman, 1985). Table 1 presents the application of the CSFs to various exposure scenarios.

The current oral RfDs for Aroclor 1016 and Aroclor 1254 are 7.0E-5 mg/kg-day and 2.0E-5 mg/kg-day, respectively. The Aroclor 1016 value is based on critical effects observed in a reproductive bioassay in monkeys that were fed Aroclor 1016 in their diet (Barsottti and van Miller, 1984; Levin et al., 1988; Schantz et al., 1989, 1991). The Aroclor 1254 value is based on monkey clinical and immunologic studies in which the animals were fed gelatin capsules containing Aroclor 1254 in a glycerol: corn oil vehicle (Arnold et al., 1993a,b; Tryphonas et al., 1989, 1991a,b).

Absorption in the Dose-Response Study

Because all of the studies are based on dietary exposures, the AAFs developed below apply to both carcinogenic and non-carcinogenic effects of PCBs. In all of the dose-response studies, various Aroclors were administered in the diet. However, no information on the efficiency of gastrointestinal absorption in those studies was presented. The studies summarized below have been used in the development of AAFs for PCBs. The specific absorption values used in the calculation of the average absorption value are indicated by underlining below.

1. Allen et al. (1975) gave single oral doses of 2,5,2',5'-tetrachlorobiphenyl (18 mg/kg bw) to four adult rhesus monkeys by gastric intubation. PCBs were given in 2.5 ml of corn oil on an empty stomach. Unmetabolized PCBs were analyzed in the feces by gas chromatography (GC). Minimum gastrointestinal absorption was found to be 88%. PCBs found in the feces over specified post-dosing times were presumed to be unabsorbed material. Because PCB metabolites are known to be eliminated in the bile, the possibility exists that some of the PCBs present in the feces were absorbed and then eliminated. As such, only minimum absorption efficiencies can be determined from this and similar studies.

2. Allen et al. (1974) gave single oral doses of PCBs (Aroclor 1248) (1.5 or 3.0 g/kg bw) to two adult rhesus monkeys by gastric intubation. The vehicle was not specified but is presumed to be corn oil. Dosing was done on an empty stomach. Unmetabolized PCBs were analyzed for in feces by GC. Recovery was reported to be high. Minimum gastrointestinal absorption was reported to be 94%.

3. Albro and Fishbein (1972) gave single oral doses of 20 different PCB congeners (5-100 mg/kg bw) and the unabsorbed marker compound, squalene, to CD rats. The mixture was given by stomach tube to unfasted animals who were allowed food and water ad libitum. No vehicle was specified. Although this was not a diet study, per se, it is possible that dietary components were present in the stomach at the same time as were the test compounds. Minimum gastrointestinal absorption was reported to be 90% for all congeners.

4. Tanabe et al. (1981) gave repeated oral doses of Kanechlors (300, 400, 500, 600) (c.30 mg/kg bw/day x 5 days) to Wistar rats. The dose was given in corn oil. Commercial diet was given ad libitum. No information on the animals' stomach contents was reported. Parent compounds were analyzed in the feces by GC/MS (mass spectrometry). Minimal gastrointestinal absorption was reported to be 85% for total PCB. Cl_5 to Cl_7 congeners had 75-90% absorption.

5. Berlin et al. (1975) gave a single oral dose of 2,4,5,2',5'-pentachlorobiphenyl (7 mg/kg bw) to three CBA mice. The PCBs were given as an aqueous emulsion. No information on the animal's stomach contents was given. Minimal gastrointestinal absorption was reported to be 93%.

6. Van Miller et al. (1975) gave single oral doses (50 mg) of tritiated 2,2',5,5'-tetrachlorobiphenyl to three male Sprague-Dawley rats. The PCB was given by gavage in corn oil. Animals were given food and water ad libitum for 14 days. Urine, feces, and various tissues were analyzed. Over 86% of the radioactivity was present in the excreta as metabolites at 14 days. Thus, minimum gastrointestinal absorption was 86%.

7. Fries et al. (1989) gave four groups of four male Sprague-Dawley rats radiolabeled 2,2',5,5'-tetrachlorobiphenyl in diet or in corn oil (by gavage) or 2,2',4,5,5'-pentachlorobiphenyl in diet or in corn oil (by gavage). The animals given the PCBs by gavage were fed unspiked diet ad libitum. PCBs were administered daily for five days. Rats were then fed unspiked diet for 10 days. Urine and feces were collected. At 15 days, animals were sacrificed, and samples of fat and liver tissue were taken for analysis. The dose of PCBs given was not reported. The amount absorbed was defined as the amount that did not appear in the feces as parent compound. The average absorption of the two congeners when given in a dietary matrix was 89% [(91% + 86%) / 2]. The average absorption of the two congeners when given by corn oil gavage was 88% [(95% + 81%) / 2].

The above seven studies, which involve both rodents and primates and various PCB mixtures and purified congeners, all show that PCBs are very effectively absorbed from the gastrointestinal tract. In the one study (Fries, et al., 1989) in which PCBs were administered by diet, the absorption was shown to be 89%. The other six studies involved the administration of PCBs in various vehicles by gavage. These studies are also relevant to the estimation of the absorption seen in the dose-response studies, because Fries et al. (1989) showed in their rat study that there was no difference in absorption between diet and corn oil gavage. Accordingly, the results from all seven studies were averaged to yield an estimate of 89% for the absorption in the dose-response study.

Oral-Diet AAF

An oral-diet AAF for ingestion of PCBs was derived for intake of dietary constituents. The dose-response studies were all rat dietary studies. There are no studies available on gastrointestinal absorption of PCBs from fish, vegetables, milk, meat, or other human dietary constituents. To be health protective, it is assumed that the absorption of PCBs in humans from various dietary constituents is the same as the dietary absorption that occurs in rats. Thus, the AAF (oral-diet) is 1.0.

Oral-Soil AAF

Fries et al. (1989) gave four groups of four male Sprague-Dawley rats radiolabeled 2,2',5,5'-tetrachlorobiphenyl in diet or in soil or 2,2',4,5,5'-pentachlorobiphenyl in diet or soil. ^{14}C-PCB soil was added to a standard rat diet in meal form at the rate of 5%. In the control experiment, ^{14}C-PCB in acetone was added to the feed. The PCB-soil was a Galestown sandy loam with a pH of 6.7 and which contained 67% sand, 22% silt, 11% clay, and 5% organic matter. Soils had been spilled with PCBs 8 years earlier and were stored at -5°C. At the time of the experiment, fractions passing through a 125 μm sieve were spiked with ^{14}C-PCB for quantitation.

PCBs were administered daily for five days. Rats were then fed unspiked diet for 10 days. Urine and feces were collected. At 15 days, animals were sacrificed, and samples of fat and liver tissue were taken for analysis. The dose of PCB was not reported. The amount absorbed was defined as the amount that did not appear in the feces as parent compound.

The ratio of the amount of PCB absorbed when present as a soil matrix to that absorbed when present as a component of diet is a direct estimate of the oral-soil AAF. From this experiment, AAF estimates are available for two PCB congeners. The oral-soil AAF for the tetrachlorobiphenyl is (80%)/(91%)=0.88, while the estimate for the pentachlorobiphenyl congener is (67%)/(86%)=0.78. These two estimates are averaged [(0.88+0.78)/2] to give an estimate of the AAF (oral-soil) for PCB mixtures of 0.83.

Oral-Water AAF
In the absence of studies of absorption upon ingestion of PCBs in drinking water, it is assumed that the absorption of PCBs in humans from ingestion of water is the same as the dietary absorption that occurred in rats in the dose-response studies. Thus, the AAF (oral-water) is 1.

Dermal-Soil AAF
To derive the AAF (dermal-soil) one needs a value for the efficiency of absorption of soil-bound PCBs through human skin and an estimate of the absorption efficiency from dietary constituents in the dose-response studies. As discussed above, the gastrointestinal absorption of PCBs by rats from diet is estimated to be 89%. As discussed below, dermal PCB absorption in human skin from a soil matrix was determined by Roy et al. (1990) (as reported in USEPA, 1992).

In the study, dermal absorption of 3,3',4,4'-tetrachlorobiphenyl (TCB) was tested at a concentration of 1000 ppm in both low and high organic content soil for rat skin, both in vivo and in vitro, and human skin in vitro (n = 4 or 5). At 96 hours, the total fractional absorption in rats from low organic soil (at a soil application of 10 mg/cm2, and a soil concentration of 1000 ppm) was 50% +/- 11% in vivo and 32% +/- 3% in vitro. Results at intermediate time points were also given for the in vitro experiments.

Absorption was determined in the in vivo experiments by measuring the total amount of the chemical in urine, feces, and tissues. In the in vitro experiments, absorption was determined by measuring the amount of the chemical in the receptor fluid and adding to it the amount measured in the skin after washing. This unremovable material was scored as if it was systemically absorbed. The ratio of absorption in the rat in vivo to that in vitro was 1.6.

Human skin was tested in vitro. Tetrachlorobiphenyl at 1000 ppm was administered to human skin (at a soil application of 6 mg/cm2). At 24 hours, 1.33% +/- 0.47% of the dose was absorbed into the receptor fluid. At 96 hours, 7.36% +/- 2.42% was absorbed (including skin and receptor fluid).

USEPA (1992) has estimated the fractional absorption of TCB from low organic soil in humans in vivo by assuming that the in vivo/in vitro absorption ratio observed in the rat is valid for the human. In addition, the estimate reported above for the 24 hour period was made by adding the fraction of the chemical in the receptor fluid with the amount present in the skin after 96 hours. Thus, USEPA assumed that the fraction of the dose in the skin that could not be removed by washing was constant from 24 to 96 hours, which is reasonable. USEPA's estimate of fractional dermal absorption of PCBs at 1000 ppm in the live human from low organic soil is (1.6) x (1.33%) = 2.1%. USEPA also estimated the 24 hour fractional absorption in live humans from high organic soil to be 0.63%.

In developing its dermal absorption estimate for humans, USEPA considered the range of 0.6% for high organic soil to 2.1% for low organic soil and multiplied the lower estimate by 10 to arrive at its recommended default. In fact, 6% dermal absorption was not observed in any of the five human skin samples until exposure times reached 72 hours or greater. The USEPA's recommended default absorption rate of 6% is not used here, because it is not based on the scientific data.

To be health-protective, the absorption estimate for low organic soil of 2.1%, which may be encountered at various sites, is used for the AAF derivation. In addition, the upper 95% confidence

limit of the estimate, which is 3.8%, is used as an additional degree of health-protectiveness. This estimate is an overestimate of the dermal absorption that would be expected at actual sites, because PCB concentrations in soils would, in most cases, be below 1000 ppm, and field measurements have shown that actual soil loadings on skin in humans are quite low (Kissel et al., 1996; USEPA, 1997). Absorption efficiency in such cases would be expected to be lower. In addition, exposure periods would in actuality be less than 24 hours before washing. The estimate of the AAF (dermal-soil) is derived as follows: (absorption of PCB from soil through human skin) / (absorption of PCB in dose-response study) = (3.8%) / (89%) = 0.04.

The absorption efficiency determined above for tetrachlorobiphenyl in soil probably overestimates the dermal absorption efficiency of actual PCB mixtures that contain higher chlorinated congeners. These higher chlorinated species are more likely to have high binding coefficients with organic matter in soil, and they would be less likely to be absorbed through the skin from a soil matrix. However, it is health-protective to use the above data from the soil absorption study with tetrachlorobiphenyl to derive an AAF (dermal-soil) for use with all PCB mixtures.

Dermal-Water AAF

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading, swimming, or bathing. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). Thus, the AAF (dermal-water) is (100%)/(89%) = 1.1.

Inhalation AAF

In the absence of studies of absorption upon inhalation of PCBs, it is assumed that the AAF for this route of exposure is 1.

Summary of Derived AAFs for PCBs -Potentially Carcinogenic and Noncarcinogenic Effects

AAF (oral-water)	1
AAF (oral-diet)	1
AAF (oral-soil)	0.83
AAF (dermal-soil)	0.04
AAF (dermal-water)	1.1
AAF (inhalation)	1

References

Albro, P.W. and L. Fishbein. 1972. Bull. Env. Contam. Toxicol. 8:26-31.

Allen, J.R., L.A. Cartens, L.J. Abrahamson and R.J. Marlar. 1975. Env. Res.:265-273.

Allen, J.R., D.H. Norback and I.C. Hsu. 1974. Arch. Env. Contam. 2:86-95.

Arnold, D.L., F. Bryce, R. Stapley et al. 1993a. Toxicological Consequences of Aroclor 1254 Ingestion by Female Rhesus (Macaca mulatta) Monkeys, Part 1A: Prebreeding Phase – Clinical Health Findings. Food Chem. Toxicol. 31:799-810.

Arnold, D.L., F. Bryce, K. Karpinski et al. 1993b. Toxicolobical Consequences of Aroclor 1254 Ingestion by Female Rhesus (Macaca mulatta) Monkeys, Part 1B: Prebreeding Phase – Clinical and Analytical Laboratory Findings. Food Chem. Toxicol. 31:811-824.

Barsotti, D.A., and J.P. van Miller. 1984. Accumulation of a commercial polychlorinated biphenyl mixture (Aroclor 1016) in adult rhesus monkeys and their nursing infants. Toxicology. 30: 31-44.

Berlin, M., J. Gage and S. Holm. 1975. Arch. Environ. Health 30:141-147.

Brunner, M.J., T.M. Sullivan, A.W. Singer, M.J. Ryan, J.D. Toft II, R.S. Menton, S.W. Graves, and A.C. Peters. 1996. An Assessment of the Chronic Toxicity and Oncogenicity of Aroclor-1016, Aroclor-1242, Aroclor-1254, and Aroclor-1260 Administered in Diet to Rats. Columbus, OH: Batelle Study No. SC920192, Chronic Toxicity and Oncogenicity Report.

Fries, G.F. and G.S. Marrow, and C.J. Somich. 1989. Oral Bioavailability of Aged Polychlorinated Biphenyl Residues Contained in Soil. Bull. Environ. Contam. Toxicol. 43:683-690.

Kimbrough, R.D., R.A. Squire, R.E. Linder, J.D. Strandberg, R.J. Montali and V.W. Burse. 1975. Induction of Liver Tumors in Sherman Strain Female Rats by Polychlorinated Biphenyl Aroclor-1260. J. Natl. Cancer Inst. 55:1453-1459.

Kissel, J., K. Rishter, and R. Fenske. 1996. Field Measurements of Dermal Soil Leading Attributable to Various Activities: Implications for Exposure Assessment. Risk Anal. 16(1):118-125.

Levin, E.D., S.L. Schantz and R.E. Bowman. 1988. Delayed spatial alternation deficits resulting from perinatal PCB exposure in monkeys. Arch. Toxicol. 62:267-273.

NCI. 1978. Bioassays of Aroclor 1254 for Possible Carcinogenicity. Carcinogenic Tech. Rep. Ser. No. 38. National Cancer Institute.

Norback, D.H. and R.H. Weltman. 1985. Polychlorinated biphenyl induction of hepatocellular carcinoma in the Sprague-Dawley rat. Environ. Health Perspect. 60:97-105.

Roy, T.A., J.J. Yang, A.J. Krueger, C.R. Mackerer. 1990. Percutaneous Absorption of Neat 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and TCDD Sorbed on Soils. Toxicology 10(1):308.

Schaeffer, E., H. Greim, and W. Goessner. 1984. Pathology of Chronic Polychlorinated Biphenyl (PCB) Feeding in Rats. Toxicol. Appl. Pharmacol. 75:278-288.

Schantz, S.L., E.D. Levin, R.E. Bowman et al. 1989. Effects of perinatal PCB exposure on discrimination-reversal learning in monkeys. Neurotoxicol. Teratol. 11:243-250.

Schantz, S.L., E.D. Levin, R.E. Bowman et al. 1991. Long-term neurobehavioral effects of perinatal polychlorinated biphenyl (PCB) exposure in monkeys. Environ. Toxicol. Chem. 10:747-756.

Tanabe S., Y. Makagawa and R. Tatsukawa. 1981. Agric. Biol. Chem. 45:717-726.

Tryphonas, H., S. Hayward, L. O'Grady, et al. 1989. Immunotoxicity Studies of PCB (Aroclor 1254) in the Adult Rhesus (Macaca mulatta) Monkey – Preliminary Report. Int. J. Immunopharmacol. 11:199-206.

Tryphonas, H., M.I. Luster, G. Schiffman, et al., 1991b. Effect of Chronic Exposure of PCB (Aroclor 1254) on Specific and Nonspecific Immune Parameters in the Rhesus (Macaca mulatta) Monkey. Fund. Appl. Toxicol. 16(4):733-786.

Tryphonas, H., M.I. Luster, K.L. White, et al. 1991b. Effects of Chronic (Aroclor 1254) on Nonspecific and Immune Parameters in Rhesus (Macaca mulatta) Monkeys. Int. J. Immunopharmacol. 13:639-648.

USEPA. 1992. Dermal Exposure Assessment: Principles and Applications. Exposure Assessment Group, Office of Health and Environmental Assessment. U.S. Environmental Protection Agency. Washington, D.C. EPA/600/8-91/011B. January 1992 (Interim Report).

USEPA. 1997. Exposure Factors Handbook. Volume I: General Factors. Office of Research and Development. August 1997. EPA/600/P-95/002Fa.

USEPA. 2003. Integrated Risk Information System. [URL: http://www.epa.gov/ngispgm3/iris/]

Van Miller, J.P., I.C. Hsu, and J.R. Allen. 1975. Distribution and Metabolism of ^{3}H-2,5,2',5'-tetrachlorobiphenyl in Rats (38610). Proceedings of the Society for Experimental Biology and Medicine. 148:682-687.

TABLE 1.
TIERS OF CANCER SLOPE FACTORS FOR ENVIRONMENTAL PCBs

HIGH RISK AND PERSISTENCE Upper-bound slope factor: 2.0 $(mg/kg\text{-}day)^{-1}$ Central-estimate slope factor: 1.0 $(mg/kg\text{-}day)^{-1}$
Criteria for use: - Food chain exposure - Sediment or soil ingestion - Dust or aerosol inhalation - Dermal exposure, if an absorption factor has been applied - Presence of dioxin-like, tumor-promoting, or persistent congeners - Early-life exposure (all pathways)
LOW RISK AND PERSISTENCE Upper-bound slope factor: 0.4 $(mg/kg\text{-}day)^{-1}$ Central-estimate slope factor: 0.3 $(mg/kg\text{-}day)^{-1}$
Criteria for use: - Ingestion of water-soluble congeners - Inhalation of evaporated congeners - Dermal exposure if no absorption factor has been applied
LOWEST RISK AND PERSISTENCE Upper-bound slope factor: 0.07 $(mg/kg\text{-}day)^{-1}$ Central-estimate slope factor: 0.04 $(mg/kg\text{-}day)^{-1}$
Criteria for use: Congener or isomer analyses verify that congeners with more than 4 chlorines comprise less than 0.5% of total PCBs.

DIOXINS

DIOXINS

The U.S. EPA oral CSF of 1.5E+05 $(mg/kg\text{-}day)^{-1}$ is based on a dietary study in rats (Kociba et al., 1978). The diet was prepared by mixing (30 minutes) an acetone solution of TCDD with laboratory chow. The acetone was evaporated yielding a TCDD/diet mixture. TCDD concentration was 0.02 - 2 ppb (0.001 - 0.1 μg/kg-day). No absorption information is given in the Kociba et al. (1978) study. In a study by Fries and Marrow (1975), however, rats were given TCDD in their diet continuously for 42 days. The total observation period of the experiment was 70 days. Diets were prepared in a similar manner to that used by Kociba et al. (1978). Laboratory chow was mixed with a benzene solution of TCDD and the benzene was evaporated. Two dose levels were used, 7 ppb and 20 ppb. Absorption was reported to be 50-60%. For the purposes of AAF derivation, 55% was used as the observed absorption efficiency.

In several other studies, TCDD absorption was measured using vegetable oil and solvent vehicles. Gastrointestinal absorption from oil or solvent has been reported to range from 70% to >87%. It is generally accepted that absorption for these vehicles is more efficient than absorption from diet. Thus, the results of the single dietary experiment (55%) will be used as an estimate of the absorption from the dietary dose-response study (Kociba et al., 1978).

AAF (Dermal-Soil)

To derive the AAF (dermal-soil) one needs a value for the efficiency of absorption of soil-bound TCDD through human skin and an estimate of the absorption efficiency from dietary constituents in the Kociba study. As discussed above, the gastrointestinal absorption of TCDD by rats from diet was found to be 55% by Fries and Marrow (1975). Several studies have been performed to determine such absorption of TCDD from various matrices. These will be used in the AAF derivation.Roy et al. (1990) measured the dermal bioavailability of neat 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) and TCDD adsorbed on soils in an EPA-funded study. Parallel experiments were carried out with female Sprague-Dawley rats, in vivo and in vitro, and with human skin specimens, in vitro. Adsorption of TCDD on low organic soil (0.77% organic matter) at 1 ppm dramatically reduced the dermal bioavailability of TCDD. The soil application rate was 10 mg/cm^2. The fraction of applied dose absorbed was decreased by a factor of five to ten compared to experiments with neat TCDD at an equivalent dose. Penetration of low organic soil-sorbed TCDD through human skin was approximately three times less than for rat skin.

The AAF (dermal-soil) was calculated several ways for TCDD. In all cases, the AAF is defined as (absorption in humans from soil)/(absorption in rats from diet). ENSR assumes that a relevant exposure time for soil contact was several hours. To be health-protective, however, 8-hour exposures are assumed for purposes of deriving the AAF. The data of Roy et al. (1990) demonstrate that only 1.0% of the exposure dose was absorbed from high organic soil over 96 hours on rat skin. Because human skin was shown to be less permeable than rat skin for TCDD and because absorption of TCDD from soil over 8 hours would be considerably less than that measured over 96 hours, the predicted absorption through human skin from high organic soil would be <1%. The AAF would thus be (<1%)/(55%) = <2%. To be health protective, however, ENSR will use the results from the low organic soil to derive the AAF (dermal-soil).
Roy and co-workers found that 33% of 10 ng/cm^2 of TCDD (neat) was dermally absorbed by the rat over 8 hours. This was determined in vivo. In addition, after 96 hours 77.4% was absorbed in an in vivo experiment, and 76% was absorbed in an in vitro experiment (average 76.5%). When the same amount of TCDD was applied to the rat in low organic soil, 16.3% was absorbed in 96 hours in vivo and 7.7% was absorbed in vitro (average 12.0%). The TCDD concentration in soil (1 ppm) and the soil contact rate (10 mg/cm^2) are both relevant for use in risk assessment. When the same dose in low organic soil was applied to human skin in vitro, 2.4% was absorbed after 96 hours. The same dose was also applied in high organic soil to rat skin in vitro, and absorption after 96 hours was 1.0%.

First, ENSR derived a AAF (dermal-soil) from the in vitro human skin experiment. Here, the absorption of TCDD from low organic soil over 96 hours was 2.4%. Because there are no data for 8-hour exposures, ENSR conservatively assumes that the entire amount was absorbed in only 8 hours. The AAF, then, is (2.4%)/(55%) = 0.04.
Second, ENSR derived an AAF (dermal-soil) from both the in vivo and in vitro rat experiments using low organic soil. At 96 hours, the ratio of absorption of TCDD from soil to absorption of pure TCDD was (12%)/(76.7%) = 0.16. An estimate of absorption of TCDD from soil at 8 hours can be made using the following relationship:

abs. from soil, 8 hrs = [(abs. from soil, 96 hrs)/(abs. neat, 96 hrs) x (abs. neat, 8 hrs).

Use of this relationship assumes that the decrease in bioavailability seen with a 96 hour observation is the same over 0-8 hours. The value for absorption of pure (neat) TCDD at 8 hours is taken from the same study, where 33% was observed in rats in vivo. Thus, absorption from soil over 8 hr = 0.16 x 33% = 5.28%, and the AAF (dermal-soil) = (5.28%)/(55%) = 0.10.

The approach outlined above was also used with a different estimate of absorption of pure TCDD after 8 hours. Banks and Birnbaum (1990) measured absorption of 3 μg radiolabelled TCDD/cm^2 in 10-week old male Fischer 344 rats at various time points up to 48 hours. Absorption was linear to 48 hours with a rate of 0.5 ng/hr. Predicted absorption at 8 hours was 6.6% (actual data point at 8 hours was 5.5%). Combining the data of Roy et al. (1990) and Banks and Birnbaum (1990), absorption from soil over 8 hr = .16 x 6.6% = 1.1%, and the AAF (dermal-soil) is (1.1%)/(55%) = 0.02.

In addition to the recent study of Roy et al. (1990), a study by Poiger and Schlatter (1980) has been widely used by risk assessors. Poiger and Schlatter (1980) dosed hairless rats (Naked ex Back-Cross and Holzman strain) with radiolabelled TCDD. The fraction of the administered dose in the liver after 24 hours was compared for two situations:

- 26 ng pure TCDD per 3 cm^2 of skin; and
- 26, 350 or 1,300 mg TCDD in a soil/water paste of 75 mg per 3-4 cm^2 of skin (50 mg dry soil/3-4 cm^2).

The fraction of the dose in the liver after administration of the soil paste was near the detection limit for the low dose and the same for the two higher dose levels. ENSR averaged the values and compared them to the percent dose in the liver following administration of pure TCDD to determine the ratio: (absorption from soil, 24 hours)/(absorption neat, 24 hours) = (1.32%)/(14.8%) = 0.09. One cannot obtain an estimate of the actual fraction of a dose of pure TCDD that is absorbed in 8 hours from this experiment. Thus, the two estimates provided by the Roy et al. (1990) and Banks and Birnbaum (1990) studies were used in AAF derivation:

AAF (dermal-soil) = [(0.09) x (0.33)]/(0.55) = 0.05
AAF (dermal-soil) = [(0.09) x (0.066)]/(0.55) = 0.01

In conclusion, ENSR has derived five estimates of the AAF (dermal-soil). These estimates agree well:

- Roy et al. (1990), human, in vitro; AAF = 0.04.
- Roy et al. (1990), rat, in vivo + in vitro; AAF = 0.09.
- Roy et al. (1990), rat, in vivo + in vitro; Banks and Birnbaum (1990), rat, in vivo, AAF = 0.02.
- Poiger and Schlatter (1980), rat, in vivo; Roy et al. (1990), rat, in vivo; AAF = 0.05.
- Poiger and Schlatter (1980), rat, in vivo; Banks and Birnbaum (1990), rat, in vivo; AAF = 0.01.

ENSR uses the average of these five estimates as the AAF (dermal-soil) = 0.04.

AAF (Oral-Diet)
An oral AAF for ingestion of TCDD equivalents was derived for intake of dietary constituents. The dose-response study is a study in which rats were dosed with TCDD in their diet (Kociba, 1978). There are no studies available on gastrointestinal absorption of TCDD by humans from fish, vegetables, milk or other dietary constituents. Using a single human volunteer, Poiger and Schlatter (1986) reported that a minimum of 85% of a dose of TCDD (1 ng/kg) in corn oil was absorbed. This study is not relevant for AAF derivation, however, because absorption of TCDD from vegetable oil vehicles has been well-documented to exceed the absorption from dietary constituents (U.S. EPA, 1985). Thus, ENSR assumes that the absorption of TCDD equivalents in humans from various dietary constituents is the same as the dietary absorption that occurred in rats in the Kociba (1978) study. Thus, the AAF (oral-diet) is 1.0.

AAF (Oral-Soil)
Several studies were identified that compared TCDD absorption from soil to either dirt, oil vehicle, or alcohol vehicle. These studies are relevant for derivation of the AAF. In the first study, Van den Berg and co-workers (1983) administered PCDDs and PCDFs from fly-ash and fly-ash extract to male Wistar rats as a dietary constituent. The fly-ash from a municipal incinerator in the Netherlands was chemically characterized and used.

Rats were fed treated diets for 19 days. The levels of PCDD and PCDF isomers in the liver at the end of the experiment were used as measures of absorption. By comparing fly-ash and fly-ash extract in a single experiment, the congener composition of the test material was held constant. Treatment of test diets with a PCDD/PCDF containing extract and evaporating the solvent is identical to the treatment of diets used by Kociba (1978) in the dose-response study. Thus, a comparison of the liver retention of PCDD/PCDF isomers with fly-ash-treated diet and extract-treated diet directly yields an estimate of the AAF (oral-fly-ash). ENSR assumes that the AAF (oral-soil) equals the oral fly-ash AAF.

The authors measured the liver levels of six isomer groups at the end of the experiment. ENSR has calculated the fly-ash/extract ratio for each isomer group separately:

Liver concentration (ng/g)

	tetra-CDD	tetra-CDF	penta-CDD	penta-CDF	hexa-CDD	hexa-CDF
Fly-ash + diet (n=2)	0.8	3.5	2.7	11.0	5.2	13.6
Extract + diet (n=4)	1.9	14.5	18.9	50.0	47.7	83.3
Fly-ash/extract	0.42	0.24	0.14	0.22	0.11	0.16

The average fly-ash/extract ratio for all six isomer groups is 0.22. This is a direct measure of the degree to which adsorption to fly-ash decreases the bioavailability of PCDDs/PCDFs compared to pure compounds mixed with dietary constituents. Thus, the AAF (oral-fly-ash) is 0.22. Because fly-ash is a major source of TCDD equivalents in the environment, this data is relevant to risk assessment, especially for resource recovery facilities. Thus, one estimate of the AAF (oral-soil) is 0.22.

Three other studies are available in which absorption of TCDD from soil was compared to oil or alcohol vehicles. Results from these studies are useful if an independent estimate is available for gastrointestinal absorption of TCDD from the relevant vehicle.

McConnell et al. (1984) investigated absorption in guinea pigs using soil from Missouri that was contaminated with TCDD. One or 3 ug/kg of TCDD was administered orally either in a corn oil vehicle or as a soil suspension. After a single dose of TCDD, the animals were observed for 30 days. The TCDD content of the liver was determined at 30 days or at the time of death of the animal. No detectible TCDD was observed in livers of animals dosed with 1 μg/kg of TCDD in either Times Beach or Minker Stout soil. At the higher dose level, TCDD was detected in animal livers with all groups. The liver levels in animals that survived for 30 days was lower than the levels in animals that died before the experiment's completion. Accordingly, the ratio of absorption from soil to absorption from corn oil for the latter group is higher: 0.24 for Times Beach and 0.15 for Minker Stout. The average ratio is 0.20.

It is well-documented that absorption of TCDD from vegetable oil vehicles exceeds the absorption from dietary constituents (U.S. EPA, 1985). As an estimate of the absorption of TCDD from vegetable oils, ENSR has averaged the results from the following four studies:

- Rose et al. (1976); rat; 1 μg/kg single dose; acetone/corn oil (1:25); 84%.
- Rose et al. (1976); rat; 0.1 or 1.0 μg/kg/da; acetone/corn oil (1:25); 5 days/week x 7 weeks; 86%.
- Piper et al (1973); rat; 50 μg/kg single dose; acetone/corn oil (1:9); 70%.
- Olson et al. (1980); hamster; 650 μg/kg; olive oil; 74%.
- Poiger and Schlatter (1986); human; 1 ng/kg; single dose; corn oil; >87%.

The average of these values is 80%. The AAF (oral-soil) is defined as follows:

$$\text{AAF (oral-soil)} = \frac{\text{abs. soil}}{\text{abs. diet}} = \frac{\text{abs. soil}}{\text{abs. oil}} \times \text{abs. oil} \div \text{abs. diet}$$

$$= (0.20) \times (0.8) \div (0.55) = 0.29$$

This indirectly derived AAF (oral-soil) based on McConnell et al. (1984) is in close agreement with the value of 0.22 directly demonstrated by Van den Berg et al. (1983).

In a similar experiment, Poiger and Schlatter (1980) studied the effects of soil adsorption on the bioavailability of TCDD in Sprague-Dawley rats. After oral administration of 15 ng radiolabelled TCDD using 50% ethanol as a vehicle, 37% of the dose was detected in the liver 24 hours later. When the constituent (21-22 ng) was administered as an aqueous suspension of soil particles (37% w/w) that had been in contact with the TCDD for 8 days, the fraction of the administered dose that was found in the liver 24 horus later was 16%. From these data, the ratio of TCDD absorption from soil compared to an aqueous ethanol vehicle is 0.43.

There are no estimates available for absorption of TCDD from 50% ethanol vehicles. To derive an estimate of the AAF (oral-soil) from the Poiger and Schlatter data, ENSR assumes that the absorption of TCDD from 50% ethanol is the same as the average absorption reported from corn oil, olive oil, 1:25 acetone/corn oil, and 1:9 acetone/corn oil. The AAF (oral-soil) is derived as above: (0.43) x (0.8)/(0.55) = 0.63.

Similar studies have also been performed in rabbits by Bonaccorsi et al. (1984). Levels of TCDD in the liver 7 days after an oral dose of TCDD either in alcohol or in soil from Seveso, Italy were compared. The ratio of TCDD absorption from soil relative to alcohol vehicle was 0.32 in this study. As above, ENSR assumes that the absorption of TCDD from alcohol vehicle is 80%. Thus, the AAF (oral-soil) is (0.32) x (0.80/(0.55) = 0.47.

The mean of the four estimates of the AAF (oral-soil) is 0.40. This value is more health-protective than the bioavailability factor of 30% used in the Center for Disease Control's risk assessment of TCDD in soil (Kimbrough et al. 1985). Thus, the AAF (oral-soil) and (oral-sediment) is 0.40.

AAF (Dermal-Water)
The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a constituent-specific permeability constant that estimates the rate at which the constituent passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For dioxin, the AAF (dermal-water) is (100%)/(55%) = 1.8.

AAF (Oral-Water)
ENSR assumes that the absorption of TCDD equivalents in humans from ingestion of water is the same as the dietary absorption that occurred in rats in the Kociba (1978) study. Thus, the AAF (oral-water) is 1.0.

AAF (Inhalation)
The EPA has developed a unit risk for inhaled dioxin from the oral CSF. In so doing, EPA assumed that 100% of the particles estimated to be retained in the lung are absorbed. ENSR defines here a AAF (inhalation) for dioxin contaminated fly ash based on the work of Nessel et al. (1990).
Transpulmonary absorption of 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) from ground fly-ash (<3 um) and gallium oxide (0.7 ± 0.5 um) was assessed following intratracheal instillation of contaminated particles. Contact time of TCDD with the carrier ranged from 1 hour to 4 weeks. Female Sprague-Dawley rats (200-250 g) were intratracheally administered 5.25 µg TCDD/kg on 15 mg particles in 0.3 ml saline and sacrificed 4 days later. Absorption was characterized by aryl hydrocarbon hydroxylase (AHH) induction in hepatic and pulmonary microsomes.

TCDD-contaminated gallium oxide caused a consistent 13- to 15-fold induction regardless of the duration of contact. TCDD-contaminated fly ash caused only a 4-fold induction when the duration of contact was 1 hour to 1 week. After a 4-week contact, the induction was only 2-fold. These data can be used to derive a AAF (inhalation) for TCDD on fly ash. Thus, the ratio of fly ash to gallium oxide is 4/13 = 0.3. ENSR assumes that the absorption of TCDD from gallium oxide is 100%. Systemic absorption of TCDD from inhaled fly ash is then estimated to be 30%. Because the absorption from the Kociba study was 55%, the AAF (inhalation) is 30%/55% = 0.55. If absorption of TCDD from gallium oxide particles was less than complete, then the AAF for TCDD-contaminated fly ash would be less than 0.55. Thus, ENSR's AAF is health-protective.

Summary of AAFs for TCDD

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	0.40
Dermal-Soil	0.04
Dermal-Water	1.8
Inhalation	0.55

REFERENCES

Banks, Y.B. and L.S. Birnbaum. 1990. Finite Dermal Absorption After Low-Dose TCDD Exposure. Toxicologist 10:309.

Bonaccorsi, A., A. DiDomencio, F. Fanelli, F. Merli, R. Motta, R. Vanzati and G.A. Zapponi. 1984. The influence of soil particle adsorption on 2,3,7,8-TCDD biological uptake in the rabbit. Arch. Toxicol. Suppl. 7:431-434.

Fries, G.F. and G.S. Marrow. 1975. Retention and excretion of 2,3,7,8-tetrachlorodibenzo-p- dioxin by rats. J. Agric. Food Chem. 23(2): 265-269.

Kimbrough, R., H. Falk, P. Stehr, and G. Fries. 1985. Health implication of 2,3,7,8 -tetrachlorodibenzo(p)dioxin (TCDD) contamination of residential soil. J. Toxicol. Environ. Health 14:47-93.

Kociba, R.J., D.G. Keyes, J.E. Beyer, et al. 1978. Results of a two-year chronic toxicity and oncogenicity study of 2,3,7,8-tetrachlorodibenzo-p-dioxin in rats. Toxicol. Appl. Pharmacol. 46(2):279-303.

McConnell, E., G. Lucier, R. Rumbaugh, P. Albro, D. Harvan, J. Hass and M. Harris. 1984. Dioxin in soil: bioavailability after ingestion by rats and guinea pigs. Science 223:1077-1079.

Olson, J.R., T.A. Gasiewicz and R.A. Neal. 1980a. Tissue distribution, excretion, and metabolism of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in the Golden Syrian hamster. Toxicol. Appl. Pharmacol. 56:78-85.

Piper, W.N., J.Q. Rose and P.J. Gehring. 1973. Excretion and Tissue Distribution of 2,3,7,8-Tetrachlorodibenzo-p-dioxin in the Rat. Environ. Health Perspect. Sept. (5):241-244.

Poiger, H. and C. Schlatter. 1980. Influence of Solvents and Absorbents on Dermal and Intestinal Absorption of TCDD. Food Cosmet. Toxicol. 18:477-481.

Poiger, H. and C. Schlatter. 1986. Pharmacokinetics of 2,3,7,8-TCDD in man. Chemosphere 15:1489-1494.

Rose, J.Q., J.C. Ramsey, T.H. Wentzler, R.A. Humeland P.J. Gehring. 1976. The fate of 2,3,7,8-tetrachlorodibenzo-p-dioxin following single and repeated oral doses to the rat. Toxicol. Appl. Pharmacol. 36(2):209-226.

Roy, T.A., J.J. Yang, A.J. Krueger and C.R. Mackerer. 1990. Percutaneous Absorption of Neat 2,3,7,8-Tetrachloro-Dibenzo-p-Dioxin (TCDD) and TCDD Sorbed on Soils. Toxicologist 10:308.

U.S. EPA. 1985. Health Assessment Document for Polychlorinated Dibenzo-p-dioxin. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. EPA-600/8-84-014F. NTIS PB86-122546.

Van den Berg, M., K. Olie and O. Hutzinger. 1983. Uptake and selective retention in rats of orally administered chlorinated dioxins and dibenzo-furans from fly-ash and fly-ash extract. Chemosphere. 12(4/5):537-544.

METALS

ANTIMONY

The USEPA oral RfD of 4E-04 mg/kg-day provided on IRIS (USEPA, 2003) is based on a drinking water study in rats using potassium antimony tartrate. Antimony is poorly absorbed across the gastrointestinal tract with one report of 15 percent absorption of ingested potassium antimony tartrate by rats (USEPA, 1990). It is assumed that the absorption of antimony in the diet and soil is the same as that in drinking water. Thus, the AAF (oral-diet), the AAF (oral-soil), and the AAF (oral-water) are all 1.

Dermal absorption of antimony is also reported to be poor, although specific estimates were not located (USEPA, 1990). A recommended default value for inorganics of 0.1 percent for the dermal absorption from soil (USEPA, 2000) has been used. Assuming that the gastrointestinal absorption of antimony from the drinking water study was 15 percent results in an AAF (dermal-soil) of 0.1%/15% = 0.007.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantifying risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, rather than adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For antimony, the AAF (dermal-water) is (100%)/(15%) = 6.7.

Summary of AAFs for Antimony

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	1.0
Dermal-Soil	0.007
Dermal-Water	6.7

References

U.S. EPA. 1990. Drinking Water Criteria Document for Antimony. U.S. Environmental Protection Agency. Office of Drinking Water. April 1990.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

ARSENIC

These AAFs are appropriate for use with the following dose-response values for arsenic:

- The oral reference dose (RfD) for arsenic, which is 3E-04 mg/kg-day (USEPA, 2003)
- The oral cancer slope factor (CSF) for arsenic, which is 1.5E+00 $(mg/kg\text{-}day)^{-1}$ (USEPA, 2003).
- The inhalation CSF for arsenic, which is 1.5E+01 $(mg/kg\text{-}day)^{-1}$ (USEPA, 2003).

Absorption in the Dose-Response Study

Both oral toxicity values for arsenic are based on epidemiological studies that characterized health effects in a large population of Taiwanese who consumed drinking water containing arsenic. The exact form of the ingested arsenic is unknown. For the purposes of the development of the AAFs, it has been assumed that the arsenic was a soluble inorganic arsenic salt (such as arsenic trioxide, As2O3, a smelting by-product). Several studies investigating the absorption of arsenic have been performed in humans and various animal species. Human studies are sufficiently extensive to strongly suggest that close to 100% of soluble inorganic arsenic in water is absorbed from the gastrointestinal tract. These human studies are reviewed in detail here.

One direct indication of absorption of an orally administered dose of a chemical is its urinary excretion. Several studies show that urinary excretion can account for the majority of an orally administered dose of arsenic. Buchet et al. (1981a) administered aqueous sodium arsenite (NaAsO2) as a single dose to three human volunteers. An average of 45% of the dose was excreted in the urine in four days. In a second study (Buchet et al., 1981b), four individuals given 125, 250, 500, or 1000 µg As/day orally for five days excreted 54, 73, 74, and 64% of the dose in urine, respectively, over 14 days. The average urinary excretion of arsenic for the four subjects was 66% of the administered dose. Crecelius (1977) reports that approximately 50% and 80% of orally administered aqueous arsenic was excreted in urine within 61 hours by a single individual in two experiments. The results of these studies represent the minimum amount of arsenic absorbed since the balance of the dose was not accounted for.

Data for human fecal excretion of arsenic do exist. Pomroy et al. (1980) gave 6 male subjects radiolabelled arsenic acid ($[^{74}As]H_3AsO_4$) in gelatin capsules followed by a glass of water. The presence of arsenic in the body, urine, and feces was measured using a whole body radiation counter. The authors report that for the six subjects the average total excretion over 7 days was $6.1 \pm 2.8\%$ in feces. It is not possible to determine how much of this arsenic was first absorbed and then excreted. The total recovery of arsenic (urine plus feces) was $68.4 \pm 4.0\%$ of the single oral dose. The remaining arsenic was reported to be present in the body tissues; virtually the entire dose could be accounted for. This suggests a minimum absorption of 94% (100% - 6%) of orally ingested arsenic.

A study by Bettley and O'Shea (1975) also reports excretion of arsenic in both urine and feces. Three subjects were exposed to 8.52 mg As (as 1.25 ml of Liq. Arsenicalis B.P.) in three portions 8 hours apart on one day. They found that at most 3.5% of the dose was excreted in feces over ten days. This suggests a minimum absorption of 96%. Urinary excretion averaged $52 \pm 4\%$ of the exposure dose over 10 days (n=3). The remaining half of the dose was unaccounted for, although small amounts of arsenic were found in blood and hair.

In the Coulson study (Coulson et al., 1935), results from two humans each ingesting two forms of arsenic are reported. Less than 5% of an oral dose was excreted in feces whether the arsenic was

taken as arsenic trioxide (As_2O_3) or as natural arsenic present in shrimp. The remainder of the dose, more than 95%, was recovered in urine in three experiments where total recoveries ranged from 74 to 115%. Based on the fecal excretion data from this study, it can be estimated that at least 95% of the ingested arsenic was absorbed. The fecal excretion data are consistent with those of Pomroy et al. (1980) and Bettley and O'Shea (1975).

Fecal excretion data from oral studies provide a minimum estimate of absorption, because it cannot be determined how much of the dose was first absorbed and then excreted into the feces. However, a study in humans injected intravenously with arsenic suggests that absorbed arsenic may be excreted, presumably from bile, into the feces. Mealy et al. (1959) administered radiolabelled arsenic by intravenous injection. Between 57% and 90% of the injected dose was recovered in urine in 10 days. Fecal excretion accounted for 1.3% of the dose after seventeen days in one individual. A second subject excreted 0.2% of the intravenous dose into the feces in one week. Both results indicate some excretion of arsenic into the feces. Virtually all of the remaining dose was recovered in the urine. Biliary excretion of arsenic has been demonstrated in rats, rabbits, and dogs (Klaassen, 1974; Gregus and Klaassen, 1986). This indicates that a portion of the arsenic found in feces in studies using oral dosing may have been first absorbed and then excreted.

The urinary excretion data from the oral studies discussed above provide minimum estimates of arsenic absorption ranging from 45% to 95%. The fecal excretion data suggest that, at a minimum, 95-96% of an orally administered dose of arsenic is absorbed. The study of intravenously administered arsenic suggest that biliary excretion can occur. Therefore, it can conservatively be concluded from the above studies that virtually 100% of an orally administered dose of soluble inorganic arsenic can be absorbed in humans.

Oral-Water AAF

The oral-water AAF for arsenic is defined as: (absorption of arsenic in humans from ingested water) / (absorption of arsenic in humans in the epidemiological study from ingested water). Since the route, matrix, and species are the same for the potential exposure in a risk assessment and the exposure in the dose-response study, the AAF is by definition 1.0. Moreover, the above results suggest that virtually all soluble inorganic arsenic administered orally in water can be absorbed from the gastrointestinal tract. Thus, it is assumed here that 100% of the arsenic was absorbed in the dose-response studies, in which humans ingested arsenic as a component in drinking water, and in the exposure route of concern - human ingestion of drinking water. Therefore, the AAF can also be defined as (100%)/(100%) = 1.

Oral-Diet AAF

The AAF (oral-diet) for this chemical is defined as: (absorption in humans from ingested diet)/(absorption in humans from arsenic in water). Gastrointestinal absorption of arsenic from diet is assumed to be 100% in the absence of other information. Therefore, the AAF (oral-diet) is (100%)/(100%) = 1.

Oral-Soil AAF

The oral-soil AAF for arsenic is defined as: (absorption of arsenic in humans from ingested soil) / (absorption of arsenic in humans in the epidemiological study from ingested water).

An oral-soil AAF of 0.3 is recommended for arsenic in soil and dust in cases where site-specific information is not available. The 0.3 value is based on the high end of relative bioavailability estimates for arsenic ingested in soil and dust by *Cynomolgus* monkeys (Freeman et al., 1995).

The study was conducted to determine arsenic absorption from soil and house dust impacted by smelter activities near Anaconda, Montana. The Cynomolgus monkeys each received sequential treatments of iv sodium arsenate and three oral treatments: soil arsenic in capsules, house dust

arsenic in capsules, and sodium arsenate solution administered by gavage. Absolute bioavailability values for arsenic administered in soil, dust, and solution were calculated based on (1) total urinary arsenic excretion and (2) blood arsenic levels, each normalized based on intravenous data. The bioavailability of arsenic in soil and dust relative to soluble arsenic in solution ranged from 10% to 30%, depending or whether urinary or blood values were used. Results from this study were used by USEPA to derive the oral-soil AAF of 0.183 and oral-dust AAF of 0.258 used in the risk assessment at the Anaconda Superfund site (Walker and Griffin, 1998).

Other Relevant Studies

Other studies of various forms of arsenic support the conclusion that arsenic in soil is poorly absorbed. At the Murray Smelter Superfund site in Utah, a site-specific relative bioavailability adjustment value for arsenic in soil of 0.26 was derived based on an immature swine study comparing absorption of arsenic in soil from the site to absorption of soluble sodium arsenate (Weis et al., 1996; USEPA,1997). In a similar swine study performed at the Ruston/North Tacoma Superfund site in Washington, the site-specific relative bioavailability adjustment value for arsenic in slag dust was 0.42 (USEPA, 1996). Groen et al. (1994) fed ore-containing soil or administered soluble arsenic iv, sequentially to beagle dogs. When compared to iv administration, bioavailability of arsenic from ore-containing soil was approximately 8%. In rabbits, the absorption of arsenic (primarily as Cu_3AsS_4) in soil from a site in Anaconda, Montana was only 24%, while the absorption of a soluble form arsenic from water was 50% (Freeman et al., 1993). Rats fed soil containing mine waste absorbed only one tenth times as much arsenic as rats dosed with soluble arsenic (Yanez et al., 1993). Arsenic selenide, a highly insoluble form, was administered to humans as a fine powder and no increase in urinary arsenic was observed (Mappes, 1977). Thus, absorption in this study was probably low or negligible.

Derivation of the AAF (Oral-Soil) for Arsenic

An oral-soil AAF of 0.3 is recommended for arsenic in soil and dust in cases where site-specific information is not available. The 0.3 value is based on the high end of relative bioavailability estimates for arsenic ingested in soil and dust by *Cynomolgus* monkeys (Freeman et al., 1995). This study was selected to derive the oral-soil AAF for arsenic because, of the animals models studied thus far, the monkey is more physiologically and anatomically similar to humans than are rats, rabbits, swine, or dogs.

Dermal-Soil AAF

A recommended default value for inorganics of 0.1 percent for the dermal absorption of arsenic from soil (USEPA Region 4, 2000) has been used. Assuming that the gastrointestinal absorption of arsenic from drinking water is 100%, results in an AAF (dermal-soil) of 0.1%/100% = 0.001.

Dermal-Water AAF

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading, swimming, or bathing. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). Thus, the AAF (dermal-water) is (100%)/(100%) = 1 for both potential carcinogenic and noncarcinogenic effects.

Inhalation AAF

The inhalation unit risk for assessing carcinogenic effects of arsenic is 4.3E-03 $(\mu g/m^3)^{-1}$. This corresponds to an inhalation CSF of 15 $(mg/kg\text{-}day)^{-1}$, assuming a 70 kg adult breathes 20 m^3 air per day. The unit risk is based on human epidemiological studies, and it is assumed for the purposes of this report that inhalation absorption of arsenic in humans in the exposure scenarios is the same as that of humans in the dose-response study. It is assumed by USEPA that absorption of arsenic adsorbed to respirable particles that are retained in the lung is 30%. Therefore, the AAF (inhalation) is (30%)/(30%) = 1.0 for carcinogenic effects.

Summary of Derived AAFs for Arsenic

Oral-Water	1
Oral-Diet	1
Oral-Soil	0.3
Dermal-Soil	0.001
Dermal-Water	1
Inhalation	1 (for carcinogenic effects)

References

Bertolero, F., E. Maragante, J. Edel Rade, R. Pietra and E. Sabbioni. 1981. Biotransformation and Intracellular Binding of Arsenic in Tissues of Rabbits After Intraperitoneal Administration of ^{74}As Labelled Arsenite. Toxicol. (20):35-44.

Bettley, F.R. and J.A. O'Shea. 1975. The Absorption of Arsenic and Its Relation to Carcinoma. British Journal of Dermatology. (92):563-568.

Buchet, J.P., R. Lauwerys, and H. Roels. 1981a. Comparison of the Urinary Excretion of Arsenic Metabolites After a Single Oral Dose of Sodium Arsenite, Monomethylarsonate, or Dimethylarsinate in Man. Int Arch Occup Environ Health. (48):71-79.

Buchet, J.P., R. Lauwerys, and H. Roels. 1981b. Urinary Excretion of Inorganic Arsenic and Its Metabolites After Repeated Ingestion of Sodium Metaarsenite by Volunteers. Int Arch Occup Environ Health. (48):111-118.

Charbonneau, S.M., K. Spencer, F. Bryce and E. Sandi. 1978. Arsenic Excretion by Monkeys Dosed with Arsenic-Containing Fish or With Inorganic Arsenic. Bull Environm Contam Toxicol. (20):470-477.

Charbonneau, S.M., J.G. Hollins, G.K.H. Tam, F. Bryce, J.M. Ridgeway and R.F. Willes. 1980. Toxicol Lett. (5):175-182.

Coulson, E.J., R.E. Remington and K.M. Lynch. 1935. Metabolism in the Rat of the Naturally Occurring Arsenic of Shrimp as Compared With Arsenic Trioxide. The Journal of Nutrition. (10):255-270.

Crecelius, E.A. 1977. Changes in the Chemical Speciation of Arsenic Following Ingestion by Man. Environmental Health Perspectives. (19):147-150.

ENSR Consulting and Engineering. 1991. Extractability of Arsenic From Slag Materials Under Physiologically Relevant Conditions.

Freeman, G.B., J.D. Johnson, J.M. Killinger, S.C. Liao, A.O. Davis, M.V. Ruby, R.L. Chaney, S.C. Lovre, and P.D. Bergstrom. 1993. Bioavailability of arsenic in soil impacted by smelter activities following oral administration in rabbits. Fundam. Appl. Toxicol. 21:83-88.

Freeman, G.B., R.A. Schoof, M.V. Ruby, A.O. Davis, J.A. Dill, S.C. Liao, C.A. Lapin, and P.D. Bergstrom. 1995. Bioavailability of arsenic in soil and house dust impacted by smelter activities following oral administration in Cynomolgus monkeys. Fundam. Appl. Toxicol. 28:215-222.

Groen, K., H.A.M.G. Vaessen, J.J.G. Kliest, J.L.M. de Boer, T. van Ooik, A. Timmerman, and R.F. Vlug. 1994. Bioavailability of inorganic arsenic from bog ore-containing soil in the dog. Environmental Health Perspective 102(2):182-184.

Gregus, Z. and C.D. Klaassen. 1986. Disposition of Metals in Rats: A Comparative Study of Fecal, Urinary, and Biliary Excretion and Tissue Distribution of Eighteen Metals. Toxicol Appl Pharmacol. (85):24-38.

Hollins J.G., S.M. Charbonneau, F. Bryce, J.M. Ridgeway, G.K.H. Tam, and R.F. Willes. 1979. Whole Body Retention and Excretion of [^{74}As] Arsenic Acid in the Adult Beagle Dog. Toxicology Letters. (4):7-13.

Klaassen, C.D. 1974. Biliary Excretion of Arsenic in Rats, Rabbits, and Dogs. Toxicol Appl Pharmacol. (29):447-457.

Mappes, R. 1977. (Experiments on Excretion of Arsenic in Urine) Versuche zur Ausscheidung von Arsen in Urin. Int Arch Occup Environ Health. (40):267-272.

Marafante, E. and M. Vahter. 1987. Solubility, Retention, and Metabolism of Intratracheally and Orally Administered Inorganic Arsenic Compounds in the Hamster. Environ Res. (42):72-82.

MDNR. 1995. Interoffice Communication from Dr. Linda D. Larson (toxicologist) to Barbara Cowles (environmental quality analyst) dated February 24, 1995, regarding the Ralph Crego Park Site in Lansing, MI. Michigan Department of Natural Resources, Lansing, MI.

Mealey, J. Jr., G.L. Brownell, and W.H. Sweet. 1959. Radioarsenic in Plasma, Urine, Normal Tissues, and Intracranial Neoplasms: Distribution and Turnover after Intravenous Injection in Man. Am Med Assoc Arch Neurol Psychiat. (81):310-320.

ODEQ. 1994. Record of Decision for Operable Unit One of the National Zinc Site, Bartlesville, Oklahoma. Oklahoma Department of Environmental Quality.

Pomroy, C., S.M. Charbonneau, R.S. McCullough and G.K.H. Tam. 1980. Human Retention Studies with ^{74}As. Toxicol Appl Pharmacol. (53):550-556.

Ruby, M.V., A. Davis, R. Schoof, S, Eberle, and C.M. Sellstone. 1996. Estimation of lead and arsenic bioavailability using a physiologically-based extraction test. Environ. Sci. Technol. 30: 422-426.

USEPA. 1996. Bioavailability of Arsenic and Lead in Environmental Substrates. 1. Results of an Oral Dosing Study in Immature Swine. USEPA. Region X. Seattle, WA. PB97-165955. February.

USEPA. 1997. Baseline Human Health Risk Assessment for the Murray Smelter Superfund Site. Site-Wide Evaluation. Prepared by Roy F. Weston, Inc. for USEPA Region VIII. May

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

USEPA. 2000. Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment. U.S. Environmental Protection Agency. Region 4. 5/30/00.

Walker, S., and S. Griffin. 1998. Site-specific Data Confirm Arsenic Exposure Predicted by the U.S. Environmental Protection Agency. Environ. Health Perspect. 106 (3): 133-139.

Weis, C.P., G. Henningsen, and S. Griffin. 1996. Preliminary Bioavailability Values for Arsenic in Soil and Slag from the Murray Smelter Superfund Site. Memo from Christopher P. Weis, Gerry Henningsen and Susan Griffin to Bonnie Lavelle, dated 8/19/96, as cited in EPA 1997.

Yanez, L., L. Carrizales, J. Mejia, O. Ramos, and F. Diaz-Barriga. 1993. Bioavailability and Toxicity of Arsenic in Mine Wastes. SEGH International Conference on Arsenic Exposure and Health Effects. Poster Abstract #18.

BARIUM

The USEPA oral RfD for barium (7E-02 mg/kg-day) is based on a drinking water study in humans in which healthy male volunteers consumed barium chloride. The gastrointestinal absorption in humans of other forms of barium from surface water or groundwater is assumed to be the same. Thus, the AAF (oral-water) is 1. The absorption of barium in humans from dietary constituents is reported to be greater than 91% (Lisk et al., 1988). It is assumed that the absorption from drinking water is 100%. Thus, the AAF (oral-diet) is 1. It is further assumed that the gastrointestinal absorption from soil is the same as from the diet (91-100%). Thus, the AAF (oral-soil) is assumed to be 1.

A recommended default value for inorganics of 0.1% was assumed for dermal absorption from soil in the absence of data on the dermal absorption of barium (USEPA, 2000). Thus, the AAF (dermal-soil) is 0.001.

The inhalation dose-response value for barium (1.43E-04 mg/kg-day) is based on the USEPA RfC, which is derived from an inhalation study in rats. It is assumed that absorption in humans from respirable particles retained in the lung is the same as absorption of $BaCO_3$ dust particles in rats. Thus, the AAF (inhalation) is 1.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For barium the AAF (dermal-water) is (100%)/(100%) = 1.

Summary of AAFs for Barium

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	1.0
Dermal-Soil	0.001
Dermal-Water	1.0
Inhalation	1.0

REFERENCES

Lisk, D.J., C.A. Bache, L.A. Essick, C.M. Reid, M. Rutzke, and K. Crown. 1988. Absorption and excretion of selenium and barium in humans from consumption of brazil nuts. Nutrition Reports International 38:183-192.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL:http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

BERYLLIUM

The USEPA oral RfD of 2E-03 mg/kg-day is based on a dietary study in dogs. Beryllium is very poorly absorbed across the gastrointestinal tract with several investigators reporting less than 1% absorption of ingested beryllium (ATSDR, 1987). It is assumed that the absorption of beryllium in the diet, soil and sediment is the same as that in drinking water. Thus, the AAF (oral-diet), the AAF (oral-soil), the AAF (oral-sediment), and the AAF (oral-water) are all 1.

Dermal absorption of beryllium is also reported to be poor, although specific estimates were not located (ATSDR, 1987). A recommended default value for inorganics of 0.1% for the dermal absorption from soil has been used (USEPA, 2000). Assuming that the gastrointestinal absorption of beryllium from the drinking water study was 1%, results in an AAF (dermal-soil/sediment) of (0.1%)/(1%) = 0.1.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantifying risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make adjustment to the absorbed dermal dose, rather than adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For beryllium, the AAF (dermal-water) is (100%)/(1%) = 100.

Both the inhalation CSF of 8.4 $(mg/kg\text{-}day)^{-1}$ and the inhalation of RfD of 5.71E-06 mg/kg-day were derived from epidemiological data based on occupationally exposed workers. It is assumed that the absorption of inhaled beryllium in the environment is the same as in the dose-response study. Thus, the AAF (inhalation) is 1.

Summary of AAFs for Beryllium

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	1.0
Dermal-Soil	0.1
Dermal-Water	100
Inhalation	1.0

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1987. Draft Toxicological Profile for Beryllium. ATSDR, Atlanta, GA.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL:http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

CADMIUM

These AAFs are appropriate for use with the following dose-response values for cadmium:

- The oral Reference Dose (RfD) for exposures to cadmium in food, which is 1.0E-3 mg/kg-day (USEPA, 2003)
- The oral Reference Dose (RfD) for exposures to cadmium in water, which is of 5E-04 mg/kg-day (USEPA, 2003)
- The inhalation cancer slope factor (CSF) for cadmium, which is 6.3 $(mg/kg\text{-}day)^{-1}$ (USEPA, 2003)

Absorption in the Dose-Response Study

The noncarcinogenic dose-response values for cadmium are based on a one-compartment toxicokinetic model that evaluated a large quantity of both human and animal toxicity data (Friberg et al., 1974; USEPA, 1985). The RfDs are based on the highest level of cadmium in the human renal cortex (i.e. the critical level) not associated with significant proteinuria (i.e. the critical effect). This critical level has been estimated to be 200 µg/gm wet weight human renal cortex. The toxicokinetic model assumes that 0.01% of the cadmium body burden is eliminated per day (USEPA, 1985). In deriving the RfDs for cadmium, USEPA assumed that absorption was different for cadmium ingested in food and water (the model itself does not provide estimates for absorption of cadmium ingested in water). Using a 5% absorption factor for drinking water exposure and a 2.5% absorption factor for dietary exposure, USEPA estimated that a daily intake of 0.005 and 0.01 mg/kg-day, respectively would be required to produce a concentration of 200 ug/gm wet weight in the renal cortex during a lifetime of exposure (USEPA, 2003). These values were divided by 10 to obtain the RfDs of 1E-03 (diet) and 5E-04 mg/kg-day (water). Because these absorption values were used by USEPA to derive the dose-response values for cadmium, they will also be used to determine the AAF values for cadmium.

It should be noted that USEPA (1993) performed a case study on cadmium to determine if there was adequate evidence to support the different media-specific (i.e., food and water) RfDs. In the study, information was used from 35 published studies where rats ingested cadmium in either rat chow or drinking water ad libitum for chronic durations and cadmium levels in the liver and/or kidney were subsequently measured. Based on the analysis, the bioavailability of cadmium ingested in food was not measurably different from that ingested in water in non-fasted rats (fed ad libitum). Instead, in this non-fasting scenario, total diet rather than the actual medium of exposure, appeared to be more of a determining factor for the uptake of cadmium from the GI tract. Based on these results, USEPA (1993) recommended that distinct RfDs for cadmium ingested in food and drinking water not be based on the assumption that the bioavailability of cadmium in drinking water is greater than that of cadmium in food (also published as Ruoff et al., 1994).

AAF (Oral-Water)

The AAF (oral-water) is defined for cadmium as: (absorption in humans from ingested water) / (absorption from water in the toxicokinetic model). Absorption of approximately 5% was assumed in the toxicokinetic model for cadmium administered orally in water. Therefore, since the toxicokinetic model is for the same route and matrix relevant to the human exposure of concern, the AAF is simply 1, or (5%)/(5%). This AAF is intended to be used with the RfD for water. As discussed above, USEPA (1993) concluded that, (1) in non-fasting scenarios, the absorption of cadmium ingested in water is likely the same as the absorption of cadmium ingested in the diet and (2) that distinct RfDs for cadmium ingested in food and drinking water should not be based on the

assumption that the bioavailability of cadmium in drinking water is greater than that of cadmium in food (also published as Ruoff et al., 1994).

Therefore, using the RfD for cadmium ingested in water, with oral-water AAF of 1, may overestimate the toxicity of cadmium ingested in water.

AAF (Oral-Diet)
The AAF (oral-diet) is defined as: (absorption in humans from ingested diet)/(absorption from diet in the toxicokinetic model). Absorption of approximately 2.5% was assumed in the toxicokinetic model for absorption of cadmium from diet. Thus, since the toxicokinetic model is for the route and matrix relevant to human exposure, the AAF is simply 1. This AAF is intended to be used with the RfD for diet.

AAF (Oral-Soil)
The AAF (oral-soil) is defined for cadmium as: (absorption in humans from ingested soil) / (absorption from diet in the toxicokinetic model). The AAF (oral-soil) of 1 is derived below. This AAF is intended to be used with the RfD for diet.

Griffin et al. (1991) have studied the absorption of radiolabelled $^{109}CdCl_2$ present in an aqueous slurry with sand or clay soils. Crl:CD BR rats (4/sex/dose) were administered cadmium by IV (0.5 mg/kg), oral gavage of an aqueous solution (8 or 40 mg/kg), or oral gavage of an aqueous sandy-loam or clay-loam slurry (8 or 40 mg/kg). The cadmium containing soils were prepared by mixing a soil sample with an aqueous solution of $^{109}CdCl_2$, allowing the soil to dry, and then resuspending the soil in an aqueous slurry. Blood was collected at intervals up to 48 hours post-dosing and analyzed for ^{109}Cd by liquid scintillation counting. Absorption of cadmium was measured based on the area under the blood concentration vs. time curve (AUC), using either the IV group or the aqueous oral gavage group AUC as the comparative standard. The results of the Griffin et al. (1991) study are presented in Table 1.

Two points must be considered before evaluating the data in this experiment. First, the concentration of cadmium in soil that would support an 8 mg/kg-day dose in a 15 kg child assumed to ingest 200 mg of soil per day would be 600,000 ppm. The concentration of cadmium in soil that would support this dose in a child assumed to exhibit pica behavior, i.e., ingest 10 g soil/day, would be 12,000 ppm. Likewise, a 40 mg/kg dose is equivalent to exposure by a pica child to soils that are 60,000 ppm cadmium. These high dose levels may have been required in the experiment based on detection limit constraints. However, soil concentrations of cadmium at Superfund sites are unlikely to be as high any either of these values. Therefore, only the results of the lower test groups will be considered in the development of the AAF.

Second, the method of preparation of cadmium-containing soils is unlikely to mimic the physical state of cadmium in weathered soils, where it would be expected to be present in complex mineralogical forms. However, since this is the only study available that evaluates cadmium absorption from soils, it must be considered.

From the data presented in Table 1, it is evident that absorption from both the sand- and clay-based soils was less than absorption of the same dose of cadmium when administered by oral gavage. The average relative absorption of cadmium from the soils (compared to the oral aqueous gavage data) is 41.5%. Thus, oral absorption of cadmium from soils is roughly half of that from an aqueous solution.

Table 1. Data from Griffin et al. (1991) for Cadmium

TEST GROUP	ROUTE OF EXPOSURE	DOSE (mg/kg)	ABSOLUTE ABSORPTION*	RELATIVE ABSORPTION**
1	IV	0.5	100	-
2	Oral/Water	8	0.95	100
3	Oral/Water	40	1.85	100
4	Oral/Sand	8	0.6	61.9
5	Oral/Sand	40	1.6	84.5
6	Oral/Clay	8	0.2	21.1
7	Oral/Clay	40	0.2	13.0

* Absolute absorption is relative to IV dose group data.
** Relative absorption is relative to aqueous oral gavage dose group data at the same dose.

A more recent study also indicates that oral absorption of cadmium from soils is roughly half of that from an aqueous solution in rats (Schilderman et al., 1997). Based on blood cadmium levels, bioavailability in rats ingesting cadmium chloride in soil was 43% of that in rats ingesting cadmium chloride in saline solution. The authors concluded that the soil matrix significantly reduced the absorption of cadmium from the gastrointestinal tract.

One must now attempt to use these data for human exposure assessment. The estimate of human oral absorption of cadmium comes from a toxicokinetic model that was based on many human and animal studies. In that model, the absorption of cadmium from food (2.5%) is estimated to be half of that from drinking water (5%) in humans. Although the absolute absorption values are not directly comparable between rats and humans, a comparison of absorption from soil and water can be made between the two species. Cadmium absorption from soil in rats is approximately half of that from water, as shown above. Assuming that the comparison of cadmium absorption from soil and water in rats can be extrapolated to humans, then it can be concluded that absorption in humans of cadmium from soil should be half that from water. In this case, human absorption of cadmium from water is 5%. Therefore, oral absorption of cadmium from soil would be 2.5%, which is equivalent to human absorption of cadmium from food. The AAF (oral-soil) is defined for cadmium as: (absorption in humans from ingested soil) / (absorption from diet in the toxicokinetic model). Therefore, the AAF for oral exposure to cadmium containing soils, to be used with the RfD for cadmium ingested in food, is:

$$AAF = (2.5\%) / (2.5\%) = 1.$$

A typical default assumption in the absence of data would be simply to assume that absorption from soil was the same as from diet. Therefore, using either approach gives similar results; thus the AAF (oral-soil) is 1.

The Griffin et al. (1991) study does suggest that site-specific information derived from the actual soils present could result in an AAF that is either lower or higher than that derived here. Such information could be obtained either from appropriate absorption studies in animals or from in vitro extraction experiments under conditions mimicking the stomach, i.e., pH 2.

AAF (Dermal-Soil)
The AAF (dermal-soil) is defined for this chemical as: (absorption in humans from dermal contact with soil) / (absorption from food in the toxicokinetic model). The AAF (dermal-soil) of 0.04 is derived below. This value is to be used with the RfD for diet.

A recommended default value for inorganics of 0.1 percent for the dermal absorption of cadmium from soil (USEPA, 2000) has been used. Assuming that the gastrointestinal absorption of cadmium from food is 2.5%, results in an AAF (dermal-soil) of 0.1%/2.5% = 0.04.

AAF (Dermal-Water)
The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming or potable water when bathing. The methodology for quantitating risks posed by these exposure pathways uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. The dose-response value for cadmium, however, is based on administered dose. Thus, the AAF (dermal-water) is defined as: (100%) / (absorption from diet in the toxicokinetic model).

To derive the AAF (dermal-water), the absorption from food of 2.5% assumed in the toxicokinetic model is used. Accordingly, the AAF (dermal-water) is 100% / 2.5% = 40. This value is for use with the RfD for diet.

AAF (Inhalation)
The AAF (inhalation) is defined for potential carcinogenic effects as: (absorption in humans from inhaled materials)/(absorption in workers from inhaled materials). The inhalation AAF (carcinogenic) of 1.0 is derived below.

The inhalation unit risk for cadmium (1.8×10^{-3} $(ug/m^3)^{-1}$) is derived from a human occupational inhalation study. This corresponds to an inhalation CSF of 6.3 $(mg/kg/day)^{-1}$. It is assumed that absorption in humans from respirable soil particles retained in the lung is the same as absorption of cadmium by workers in the dose-response study. Thus, the AAF (inhalation) for carcinogenic effects is 1.

Summary of AAFs Derived for Cadmium

Oral-Water	1	(use with RfD-water: 0.0005 mg/kg-day)
Oral-Diet	1	(use with RfD-food: 0.001 mg/kg-day)
Oral-Soil	1	(use with RfD-food: 0.001 mg/kg-day)
Dermal-Soil	0.04	(use with RfD-food)
Dermal-Water	40	(use with RfD-food)
Inhalation	1	(carcinogenic - use with inhalation CSF: 6.3 $(mg/kg-day)^{-1}$)

References

Friberg, L., M. Piscator, G.F. Nordberg, and J. Kjellstrom. 1974. Cadmium in the Environment, 2nd ed,. CRC Press, Inc., Boca Raton, FL.

Griffin, S., R. Rubenstein, S. Irene, C. DeRosa and H. Choudhury. 1991. Bioavailability in Rats of Metals Adsorbed to Soils. USEPA, Washington, D.C. Hazleton Laboratories America, Inc.

Ruoff, W.L., G.L. Diamond, S.F. Velazquez, W.M. Stiteler, and D. Gefell. 1994. Bioavailability of Cadmium in Food And Water: A Case Study on the Derivation of Relative Bioavailability Factors for Inorganics and Their Relevance to the Reference Dose. Regulatory Toxicology and Pharmacology, 20: 139-160.

Schildermann, P., E. Moonen, P. Kempkers, and J. Kleinjans. 1997. Bioavailability of Soil-adsorbed Cadmium in Orally Exposed Male Rats. Environmental Health Perspectives. 105(2): 234-238.

USEPA. 1985. Drinking Water Health Criteria Document on Cadmium. Criteria and Standards Division, Office of Drinking Water, US EPA, Washington, D.C. PB89-192140.

USEPA. 1993. Relative Bioavailability of Inorganics: Cadmium Case Study. Prepared by Syracuse Research Corporation for Environmental Criteria and Assessment Office. USEPA. Cincinnati, OH. Contract No. 68-C0-0003.

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

CHROMIUM VI

The oral-dose response value for chromium VI (0.005 mg/kg-day) is a chronic RfD based on a drinking water study in rats. The RfD is based on administered dose units. In order to derive AAFs for chromium, it is important to understand the degree to which it is excreted in the feces. Therefore, this topic is addressed first, followed by the estimation of absorption in the chromium VI dose-response study, and finally the derivation of the AAFs.

Fecal Excretion of Chromium

As discussed in the introduction, most absorption studies rely on quantitation of a compound in urine and/or feces for absorption determinations. For orally administered compounds, presence of the compound in the feces could merely indicate transit of the compound through the GI tract, or could indicate absorption of the compound with subsequent excretion into the feces. The best method for the determination of fecal excretion is quantitation of the compound in urine and feces after administration of an IV or IP dose. From the data, the ratio of the compound present in the feces to the compound present in the urine can be determined. This ratio can then be used with urinary excretion data from oral absorption studies to estimate the amount of fecal excretion. The sum of urinary and fecal excretion is a estimate of absorption.

Several studies demonstrate that fecal excretion of absorbed chromium is a significant pathway of elimination for chromium VI. As the results of these studies are integral to the determination of chromium absorption, these studies are reviewed below. A summary of the results are presented in Table 5-1.

1. Sayato et al. (1980) administered radioactive sodium chromate by intravenous injection to male Wistar rats. At both 4 and 25 days post-injection, fecal excretion was 50% of urinary excretion.

2. Visek et al. (1953) administered intravenous injections of radioactive sodium chromate to rats of the Rockland and Carworth strains and measured the metal in urine and feces. At four days, fecal excretion was 49% of urinary excretion.

3. Cikrt and Bencko (1979) administered radioactive sodium chromate to female Wistar rats after a 24 hour fast by intravenous injection. After 24 hours, fecal chromium was 52% of urinary chromium.

4. Manzo et al. (1983) dosed five male COBS albino rats with radiolabelled chromic chloride by intravenous injection. At 24 hours, fecal excretion was 99% of urinary excretion.

TABLE - Excretion Patterns of IV Administered Chromium VI

Study	Route	Species	Dose (mg Cr/kg)	Time (days)	% Dose in Urine	% Dose in Feces	% F/U
Sayto (1980)	IV	rat	0.02	4 25	45% 50%	22% 25%	50%
Visek (1953)	IV	rat	0.05 to 0.3	4	35%	17%	49%
Cikrt & Benko (1979)	IV	rat	0.05	1	20.8%	7.3% + 3.5% (in bile)	52%
Manzo (1983)	IV	rat	0.11	1	3.27%	3.24%	99%
Bryson, Goodson (1983)	IP	mouse	2.2	7	45%	25%	56%

5. Bryson and Goodall (1983) administered chromic chloride to CxO mice by IP injection. Urine and feces were analyzed by a diphenylcarbazone spectrophotometric method. At four days, 45% of the dose was recovered in the urine, and 25% of the dose was in the feces. Thus, fecal excretion was 56% of urinary excretion.

The measured values of fecal excretion as a percentage of urinary excretion from these studies vary from 49% to 99%. Not all of these studies are appropriate for the derivation of an average value. Several issues must be considered. First, it is not necessary to include the mouse data from the Bryson and Goodall (1983) study here, because the study upon which the RfD for chromium III is based was performed in rats, and the remaining studies do use rats as the experimental animal.

Second, the duration of the experiments must be considered. One study presents the time course of elimination of chromium VI in both urine and feces (Sayato et al., 1980). The results of this study shows that after a single dose, both urinary and fecal excretion begin to plateau after 4 days. Therefore, only studies that have a duration of at least 96 hours should be included in this fecal elimination analysis. This means that the results of Cikrt and Bencko (1979) and Manzo et al. (1983) will be excluded from analysis as these studies lasted only 24 hours.

This evaluation leaves the first two studies mentioned above and as listed in Table 5-1. Thus, the results of Sayato (1980) and Visek (1953) on the ratio of fecal to urinary excretion, 50% and 49%, respectively, can be used to calculate a mean value of 49.5%. This value for estimating fecal excretion is appropriate to use with cumulative urinary excretion data from 4 days post dosing onward because it was shown by Sayato (1980) that urinary excretion generally begins to plateau at 4 days.

From the time courses of elimination (Sayato et al., 1980), the relationship between urinary excretion at 24 hours and at 96 hours can also be determined. Urinary excretion at 24 hr as a percent of urinary excretion at 96 hours is 68%. This value will be used to evaluate oral absorption data that only report results up to 24 hours post-dosing. Use of this value assumes that nearly all the administered dose will be excreted at 96 hours.

Therefore, in the absence of fecal excretion data for a study of oral absorption of chromium VI, it will be assumed that some of the chromium present in the feces is metal that was absorbed from the gastrointestinal tract and has been eliminated into the gastrointestinal tract either by biliary excretion, or some other mechanism. The fecal elimination will be estimated by assuming that an amount

equivalent to 49.5% of the amount eliminated in the urine is also eliminated in the feces. In addition, it will be assumed that urinary elimination at 24 hours post-dosing represents 68% of the total urinary output of chromium VI. This approach assumes that the degree of urinary or fecal elimination is independent of the route of administration, and moreover, that fecal elimination occurs in humans as is does in rats.

Estimation of Absorption in the Dose-Response Study

Donaldson and Barreras (1966) administered radioactive sodium chromate in water to six fasting female albino rats. Urine and feces were collected for seven days. On average, 98.5% of the chromium was recovered. On average, 0.8% was found in the urine and 97.7% was found in the feces. Individual subject data were not presented. The absorbed amount excreted in the feces is estimated as (0.495) x (0.008) x 100 = 0.4%. The total amount absorbed is thus estimated as (0.8%) + (0.4%) = 1.3%.

MacKenzie et al. (1959) gave radioactive sodium chromate solutions to nonfasting Sprague-Dawley rats. Urine, feces, and tissues were collected for 1, 7, or 14 days for different experimental groups. Data from the one day group were excluded, because of the slow clearance of chromium from tissues. Over 20% of the dose was still in the tissues. Data from the other two groups was used below. On average, 97.8% of the dose was recovered in the 7 day group, and 99.3% was recovered in the 14 day group.

Urinary Fecal	Fecal Absorbed	Urinary + Fecal Absorbed	
2.3%	95.3%	1.1%	3.4%
2.8%	94.7%	1.4%	4.2%

Sayato et al. (1980) gave radioactive sodium chromate to four male Wistar rats and collected urine and feces for ten days. On average, 99.6% of the chromium was recovered. Of the dose, 0.6% was found in the urine, and 99% was found in the feces. The absorbed amount in the feces is estimated as (0.495) x (0.006) x 100 = 0.3%. The total amount absorbed is thus estimated as (0.6%) + (0.3%) = (0.9%).

The average absorption value from the rodent data is calculated from the mean values from Donaldson and Barreras (1966) and Sayato et al. (1980) and the two values from MacKenzie et al. (1959) as 2.5%. The values range from 0.9% to 4.2%.

Oral-Water AAF

The oral-water AAF for chromium VI is defined as: (absorption of chromium VI in humans from ingested water) / (absorption of chromium VI in rats from ingested water). The absorption of chromium VI in rats was estimated above. The estimation of human absorption of chromium VI in drinking water follows.

Human Oral Absorption Studies

Donaldson and Barreras (1966) administered radioactive sodium chromate in water to six fasting human subjects. Urine was collected for 24 hours and feces were collected for 6 days. On average, 91.5% of the chromium was recovered. On average, 2.1% was found in the urine and 89.4% was found in the feces. Individual subject data were not presented. The absorbed amount excreted in the feces is estimated as (0.495) x (0.021) x 100 = 1.0%. The total amount absorbed is thus estimated as (2.1%) + (1%) = 3.1%.

Roche et al. (1957) administered radioactive chromate to four human subjects whose fasting state was not reported. Urine and feces were collected for five days. Recovery ranged from 60% to 103%. Data is presented for each subject below. Fecal chromium that was absorbed is estimated as above: (0.495) x (urinary chromium) x 100.

Urinary	Fecal	Fecal Absorbed	Urinary + Fecal Absorbed
9%	86.2%	4.5%	13.5%
1.8%	98%	0.9%	2.7%
7.4%	95.8%	3.7%	11.1%
1.0%	59.2%	0.5%	1.5%

In a third study, Ebaugh et al. (1958) orally administered radioactive sodium chromate in grape juice to two patients. On average, 94.5% of the dose was excreted into the feces. The amount not recovered in the feces can be presumed to be absorbed and either eliminated in the urine or stored in the tissues. Thus, an estimate of 5.5% can be made from this study.

Hansky and Connell (1962) gave human subjects sodium chromate in an aqueous solution, and chromium was analyzed in feces only, for several days. Urinary chromium was not measured. The average amount of the dose that was eliminated in the feces was 88.5%. Thus, an estimate of 11.5% can be made from this study.

The estimates of human oral absorption of chromium VI range from 1.5% to 13.5%. The average absorption of orally administered chromium VI in humans from the above studies is 7.6%.

Derivation of the Oral-Water AAF

To summarize the absorption data:

1. The average absorption value from the rodent data is calculated from the mean values from Donaldson and Barreras (1966) and Sayato et al. (1980) and the two values from MacKenzie et al. (1959) as 2.5%. The values range from 0.9% to 4.2%.

2. The estimates of human oral absorption of chromium VI range from 1.5% to 13.5%. The average absorption of orally administered chromium VI in humans from the above studies is 7.6%.

Although the average values of absorption in rats and humans are different, the range of values for both species overlap to the extent that it cannot be concluded that they are significantly different. Therefore, it is concluded that the oral absorption of chromium VI from water in rats and humans is not significantly different. Thus, the oral-water AAF is 1.0.

AAF (Oral-Diet)

The AAF (oral-diet) for this chemical is defined as: (absorption in humans from ingested diet) / (absorption in rats from ingested water). According to the U.S. EPA, the gastrointestinal absorption of chromium VI in rats and humans is similar. Thus, an experiment in which rats were fed chromium VI with or without fasting is used as the basis of the AAF (oral-diet). The AAF (oral-diet) is defined as: (absorption from diet)/(absorption from drinking water). In rats, Ogawa (1976) found this ratio to be 1.4%/11% = 0.13. In another experiment, MacKenzie et al. (1959) found the ratio in rats to be 3%/6% = 0.5. The mean of these two ratios is 0.3. Thus, the AAF (oral-diet) is 0.3.

Oral-Soil AAF

The Oral-Soil AAF for chromium VI is defined as: (absorption of chromium VI in humans from soil) / (absorption of chromium VI in rodents from drinking water).

No studies were found in which chromium VI was added to soil in the laboratory under controlled conditions and fed to animals. One laboratory (Witmer and Park, 1989; Witmer et al. 1991) orally administered chromium containing soil to rats. The chromium in the soil was approximately 30-35% hexavalent chromium. Because of the complicated experimental design, it is not possible to develop a reliable estimate of absorption from this study.

Estimates of oral absorption can be made form the data of MacKenzie et al. (1959) and Ogawa (1976) in which absorption in fasted and unfasted animals are compared.

An estimate of the oral-soil AAF is made from the data of MacKenzie et al. (1959). In this experiment the seven day excreta are compared between fasting and nonfasting female albino rats. MacKenzie et al. (1959) gave radioactive sodium chromate solutions to the rats. Urine, feces, and tissues were collected for 1, 7, or 14 days for different experimental groups. Data from the one day group were excluded, because of the slow clearance of chromium from tissues. Over 20% of the dose was still in the tissues. Data from the other two groups was used below. As done elsewhere, the amount of chromium in the feces that was absorbed and then excreted was estimate by multiplying the urinary amount by 0.495.

Not Fasting:

Urinary	Fecal Absorbed	Urinary + Fecal Absorbed
2.3%	1.1%	3.4%
2.8%	1.4%	4.2%
	Average: 3.8%	

Fasting:

Urinary	Fecal Absorbed	Urinary + Fecal Absorbed
5.3%	2.6%	7.9%
5.7%	2.8%	8.5%
	Average: 8.2%	

The ratio between the nonfasting rats and the fasting rats yields an estimate of the degree to which the presence of food in the gastrointestinal tract inhibits the absorption of chromium VI in rats. It is assumed that the absorption of chromium VI in soils would be inhibited to the same degree compared to drinking water. Thus, an estimate for the oral-soil AAF is (3.8%) / (8.2%) = 0.46.

In a separate experiment Ogawa (1976) fed rats chromium VI with or without fasting. Absorption was reported to be 1.4% in nonfasting animals and 11% in fasting animals. This study has been cited in U.S. EPA (1984) and ATSDR (1990). A second estimate of the oral-soil AAF can be made from this study: (1.4%) / (11%) = 0.13.

The oral-soil AAF to be used in human health risk assessment is the average of the two estimates made above: (0.46 + 0.13) / 2 = 0.3.

Dermal-Soil AAF

Cal-EPA (1994) recommends a dermal absorption adjustment factor of 0%, because chromium VI has not been shown to be carcinogenic by the dermal route. Horowitz and Finley (1993) demonstrated that the fraction of chromium VI released as soluble chromium by real human sweat is less than 0.1%. In addition to the low bioaccessibility of chromium VI, measurable absorption of soluble chromium VI is unlikely because the skin in an effective barrier (Paustenbach et al., 1997). Finley and Paustenbach (1997) state that systemic uptake of chromium VI following dermal contact with soil does not occur to a degree that warrants quantitative evaluation in a risk assessment. Accordingly, the dermal-soil AAF is 0.

Dermal-Water AAF

The dermal-water AAF is used when estimating the human risks posed by dermally contacting surface water when wading or swimming or potable water when bathing. The methodology for quantitating risks posed by these exposure pathways uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. The dose-response value for this chemical, however, is based on administered dose. The AAF can be used to make an adjustment of the exposure dose.

Thus, the dermal-water AAF is defined as: (100%)/ (absorption in rats from ingestion of aqueous solutions). This AAF is derived using the estimate of absorption from aqueous solutions derived above from rodents (2.5%). Accordingly, the dermal-water AAF is: (100%) / (2.5%) = 40.

Inhalation AAF

The CSF of 42 $(mg/kg/day)^{-1}$ for assessing carcinogenic effects of inhalation of chromium VI is based on human epidemiological studies. It corresponds to an inhalation unit risk of 1.2×10^{-2} $(\mu g/cu.m)^{-1}$. According to EPA, the CSF should not be used if air concentrations exceed 0.8 µg/cu.m. It is assumed that the absorption of chromium VI from respirable particles or aerosols that are retained in the lung is the same as the absorption of chromium VI by humans in the dose-response studies. Thus, the AAF (inhalation) is 1.0.

Summary of AAFs for Chromium VI

Oral-Water	1.0
Oral-Diet	0.3
Oral-Soil	0.3
Dermal-Soil	0
Dermal-Water	40
Inhalation	1.0

REFERENCES

ATSDR. 1990. Toxicological Profile for Chromium. Agency for Toxic Substances and Disease Registry. Atlanta, GA.

Bryson, W.G. and C.M. Goodall. 1983. Differential Toxicity and Clearance Kinetics of Chromium(III) or (VI) in Mice. Carcinogenesis 4(2):1535-1539.

Cikrt, M. and V. Bencko. 1979. Biliary Excretion and Distribution of $^{51}Cr(III)$ and $^{51}Cr(VI)$ in Rats. J. Hyg., Epimed., Microb. and Immun. (3):241-246.

Collins, R.J., P.O. Fromm and W.D. Collings. 1960. Chromium Excretion in the Dog. Am. J. Physiol. 201(5):795-798.

Donaldson, R.M. and R.F. Barreras. 1966. Intestinal Absorption of Trace Quantities of Chromium. J. Lab. and Clin. Med. (68).

Ebaugh, F.G., T. Clemens, G. Rodnan and R.E. Peterson. 1958. Quantitative Measurement of Gastrointestinal Blood Loss: I. The Use of Radioactive Cr^{51} in Patients with Gastrointestinal Hemorrhage. Amer. J. Med.

Finley, B.L. and D.J. Paustenbach. 1997. Using Applied Research to Reduce Uncertainty in Health Risk Assessment: Five Case Studies Involving Human Exposure to Chromium in Soil and Groundwater. In: Chromium in Soil: Perspectives in Chemistry, Health, and Environmental Regulation. Special Issue. J. Soil Contamin. (Eds. D. Proctor, B. Finley, M. Harris, D.J. Paustenbach, and D. Rabbe). Volume 6(6): 649-706.Gregus, Z. and C.D. Klaassen. 1986. Disposition of Metals in Rats: A Comparative Study of Fecal, Urinary, and Biliary Excretion and Tissue Distribution of Eighteen Metals. Toxicology and Applied Pharmacology. (85):24-38.

Gregus, Z. and C.D. Klaassen. 1986. Disposition of Metals in Rats: A Comparative Study of Fecal, Urinary, and Biliary Excretion and Tissue Distribution of Eighteen Metals. Toxicology and Applied Pharmacology. (85):24-38.

Hansky, J. and A.M. Connell. 1962. Measurement of Gastrointestinal Transit Using Radioactive Chromium. Gut. (3):187-188.

Horowitz, S.B. and B.L. Finley. 1993. Using Human Sweat to Extract Chromium from Chromite Ore Processing Residue: Applications to Setting Health-Based Cleanup Levels. J. Toxicol. Environ. Health. 40: 585-599.Mackenzie, R.D., R.A. Anwar, R.U. Byerrum and C.A. Hoppert. 1959. Absorption and Distribution of Cr^{51} in the Albino Rat. Arch. Biochem. Biophys. 79:200-205. As cited in US EPA, 1984.

Mackenzie, R.D., R.A. Anwar, R.U. Byerrum and C.A. Hoppert. 1959. Absorption and Distribution of Cr^{51} in the Albino Rat. Arch. Biochem. Biophys. 79:200-205. As cited in EPA, 1984.

Manzo, L., A. DiNucci, J. Edel, C. Gregotti and E. Sabbioni. 1983. Biliary and Gastrointestinal Excretion of Chromium After Administration of Cr-III and Cr-VI in Rats. Research Communications in Chemical Pathology and Pharmacology. 42(1):113-125.

Ogawa, E. 1976. Experimental Study on Absorption, Distribution and Excretion of Trivalent and Hexavalent Chromes. Japanese J. Pharmacol. 26:92. As cited in EPA, 1984.

Paustenbach, D.J., J.M. Panko, M.M. Fecrick, B. Finley, and D.M. Proctor. 1997. Urinary Chromium as a Biological Marker of Environmental Exposure: What are the Limitations? Regul. Toxicol. Pharmacol. 26(1): S23-S34.

Roche, M., M.E. Perez-Gimenez, M. Layrisse and E. DiPrisco. 1957. Study of Urinary and Fecal Excretion of Radioactive Chromium Cr^{51} in Man. Its Use in the Measurement of Intestinal Blood Loss Associated With Hookworm Infection. J. Clin. Invest. 36:1183-1192.

Sayato, Y., K. Nakamuro, S. Matsui and M. Ando. 1980. Metabolic Fate of Chromium Compounds. I. Comparative Behavior of Chromium in Rat Administered With $Na_2{}^{51}CrO_4$ and $^{51}CrCl_3$. J. Pharm. Dyn. 3:17-23.

U.S. EPA. 1984. Health Assessment Document for Chromium: Chromium Metabolism in People and Animals. EPA600/8-83-014F.

Visek, W.J., I.B. Whitney, U.S.G. Kuhn and C.L. Comar. 1953. Metabolism of Cr^{51} by Animals as Influenced by Chemical State. P.S.E.B.M. (84):610-615.

Witmer, C.M., R. Harris and S.I. Shupack. 1991. Oral Bioavailability of Chromium from a Specific Site. Env. H. Persp. (92):105-110.

Witmer, C.M. and H.S. Park. 1989. Mutagenicity and Disposition of Chromium. The Science of the Total Environment. (86):131-148.

COBALT

The oral noncarcinogenic dose-response value (RfD) (2E-2 mg/kg-day) is based on observations of humans undergoing dialysis. Absorption in the dose-response study is assumed to be 100%. It is assumed that absorption in this study is complete and is the same for drinking water, and soil ingestion exposures. Thus, the AAF (oral-water), and the AAF (oral-soil) are 1.

A recommended default value for organics of 1% was assumed for dermal absorption of cobalt from soil (U.S. EPA, 2000). Thus, the AAF (dermal-soil) is (1%)/(100%) = 0.01.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). Thus, the AAF (dermal-water) is (100%)/(100%) = 1.

The inhalation noncarcinogenic RfD value for cobalt (5E-06 mg/kg-day) is derived from a human occupational study. The inhalation CSF (9.8E+0 $(mg/kg\text{-}day)^{-1}$) is based on an inhalation study in mice. It is assumed that the absorption in humans is the same as absorption of cobalt in mice. Thus, the AAF (inhalation) for both carcinogenic and noncarcinogenic effects is 1.

Summary of AAFs for Cobalt

Oral-water	1
Oral-soil	1
Dermal-soil	0.01
Dermal-water	1
Inhalation	1

REFERENCE

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00. [URL:http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

COPPER

The oral RfD for copper (3.7E-02 mg/kg-day) is converted from a drinking water standard of 1.3 mg/L, and is based on an oral study with copper sulfate in humans (USEPA, 1997). It is assumed that this was a dietary study and that the absorption from diet is the same as the absorption from drinking water. Thus, the AAF (oral-water) and the AAF (oral-diet) are both 1. It is also assumed that the gastrointestinal absorption from diet and soil is the same. Thus, the AAF (oral-soil) is 1.

The USEPA (USEPA, 2000) recommended default value of 0.1% for dermal absorption of inorganics was assumed for dermal absorption of copper. According to Weber et al. (1969) ingested copper salts are 60% absorbed in humans from the diet. Thus, the AAF (dermal-soil) is 0.1%/60% = 0.002.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For copper, the AAF (dermal-water) is (100%)/(60%) = 1.67.

Summary of AAFs for Copper

Oral-water	1
Oral-diet	1
Oral-soil	1
Dermal-soil	0.002
Dermal-water	1.67

REFERENCES

USEPA. 1997. Health Effects Assessment Summary Tables (HEAST). PB97-921199.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

Weber, P.M., S.M., O'Reilly, M. Pollycove, and L. Shipley. 1969. Gastrointestinal absorption of copper: studies with ^{64}Cu, ^{95}Zr, a whole-body counter and the scintillation camera. J. Nucl. Med. 10:591-596.

MANGANESE

The oral RfD for dietary intake of manganese is 1.4E-01 mg/kg-day based on human consumption studies. Because these are dietary studies, the AAF (oral-diet) is by definition 1.

The oral RfD for exposure to manganese in non-food media such as drinking water, soil, etc., is 2.4E-02 mg/kg-day. This value is based on the dietary RfD after the application of a modifying factor of 3 and subtraction of dietary intake from the LOAEL. The AAF (oral-water) and AAF (oral-soil) are assumed to be 1.

No studies have been found that address the dermal absorption of manganese from soils. A default value for the absorption of metals from soil is 0.1% (USEPA, 2000). Assuming a 10% absorption of manganese from the diet, the AAF (dermal-soil) is (0.1%/10%) = 0.01.

The inhalation RfC for manganese is 5.0E-05 mg/m^3. This corresponds to an inhalation RfD of 1.43E-05 mg/kg-day. The value is based on a human occupational epidemiological study. Absorption of airborne manganese is assumed not to differ from that in the dose-response study. Therefore, the AAF (inhalation) is 1.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantifying risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make adjustment to the absorbed dermal dose, rather than adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For manganese, the AAF (dermal-water) is 100%/10% = 10.

Summary of AAFs for Manganese

Oral-water	1.0
Oral-diet	1.0
Oral-soil	1.0
Dermal-soil	0.01
Dermal-water	10.0
Inhalation	1.0

REFERENCES

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00. [URL:http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

INORGANIC MERCURY

The dose-response value for inorganic mercury (3.0E-4 mg/kg-day) is a chronic RfD based on three subchronic studies in which rats were dosed with mercuric chloride either by gavage or by subcutaneous injection. This RfD is intended to be used for risk assessment of water, soils, and sediments containing unspeciated mercury. In addition, it should be used in all situations in which mercury has been speciated and found to be inorganic mercury.

The above RfD should not be used for risk assessments in which fish uptake of mercury is modeled from any source, and human consumption of mercury-contaminated fish is estimated. This is because the mercury in fish is generally in the form of methyl mercury, or some other organomercury compound. Therefore, for fish consumption, the RfD for methyl mercury should be used. In addition, the RfD for inorganic mercury should not be used whenever methyl mercury has been specifically detected and quantitated in any environmental media.

The AAFs developed in this document for inorganic mercury are applicable to soluble forms of mercury; i.e., they are applicable to most forms of inorganic mercury except mercuric sulfide. As shown below, the gastrointestinal absorption of mercuric sulfide is much lower than that of mercuric chloride, the compound upon which the RfD is based. Thus, the use of the following AAFs will cause an overestimation of the risks posed by mercuric sulfide. If it is known from site history or mercury speciation analyses that the mercury present in some environmental media is mercuric sulfide, then it may be appropriate to derive a mercuric sulfide-specific set of AAFs.

Derivation of the RfD for Inorganic Mercury

The EPA-derived RfD for mercuric chloride is a consensus value determined by a panel of mercury experts who met at EPA in October, 1987. The rat LOAEL for autoimmune effects was based on three LOAELs identified in three rat studies. In two studies mercuric chloride was given to the animals by gavage as an aqueous solution. LOAELS in these studies were 0.32 and 0.63 mg/kg-day in administered dose units. In a third study, mercuric chloride was injected subcutaneously. EPA converted the LOAEL of 0.016 mg/kg-day to units comparable to the gavage studies by assuming the following: (1) 7% of mercuric chloride is absorbed from the gastrointestinal tract and (2) 100% of mercuric chloride is absorbed when injected subcutaneously. The converted LOAEL was 0.23 mg/kg-day.

From these three LOAELS, the experts determined that 0.3 mg/kg-day was an appropriate average LOAEL from which to derive a chronic RfD. The resulting RfD is in administered dose units assuming an oral gavage dosing regimen with aqueous solutions. Thus, an estimation of absorption of inorganic mercury in rats from oral gavage is required for the development of the AAFs.

Estimation of Absorption in the Dose-Response Study

Three studies have been used to estimate the absorption of orally administered inorganic mercury in rodents. Two of these studies have defined absorption based on the residual body burden following a dose of radiolabelled ^{203}Hg. One has determined absorption based on urinary excretion data. Each of these will be discussed in turn below.

Residual Body Burden

Clarkson (1971) fed mice diets containing an unreported dose of $^{203}HgCl_2$. The body burden of mercury was measured by whole body radioactivity counting. After an initial sharp increase in

radioactivity over the course of two days, whole body counts at steady state indicated that 1-2% of the daily dose was absorbed. The average of 1.5% is a minimum estimate of inorganic mercury absorption because it does not take into account the amount of the dose that was absorbed and then excreted either in urine or feces.

Walsh (1982) introduced $^{203}HgCl_2$ (46ug/kg) by gavage in aqueous solution to rats (3-6/group). At 4 hr and 43 hr post-dosing, radioactivity measurements were made on: 1) the contents of the GI tract (stomach and the regions of the intestine), and 2) the carcass after the GI contents had been removed. Radioactivity in the eliminated urine and feces were not determined. At 4 hr, 1.5% of the dose was associated with the carcass and the balance of the dose was recovered in the GI contents. At 43 hr, 2.4% of the dose was associated with the carcass and 3.3% of the dose was recovered in the GI contents. (This 3.3% may or may not be available for absorption, or may have already been absorbed and excreted.) Therefore, at 43 hr the remaining 94.3% of the dose had been eliminated from the body. The value of 2.4% then is an estimate of the body burden of inorganic mercury.

The above studies have estimated the following body burdens of inorganic mercury in rodents: 1.5% for inorganic mercury administered with food, and 2.4% for inorganic mercury administered in water. Because these values are similar, it can be assumed that the body burden of mercury administered with food is the same as the body burden resulting from exposure to mercury in drinking water. Thus, an average can be taken to estimate residual body burden of inorganic mercury after oral gavage, 2.0%.

Urinary Excretion Data

One study has reported the elimination of inorganic mercury as a fraction of the dose. This was a chronic feeding study conducted by Fitzhugh et al. (1950) in which mercuric acetate was administered in the diet to mice (20-24/sex/dose) at the following dietary concentrations: 0.5, 2.5, 10, 40, and 160 ppm. Six months into the study, urine and feces were collected for a 24 hour period and assayed for mercury content. Urinary excretion accounted for 0.5%-4.8% of the daily dose, and fecal elimination accounted for 40%-60% of the dose (values are the ranges of the averages for the dose groups).

To use the data of Fitzhugh et al. (1980) it is necessary to estimate fecal elimination from data on urinary elimination. The excretion of absorbed inorganic mercury into the urine and feces has been demonstrated by Gregus and Klassen (1986). Male Sprague-Dawley rats (4-6/group) were injected intravenously with $^{203}HgCl_2$. Urine and feces were collected, and after 4 days, fecal excretion accounted for 15.2% +/- 2.4% of the dose, and 16.3% +/- 1.4% of the dose was recovered in the urine. Thus it can be concluded from this study that fecal excretion of inorganic mercury does occur and that equal percentages of an absorbed dose are excreted into the feces and the urine.

Applying the results of the Gregus and Klassen (1986) study to the Fitzhugh et al. (1980) study, fecal excretion of absorbed inorganic mercury could also account for 0.5%-4.8% of the administered daily dose (i.e., assuming urinary and fecal excretion are equal). Therefore, it can be concluded from this study that 1%-9.6%, or an average of 5.3%, of the ingested dose was absorbed and excreted within a 24 hr time period. Alternatively, it could be concluded that the portion of the dose not excreted, i.e., 100% minus 40%-60% or approximately 50% of the dose, was absorbed. The former estimate of 5.3% and the latter estimate of 50% are minimum and maximum estimates respectively. The results of this study are difficult to interpret because the elimination data are from animals who were on a diet containing mercury for six months, and the elimination data are only for a 24 hour period. Therefore, the 24 hour determination of elimination in this study is not a complete estimation, and only minimum and maximum amounts of absorption can be identified.

Absorption Estimate

The elimination data of Fitzhugh et al. (1950) provide an estimate of the average minimum absorption of 5.3% of inorganic mercury based on excretion data. The total absorption of inorganic mercury can be represented by the amount excreted plus the amount retained in the body, which was shown above to be 2%. Therefore, the absorption estimate is 2.0% plus 5.3% or 7.3%.

This value is very similar to the value of 7% absorption assumed by EPA in the calculation of the third LOAEL used to derive the RfD for inorganic mercury. The 7% value is also supported by two additional studies described below.

Revis et al. (1992) orally gavaged five male mice with an unreported dose of $^{203}HgCl_2$ in a slurry with powdered mouse chow. After 10 days, the feces eliminated over that period and the contents of the GI tract were assayed for radioactivity. The remainder of the dose not present in the fecal sample or GI tract was assumed to have been absorbed. The value of absorption of inorganic mercury determined from this experiment, 2.1%, is a minimum estimate of absorption because the amount of the dose that was absorbed and excreted into the feces was not accounted for.

The data of Clarkson (1971) were reviewed by Clarkson (1972) where it was estimated that the measured body burden of inorganic mercury of 1-2%, when corrected for excretion, would result in an absorption estimate of 10-15% for inorganic mercury when given orally. Quantitation of this estimate was not included in the paper, and, therefore, the results are considered here only for qualitative purposes.

The oral absorption value of 7% for inorganic mercury derived above is midway between the minimum absorption estimate of 2.1% (Revis et al., 1992) and a maximum estimate of 10-15% (Clarkson, 1972).

The value of 7.3% will be used in the AAF determinations for inorganic mercury.

AAF (Oral-Water) and AAF (Oral-Diet)

The AAF (oral-water) and AAF (oral-diet) are defined for inorganic mercury as: (absorption of inorganic mercury in humans from ingestion) / (absorption of inorganic mercury in rats from oral gavage). The estimate of absorption in rats from oral gavage, 7.3%, was derived above. Human oral absorption is discussed below.

Absorption in Humans

Miettinen (1973) estimated the oral absorption of inorganic mercury in humans using radioactive mercury and performing whole body counting, as well as analyzing the radiolabel in excreta and blood. Ten volunteers ingested a single, unreported dose of mercuric nitrate either in water or bound to calf liver protein (4-14 uCi). During the first four to five days, 0.17% of the dose was excreted in the urine and 85% of the dose was excreted in the feces. No difference was observed between the water and calf liver protein vehicles.

As described above, fecal excretion is a route of elimination of inorganic mercury. Thus, some of the mercury found in the feces was unabsorbed metal and some was absorbed and excreted metal. The minimum percentage of the administered dose absorbed was 15% (100%-85%) in the Miettinen study, if it is assumed that all mercury not excreted in the feces was absorbed. If it is also assumed that fecal and urinary elimination are roughly equal in humans, as they are in rats (Gregus and Klaassen, 1986), one can estimate the fecal mercury that was excreted as approximately 0.17% of the dose. This

suggests that almost all of the metal present in the feces was unabsorbed. Thus, a minimum estimate of absorption is 14.8% (15%-0.17%).

The human gastrointestinal absorption value of 14.8% differs from a value of 7% that has been quoted in various articles, but which is based on the same experimental study. The Task Group on Metal Accumulation (1973) and WHO (1976) both report that 7% of soluble mercury is absorbed in humans and cite Rahola et al. (1973). This study is the original publication of work by Rahola and Miettinen. The Task Group (1973) and WHO (1976) erroneously gleaned a value of 7% from this work. The minimum absorption is, indeed, 14.8% from this experiment, as was reported in a later publication by Miettinen (1973).

Derivation of AAF (Oral-Water) and AAF (Oral-Diet)

The above experimental results indicate that the gastrointestinal absorption in humans of soluble inorganic mercury (mercuric nitrate) as an aqueous solution is the same as the absorption of the same compound when administered as a protein bound species (Miettinen, 1973). This value is 14.8%.

The estimate of absorption of mercury in rats from oral gavage was derived from the literature studies presented above to be 7.3%. Accordingly:

AAF (Oral-Water): (14.8%) / (7.3%) = 2.0

AAF (Oral-Diet): (14.8%) / (7.3%) = 2.0

AAF (Oral-Soil)

The AAF (oral-soil) is defined for inorganic mercury as: (absorption of inorganic mercury in humans from ingested soil) / (absorption of inorganic mercury in rats from oral gavage).

No relevant studies could be found in the literature regarding the gastrointestinal absorption of mercuric chloride, or other soluble mercury species, administered to any animal as a component of or mixed with soil. In the absence of absorption data from soil, it is assumed that mercuric chloride and other soluble inorganic mercury compounds are absorbed in humans from ingested soil to the same degree as when administered as an aqueous solution or as a protein bound species (Miettinen, 1973). This value is 14.8%. Therefore, the AAF (oral-soil) is:

AAF (Oral-Soil): (14.8%) / (7.3%) = 2.0

Mercuric Sulfide

Mercuric sulfide is very insoluble. According to Weast (1978), the solubility of alpha-mercuric sulfide is 0.000001 g/100 mL. Beta-mercuric sulfide is listed as insoluble. The only study in the literature that evaluates the oral absorption of mercury from soil used soils containing mercury primarily in the form of mercuric sulfide (Revis et al., 1990). Several experimental studies have shown that gastrointestinal absorption of mercuric sulfide is extremely low. The absorption of mercuric sulfide will be discussed here followed by a discussion of the Revis study.

Sin et al. (1983) administered mercuric sulfide to mice by gavage as an aqueous slurry. The amounts of mercury found in various tissues and organs after dosing of 300 µg Hg/week for 2-10 weeks were negligible and not statistically different from those of the controls. In the animals dosed with mercuric

chloride, however, significant accumulation had occurred in kidney and spleen. The authors attribute this lack of tissue accumulation to poor absorption of the mercuric sulfide.

In another experiment, Sin et al. (1989) administered mercuric sulfide (6-324 µg Hg/g/day) to mice for four days. Very little accumulation in liver and kidney was seen compared to mice receiving mercuric chloride. These results again suggest that absorption of mercuric sulfide is very low.

Yeoh et al. (1986) fed mercuric sulfide to Swiss mice as a component of their diet (2976 µg/g) for one week. Urinary mercury was analyzed on days 2, 4, and 6, and mercury in kidney and liver was measured after one week. Mercury excretion was extremely low. On average, urinary excretion was 2.55 ng/hr. The amount excreted over seven days at this rate would be 0.4 µg, which constitutes 0.001% of the total administered dose. Mercury accumulation in liver and kidney was also extremely low. Liver mercury levels were 0.6 µg Hg/g and kidney mercury levels were 2.7 µg Hg/g. A maximum mercury burden in these tissues can be estimated assuming that 50% of the mouse body weight is liver and 50% is kidney. This maximum body burden was 41 µg, which constitutes 0.08% of the total administered dose.

Revis et al. (1990) also showed that mercuric sulfide is poorly absorbed from the gastrointestinal tract. The authors performed feeding studies with pure mercuric sulfide which showed that intestinal transit time for this compound was much longer than for mercuric chloride. With the pure sulfide, 11.3% of the dose was found in the intestinal tract and contents at 96 hours. The time estimated for the metal to clear the intestinal tract was 10 days. At this time only 0.4% of the dose had not been accounted for in the feces, thus indicating very poor absorption.

In this same study, the absorption of mercury sulfide present in soil was investigated (Revis et al., 1990). Field samples of soil from a site were mixed with a powdered mouse diet and fed to Swiss mice. Analysis of the soil determined that the mercury in the soil was present as 88% mercuric sulfide, 0.01% methyl mercury, and 7% elemental mercury. The soils were collected from different areas of the site and ranged in mercury concentration from 88 ppm to 660 ppm. The various soils were administered as 5% of the mouse diet. Seventy animals of both sexes received soil from one of seven locations for 24 hours. Animals were returned to the normal diet for 72 hours. Fecal samples were collected for 96 hours and analyzed for mercury by the cold vapor technique.

Absorption was defined in this study as the fraction of the administered dose that was not present in the feces after 96 hours. The fraction not present in feces ranged from 4-16% for the different experimental groups, with an average being 9.1 +/- 4.3 (n=70). As shown above, however, fecal excretion is a route of elimination for inorganic mercury. Thus, it is not possible to determine what fraction of the amount present in the feces was unabsorbed metal and what fraction was absorbed and excreted metal. In addition, as shown below, mercuric sulfide has a long transit time in the intestinal tract. Thus, some material present in the animal's body is unabsorbed metal that has not made its way through the intestinal tract. The authors suggested that the mercury containing soil would also have shown a lower fraction not present in the feces if the animals had been followed for 10 days instead of 96 hours. Thus, the absorption estimate from this experiment is certainly an over-estimate.

All of the data presented above strongly suggest that the oral absorption of mercuric sulfide and mercury from mercuric sulfide containing soil is extremely low. Thus, the AAF (oral-soil) for soils containing primarily mercuric sulfide would be close to zero. However, the chemical species of mercury are not usually known for environmental samples. It is not known to what extent the presence of soil may retard the gastrointestinal absorption of soluble inorganic mercury compounds. Accordingly, the AAF (Oral-Soil) derived above must be applicable to mercury species other than mercuric sulfide. In the absence of data for soluble mercury species, it has been assumed that

gastrointestinal absorption is the same for a soil matrix and for aqueous oral gavage. In this case the AAF (Oral-Soil) is 1.0. If it is known that mercuric sulfide or another insoluble compound is present, a site-specific AAF can be derived based on animal feeding studies with site soil or extractability studies with acidic solutions that mimic the conditions of the stomach.

AAF (Dermal-Soil)
The AAF (dermal-soil) is defined for this chemical as: (absorption in humans from dermal contact with soil) / (absorption in rats from aqueous gavage).

The AAF (dermal-soil) was derived from the estimate of the fractional dermal absorption of mercury from soil documented elsewhere (0.05%) and the estimate rat absorption of 7.3% from Clarkson et al. (1972). Accordingly, the AAF (dermal-soil) is:

AAF (Dermal-Soil) = (0.05%) / (7.3%) = 0.007

AAF (Dermal-Water)
The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming or potable water when bathing. The methodology for quantitating risks posed by these exposure pathways uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. The AAF is used to make an adjustment of the exposure dose.

Thus, the AAF (dermal-water) is defined as: (100%) / (absorption of inorganic mercury in rats from aqueous gavage). This AAF is derived using the estimate of rat absorption of 7.3% from Clarkson et al. (1972). Accordingly, the AAF (dermal-water) is:

AAF (Dermal-Water) = (100%) / (7.3%) = 13.7

AAF (Inhalation)
The inhalation RfC for mercury is 3.0E-04 mg/m^3. This corresponds to an RfD of 8.57E-05 mg/kg-day. The value is based on inhalation exposure in humans. Therefore, the AAF (inhalation) is 1.0.

Summary of AAFs for Inorganic Mercury

Oral-Water	2.0
Oral-Diet	2.0
Oral-Soil	2.0
Dermal-Soil	0.007
Dermal-Water	13.7
Inhalation	1.0

REFERENCES

ATSDR. 1989. Toxicological Profile for Mercury. Agency for Toxic Substances and Disease Registry. Atlanta, GA.

Clarkson, T.W. 1971. Epidemiological and Experimental Aspects of Lead and Mercury Contamination of Food. Fd. Cosmet. Toxicol. (9):229-243.

Clarkson, T.W. 1972. Recent Advances in the Toxicology of Mercury With Emphasis on the Alkylmercurials. (CRC) Critical Reviews in Toxicology. (1):203-234.

Fitzhugh, O.G., A.A. Nelson, E.P. Laug and F. M. Kunze. 1950. Chronic Oral Toxicities of Mercuriphenyl and Mercuric Salts. Arch. Ind. Hyg. Occup. Med. (2):433.

Goldman, M. and jP. Blackburn. 1979. The Effect of Mercuric Chloride on Thyroid Function in the Rat. Tox. and Appl. Pharmacol. (48):49-55.

Gregus, Z. and C.D. Klaassen. 1986. Disposition of Metals in Rats: A Comparative Study of Fecal, Urinary, and Biliary Excretion and Tissue Distribution of Eighteen Metals. Toxicology and Applied Pharmacology. (85):24-38.

Miettinen, J.K. 1973. Absorption and Elimination of Dietary Mercury (Hg^{2+}) and Methylmercury in Man. In: Miller, M. W. and T. W. Clarkson (eds.). Mercury, Mercurials and Mercaptans. Springfield, C.C. Thomas: 233.

Rahola, T., T. Hattula, T. Korolainen and J.K. Miettinen. 1973. Elimination of Free and Protein-Bound Ionic Mercury 203 Hg2+ in Man. Ann. Clin. Res. (5):214-219.

Revis, N.W., T.R. Osborne, G. Holdsworth and C. Hadden. 1990. Mercury in Soil: A Method for Assessing Acceptable Limits. Arch. Environ. Contam. Toxicol. (19):221-226.

Sin, Y.M., Y.F. Lim and M.K. Wong. 1983. Uptake and Distribution of Mercury in Mice from Ingesting Soluble and Insoluble Mercury Compounds. Bull. Environ. Contam. Toxicol. (31):605-612.

Sin, Y.M., W.F. Teh and M.K. Wong. 1989. Absorption of Mercuric Chloride and Mercuric Sulphide and Their Possible Effects on Tissue Glutathione in Mice. Bull. Environ. Contam. Toxicol. (42):307-314.

Task Group on Metal Accumulation. 1973. Accumulation of Toxic Metals with Special Reference to their Absorption, Excretion and Biological Half-Times. Environ, Physiol. Biochem. (3):65-107.

Walsh, C.T. 1982. The Influence of Age on the Gastrointestinal Absorption of Mercuric Chloride and Methyl Mercury Chloride in the Rat. Environ. Res. (27):412-420.

Weast, R.C. (ed.) 1978-1979. CRC Handbook of Chemistry and Physics. 59th Edition. CRC Press, Inc.

WHO. 1976. Environmental Health Criterial 1: Mercury. Geneva, World Health Organization. 68-82.

Yeoh, T.S., A.S. Lee and H.S. Lee. 1986. Absorption of Mercuric Sulphide Following Oral Administration in Mice. Toxicology (41):107-111.

NICKEL

These AAFs are appropriate for use with the following dose-response values for nickel:

- The oral Reference Dose (RfD) for soluble nickel salts, which is 2E-02 mg/kg-day (USEPA, 2003)
- The inhalation cancer slope factor (CSF) for nickel refinery dust, which is 8.4E-01 (mg/kg-day)$^{-1}$ (USEPA, 2003)

Absorption in the Dose-Response Study

The USEPA oral dose-response value for the noncarcinogenic effects of nickel (2E-02 mg/kg-day) is based on a dietary study of nickel sulfate in rats. The RfD is to be used with both subchronic and chronic exposures. The RfD is based on administered dose units. Unfortunately, no detailed studies exist that measure the absorption of nickel from dietary components in the rat or any other laboratory animal. The absorption data for nickel in laboratory animals are limited to absorption from drinking water. Data do exist for absorption of nickel in humans from both drinking water and the diet. Comparison of the absorption of nickel from drinking water between laboratory animals and humans reveals that percent absorption is very similar for both, and that virtually all of the absorbed nickel is rapidly eliminated in the urine (USEPA, 1993). Therefore, for the purposes of developing AAFs for nickel, it will be assumed that the percent absorption of nickel from the diet is the same for humans and laboratory animals, and that urinary excretion is an accurate measurement of the amount absorbed. The absorption of nickel in the diet is discussed below.

Absorption from Diet

USEPA (1993) evaluated three studies where nickel was ingested by humans in food, using a pharmacokinetic model based on rate of urinary excretion (Horak and Sunderman, 1983; McNeeley et al., 1972; Sunderman et al., 1989). Estimated bioavailability of nickel in food ranged from 1.0 to 1.8%. Two additional studies show similar results. Tedeschi and Sunderman (1957) and Nomoto and Sunderman (1970) indicate that human absorption of nickel from diet is 1-2%.

The average of this range (1.5%) is pooled with the USEPA (1993) estimates of 1.0, 1.2, and 1.8, to derive a mean of 1.3%, which is used here as an estimate of absorption of nickel from the diet for both humans and rats.

AAF (Oral-Water)

The AAF (oral-water) is defined as: (absorption of nickel in humans from ingested water) / (absorption of nickel in rats from diet).

In 1993, USEPA performed a case study to determine if there was adequate evidence to support the derivation of a relative bioavailability factor for nickel in food and drinking water that could be used for assessing risks to the general population (USEPA, 1993). Eleven key studies on bioavailability of nickel ingested by humans as well as 8 studies on bioavailability of nickel administered to animals were evaluated using a pharmacokinetic model based on rate of urinary excretion. The conclusion of the case study was that, for non-fasting scenarios, there was no difference between the bioavailability of nickel ingested in water or in food (USEPA, 1993; Ruoff et al., 1994). Total diet, rather than the actual medium of exposure, appears to be more of a determining factor for the uptake of nickel from the GI tract. Therefore, for typical (non-fasting) human exposure scenarios, the bioavailability of nickel ingested in water is approximately equal to the bioavailability of nickel ingested in food. Therefore, the AAF (oral-water) is 1.

AAF (Oral-Diet)
The AAF (oral-diet) is defined as: (absorption in humans from ingested diet) / (absorption in rats from ingested diets). The AAF (oral-diet) of 1.0 is derived below.

Absorption in humans and rodents is assumed to be similar. USEPA (1993) evaluated three studies where nickel was ingested by humans in food, using a pharmacokinetic model based on rate of urinary excretion. Estimated bioavailability of nickel in food ranged from 1.0 to 1.8%.

Two additional studies show similar results. Tedeschi and Sunderman (1957) and Nomoto and Sunderman (1970) indicate that human absorption of nickel from diet is 1-2%. The average of this range (1.5%) is pooled with the USEPA (1993) estimates of 1.0, 1.2, and 1.8 to derive a mean estimate of 1.3%, which is used here as an estimate of the fractional absorption of nickel from diet. Thus, the AAF (oral-diet) is (1.3%)/(1.3%) = 1.

AAF (Oral-Soil)
The AAF (oral-soil) is defined as: (absorption in humans from ingested soil) / (absorption in rats from diet). It is likely that nickel absorption from ingested soil of some types would be less than its absorption from dietary components. However, no studies could be located in the scientific literature to test this hypothesis.

Griffin et al. (1991) have studied the absorption of radiolabelled $^{63}NiCl_2$ present in an aqueous slurry with sand or clay soils. Crl:CD BR rats (4/sex/dose) were administered nickel by iv (2.1 mg/kg), oral gavage of an aqueous solution (2.1 or 21 mg/kg), or oral gavage of an aqueous sandy-loam or clay-loam slurry (2.1 or 21 mg/kg). The nickel containing soils were prepared by mixing a soil sample with an aqueous solution of $^{63}NiCl_2$, allowing the soil to dry, and then resuspending the soil in an aqueous slurry. Blood was collected at intervals up to 48 hours post-dosing and analyzed for ^{63}Ni by liquid scintillation counting. Absorption of nickel was measured based on the area under the blood concentration vs. time curve (AUC), using either the iv group or the aqueous oral gavage group AUC as the comparative standard.

Two points must be considered before evaluating the data in this experiment. First, the concentration of nickel in soil that would support an 2.1 mg/kg-day dose in a 15 kg child assumed to exhibit pica behavior, i.e., ingest 10 g soil/day, would be 3,150 ppm. Likewise, a 21 mg/kg dose is equivalent to exposure to soils that are 31,500 ppm nickel. Because these concentrations span the upper end of the range of concentrations that could be encountered at USS Sites/Facilities, the results for both doses will be considered in the development of the AAF. Second, the method of preparation of nickel-containing soils is unlikely to mimic the physical state of nickel in weathered soils, where it would be expected to be present in complex mineralogical forms. However, since this is the only study available that evaluates nickel absorption from soils, it must be considered.

The results of the study are presented in Table 1. The average per cent absolute absorption for the sand-based soil was 2.95% and was 1.45% for the clay-based soil. The mean absorption for the four groups was 2.2% +/- 0.9%.

Table 1. Data from Griffin et al. (1991) for Nickel

TEST GROUP	ROUTE OF EXPOSURE	DOSE (mg/kg)	ABSOLUTE ABSORPTION*	RELATIVE ABSORPTION**
1	IV	2.1	100	-
2	Oral/Water	2.1	4.45	100
3	Oral/Water	21	5.2	100
4	Oral/Sand	2.1	2.8	65.1

TEST GROUP	ROUTE OF EXPOSURE	DOSE (mg/kg)	ABSOLUTE ABSORPTION*	RELATIVE ABSORPTION**
5	Oral/Sand	21	3.1	61.1
6	Oral/Clay	2.1	1.1	26.6
7	Oral/Clay	21	1.8	40.4

* Absolute absorption is relative to iv dose group data.
** Relative absorption is relative to aqueous oral gavage dose group data at the same dose.

The AAF (oral-soil) is defined as the ratio of the absorption from soil to the absorption from diet. The absorption from soil (2.2% +/- 0.9%) is not significantly different from the estimate of the absorption from diet described above (1.3% +/- 0.4%). Thus, gastrointestinal absorption of nickel from soil in rats is the same as the absorption in rats from dietary components. Assuming that absorption of nickel is similar in humans and rodents, the estimate of the AAF (oral-soil) is 1.0.

AAF (Dermal-Soil)
The AAF (dermal-soil) is defined as: (absorption in humans from dermal contact with soil) / (absorption in rats from diet). A recommended default value for inorganics of 0.1 percent for the dermal absorption of nickel from soil (USEPA, 2000) has been used. Assuming that the gastrointestinal absorption of nickel from the dietary study is as estimated by USEPA (1993), Tedeschi and Sunderman (1957), and Nomoto and Sunderman (1970) (e.g., 1.3%), an AAF (dermal-soil) of 0.1%/1.3% = 0.08 is calculated.

AAF (Dermal-Water)
The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming or potable water when bathing. The methodology for quantitating risks posed by these exposure pathways uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. The dose-response value for nickel, however, is based on administered dose. The AAF is used to make an adjustment of the exposure dose by this pathway. Thus, the AAF (dermal-water) is defined as: (100%) / (absorption in rats from ingestion of nickel in diet).

This AAF is derived using the estimate of absorption from diet from Sunderman et al. (1989), Tedeschi and Sunderman (1957) and Nomoto and Sunderman (1970) (1.3%). As above, the gastrointestinal absorption in rats from diet is assumed to be the same as the gastrointestinal absorption in humans from diet. Accordingly, the AAF (dermal-water) is:

AAF (Dermal-Water) = (100%) / (1.3%) = 77.

Summary of AAFs for Nickel

Oral-Water	1
Oral-Diet	1
Oral-Soil	1
Dermal-Water	77
Dermal-Soil	0.08

REFERENCES

Foulkes, E.C. and S. Blanck. 1984. The Selective Action of Nickel on Tubule Function in Rabbit Kidneys. Toxicology 33:245-249 (cited in EPA 1986a).

Griffin, S., R. Rubenstein, S. Irene, C. DeRosa and H. Choudhury. 1991. Bioavailability in Rats of Metals Adsorbed to Soils. USEPA, Washington, D.C. Hazleton Laboratories America, Inc.

Horak, E. and F.W. Sunderman, Jr. 1973. Fecal nickel excretion by healthy adults. Clin. Chem. 19: 42-430.

McNeeley, M.D. M.W. Nechay, and F.W. Sunderman, Jr. 1972. Measurements of nickel in serum and urine as indices of environmental exposure to nickel. Clin. Chem. 18: 992-995.

Nomoto, S. and F.W. Sunderman, Jr. 1970. Atomic Absorption Spectrometry of Nickel in Serum, Urine and Other Biological Materials. Clin. Chem. 16:477.

Ruoff, W.L., G.L. Diamond, and S.F. Velazquez. 1994. Relative Bioavailability of Inorganics: A Case Study of Nickel. Poster at the USEPA Conference on the Temporal Aspects in Risk Assessment for Noncancer Endpoints. April.

Sunderman, F.W., S.M. Hopfer, K.R. Sweeney, A.H. Marcus, B.M. Most and J. Creason. 1989. Nickel Absorption and Kinetics in Human Volunteers. P.S.E.B.M. (191):5-11.

Tedeschi, R.E. and F.W. Sunderman. 1957. Nickel Poisoning. V. The Metabolism of Nickel Under Normal Conditions and After Exposure to Nickel Carbonyl. Arch. Ind. Health. (16):486-8.

USEPA. 1993. Relative Bioavailability of Inorganics: A Case Study of Nickel. Prepared by Syracuse Research Corporation for Environmental Criteria and Assessment Office. USEPA. Cincinnati, OH. Contract No. 68-C0-0003. September.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

THALLIUM

The U.S. EPA oral RfD for thallium sulfate (8E-05 mg/kg-day) is based upon a study in rats. The RfD has been adjusted for the molecular weight of thallium to 6.7E-05 mg/kg-day. Thallium sulfate was administered by gavage. There is limited evidence in animals and humans describing the oral absorption of thallium. A terminal cancer patient treated with a single dose of [^{204}Tl]-thallium nitrate appeared to absorb virtually the entire dose; only, 0.4% was recovered in the feces in a 72 hour collection period (Barclay et al., 1953 as cited in ATSDR, 1991). Single doses of radiolabeled thallium nitrate to rats also appear to be completely absorbed (Lie et al., 1960 as cited in ATSDR, 1991). Thus the AAF (oral-water) is (100%) / (100%) = 1.0. Absorption from diet and soil is assumed to be identical to that for absorption from water in the absence of other specific information. This is a conservative assumption since it is likely that gastrointestinal absorption of thallium from complex solid matrices such as food or soil is not as complete as thallium given orally in a liquid medium. Thus, the AAF (oral-diet) and the AAF (oral-soil) are both 1.0.

The recommended default value of 0.1% for inorganics was assumed for dermal absorption of thallium (U.S. EPA, 1995). Thus the AAF (dermal-soil) is (0.1%)/(100%) = 0.001.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For thallium, the AAF (dermal-water) is (100%)/(100%) = 1.0.

Summary of AAFs for Thallium

Oral-Water	1.0
Oral-Diet	1.0
Oral-Soil	1.0
Dermal-Soil	0.001
Dermal-Water	1.0

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1991. Toxicological Profile for Thallium (Draft for Public Comment) Washington DC:U.S. Department of Health and Human Services.

ENSR Consulting and Engineering. 1991. Fractional Dermal Absorption of Metals from Soils (Draft Report).

U.S. EPA. 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment. U.S. Environmental Protection Agency. Region 4. November 1995.

VANADIUM

The oral RfD of 7E-03 mg/kg-day provided by HEAST (USEPA, 1997) is based on a drinking water study in rats using vanadium sulfate. Vanadium is very poorly absorbed across the gastrointestinal tract with several investigators reporting between 0.1% and greater than 18% absorption of ingested vanadium given in different forms (USEPA, 1987). Based on these studies and absorption for other metals, absorption of 10% was assumed for vanadium. It is assumed that the absorption of vanadium in the diet, water, soil, and sediment is the same as that in the dose-response study. Thus, the AAF (oral-diet), the AAF (oral-soil), and the AAF (oral-water) are all 1.

Dermal absorption of vanadium is assumed to be poor, although specific estimates were not located (USEPA, 1987). A recommended default value for inorganics of 0.1% for the dermal absorption of inorganics from soil (USEPA, 2000) has been used. Assuming that the gastrointestinal absorption of vanadium from the drinking water study was 10%, results in a AAF (dermal-soil/sediment) of 0.1%/10% = 0.01.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantifying risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make adjustment to the absorbed dermal dose, rather than adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For vanadium, the AAF (dermal-water) is 100%/10% = 10.

Summary of AAFs for Vanadium

Oral-water	1
Oral-diet	1
Oral-soil	1
Dermal-soil	0.01
Dermal-water	10

References

USEPA. 1987. Health Effects Assessment for Vanadium and Compounds. Environmental Criteria and Assessment Office: Cincinnati, OH. PB 88-176383.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

ZINC

The oral RfD for zinc (3.0E-01 mg/kg-day) provided by IRIS (USEPA, 2003) is based on a human study with zinc sulfate in the diet. Thus, the AAF (oral-diet) is 1. The mean absorption of zinc from diet in ten humans has been determined by Sandstrom et al. (1987) as 33% (22-46%). The absorption of zinc from drinking water was determined in humans by several workers: 56% (Dinsmore et al., 1985), 42% (Milman et al., 1983), 58% (Farah et al., 1984) and 55% (Valberg et al., 1985). The mean of these four values is 53%. Thus, the AAF (oral-water) is 53%/33% = 1.6. The gastrointestinal absorption of zinc from soil is assumed to be identical to that from diet. Thus, the AAF (oral-soil) is 1. A recommended default value of 0.1% (USEPA, 2000) for inorganics was assumed for dermal absorption of zinc from contact with soil. Thus, the AAF (dermal-soil) is 0.1%/33% = 0.003.

The AAF (dermal-water) is used when estimating the human risks posed by dermally contacting surface water when wading or swimming. The methodology for quantitating risks posed by this exposure pathway uses a chemical-specific permeability constant that estimates the rate at which the chemical passes into and through the skin from an aqueous solution. By definition, the dose estimated by this procedure is an absorbed dose. Most dose-response criteria, however, are based on administered doses. An adjustment is necessary to account for the absorption in the dose-response study. In order to use consistent dose-response criteria across all exposure pathways, the AAF is used to make an adjustment to the absorbed dermal dose, instead of adjusting the dose-response criteria. Here, the AAF is defined as (100%)/(estimated absorption in the dose-response study). For zinc, the AAF (dermal-water) is 100%/33% = 3.03.

Summary of AAFs for Zinc

Oral-diet	1
Oral-water	1.6
Oral-soil	1
Dermal-soil	0.003
Dermal-water	3.03

References

Dinsmore, W., M.E. Callender, D. McMaster, S.J. Todd and A.H.G. Love. 1985. Zinc Absorption in Alcoholics Using Zinc-65. Digestion 32:238-242.

Farah, D.A., M.J. Hall, P.R. Mills and R.I. Russell. 1984. Effect of Wheat Bran on Zinc Absorption. Human Nutrition: Clinical Nutrition. 38C:433-441.

Milman N., K. Hvid-Jacobsen, J. Hegnhoj and S.S. Sorensen. 1983. Zinc Absorption in Patients with Compensated Alcoholic Cirrhosis.

Sandstrom, B., L. Davison, B. Kivisto, C. Hasselbland and A. Cederbland. 1987. The Effect of Vegetables and Beet Fibre on the Absorption of Zinc in Humans From Composite Meals. British Journal of Nutrition. 58:49-57.

USEPA. 2000. Region 4 Human Health Risk Assessment Bulletins - - Supplement to RAGS. USEPA Region 4. Atlanta, GA. Update 05/30/00.
[URL: http://www.epa.gov/region4/waste/oftecser/otsguid.htm]

USEPA. 2003. Integrated Risk Information System (IRIS). [URL: http://www.epa.gov/ngispgm3/iris/]

Valberg, L.S., P.R. Flanagan, C.N. Ghent and M.J. Chamberlain. 1985. Zinc Absorption and Leukocyte Zinc in Alcoholic and Nonalcoholic Cirrhosis. Digestive Diseases and Sciences 30:329-333.

APPENDIX I

CALCULATION OF 95% UCLs

Appendix I
Calculation of 95% UCLs

The USEPA document "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites" (USPEA, 2002a) provides guidance on the methodology for calculating 95% Upper Confidence Levels (UCLs). The calculation of the 95% UCL is dependent on the data distribution, which can be normal, lognormal, or nonparametric. For normally distributed datasets, the guidance recommends the use of the Student's t-statistic to calculate a 95% UCL. However, for lognormal or nonparametric datasets, a variety of methods are used, depending on the skewness and other charateristics of the data.

An ENSR-developed program has been used to implement the recommendations of the guidance. The USEPA program ProUCL, which has been developed to partially implement the guidance (USEPA, 2002a), does not always make a final selection as to which 95% UCL is appropriate. The ENSR program results were compared with the ProUCL results for several COPCs, and the 95% UCLs were similar. The table below presents the results of a benchmarking comparison indicating that the two programs arrive at the same value, except in two cases where the ProUCL program uses a slightly incorrect factor.

Comparison of ENSR Statistics Program and ProUCL

UCL_{95} Method	Included in ENSR Program?	Included in ENSR Decision Tree?	Included in ProUCL?	ProUCL Benchmark	ENSR Benchmark
Student's t-Distribution	Yes	Yes	Yes	519	519
Modified t-Distribution	No	No	Yes		
Land Method ("H-Statistic")	Yes	Yes	Yes	14.3	14.3
MVUE Log Jackknife	Yes	Yes	No		
MVUE Log Chebyshev	Yes	Yes	Yes	1965	1998[a]
Non-parametric Chebyshev	Yes	No	Yes	16.7	16.9[a]
Central Limit Theorem	Yes	No	No		
Adjusted Central Limit Theorem	Yes	No	Yes	41.5	41.5
Standard Bootstrap	Yes	Yes	No	12.2	12.3
Hall's Bootstrap	Yes	Yes	No		
Hall's Bootstrap-t	Yes	Yes	Yes	13.1	13.1
Maximum	Yes	Yes	Yes		

Notes:
[a] Factor in the UCL_{95} equation should be 4.47 not the ProUCL value of 4.36

The program documentation is presented below. Attachments A-H present the equations used in the program. Attachment I presents the input and output files for the calculation of each 95% UCL used in this risk assessment. Note that the input file is simply a list of numbers that represent the sample concentrations for the Constituent of Potential Concern (COPC) in question after non-detects were handled as discussed in Section 3.1.4 of the main text, and after duplicates were averaged. Attachment J presents the Exposure Point Concentration (EPC) selection procedure. For COPCs in areas/media with fewer than eight samples, the maximum detected concentration is selected as the EPC. For all other COPCs, the lower of the calculated 95% UCL and the maximum detect is selected as the EPC.

Advanced Statistical Analysis for Risk Assessment

Introduction

The cleanup costs for a contaminated site depend upon the risks associated with its use at its current level of contamination. Site cleanup measures are selected that will reduce the risk to an acceptable level. Calculated risks are based upon the average soil or groundwater concentrations for the area in question. Because the number of measurements is limited, there is some uncertainty in the average concentration. To account for this uncertainty, EPA requires that the 95th percent confidence limit of the mean value ("UCL_{95}") be used for the risk calculations.

Under the current EPA guidance, the first step in determining the UCL_{95} is to classify the observed frequency distribution of measured concentrations as either normal or lognormal. See Attachment A for a discussion of normal and lognormal distributions. The Shapiro-Wilk/D'Agostino Test (see Attachment B) is used to determine whether the underlying distribution is more likely to be normal or lognormal. If the data are better characterized by a normal distribution, then the standard "t-statistic" (see Attachment C) is used to calculate the UCL_{95}. For lognormal distributions, the less-well-known "h-statistic" (see Attachment D) is used to calculate the UCL_{95}. In most cases the measurement data is classified as lognormal. For small data sets or those having distributions that are highly skewed, the use of the h-statistic can lead to the calculation of unrealistically high UCL_{95} values. This problem translates into a calculated risk and associated cleanup cost that is inflated.

Alternate Approach

ENSR has developed a statistical analysis protocol and associated software for the calculation of more realistic UCL_{95} values. The two major improvements over the current recommended methodology are introduced. The first is the consideration of non-parametric distributions for data that do not follow normal or lognormal distributions. The second is a more technically defensible scheme for the calculation of the UCL_{95} of a lognormal distribution that does not rely solely on the use of the h-statistic.

The data are first tested for normality by use of the Shapio-Wilk/D'Agostino Test (see Attachment B). If the data set passes this normality test at the 5 percent confidence level, then the UCL_{95} is calculated by use of the t-statistic as described in Attachment C. If the data set fails the normality test, then the natural logarithms of the data values are tested for normality by use of the Shapiro-Wilk/D'Agostino Test (see Attachment B). If the

data set of the logarithms does not pass this normality test, then the distribution is considered non-parametric and the UCL_{95} value is calculated by the methods described in Attachment E. If the data set of logarithms does pass the Shapiro-Wilk/D'Agostino Test, then the data set of logarithms is further tested for normality at the 10 percent confidence level by use of the Anderson-Darling Test (see Attachment F). If the data set of logarithms passes the Anderson-Darling Test, then the underlying distribution is considered to be "confirmed lognormal." Otherwise the distribution is characterized as "unconfirmed lognormal." The determination of the UCL_{95} for these two types of lognormal distributions is described in Attachment D.

Auxiliary Programs

Two auxiliary programs were developed for the statistical data analysis. The first is a program for calculating outliers (see Attachment G). During the calculation of the UCL_{95} both the data values and the logarithms of the data values are tested for outliers. The reporting of outliers is based upon the assumption that the underlying distribution is normal. The outlier analysis is only for diagnostic purposes. No data values are discarded prior to the UCL_{95} calculation. The second program, in the form of an EXCEL workbook ("NormPlot"), displays the cumulative frequency distribution of the data values and the logarithms of the data values as a normal probability plot (see Attachment H). The data points are fitted to a straight line to graphically illustrate the departure the distribution of points from normal.

This program was used to calculate UCL_{95} values for a number of constituents for this site. The program input and output files are included in Attachment I. Attachment J selects the final EPCs.

Attachment A
Normal and Lognormal Distributions

A normal probability distribution is described by the following probability density function:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2\sigma^2}(x-\mu)^2\right] \quad -\infty < x < \infty \qquad (A-1)$$

where

= mean of the distribution (- < <)

^{2} = variance of the distribution (0 < ^{2})

The probability density f(x) given by Equation (A-1) represents the probability that the random variable X will take on a value between x- /2 and x+ /2, where is an infinitesimal increment in x. The probability F(x) that the random variable X will take on a value less than or equal to the value x is called the cumulative frequency distribution and is given by:

$$F(x) = \int_{-\infty}^{x} f(x)\,dx \qquad (A-2)$$

$$= \frac{1}{2}\left[1 + erf\left(\frac{x-\mu}{\sqrt{2}\sigma}\right)\right]$$

If the logarithm of x, ln(x), is normally distributed, then x is said to be described by a lognormal distribution with a probability density function given by:

$$f(x) = \frac{1}{x\sigma_y\sqrt{2\pi}} \exp\left[-\frac{1}{2\sigma_y^2}(\ln x - \mu_y)^2\right] \quad x > 0 \qquad (A-3)$$

where

$_y$ = mean of the transformed variable y = ln(x); - < $_y$ <

^2_y = variance of the transformed variable y = ln(x); $_y > 0$

The mean and variance of the non-transformed values are given in terms of the mean and variance of the transformed values as follows:

$$\mu = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad (A-4)$$

$$\sigma = \sqrt{\exp(2\mu_y + \sigma_y^2)(\exp(\sigma_y^2) - 1)} \qquad (A-5)$$

Examples of normal and lognormal distributions are given in Figures A-1 and A-2 for a mean of 1.0 and a variance of 0.5.

Figure A-1. Normal Distribution: Mean=1.00; Variance=0.50

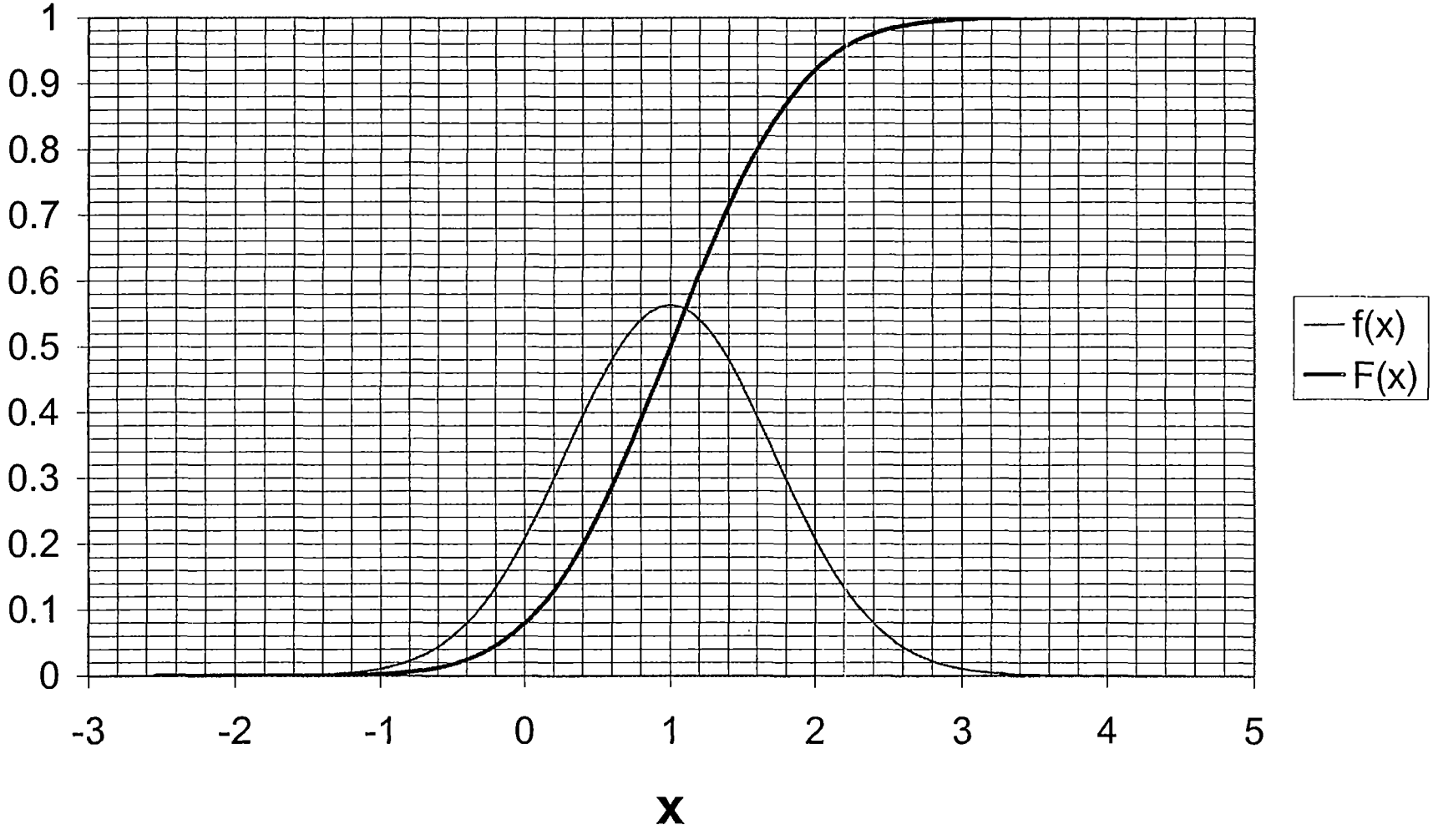
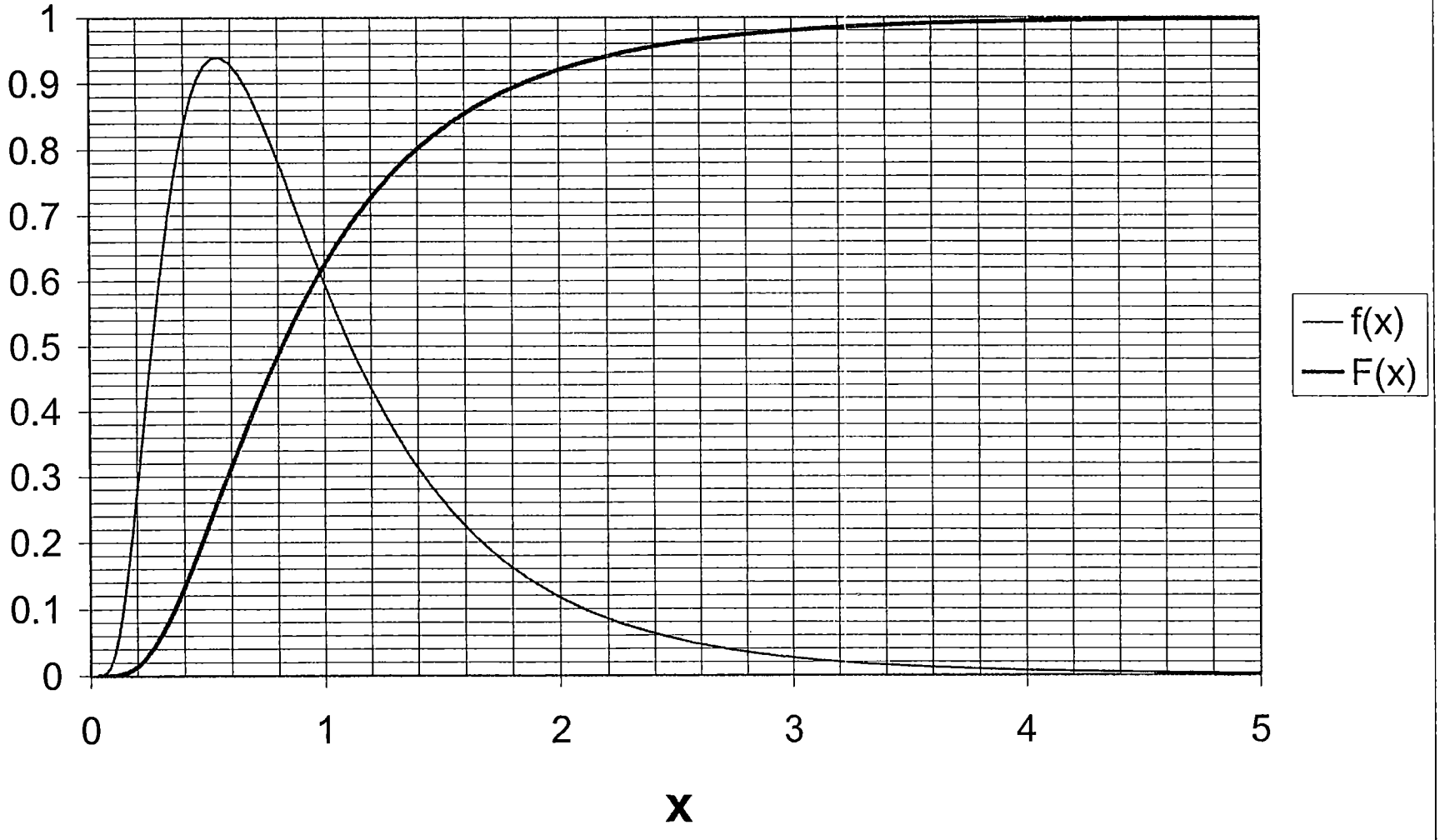


Figure A-2. Lognormal Distribution: Mean=1.00; Variance=0.50



Attachment B
Shapiro-Wilk and D'AgostinoTests for Normality

Consider a data set ($x_1, x_2, \ldots, x_n$) where n 50. The Shapiro-Wilk statistic W is proportional to the ratio of the slope of the normal probability plot to the mean square estimate:

$$W = \frac{\left(\sum_{i=1}^{n} a_{i,n} x_{(i)}\right)^2}{\sum_{i=1}^{n} (x_i - \bar{x})^2} \qquad (B-1)$$

where

$x_{(i)}$ = data values sorted from smallest to largest

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Values of the $a_{i,n}$ coefficients are given in Table B-1 (Reference 1). If some of the values x_i are found to be the same, then an average $a_{i,n}$ value is applied across the range of identical sorted data values in Equation (B-1).

The larger the value of W, the less confident one can be about rejecting the assumption that the underlying frequency distribution from which the "n" values were selected is a normal distribution. The W values associated with a 5 percent probability of incorrectly rejecting the assumption of normality are given in Table B-2 (Reference 1). If the logarithms of the data values are used, then the W statistic can be used to test for lognormality of the distribution.

If the number of observations is greater than 50, then the D-statistic is computed as follows:

$$D = \frac{\sum_{i=1}^{n} [i - 0.5(n+1)] x_{(i)}}{n^2 s} \qquad (B-2)$$

where

$$s = \left[\frac{1}{n} \sum_{i=1}^{n} (x_i - \bar{x})^2 \right]^{1/2}$$

The D-Statistic is transformed to the Y-Statistic as follows:

$$Y = \frac{(D - 0.28209479)\sqrt{n}}{0.02998598} \qquad (B-3)$$

The null hypothesis of normality is rejected at the 5 percent significance level if Y is less than the 2.5 percent quantile or greater than the 97.5 percent quantile of the distribution of Y values. These quantiles are given in Table B-3 as a function of the number of observations (Reference 2). Lognormality may be tested if the logarithms of the data are substituted for the data values in Equations (B-2) and (B-3).

References

1. Shapiro, S.S., and M.B. Wilk, 1965. An Analysis of Variance Test for Normality (complete samples), *Biometrika* **52**:591-611.

2. D'Agostino, R.B., 1971. An Omnibus Test for Normality for Moderate and Large Size Samples, *Biometrika* **58**:341-348.

Table B-1(a). A(i,n) Coefficients for the Shapio-Wilk Test of Normality (Part 1)

i	*n*																		
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0.7071	0.7071	0.6872	0.6646	0.6431	0.6233	0.6052	0.5888	0.5739	0.5601	0.5475	0.5359	0.5251	0.5150	0.5056	0.4968	0.4886	0.4808	0.4734
2	-0.7071	0.0000	0.1677	0.2413	0.2806	0.3031	0.3164	0.3244	0.3291	0.3315	0.3325	0.3325	0.3318	0.3306	0.3290	0.3273	0.3253	0.3232	0.3211
3	0.0000	-0.7071	-0.1677	0.0000	0.0875	0.1401	0.1743	0.1976	0.2141	0.2260	0.2347	0.2412	0.2460	0.2495	0.2521	0.2540	0.2553	0.2561	0.2565
4	0.0000	0.0000	-0.6872	-0.2413	-0.0875	0.0000	0.0561	0.0947	0.1224	0.1429	0.1586	0.1707	0.1802	0.1878	0.1939	0.1988	0.2027	0.2059	0.2085
5	0.0000	0.0000	0.0000	-0.6646	-0.2806	-0.1401	-0.0561	0.0000	0.0399	0.0695	0.0922	0.1099	0.1240	0.1353	0.1447	0.1524	0.1587	0.1641	0.1686
6	0.0000	0.0000	0.0000	0.0000	-0.6431	-0.3031	-0.1743	-0.0947	-0.0399	0.0000	0.0303	0.0539	0.0727	0.0880	0.1005	0.1109	0.1197	0.1271	0.1334
7	0.0000	0.0000	0.0000	0.0000	0.0000	-0.6233	-0.3164	-0.1976	-0.1224	-0.0695	-0.0303	0.0000	0.0240	0.0433	0.0593	0.0725	0.0837	0.0932	0.1013
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.6052	-0.3244	-0.2141	-0.1429	-0.0922	-0.0539	-0.0240	0.0000	0.0196	0.0359	0.0496	0.0612	0.0711
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5888	-0.3291	-0.2260	-0.1586	-0.1099	-0.0727	-0.0433	-0.0196	0.0000	0.0163	0.0303	0.0422
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5739	-0.3315	-0.2347	-0.1707	-0.1240	-0.0880	-0.0593	-0.0359	-0.0163	0.0000	0.0140
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5601	-0.3325	-0.2412	-0.1802	-0.1353	-0.1005	-0.0725	-0.0496	-0.0303	-0.0140
12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5475	-0.3325	-0.2460	-0.1878	-0.1447	-0.1109	-0.0837	-0.0612	-0.0422
13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5359	-0.3318	-0.2495	-0.1939	-0.1524	-0.1197	-0.0932	-0.0711
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5251	-0.3306	-0.2521	-0.1988	-0.1587	-0.1271	-0.1013
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5150	-0.3290	-0.2540	-0.2027	-0.1641	-0.1334
16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.5056	-0.3273	-0.2553	-0.2059	-0.1686
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4968	-0.3253	-0.2561	-0.2085
18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4886	-0.3232	-0.2565
19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4808	-0.3211
20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4734
21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table B-1(b). A(i,n) Coefficients for the Shapio-Wilk Test of Normality (Part 2)

i \ n	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	0.4407	0.4366	0.4328	0.4291	0.4254	0.4220	0.4188	0.4156	0.4127	0.4096	0.4068	0.4040	0.4015	0.3989	0.3964	0.3940	0.3917	0.3894	0.3872	0.3850	0.3830	0.3808	0.3789	0.3770	0.3751
2	0.3043	0.3018	0.2992	0.2968	0.2944	0.2921	0.2898	0.2876	0.2854	0.2834	0.2813	0.2794	0.2774	0.2755	0.2737	0.2719	0.2701	0.2684	0.2667	0.2651	0.2635	0.2620	0.2604	0.2589	0.2574
3	0.2533	0.2522	0.2510	0.2499	0.2487	0.2475	0.2462	0.2451	0.2439	0.2427	0.2415	0.2403	0.2391	0.2380	0.2368	0.2357	0.2345	0.2334	0.2323	0.2313	0.2302	0.2291	0.2281	0.2271	0.2260
4	0.2151	0.2152	0.2151	0.2150	0.2148	0.2145	0.2141	0.2137	0.2132	0.2127	0.2121	0.2116	0.2110	0.2104	0.2098	0.2091	0.2085	0.2078	0.2072	0.2065	0.2058	0.2052	0.2045	0.2038	0.2032
5	0.1836	0.1848	0.1857	0.1864	0.1870	0.1874	0.1878	0.1880	0.1882	0.1883	0.1883	0.1883	0.1881	0.1880	0.1878	0.1876	0.1874	0.1871	0.1868	0.1865	0.1862	0.1859	0.1855	0.1851	0.1847
6	0.1563	0.1584	0.1601	0.1616	0.1630	0.1641	0.1651	0.1660	0.1667	0.1673	0.1678	0.1683	0.1686	0.1689	0.1691	0.1693	0.1694	0.1695	0.1695	0.1695	0.1695	0.1695	0.1693	0.1692	0.1691
7	0.1316	0.1346	0.1372	0.1395	0.1415	0.1433	0.1449	0.1463	0.1475	0.1487	0.1496	0.1505	0.1513	0.1520	0.1526	0.1531	0.1535	0.1539	0.1542	0.1545	0.1548	0.1550	0.1551	0.1553	0.1554
8	0.1089	0.1128	0.1162	0.1192	0.1219	0.1243	0.1265	0.1284	0.1301	0.1317	0.1331	0.1344	0.1356	0.1366	0.1376	0.1384	0.1392	0.1398	0.1405	0.1410	0.1415	0.1420	0.1423	0.1427	0.1430
9	0.0876	0.0923	0.0965	0.1002	0.1036	0.1066	0.1093	0.1118	0.1140	0.1160	0.1179	0.1196	0.1211	0.1225	0.1237	0.1249	0.1259	0.1269	0.1278	0.1286	0.1293	0.1300	0.1306	0.1312	0.1317
10	0.0672	0.0728	0.0778	0.0822	0.0862	0.0899	0.0931	0.0961	0.0988	0.1013	0.1036	0.1056	0.1075	0.1092	0.1108	0.1123	0.1136	0.1149	0.1160	0.1170	0.1180	0.1189	0.1197	0.1205	0.1212
11	0.0476	0.0540	0.0598	0.0650	0.0697	0.0739	0.0777	0.0812	0.0844	0.0873	0.0900	0.0924	0.0947	0.0967	0.0986	0.1004	0.1020	0.1035	0.1049	0.1062	0.1073	0.1085	0.1095	0.1105	0.1113
12	0.0284	0.0358	0.0424	0.0483	0.0537	0.0585	0.0629	0.0669	0.0706	0.0739	0.0770	0.0798	0.0824	0.0848	0.0870	0.0891	0.0909	0.0927	0.0943	0.0959	0.0972	0.0986	0.0998	0.1010	0.1020
13	0.0094	0.0178	0.0253	0.0320	0.0381	0.0435	0.0485	0.0530	0.0572	0.0610	0.0645	0.0677	0.0706	0.0733	0.0759	0.0782	0.0804	0.0824	0.0842	0.0860	0.0876	0.0892	0.0906	0.0919	0.0932
14	-0.0094	0.0000	0.0084	0.0159	0.0227	0.0289	0.0344	0.0395	0.0441	0.0484	0.0523	0.0559	0.0592	0.0622	0.0651	0.0677	0.0701	0.0724	0.0745	0.0765	0.0783	0.0801	0.0817	0.0832	0.0846
15	-0.0284	-0.0178	-0.0084	0.0000	0.0076	0.0144	0.0206	0.0262	0.0314	0.0361	0.0404	0.0444	0.0481	0.0515	0.0546	0.0575	0.0602	0.0628	0.0651	0.0673	0.0694	0.0713	0.0731	0.0748	0.0764
16	-0.0476	-0.0358	-0.0253	-0.0159	-0.0076	0.0000	0.0068	0.0131	0.0187	0.0239	0.0287	0.0331	0.0372	0.0409	0.0444	0.0476	0.0506	0.0534	0.0560	0.0584	0.0607	0.0628	0.0648	0.0667	0.0685
17	-0.0672	-0.0540	-0.0424	-0.0320	-0.0227	-0.0144	-0.0068	0.0000	0.0062	0.0119	0.0172	0.0220	0.0264	0.0305	0.0343	0.0379	0.0411	0.0442	0.0471	0.0497	0.0522	0.0546	0.0568	0.0588	0.0608
18	-0.0876	-0.0728	-0.0598	-0.0483	-0.0381	-0.0289	-0.0206	-0.0131	-0.0062	0.0000	0.0057	0.0110	0.0158	0.0203	0.0244	0.0283	0.0318	0.0352	0.0383	0.0412	0.0439	0.0465	0.0489	0.0511	0.0532
19	-0.1089	-0.0923	-0.0778	-0.0650	-0.0537	-0.0435	-0.0344	-0.0262	-0.0187	-0.0119	-0.0057	0.0000	0.0053	0.0101	0.0146	0.0188	0.0227	0.0263	0.0296	0.0328	0.0357	0.0385	0.0411	0.0436	0.0459
20	-0.1316	-0.1128	-0.0965	-0.0822	-0.0697	-0.0585	-0.0485	-0.0395	-0.0314	-0.0239	-0.0172	-0.0110	-0.0053	0.0000	0.0049	0.0094	0.0136	0.0175	0.0211	0.0245	0.0277	0.0307	0.0335	0.0361	0.0386
21	-0.1563	-0.1346	-0.1162	-0.1002	-0.0862	-0.0739	-0.0629	-0.0530	-0.0441	-0.0361	-0.0287	-0.0220	-0.0158	-0.0101	-0.0049	0.0000	0.0045	0.0087	0.0126	0.0163	0.0197	0.0229	0.0259	0.0288	0.0314
22	-0.1836	-0.1584	-0.1372	-0.1192	-0.1036	-0.0899	-0.0777	-0.0669	-0.0572	-0.0484	-0.0404	-0.0331	-0.0264	-0.0203	-0.0146	-0.0094	-0.0045	0.0000	0.0042	0.0081	0.0118	0.0153	0.0185	0.0215	0.0244
23	-0.2151	-0.1848	-0.1601	-0.1395	-0.1219	-0.1066	-0.0931	-0.0812	-0.0706	-0.0610	-0.0523	-0.0444	-0.0372	-0.0305	-0.0244	-0.0188	-0.0136	-0.0087	-0.0042	0.0000	0.0039	0.0076	0.0111	0.0143	0.0174
24	-0.2533	-0.2152	-0.1857	-0.1616	-0.1415	-0.1243	-0.1093	-0.0961	-0.0844	-0.0739	-0.0645	-0.0559	-0.0481	-0.0409	-0.0343	-0.0283	-0.0227	-0.0175	-0.0126	-0.0081	-0.0039	0.0000	0.0037	0.0071	0.0104
25	-0.3043	-0.2522	-0.2151	-0.1864	-0.1630	-0.1433	-0.1265	-0.1118	-0.0988	-0.0873	-0.0770	-0.0677	-0.0592	-0.0515	-0.0444	-0.0379	-0.0318	-0.0263	-0.0211	-0.0163	-0.0118	-0.0076	-0.0037	0.0000	0.0035
26	-0.4407	-0.3018	-0.2510	-0.2150	-0.1870	-0.1641	-0.1449	-0.1284	-0.1140	-0.1013	-0.0900	-0.0798	-0.0706	-0.0622	-0.0546	-0.0476	-0.0411	-0.0352	-0.0296	-0.0245	-0.0197	-0.0153	-0.0111	-0.0071	-0.0035
27	0.0000	-0.4366	-0.2992	-0.2499	-0.2148	-0.1874	-0.1651	-0.1463	-0.1301	-0.1160	-0.1036	-0.0924	-0.0824	-0.0733	-0.0651	-0.0575	-0.0506	-0.0442	-0.0383	-0.0328	-0.0277	-0.0229	-0.0185	-0.0143	-0.0104
28	0.0000	0.0000	-0.4328	-0.2968	-0.2487	-0.2145	-0.1878	-0.1660	-0.1475	-0.1317	-0.1179	-0.1056	-0.0947	-0.0848	-0.0759	-0.0677	-0.0602	-0.0534	-0.0471	-0.0412	-0.0357	-0.0307	-0.0259	-0.0215	-0.0174
29	0.0000	0.0000	0.0000	-0.4291	-0.2944	-0.2475	-0.2141	-0.1880	-0.1667	-0.1487	-0.1331	-0.1196	-0.1075	-0.0967	-0.0870	-0.0782	-0.0701	-0.0628	-0.0560	-0.0497	-0.0439	-0.0385	-0.0335	-0.0288	-0.0244
30	0.0000	0.0000	0.0000	0.0000	-0.4254	-0.2921	-0.2463	-0.2137	-0.1882	-0.1673	-0.1496	-0.1344	-0.1211	-0.1092	-0.0986	-0.0891	-0.0804	-0.0724	-0.0651	-0.0584	-0.0522	-0.0465	-0.0411	-0.0361	-0.0314
31	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4220	-0.2898	-0.2451	-0.2132	-0.1883	-0.1678	-0.1505	-0.1356	-0.1225	-0.1108	-0.1004	-0.0909	-0.0824	-0.0745	-0.0673	-0.0607	-0.0546	-0.0489	-0.0436	-0.0386
32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4188	-0.2876	-0.2439	-0.2127	-0.1883	-0.1683	-0.1513	-0.1366	-0.1237	-0.1123	-0.1020	-0.0927	-0.0842	-0.0765	-0.0694	-0.0628	-0.0568	-0.0511	-0.0459
33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4156	-0.2854	-0.2427	-0.2121	-0.1883	-0.1686	-0.1520	-0.1376	-0.1249	-0.1136	-0.1035	-0.0943	-0.0860	-0.0783	-0.0713	-0.0648	-0.0588	-0.0532
34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4127	-0.2834	-0.2415	-0.2116	-0.1881	-0.1689	-0.1526	-0.1384	-0.1259	-0.1149	-0.1049	-0.0959	-0.0876	-0.0801	-0.0731	-0.0667	-0.0608
35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4096	-0.2813	-0.2403	-0.2110	-0.1880	-0.1691	-0.1531	-0.1392	-0.1269	-0.1160	-0.1062	-0.0972	-0.0892	-0.0817	-0.0748	-0.0685
36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4068	-0.2794	-0.2391	-0.2104	-0.1878	-0.1693	-0.1535	-0.1398	-0.1278	-0.1170	-0.1073	-0.0986	-0.0906	-0.0832	-0.0764
37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4040	-0.2774	-0.2380	-0.2098	-0.1876	-0.1694	-0.1539	-0.1405	-0.1286	-0.1180	-0.1085	-0.0998	-0.0919	-0.0846
38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.4015	-0.2755	-0.2368	-0.2091	-0.1874	-0.1695	-0.1542	-0.1410	-0.1293	-0.1189	-0.1095	-0.1010	-0.0932
39	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3989	-0.2737	-0.2357	-0.2085	-0.1871	-0.1695	-0.1545	-0.1415	-0.1300	-0.1197	-0.1105	-0.1020
40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3964	-0.2719	-0.2345	-0.2078	-0.1868	-0.1695	-0.1548	-0.1420	-0.1306	-0.1205	-0.1113
41	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3940	-0.2701	-0.2334	-0.2072	-0.1865	-0.1695	-0.1550	-0.1423	-0.1312	-0.1212
42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3917	-0.2684	-0.2323	-0.2065	-0.1862	-0.1695	-0.1551	-0.1427	-0.1317
43	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3894	-0.2667	-0.2313	-0.2058	-0.1859	-0.1693	-0.1553	-0.1430
44	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3872	-0.2651	-0.2302	-0.2052	-0.1855	-0.1692	-0.1554
45	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3850	-0.2635	-0.2291	-0.2045	-0.1851	-0.1691
46	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3830	-0.2620	-0.2281	-0.2038	-0.1847
47	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3808	-0.2604	-0.2271	-0.2032
48	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3789	-0.2589	-0.2260
49	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3770	-0.2574
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3751

Table B-2. Five Percent Confidence Limits for Shapiro-Wilk Test	
n	$W_{0.05}$
1	0.767
2	0.767
3	0.767
4	0.748
5	0.762
6	0.788
7	0.803
8	0.818
9	0.829
10	0.842
11	0.850
12	0.859
13	0.866
14	0.874
15	0.881
16	0.887
17	0.892
18	0.897
19	0.901
20	0.905
21	0.908
22	0.911
23	0.914
24	0.916
25	0.918
26	0.920
27	0.923
28	0.924
29	0.926
30	0.927
31	0.929
32	0.930
33	0.931
34	0.933
35	0.934
36	0.935
37	0.936
38	0.938
39	0.939
40	0.940
41	0.941
42	0.942
43	0.943
44	0.944
45	0.945
46	0.945
47	0.946
48	0.947
49	0.947
50	0.947

Table B-3. D'Agostino Test Quantiles		
n	$Y_{0.025}$	$Y_{0.975}$
50	-2.757	1.038
60	-2.699	1.115
70	-2.652	1.176
80	-2.613	1.226
90	-2.580	1.268
100	-2.552	1.303
150	-2.452	1.423
200	-2.391	1.496
250	-2.348	1.545
300	-2.316	1.528
350	-2.291	1.610
400	-2.270	1.633
450	-2.253	1.652
500	-2.239	1.668
550	-2.226	1.682
600	-2.215	1.694
650	-2.206	1.704
700	-2.197	1.714
750	-2.189	1.722
800	-2.182	1.730
850	-2.176	1.737
900	-2.170	1.743
950	-2.164	1.749
1000	-2.159	1.754

Attachment C
Calculation of the UCL_{95} for the Mean of a Normal Distribution

If a distribution of data values has been classified as normal, the upper 95 percent confidence limit (UCL_{95}) of the mean of the distribution is calculated as follows:

$$UCL_{95} = \bar{x} + \frac{s\, t_{0.05,n-1}}{\sqrt{n}} \qquad (C-1)$$

where

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

n = number of samples

$t_{0.05,n-1}$ = one-sided t-statistic for 5 percent error (see Table C-1)

Table C-1. One-sided t-statistics for 5 Percent Error

Degrees of Freedom (n-1)	One-sided t-statistic for 5 Percent Error
1	6.314
2	2.920
3	2.353
4	2.132
5	2.015
6	1.943
7	1.895
8	1.860
9	1.833
10	1.812
11	1.796
12	1.782
13	1.771
14	1.761
15	1.753
16	1.746
17	1.740
18	1.734
19	1.729
20	1.725
21	1.721
22	1.717
23	1.714
24	1.711
25	1.708
26	1.706
27	1.703
28	1.701
29	1.699
30	1.697
40	1.684
50	1.676
60	1.671
75	1.665
100	1.660
120	1.658
200	1.653
1000	1.646
>1000	1.645

Attachment D
Calculation of the UCL_{95} for the Mean of a Lognormal Distribution

Data Transformation and Testing

If a data set of concentration measurements fails the Shapiro-Wilk/D'Agostino test for normality, then the measurement values are transformed by taking the natural logarithm of each data value:

$$y_i = \ln(x_i) \qquad (D-1)$$

The transformed values, y_i, are then subjected to the Shapiro-Wilk/D'Agostino test to determine whether they conform to a normal distribution. If the transformed values pass the Shapiro-Wilk/D'Agostino test for normality, then they are further checked for normality by use of the Anderson-Darling test. If the transformed values pass both tests for normality, then the non-transformed values are characterized by a "confirmed" lognormal distribution. If the transformed values pass the Shapiro-Wilk/D'Agostino test but fail the Anderson-Darling test, then the underlying distribution of the non-transformed values is considered to be "unconfirmed" lognormal. Separate methods are used to find the upper 95 percent confidence limit (UCL_{95}) of the mean for these two distributions.

Unconfirmed Lognormal Distribution

The first step in determining the UCL_{95} of the mean of an unconfirmed lognormal distribution is to calculate the minimum variance unbiased estimate (MVUE) of the mean, μ, given by (Reference 1):

$$\mu = \exp(\bar{y}) g_n\left(\frac{s_y^2}{2}\right) \qquad (D-2)$$

where

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

$$s_y = \sqrt{\frac{\sum_{i=1}^{n}(y_i - \bar{y})^2}{n-1}}$$

$$g_n(t) = 1 + \frac{(n-1)t}{n} + \frac{(n-1)^3 t^2}{2!n^2(n+1)} + \frac{(n-1)^5 t^3}{3!n^3(n+1)(n+3)} + \frac{(n-1)^7 t^4}{4!n^4(n+1)(n+3)(n+5)} + \ldots.$$

$$t = \frac{s_y^2}{2}$$

A "Jackknife" procedure is then employed to generate "n" values of μ by alternately leaving out one of the data values. The Jackknifed mean value,Φ, is given as follows:

$$\Phi = \frac{\sum_{i=1}^{n} \mu_{(-i)}}{n} \qquad (D-3)$$

where

$\mu_{(-i)}$ = MVUE of the mean obtained by evaluating Equation (D-2) with the ith term deleted

The UCL_{95} of the mean is then calculated by the following expression:

$$UCL_{95} = \Phi + t_{0.05,n-1} S_{MVUE} \qquad (D-4)$$

where

$$S_{MVUE} = \sqrt{\frac{\sum_{i=1}^{n}(\mu_{(-i)} - \Phi)^2}{n(n-1)}}$$

$t_{0.05,n-1}$ = one-sided t-statistic for 5 percent error

Confirmed Lognormal Distribution

If the number of observations is greater than or equal to 30, then calculate the coefficient of variation, CV, as follows:

$$CV = \frac{s}{\bar{x}} \qquad (D-5)$$

where

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

If CV is less than 1, then theUCL_{95} for the arithmetic mean of the lognormal distribution is calculated as follows (Reference 2):

$$UCL_{95} = \exp\left(\bar{y} + 0.5s_y^2 + \frac{s_y H_{0.95,n,s_y}}{\sqrt{n-1}}\right) \qquad (D-6)$$

where

$H_{0.95,n,Sy}$ = H-statistic for 95 percent confidence limit (see Table D-1)

If the UCL_{95}, calculated by use of Equation (D-6) is greater than the maximum non-transformed data value, then the Chebychev theorem is used to obtain an alternate UCL_{95} value as follows:

$$UCL_{95} = \mu + 4.47\sigma_\mu \qquad (D-7)$$

The value for μ in Equation (D-7) is obtained from Equation (D-1). The value for σ_μ, the MVUE of the standard deviation of the mean of a lognormal distribution, is given by the following expression (Reference 1):

$$\sigma_\mu = \sqrt{\exp(2\bar{y})\left[\left(g_n\left(\frac{s_y^2}{2}\right)\right)^2 - g_n\left((n-2)\frac{s_y^2}{(n-1)}\right)\right]} \qquad (D-8)$$

The value for the UCL_{95} is then taken to be the lesser of the maximum data value and the UCL_{95} calculated by use of Equation (D-7).

If either CV 1 or the number of data values is less than 30, then the UCL_{95} is calculated by use of Equation (D-4).

References

1. Gilbert, R.O., 1987. *Statistical Methods for Environmental Pollution Monitoring*, Van Nostrand Reinhold, pp.164-166.

2. Land, C.E., 1971. Confidence intervals for linear functions of the normal mean and variance, *Annals of Mathematical Statistics* **42:**1187-1205.

Table D-1. H-Statistic (95% UCL)

	Number of Points																			Number of Points																		
Stdev of Log Values	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	23	25	28	31	36	41	46	51	61	71	81	101	121	161	201	251	301	401	601	1001
0.10	2.750	2.222	2.035	1.942	1.886	1.849	1.822	1.802	1.787	1.775	1.763	1.756	1.749	1.743	1.738	1.733	1.729	1.722	1.716	1.711	1.706	1.701	1.695	1.690	1.687	1.684	1.679	1.676	1.674	1.670	1.666	1.664	1.662	1.661	1.659	1.658	1.656	1.654
0.20	3.295	2.463	2.198	2.069	1.992	1.943	1.908	1.881	1.860	1.843	1.830	1.818	1.809	1.800	1.793	1.787	1.781	1.771	1.763	1.756	1.749	1.742	1.734	1.727	1.722	1.718	1.711	1.708	1.703	1.697	1.693	1.688	1.685	1.682	1.680	1.677	1.674	1.671
0.30	4.109	2.777	2.402	2.226	2.125	2.056	2.011	1.977	1.949	1.927	1.909	1.894	1.882	1.871	1.861	1.853	1.845	1.833	1.822	1.813	1.802	1.793	1.783	1.773	1.766	1.761	1.752	1.745	1.740	1.733	1.727	1.720	1.716	1.712	1.709	1.705	1.700	1.696
0.40	5.220	3.175	2.651	2.415	2.282	2.195	2.134	2.089	2.054	2.026	2.003	1.984	1.968	1.954	1.942	1.931	1.921	1.905	1.892	1.881	1.867	1.856	1.841	1.830	1.821	1.813	1.802	1.794	1.787	1.777	1.770	1.761	1.755	1.749	1.746	1.740	1.734	1.728
0.50	6.495	3.658	2.947	2.638	2.465	2.354	2.277	2.220	2.176	2.141	2.112	2.088	2.068	2.050	2.035	2.021	2.009	1.989	1.973	1.959	1.942	1.928	1.910	1.896	1.884	1.876	1.861	1.851	1.842	1.830	1.822	1.810	1.802	1.795	1.790	1.784	1.776	1.769
0.60	7.807	4.209	3.287	2.892	2.673	2.534	2.439	2.368	2.314	2.271	2.235	2.206	2.181	2.160	2.141	2.124	2.110	2.085	2.065	2.048	2.027	2.010	1.988	1.971	1.957	1.946	1.929	1.916	1.906	1.891	1.881	1.866	1.857	1.849	1.843	1.835	1.825	1.816
0.70	9.120	4.801	3.662	3.173	2.904	2.735	2.618	2.532	2.466	2.414	2.371	2.336	2.306	2.280	2.258	2.238	2.221	2.191	2.167	2.147	2.122	2.102	2.075	2.055	2.038	2.025	2.005	1.989	1.977	1.960	1.947	1.930	1.919	1.909	1.902	1.892	1.881	1.870
0.80	10.430	5.414	4.062	3.477	3.155	2.952	2.813	2.710	2.632	2.570	2.520	2.479	2.443	2.412	2.386	2.362	2.342	2.307	2.279	2.255	2.225	2.202	2.171	2.146	2.127	2.112	2.088	2.070	2.056	2.035	2.020	2.001	1.988	1.976	1.968	1.957	1.944	1.931
0.90	11.740	6.038	4.478	3.796	3.420	3.184	3.021	2.902	2.810	2.738	2.679	2.631	2.589	2.554	2.523	2.498	2.472	2.432	2.399	2.371	2.337	2.310	2.273	2.246	2.224	2.206	2.178	2.157	2.141	2.117	2.100	2.077	2.062	2.049	2.040	2.027	2.012	1.997
1.00	13.050	6.669	4.905	4.127	3.698	3.426	3.239	3.103	2.998	2.915	2.848	2.792	2.744	2.704	2.669	2.638	2.611	2.564	2.526	2.493	2.456	2.423	2.383	2.352	2.327	2.306	2.202	2.251	2.232	2.205	2.186	2.160	2.143	2.128	2.117	2.102	2.085	2.068
1.25	16.330	8.265	6.001	4.990	4.426	4.068	3.820	3.639	3.500	3.389	3.300	3.226	3.163	3.109	3.062	3.021	2.984	2.923	2.873	2.830	2.779	2.737	2.682	2.641	2.607	2.580	2.275	2.507	2.483	2.447	2.421	2.387	2.364	2.344	2.330	2.310	2.288	2.266
1.50	19.600	9.874	7.120	5.880	5.184	4.741	4.433	4.207	4.033	3.896	3.784	3.691	3.612	3.544	3.485	3.434	3.388	3.311	3.248	3.195	3.130	3.077	3.008	2.956	2.915	2.881	2.538	2.789	2.758	2.713	2.681	2.637	2.609	2.584	2.566	2.542	2.514	2.486
1.75	22.870	11.490	8.250	6.786	5.960	5.432	5.065	4.795	4.587	4.422	4.288	4.176	4.081	4.000	3.929	3.867	3.812	3.719	3.643	3.578	3.501	3.437	3.355	3.292	3.241	3.200	2.828	3.089	3.052	2.997	2.958	2.906	2.872	2.842	2.820	2.791	2.757	2.723
2.00	26.140	13.110	9.387	7.701	6.747	6.135	5.710	5.396	5.154	4.962	4.805	4.675	4.564	4.470	4.387	4.314	4.251	4.141	4.052	3.977	3.886	3.812	3.715	3.640	3.582	3.533	3.136	3.403	3.359	3.295	3.250	3.188	3.148	3.113	3.088	3.053	3.013	2.974
2.50	32.690	16.350	11.670	9.546	8.339	7.563	7.021	6.621	6.312	6.067	5.866	5.698	5.557	5.435	5.328	5.236	5.153	5.013	4.898	4.802	4.683	4.588	4.463	4.367	4.290	4.228	3.458	4.059	4.003	3.920	3.861	3.781	3.729	3.683	3.650	3.605	3.553	3.503
3.00	39.230	19.600	13.970	11.400	9.945	9.006	8.350	7.864	7.489	7.191	6.947	6.743	6.570	6.422	6.293	6.179	6.078	5.907	5.766	5.649	5.504	5.388	5.234	5.117	5.023	4.947	4.131	4.740	4.671	4.569	4.496	4.399	4.334	4.278	4.238	4.183	4.119	4.057
3.50	45.770	22.850	16.270	13.270	11.560	10.460	9.688	9.118	8.677	8.326	8.039	7.799	7.596	7.422	7.269	7.136	7.016	6.815	6.649	6.510	6.340	6.201	6.020	5.881	5.771	5.681	4.828	5.435	5.354	5.233	5.148	5.032	4.956	4.889	4.842	4.776	4.700	4.627
4.00	52.310	26.110	18.580	15.140	13.180	11.920	11.030	10.380	9.872	9.469	9.140	8.864	8.630	8.429	8.254	8.100	7.963	7.731	7.540	7.380	7.184	7.024	6.816	6.656	6.528	6.424	5.540	6.141	6.047	5.908	5.809	5.675	5.588	5.512	5.456	5.380	5.293	5.208
4.50	58.850	29.360	20.880	17.010	14.800	13.380	12.380	11.640	11.070	10.620	10.240	9.933	9.669	9.442	9.244	9.070	8.916	8.652	8.437	8.257	8.034	7.854	7.618	7.437	7.293	7.174	6.262	6.854	6.747	6.590	6.478	6.326	6.227	6.140	6.077	5.991	5.892	5.796
5.00	65.390	32.620	23.190	18.880	16.430	14.840	13.730	12.910	12.270	11.770	11.350	11.010	10.710	10.460	10.240	10.040	9.872	9.579	9.338	9.137	8.889	8.688	8.424	8.222	8.061	7.929	6.991	7.572	7.459	7.277	7.152	6.982	6.871	6.774	6.704	6.608	6.497	6.390
6.00	78.470	39.130	27.810	22.630	19.680	17.780	16.440	15.450	14.690	14.080	13.580	13.160	12.810	12.500	12.230	12.000	11.790	11.440	11.150	10.910	10.610	10.360	10.050	9.803	9.608	9.449	7.725	9.017	8.873	8.661	8.509	8.305	8.170	8.053	7.968	7.852	7.718	7.588
7.00	91.550	45.650	32.430	26.390	22.940	20.720	19.160	18.000	17.100	16.390	15.810	15.320	14.900	14.550	14.240	13.960	13.720	13.310	12.970	12.680	12.330	12.050	11.680	11.390	11.160	10.980	10.690	10.470	10.300	10.050	9.876	9.637	9.479	9.342	9.242	9.106	8.949	8.797
8.00	104.600	52.160	37.050	30.140	26.200	23.660	21.870	20.550	19.530	18.710	18.040	17.480	17.010	16.600	16.240	15.930	15.650	15.180	14.790	14.470	14.060	13.740	13.310	12.990	12.730	12.510	12.180	11.930	11.740	11.450	11.250	10.970	10.790	10.640	10.520	10.370	10.190	10.010
9.00	117.700	58.680	41.680	33.900	29.460	26.600	24.590	23.100	21.950	21.030	20.280	19.650	19.110	18.650	18.250	17.900	17.590	17.050	16.620	16.250	15.800	15.430	14.950	14.580	14.290	14.050	13.670	13.390	13.180	12.850	12.630	12.320	12.110	11.940	11.810	11.630	11.430	11.230
10.00	130.800	65.200	46.310	37.660	32.730	29.540	27.310	25.660	24.380	23.350	22.510	21.820	21.220	20.710	20.260	19.870	19.520	18.930	18.440	18.040	17.530	17.130	16.590	16.180	15.850	15.590	15.170	14.860	14.620	14.260	14.010	13.660	13.430	13.240	13.100	12.900	12.670	12.450

Attachment E
Calculation of the UCL_{95} for the Mean of a Non-Parametric Distribution

If it is found that the underlying distribution of a set of concentration measurements is neither normal nor lognormal, then the distribution is considered non-parametric. If there are 15 or more data values then the upper 95 percent confidence limit (UCL_{95}) of the mean is calculated by application of the bootstrap method. In the standard bootstrap simulation, n data values are *randomly* selected with *replacement* from a data set containing n values. A randomly selected sample will likely differ from the actual set of observations in that some of the observations will be omitted and others will be repeated. This process is repeated 10,000 times with the mean of the chosen values calculated each time. The UCL_{95} of the mean is determined from the 10,000 simulated mean values as follows:

$$UCL_{95} = \overline{X}_B + 1.645 S_B \qquad (E-1)$$

where

$$\overline{X}_B = \frac{\sum_{k=1}^{IT} \overline{X}_k}{IT}$$

$$S_B = \sqrt{\frac{1}{IT-1}\left(\sum_{k=1}^{IT} (\overline{X}_k - \overline{X}_B)^2\right)}$$

IT = number of bootstrap iterations (10,000)

$$\overline{X}_k = \frac{\sum_{i=1}^{n} x_{ki}}{n}$$

x_{ki} = i^{th} randomly selected data value for the kth bootstrap iteration

Two variations of this bootstrap method are also used to calculate the UCL_{95} of the mean. Each of these is described below.

"Bootstrap-t" Method

In addition to the mean value of the randomly selected samples, the parameter S_k is also calculated after each bootstrap iteration:

$$S_k = \sqrt{\frac{\sum_{i=1}^{n}\left(x_{ki} - \overline{X}_k\right)^2}{n}} \qquad (E-2)$$

For each bootstrap iteration a W-value is calculated as follows:

$$W_k = \frac{\left(\overline{X}_k - \overline{x}\right)}{S_k} \qquad (E-3)$$

where

$$\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

x_i = actual (not bootstrapped) data values

The UCL_{95} for this bootstrap method is given by the following expression (Reference 1):

$$UCL_{95} = \overline{x} - W_{0.05}\, S \qquad (E-4)$$

where

$$S = \sqrt{\frac{\sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2}{n}}$$

$W_{0.05}$ = 5th percentile of the distribution of W_k values obtained from bootstrapping (500th value of W for 10,000 bootstrapped values sorted from smallest to largest)

Hall's Bootstrap-t Transformation

For each bootstrap sample a Q-value is calculated as follows:

$$Q_k = W_k + \frac{\nu_k W_k^2}{3} + \frac{\nu_k^2 W_k^3}{27} + \frac{\nu_k}{6n} \qquad (E-5)$$

where

$$\nu_k = \frac{\sum_{i=1}^{n} (x_{ki} - \overline{X}_k)^3}{n S_k^3}$$

The Q-values calculated by use of Equation (E-5) are sorted from smallest to largest to identify the 5th percentile value $Q_{0.05}$. The corresponding W-value is then calculated as follows:

$$W(Q_{0.05}) = \frac{3\left\{\left[1 + \nu\left(Q_{0.05} - \frac{\nu}{6n}\right)\right]^{1/3} - 1\right\}}{\nu} \qquad (E-6)$$

where

$$\nu = \frac{\sum_{i=1}^{n} (x_i - \overline{x})^3}{n S^3}$$

The UCL_{95} is then given by

$$UCL_{95} = \overline{x} - W(Q_{0.05}) S \qquad (E-7)$$

UCL_{95} Selection

To determine which of the 3 bootstrap calculated UCL_{95} values will be selected, the frequency distributions of the following bootstrapped values are analyzed to determine which of the following bootstrapped quantities is best described by a normal distribution:

$\overline{X}_k$ (Standard Bootstrap)
W_k (Bootstrap – t)
Q_k (Hall's Bootstrap – t)

Each of these bootstrapped quantities is sorted from smallest to largest value to determine values corresponding to the following cumulative distribution percentiles: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90 and 95. The correlation coefficient is determined between these values and the corresponding percentile "Z-values" of a normal distribution. The parameter having the highest correlation is determined and the UCL_{95} for the associated bootstrap method is selected to be the UCL_{95} for the non-parametric data set.

Small Data Sets

For non-parametric data sets with less than 15 observations, the UCL_{95} of the mean of the underlying distribution is calculated as follows:

$$UCL_{95} = \overline{x} + \frac{s\, t_{0.05,n-1}}{\sqrt{n}} \qquad (E-8)$$

where

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \overline{x})^2}$$

$t_{0.05,n-1}$ = one-sided t-statistic for 5 percent error

Reference for Appendix E

1.) Manly, B.F.J., 1997.*Randomization, Bootstrap and Monte Carlo Methods in Biology.* 2nd edition, Chapman & Hall, pp.34-62.

Attachment F
Anderson-Darling Test for Normality

Consider a data set ($x_1, x_2, \ldots, x_n$) and the corresponding set of values ($x_{(1)}, x_{(2)}, \ldots, x_{(n)}$) sorted from smallest to largest. The standard deviation of the data values is calculated by use of the following expression:

$$s = \left(\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1} \right)^{1/2} \qquad (F-1)$$

where

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

The Anderson-Darling test statistic, A^2, is given by

$$A_m{}^2 = -n - \sum_{i=1}^{n} \frac{(2i-1)}{n} [\ln(F_i) + \ln(1 - F_{n+1-i})] \qquad (F-2)$$

$$A^2 = A_m^2 \left(1 + \frac{0.75}{n} + \frac{2.25}{n^2} \right) \qquad (F-3)$$

where

$$F_i = 0.5 \left[1 + erf \left(\frac{x_{(i)} - \bar{x}}{\sqrt{2}s} \right) \right]$$

The greater the value of A^2, the less confidence one has that the data values come from a normal distribution. Values of A^2 corresponding to 1, 5 and 10 percent confidence limits are 3.857, 2.492 and 1.933, respectively (Reference 1).

If the logarithms of the data values are used in place of the data values, then the Anderson-Darling test statistic can be used to test whether the underlying distribution can be characterized as lognormal.

Reference

1. Giles, D.E.A., April, 2000. A Saddlepoint Approximation to the Distribution Function of the Anderson-Darling Test Statistic, University of Victoria Econometrics Working Paper EWP0005, ISBN 1485-6441.

Attachment G
Outlier Testing

Dixon Test

For data sets having 25 or fewer members, statistical outliers may be identified by application of the Dixon Test (Reference 1). This test examines extreme values at both ends of the distribution. The assumption is made that the underlying distribution of these data is normal. Let $x_{(1)}, x_{(2)}, \ldots, x_{(n)}$ represent the data sorted from smallest to largest value. To test whether the smallest value $x_{(1)}$ is an outlier, the test statistic C is computed as follows:

$$C = \frac{x_{(2)} - x_{(1)}}{x_{(n)} - x_{(1)}} \qquad for\ 3 \le n \le 7 \qquad (G-1a)$$

$$C = \frac{x_{(2)} - x_{(1)}}{x_{(n-1)} - x_{(1)}} \qquad for\ 8 \le n \le 10 \qquad (G-1b)$$

$$C = \frac{x_{(3)} - x_{(1)}}{x_{(n-1)} - x_{(1)}} \qquad for\ 11 \le n \le 13 \qquad (G-1c)$$

$$C = \frac{x_{(3)} - x_{(1)}}{x_{(n-2)} - x_{(1)}} \qquad for\ 14 \le n \le 25 \qquad (G-1d)$$

If the value of C exceeds the 5% level of significance given in Table G-1, then $x_{(1)}$ is considered an outlier and should be investigated further.

To test whether the largest data value $x_{(n)}$ is an outlier, the test statistic C is computed as follows:

$$C = \frac{x_{(n)} - x_{(n-1)}}{x_{(n)} - x_{(1)}} \qquad for\ 3 \le n \le 7 \qquad (G-2a)$$

$$C = \frac{x_{(n)} - x_{(n-1)}}{x_{(n)} - x_{(2)}} \qquad for\, 8 \le n \le 10 \qquad (G-2b)$$

$$C = \frac{x_{(n)} - x_{(n-2)}}{x_{(n)} - x_{(2)}} \qquad for\, 11 \le n \le 13 \qquad (G-2c)$$

$$C = \frac{x_{(n)} - x_{(n-2)}}{x_{(n)} - x_{(3)}} \qquad for\, 14 \le n \le 25 \qquad (G-2d)$$

If the value of C exceeds the 5% level of significance given in Table G-1, then $x_{(n)}$ is considered an outlier and should be investigated further.

Rosner Test

Rosner's Test (Reference 1) can identify up to 10 outliers in a data set having 25 or more members. It is assumed that the distribution underlying the data is normal. Let $x_{(1)}$, $x_{(2)}$, ..., $x_{(n)}$ represent the data sorted from smallest to largest value. Compute the sample mean, $x^{(0)}_{avg}$, and standard deviation, $s^{(0)}$, for all the data as follows:

$$x^{(0)}_{avg} = \frac{\sum_{i=1}^{n} x_{(i)}}{n} \qquad (G-3)$$

$$s^{(0)} = \left[\frac{1}{n-1} \sum_{i=1}^{n} (x_{(i)} - x^{(0)}_{avg})^2 \right]^{1/2} \qquad (G-4)$$

Determine the observation farthest from $x^{(0)}_{avg}$ and label this observation $y^{(0)}$. This observation is then deleted from the data set and the sample mean $x^{(1)}_{avg}$ and standard deviation $s^{(1)}$ are computed with the remaining data. This process is repeated until 10 extreme values have been eliminated. At the end of this process the following quantities have been obtained:

$$\left\{ x^{(0)}_{avg}, s^{(0)}, y^{(0)} \right\}, \left\{ x^{(1)}_{avg}, s^{(1)}, y^{(1)} \right\}, \ldots\ldots, \left\{ x^{(9)}_{avg}, s^{(9)}, y^{(9)} \right\}$$

For each potential outlier "r", the statistic R_r is calculated as follows:

$$R_r = \frac{\left| y^{(r-1)} - x_{avg}^{(r-1)} \right|}{s^{(r-1)}} \qquad (G-5)$$

If R_r is greater than the appropriate critical value for 5 percent significance (see Table G-2), then there are "r" outliers that should be investigated.

Reference

1. Guidance for Data Quality Assessment: Practical Methods for Data Analysis: EPA QA/G-9, QA96 Version. EPA Report Number 600R96084.

Table G-1. Critical Values for Dixon's Test	
Number of Points	**0.05 Level of Significance**
3	0.941
4	0.765
5	0.642
6	0.560
7	0.507
8	0.554
9	0.512
10	0.477
11	0.576
12	0.546
13	0.521
14	0.546
15	0.525
16	0.507
17	0.490
18	0.475
19	0.462
20	0.450
21	0.440
22	0.430
23	0.421
24	0.413
25	0.406

Table G-2. 5% Critical Values for Rosner's Test										
	Number of Potential Outliers									
Number of Points	1	2	3	4	5	6	7	8	9	10
25	2.820	2.800	2.780	2.760	2.730	2.702	2.674	2.646	2.618	2.590
26	2.840	2.820	2.800	2.780	2.760	2.732	2.704	2.676	2.648	2.620
27	2.860	2.840	2.820	2.800	2.780	2.754	2.728	2.702	2.676	2.650
28	2.880	2.860	2.840	2.820	2.800	2.776	2.752	2.728	2.704	2.680
29	2.890	2.880	2.860	2.840	2.820	2.798	2.776	2.754	2.732	2.710
30	2.910	2.890	2.880	2.860	2.840	2.818	2.796	2.774	2.752	2.730
31	2.920	2.910	2.890	2.880	2.860	2.840	2.820	2.800	2.780	2.760
32	2.940	2.920	2.910	2.890	2.880	2.860	2.840	2.820	2.800	2.780
33	2.950	2.940	2.920	2.910	2.890	2.872	2.854	2.836	2.818	2.800
34	2.970	2.950	2.940	2.920	2.910	2.892	2.874	2.856	2.838	2.820
35	2.980	2.970	2.950	2.940	2.920	2.904	2.888	2.872	2.856	2.840
36	2.990	2.980	2.970	2.950	2.940	2.924	2.908	2.892	2.876	2.860
37	3.000	2.990	2.980	2.970	2.950	2.936	2.922	2.908	2.894	2.880
38	3.010	3.000	2.990	2.980	2.970	2.958	2.946	2.934	2.922	2.910
39	3.030	3.010	3.000	2.990	2.980	2.966	2.952	2.938	2.924	2.910
40	3.040	3.030	3.010	3.000	2.990	2.976	2.962	2.948	2.934	2.920
41	3.050	3.040	3.030	3.010	3.000	2.988	2.976	2.964	2.952	2.940
42	3.060	3.050	3.040	3.030	3.010	2.998	2.986	2.974	2.962	2.950
43	3.070	3.060	3.050	3.040	3.030	3.018	3.006	2.994	2.982	2.970
44	3.080	3.070	3.060	3.050	3.040	3.028	3.016	3.004	2.992	2.980
45	3.090	3.080	3.070	3.060	3.050	3.038	3.026	3.014	3.002	2.990
46	3.090	3.090	3.080	3.070	3.060	3.048	3.036	3.024	3.012	3.000
47	3.100	3.090	3.090	3.080	3.070	3.058	3.046	3.034	3.022	3.010
48	3.110	3.100	3.090	3.090	3.080	3.070	3.060	3.050	3.040	3.030
49	3.120	3.110	3.100	3.090	3.090	3.080	3.070	3.060	3.050	3.040
50	3.130	3.120	3.110	3.100	3.090	3.082	3.074	3.066	3.058	3.050
60	3.200	3.190	3.190	3.180	3.170	3.164	3.158	3.152	3.146	3.140
70	3.260	3.250	3.250	3.240	3.240	3.234	3.228	3.222	3.216	3.210
80	3.310	3.300	3.300	3.290	3.290	3.284	3.278	3.272	3.266	3.260
90	3.350	3.340	3.340	3.340	3.330	3.326	3.322	3.318	3.314	3.310
100	3.380	3.380	3.380	3.370	3.370	3.366	3.362	3.358	3.354	3.350
150	3.520	3.510	3.510	3.510	3.510	3.508	3.506	3.504	3.502	3.500
200	3.610	3.600	3.600	3.600	3.600	3.598	3.596	3.594	3.592	3.590
250	3.670	3.670	3.670	3.670	3.670	3.668	3.666	3.664	3.662	3.660
300	3.720	3.720	3.720	3.720	3.720	3.718	3.716	3.714	3.712	3.710
350	3.770	3.760	3.760	3.760	3.760	3.760	3.760	3.760	3.760	3.760
400	3.800	3.800	3.800	3.800	3.800	3.800	3.800	3.800	3.800	3.800
450	3.840	3.830	3.830	3.830	3.830	3.830	3.830	3.830	3.830	3.830
500	3.860	3.860	3.860	3.860	3.860	3.860	3.860	3.860	3.860	3.860

Attachment H
Cumulative Frequency Distribution Plots

Before a set of data is tested for normality or lognormality by use of the Shapiro-Wilk/D'Agostino or Anderson-Darling tests, it is advisable to examine the data graphically to determine whether a normal, lognormal or non-parametric distribution is appropriate. This graphical presentation can also reveal the presence of potential outliers in the data set. Consider a set of n data values x_i. These data points can represent either the actual measurements or the data transformed by taking the logarithm of each measurement. The cumulative frequency distribution of these values is given by the following expression:

$$F_n(x_{(i)}) = \frac{i - 0.5}{n} \qquad (H-1)$$

where

$x_{(i)}$ = i^{th} value of (x_j, j = 1,n) sorted from smallest to largest

The standardized normal variable, Z, associated with this cumulative frequency is given by the following approximation:

$$Z = sign(F_n(x) - 0.5)(1.238t(1 + 0.0262t)) \qquad (H-2)$$

where

$$t = \{-\ln[4F_n(x)(1 - F_n(x))]\}^{1/2}$$

$$sign(F_n(x) - 0.5) = +1 \text{ if } F_n(x) - 0.5 > 0$$
$$-1 \text{ if } F_n(x) - 0.5 < 0$$

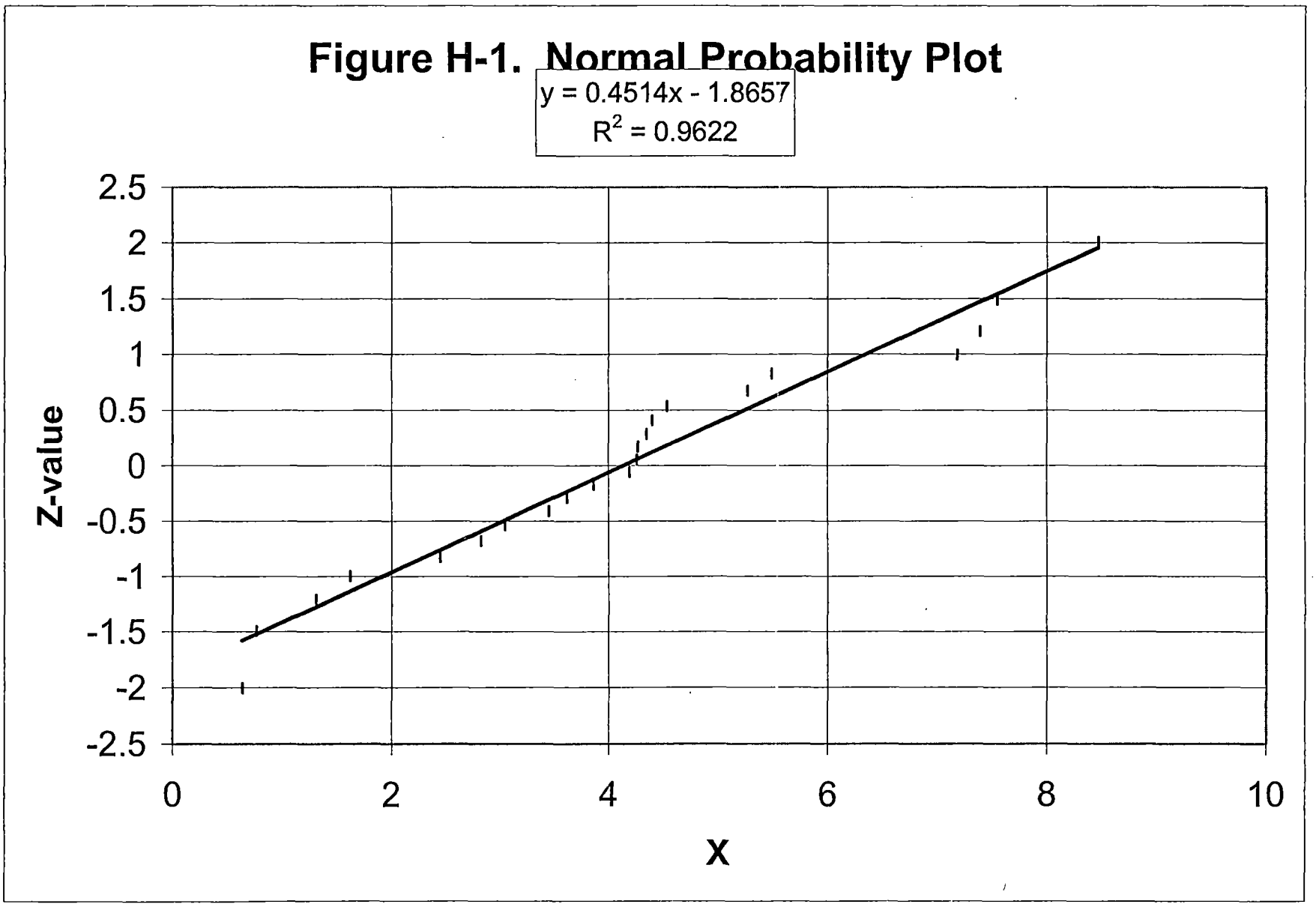
In Figure H-1, a plot of Z vs. x is shown for 22 data points generated from an EXCEL spreadsheet normal distribution random number generator. Not surprisingly the data points fall along a straight line, indicating that the underlying distribution of the data values is normal. A least-squares fit of a straight line to the data points in Figure H-1 provides an estimate of the mean, , and square root of the variance, , of the best-fit

normal distribution. If Z = A x + B is the equation of the best-fit line, then the corresponding best-fit values of and are given by:

$$\mu = \frac{-B}{A} \qquad (H-3a)$$

$$\sigma = \frac{1}{A} \qquad (H-3b)$$

Figure H-1. Normal Probability Plot



ATTACHMENT I

PROGRAM INPUT AND OUTPUT FILES

surfacesoil_qsouth_2378TCDDTEQ_data

0.00004924
5.58055E-05
0.000097905
0.000051915
0.000038011
6.23465E-05
0.000072015
4.49225E-05
0.000094285
0.00682
0.00040966
0.00047766

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.16934E-02

NUMBER OF DATA POINTS = 12
MEAN= 0.6895E-03
SQUARE ROOT OF VARIANCE= 0.1854E-02
STANDARD DEVIATION= 0.1936E-02
SKEWNESS= 0.2984E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2808E+01
MINIMUM = 0.3801E-04
MAXIMUM = 0.6820E-02

MEAN OF LOG DATA = -0.8994E+01
STANDARD DEVIATION OF LOG DATA = 0.1504E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3904E+01

MVUE ESTIMATE OF THE MEAN = 0.3265E-03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.595E-03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1553E-03

MLE ESTIMATE OF THE MEAN = 0.3849E-03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1129E-02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2470E-03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2326E-03

AVERAGE OF BOOTSTRAPPED VALUES = 0.6853E-03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5322E-03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6614E-03
B = 0.5364E-03
R = 0.9521E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1372E+01
B = 0.2110E+01
R = 0.8796E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3349E+01
B = 0.6785E+01
R = 0.6239E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1785E-02

UCL95 STANDARD BOOT = 0.1561E-02

UCL95 BOOTSTRAP-T FROM SORT = 0.1205E-01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1208E-01

UCL95 T-DISTRIBUTION = 0.1693E-02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1609E-02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2124E-02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3188E-02

UCL95 FROM LOG JACKKNIFE = 0.6648E-03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1020E-02

UCL95 FROM H-STATISTIC = 0.2261E-02

surfacesoil_qsouth_antimony_data

1.05
1.1
1.1
1.35
1.1
1.3
1.3
1.15
1.25
2.75
47
23

surfacesoil_qsouth_antimony_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.14250E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.6954E+01
SQUARE ROOT OF VARIANCE= 0.1347E+02
STANDARD DEVIATION= 0.1407E+02
SKEWNESS= 0.2268E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2023E+01
MINIMUM = 0.1050E+01
MAXIMUM = 0.4700E+02

MEAN OF LOG DATA = 0.7933E+00
STANDARD DEVIATION OF LOG DATA = 0.1295E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3479E+01

MVUE ESTIMATE OF THE MEAN = 0.4581E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.689E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1865E+01

MLE ESTIMATE OF THE MEAN = 0.5114E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1067E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3881E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2871E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.6958E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3930E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6780E+01
B = 0.4088E+01
R = 0.9880E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1212E+01
B = 0.2562E+01
R = 0.6475E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2552E+02
B = 0.5542E+02
R = 0.4853E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1445E+02

UCL95 STANDARD BOOT = 0.1342E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1791E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1770E+03

UCL95 T-DISTRIBUTION = 0.1425E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1364E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1648E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2511E+02

UCL95 FROM LOG JACKKNIFE = 0.9038E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1292E+02

UCL95 FROM H-STATISTIC = 0.1990E+02

surfacesoil_qsouth_arsenic_data

17
5
5.5
4.3
33
5.1
7.9
7.1
3.3
6
17.5
4.2

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.90583E+00
MAXIMUM DATA VALUE = 0.33000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.13449E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.9658E+01
SQUARE ROOT OF VARIANCE= 0.8376E+01
STANDARD DEVIATION= 0.8749E+01
SKEWNESS= 0.1798E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.9058E+00
MINIMUM = 0.3300E+01
MAXIMUM = 0.3300E+02

MEAN OF LOG DATA = 0.2003E+01
STANDARD DEVIATION OF LOG DATA = 0.6984E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2412E+01

MVUE ESTIMATE OF THE MEAN = 0.9238E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.677E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1940E+01

MLE ESTIMATE OF THE MEAN = 0.9463E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.7503E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.9112E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2415E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.9684E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2417E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.9631E+01
B = 0.2426E+01
R = 0.9966E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1060E+00
B = 0.4082E+00
R = 0.9593E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6517E-02
B = 0.2908E+00
R = 0.9938E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1397E+02

UCL95 STANDARD BOOT = 0.1366E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1806E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1697E+02

UCL95 T-DISTRIBUTION = 0.1419E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1381E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1521E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2095E+02

UCL95 FROM LOG JACKKNIFE = 0.1345E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1791E+02

UCL95 FROM H-STATISTIC = 0.1572E+02

surfacesoil_qsouth_benzoaanthracene_data

0.065
0.085
2.515
0.2
0.041
0.03
1.42
0.045
0.045
0.21
1.8
0.23

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.15317E+01
MAXIMUM DATA VALUE = 0.25150E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10339E+01

NUMBER OF DATA POINTS = 12
MEAN= 0.5572E+00
SQUARE ROOT OF VARIANCE= 0.8171E+00
STANDARD DEVIATION= 0.8534E+00
SKEWNESS= 0.1400E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1532E+01
MINIMUM = 0.3000E-01
MAXIMUM = 0.2515E+01

MEAN OF LOG DATA = -0.1740E+01
STANDARD DEVIATION OF LOG DATA = 0.1580E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4062E+01

MVUE ESTIMATE OF THE MEAN = 0.5064E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.985E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2531E+00

MLE ESTIMATE OF THE MEAN = 0.6113E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2039E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4748E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3113E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.5586E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2374E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5545E+00
B = 0.2377E+00
R = 0.9973E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7319E-01
B = 0.3717E+00
R = 0.9693E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1298E-01
B = 0.2587E+00
R = 0.9931E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.9725E+00

UCL95 STANDARD BOOT = 0.9491E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.1321E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.9322E+00

UCL95 T-DISTRIBUTION = 0.9996E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.9624E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1069E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1658E+01

UCL95 FROM LOG JACKKNIFE = 0.1034E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1638E+01

UCL95 FROM H-STATISTIC = 0.4232E+01

surfacesoil_qsouth_benzoapyrene_data

0.205
2.975
1.8
0.046
0.04
0.18
0.23
0.048
0.2
0.092
1.29
0.075

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.15648E+01
MAXIMUM DATA VALUE = 0.29750E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10506E+01

NUMBER OF DATA POINTS = 12
MEAN= 0.5984E+00
SQUARE ROOT OF VARIANCE= 0.8965E+00
STANDARD DEVIATION= 0.9364E+00
SKEWNESS= 0.1672E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1565E+01
MINIMUM = 0.4000E-01
MAXIMUM = 0.2975E+01

MEAN OF LOG DATA = -0.1563E+01
STANDARD DEVIATION OF LOG DATA = 0.1476E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3845E+01

MVUE ESTIMATE OF THE MEAN = 0.5322E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.946E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2482E+00

MLE ESTIMATE OF THE MEAN = 0.6222E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1740E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5004E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3063E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.5965E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2556E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5913E+00
B = 0.2564E+00
R = 0.9968E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1002E+00
B = 0.3999E+00
R = 0.9451E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1231E-02
B = 0.2689E+00
R = 0.9978E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1051E+01

UCL95 STANDARD BOOT = 0.1017E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1630E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1153E+01

UCL95 T-DISTRIBUTION = 0.1084E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1043E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1183E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1807E+01

UCL95 FROM LOG JACKKNIFE = 0.1051E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1642E+01

UCL95 FROM H-STATISTIC = 0.3442E+01

surfacesoil_qsouth_benzobfluorene_data

0.056
0.2
0.19
3.3
0.036
1.475
0.22
0.069
0.033
0.21
0.23
2.69

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.15662E+01
MAXIMUM DATA VALUE = 0.33000E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.13467E+01

surfacesoil_qsouth_benzobfluorene_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.7257E+00
SQUARE ROOT OF VARIANCE= 0.1088E+01
STANDARD DEVIATION= 0.1137E+01
SKEWNESS= 0.1495E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1566E+01
MINIMUM = 0.3300E-01
MAXIMUM = 0.3300E+01

MEAN OF LOG DATA = -0.1461E+01
STANDARD DEVIATION OF LOG DATA = 0.1576E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4054E+01

MVUE ESTIMATE OF THE MEAN = 0.6659E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.129E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3320E+00

MLE ESTIMATE OF THE MEAN = 0.8029E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2660E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6303E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3989E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.7249E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3135E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7186E+00
B = 0.3146E+00
R = 0.9973E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9185E-01
B = 0.4014E+00
R = 0.9275E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.5083E-02
B = 0.2692E+00
R = 0.9991E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1272E+01

UCL95 STANDARD BOOT = 0.1241E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.2102E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1501E+01

UCL95 T-DISTRIBUTION = 0.1315E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1266E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1417E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2193E+01

UCL95 FROM LOG JACKKNIFE = 0.1347E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.2150E+01

UCL95 FROM H-STATISTIC = 0.5510E+01

surfacesoil_qsouth_chromium_data

8.2
660
49.5
13
16
13
20
20
160
17
24
8

surfacesoil_qsouth_chromium_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.18058E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.8406E+02
SQUARE ROOT OF VARIANCE= 0.1782E+03
STANDARD DEVIATION= 0.1862E+03
SKEWNESS= 0.2774E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2215E+01
MINIMUM = 0.8000E+01
MAXIMUM = 0.6600E+03

MEAN OF LOG DATA = 0.3297E+01
STANDARD DEVIATION OF LOG DATA = 0.1293E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3475E+01

MVUE ESTIMATE OF THE MEAN = 0.5588E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.839E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2272E+02

MLE ESTIMATE OF THE MEAN = 0.6236E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1297E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4845E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3310E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.8322E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5087E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.8145E+02
B = 0.5104E+02
R = 0.9828E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7534E+00
B = 0.1511E+01
R = 0.7633E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.8001E+00
B = 0.1945E+01
R = 0.5521E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1804E+03

UCL95 STANDARD BOOT = 0.1669E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.1212E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1213E+04

UCL95 T-DISTRIBUTION = 0.1806E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1725E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2185E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3243E+03

UCL95 FROM LOG JACKKNIFE = 0.1079E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1574E+03

UCL95 FROM H-STATISTIC = 0.2418E+03

surfacesoil_qsouth_dieldrin_data

0.28
0.021
0.00041
0.0088
0.0019
0.375
0.00066
0.0021
0.0033
0.1
0.0022
0.16

surfacesoil_qsouth_dieldrin_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.16028E+01
MAXIMUM DATA VALUE = 0.37500E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.26909E+00

surfacesoil_qsouth_dieldrin_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.7961E-01
SQUARE ROOT OF VARIANCE= 0.1222E+00
STANDARD DEVIATION= 0.1276E+00
SKEWNESS= 0.1415E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1603E+01
MINIMUM = 0.4100E-03
MAXIMUM = 0.3750E+00

MEAN OF LOG DATA = -0.4531E+01
STANDARD DEVIATION OF LOG DATA = 0.2413E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5872E+01

MVUE ESTIMATE OF THE MEAN = 0.1058E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.380E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7715E-01

MLE ESTIMATE OF THE MEAN = 0.1978E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3629E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1067E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9041E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.7957E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3509E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7901E-01
B = 0.3527E-01
R = 0.9978E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.8459E-01
B = 0.3901E+00
R = 0.9496E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1562E-02
B = 0.2788E+00
R = 0.9989E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1411E+00

UCL95 STANDARD BOOT = 0.1373E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.2160E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1634E+00

UCL95 T-DISTRIBUTION = 0.1458E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1402E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1563E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2443E+00

UCL95 FROM LOG JACKKNIFE = 0.2691E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.4507E+00

UCL95 FROM H-STATISTIC = 0.1418E+02

surfacesoil_qsouth_manganese_data

630
460
2100
380
370
290
735
660
320
380
595
320

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.85995E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.6033E+03
SQUARE ROOT OF VARIANCE= 0.4739E+03
STANDARD DEVIATION= 0.4950E+03
SKEWNESS= 0.2538E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.8204E+00
MINIMUM = 0.2900E+03
MAXIMUM = 0.2100E+04

MEAN OF LOG DATA = 0.6226E+01
STANDARD DEVIATION OF LOG DATA = 0.5486E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2202E+01

MVUE ESTIMATE OF THE MEAN = 0.5795E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.328E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.9433E+02

MLE ESTIMATE OF THE MEAN = 0.5876E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3482E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5731E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1234E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.6045E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1376E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6000E+03
B = 0.1377E+03
R = 0.9889E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2434E+00
B = 0.5701E+00
R = 0.9385E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1388E+00
B = 0.4702E+00
R = 0.9525E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8638E+03

UCL95 STANDARD BOOT = 0.8309E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.1280E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1088E+04

UCL95 T-DISTRIBUTION = 0.8599E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8384E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9502E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1242E+04

UCL95 FROM LOG JACKKNIFE = 0.7947E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1001E+04

UCL95 FROM H-STATISTIC = 0.8459E+03

surfacesoil_qsouth_totalpcbs_data

1.39785
0.437
10.905
0.03265
0.0292
0.02825
0.0303
0.03195
13.402
2.687
2.8831
1.1175

surfacesoil_qsouth_totalpcbs_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.51027E+01

surfacesoil_qsouth_totalpcbs_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.2748E+01
SQUARE ROOT OF VARIANCE= 0.4348E+01
STANDARD DEVIATION= 0.4541E+01
SKEWNESS= 0.1655E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1652E+01
MINIMUM = 0.2825E-01
MAXIMUM = 0.1340E+02

MEAN OF LOG DATA = -0.9010E+00
STANDARD DEVIATION OF LOG DATA = 0.2461E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5979E+01

MVUE ESTIMATE OF THE MEAN = 0.4326E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.160E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3200E+01

MLE ESTIMATE OF THE MEAN = 0.8388E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1730E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4907E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3145E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2744E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1250E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2714E+01
B = 0.1259E+01
R = 0.9971E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1672E+00
B = 0.5371E+00
R = 0.8556E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4449E-01
B = 0.3689E+00
R = 0.9364E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4923E+01

UCL95 STANDARD BOOT = 0.4800E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1108E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1141E+02

UCL95 T-DISTRIBUTION = 0.5103E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4905E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5574E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8608E+01

UCL95 FROM LOG JACKKNIFE = 0.1056E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1863E+02

UCL95 FROM H-STATISTIC = 0.7086E+03

all_soil_p_14dichlorobenzene_data

2.1
0.205
19
0.205
65
39
1.3
1.4
0.19
3.75
0.9
160

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.19354E+01
MAXIMUM DATA VALUE = 0.16000E+03

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.66963E+02

all_soil_p_14dichlorobenzene_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.2442E+02
SQUARE ROOT OF VARIANCE= 0.4525E+02
STANDARD DEVIATION= 0.4726E+02
SKEWNESS= 0.2214E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1935E+01
MINIMUM = 0.1900E+00
MAXIMUM = 0.1600E+03

MEAN OF LOG DATA = 0.1132E+01
STANDARD DEVIATION OF LOG DATA = 0.2339E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5708E+01

MVUE ESTIMATE OF THE MEAN = 0.2698E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.924E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1921E+02

MLE ESTIMATE OF THE MEAN = 0.4780E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.7349E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2582E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2291E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2431E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1301E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2389E+02
B = 0.1305E+02
R = 0.9939E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1898E+00
B = 0.5266E+00
R = 0.9159E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3547E-01
B = 0.3255E+00
R = 0.9935E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4808E+02

UCL95 STANDARD BOOT = 0.4571E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.9976E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.7337E+02

UCL95 T-DISTRIBUTION = 0.4893E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4687E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5618E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8541E+02

UCL95 FROM LOG JACKKNIFE = 0.6696E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1129E+03

UCL95 FROM H-STATISTIC = 0.2675E+04

all_soil_p_2378 TCDD TEQ_data

0.001262
0.000281
6.66E-05
7.57E-05
0.000344
0.000264
3.7E-05
0.000418
5.82E-05
0.000364
0.000127
0.000105

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.11871E+01
MAXIMUM DATA VALUE = 0.12621E-02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.44232E-03

NUMBER OF DATA POINTS = 12
MEAN= 0.2834E-03
SQUARE ROOT OF VARIANCE= 0.3221E-03
STANDARD DEVIATION= 0.3364E-03
SKEWNESS= 0.2210E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1187E+01
MINIMUM = 0.3702E-04
MAXIMUM = 0.1262E-02

MEAN OF LOG DATA = -0.8664E+01
STANDARD DEVIATION OF LOG DATA = 0.1030E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2970E+01

MVUE ESTIMATE OF THE MEAN = 0.2761E-03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.314E-03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.8799E-04

MLE ESTIMATE OF THE MEAN = 0.2935E-03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4033E-03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2740E-03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9374E-04

AVERAGE OF BOOTSTRAPPED VALUES = 0.2835E-03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9356E-04

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2808E-03
B = 0.9367E-04
R = 0.9928E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1653E+00
B = 0.4641E+00
R = 0.9615E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.9955E-01
B = 0.4202E+00
R = 0.9743E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4575E-03

UCL95 STANDARD BOOT = 0.4373E-03

UCL95 BOOTSTRAP-T FROM SORT = 0.6416E-03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5379E-03

UCL95 T-DISTRIBUTION = 0.4578E-03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4431E-03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5093E-03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.7174E-03

UCL95 FROM LOG JACKKNIFE = 0.4423E-03

UCL95 LN CHEBYCHEV INEQUALITY = 0.6694E-03

UCL95 FROM H-STATISTIC = 0.7380E-03

_Soil_p_Arsenic_data

8.9
4
1.7
15
7.9
26
9.4
14
12
12
27
17

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.16901E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.1291E+02
SQUARE ROOT OF VARIANCE= 0.7373E+01
STANDARD DEVIATION= 0.7701E+01
SKEWNESS= 0.5761E+00
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.5966E+00
MINIMUM = 0.1700E+01
MAXIMUM = 0.2700E+02

MEAN OF LOG DATA = 0.2343E+01
STANDARD DEVIATION OF LOG DATA = 0.7721E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2525E+01

MVUE ESTIMATE OF THE MEAN = 0.1361E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.111E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3181E+01

MLE ESTIMATE OF THE MEAN = 0.1403E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1266E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1382E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2293E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1293E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2141E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1292E+02
B = 0.2134E+01
R = 0.9994E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2663E-01
B = 0.3318E+00
R = 0.9945E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1142E-01
B = 0.3299E+00
R = 0.9905E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1657E+02

UCL95 STANDARD BOOT = 0.1645E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1788E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1829E+02

UCL95 T-DISTRIBUTION = 0.1690E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1657E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1696E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2285E+02

UCL95 FROM LOG JACKKNIFE = 0.1794E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2783E+02

UCL95 FROM H-STATISTIC = 0.2525E+02

all_soil_p_benzene_data

0.00355
0.7
2.3
0.00475
0.28
0.355
0.0094
0.0038
2.2
0.64
0.78

all_soil_p_benzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

UCL95(T-DIST.) = 0.11196E+01

NUMBER OF DATA POINTS = 11
MEAN= 0.6615E+00
SQUARE ROOT OF VARIANCE= 0.7994E+00
STANDARD DEVIATION= 0.8384E+00
SKEWNESS= 0.1215E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.1267E+01
MINIMUM = 0.3550E-02
MAXIMUM = 0.2300E+01

MEAN OF LOG DATA = -0.2088E+01
STANDARD DEVIATION OF LOG DATA = 0.2640E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6641E+01

MVUE ESTIMATE OF THE MEAN = 0.1710E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.665E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1344E+01

MLE ESTIMATE OF THE MEAN = 0.4045E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1319E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2382E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9292E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6587E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2405E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6547E+00
B = 0.2421E+00
R = 0.9981E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9706E-01
B = 0.4261E+00
R = 0.9412E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4427E-01
B = 0.3795E+00
R = 0.9533E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1078E+01

UCL95 STANDARD BOOT = 0.1054E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1650E+01

all_soil_p_benzene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1519E+01

UCL95 T-DISTRIBUTION = 0.1120E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1077E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1176E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1791E+01

UCL95 FROM LOG JACKKNIFE = 0.4066E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.7716E+01

UCL95 FROM H-STATISTIC = 0.1035E+04

all_soil_p_cadmium_data

1
0.62
3
93
3.6
0.75
1.2
2
2.3
6.8
8.1
5.6

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.24424E+01
MAXIMUM DATA VALUE = 0.93000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.13337E+02

all_soil_p_cadmium_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.1066E+02
SQUARE ROOT OF VARIANCE= 0.2494E+02
STANDARD DEVIATION= 0.2605E+02
SKEWNESS= 0.2967E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2442E+01
MINIMUM = 0.6200E+00
MAXIMUM = 0.9300E+02

MEAN OF LOG DATA = 0.1132E+01
STANDARD DEVIATION OF LOG DATA = 0.1367E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3622E+01

MVUE ESTIMATE OF THE MEAN = 0.6953E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.112E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2995E+01

MLE ESTIMATE OF THE MEAN = 0.7894E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1847E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6096E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4032E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1070E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.7262E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1040E+02
B = 0.7187E+01
R = 0.9594E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1048E+01
B = 0.1632E+01
R = 0.8847E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4535E+00
B = 0.9175E+00
R = 0.9123E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2546E+02

UCL95 STANDARD BOOT = 0.2265E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1194E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.7181E+02

UCL95 T-DISTRIBUTION = 0.2417E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2303E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2992E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.4427E+02

UCL95 FROM LOG JACKKNIFE = 0.1334E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2034E+02

UCL95 FROM H-STATISTIC = 0.3512E+02

all_soil_p_dieldrin_data

0.003
0.12
0.0375
0.002
0.0405
0.038
0.0095
0.066
0.017
0.54
0.56
0.073

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.16022E+01
MAXIMUM DATA VALUE = 0.56000E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.28249E+00

NUMBER OF DATA POINTS = 12
MEAN= 0.1255E+00
SQUARE ROOT OF VARIANCE= 0.1926E+00
STANDARD DEVIATION= 0.2011E+00
SKEWNESS= 0.1684E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1602E+01
MINIMUM = 0.2000E-02
MAXIMUM = 0.5600E+00

MEAN OF LOG DATA = -0.3264E+01
STANDARD DEVIATION OF LOG DATA = 0.1759E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4441E+01

MVUE ESTIMATE OF THE MEAN = 0.1393E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.314E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7735E-01

MLE ESTIMATE OF THE MEAN = 0.1795E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.8236E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1426E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.7786E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1255E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5588E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1239E+00
B = 0.5656E-01
R = 0.9950E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2406E+00
B = 0.6839E+00
R = 0.7904E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6524E-01
B = 0.4167E+00
R = 0.8885E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2191E+00

UCL95 STANDARD BOOT = 0.2175E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.6412E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4328E+00

UCL95 T-DISTRIBUTION = 0.2298E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2211E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2512E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3851E+00

UCL95 FROM LOG JACKKNIFE = 0.2825E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.4851E+00

UCL95 FROM H-STATISTIC = 0.1892E+01

_soil_p_ethylbenzene_data

0.78
0.00026
0.11
10
2.5
0.0024
3.6
78
0.00475
0.007
0.59

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

COEFFICIENT OF VARIATION = 0.26674E+01
MAXIMUM DATA VALUE = 0.78000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.11038E+03

NUMBER OF DATA POINTS = 11
MEAN= 0.8690E+01
SQUARE ROOT OF VARIANCE= 0.2210E+02
STANDARD DEVIATION= 0.2318E+02
SKEWNESS= 0.2764E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.2667E+01
MINIMUM = 0.2600E-03
MAXIMUM = 0.7800E+02

MEAN OF LOG DATA = -0.1702E+01
STANDARD DEVIATION OF LOG DATA = 0.3973E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.9808E+01

MVUE ESTIMATE OF THE MEAN = 0.3166E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.239E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2987E+02

MLE ESTIMATE OF THE MEAN = 0.4884E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1309E+07

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4648E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3526E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.8707E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6673E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.8426E+01
B = 0.6719E+01
R = 0.9659E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1024E+01
B = 0.1826E+01
R = 0.8351E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4916E+00
B = 0.1186E+01
R = 0.7023E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2223E+02

UCL95 STANDARD BOOT = 0.1968E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1598E+03

all_soil_p_ethylbenzene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1390E+03

UCL95 T-DISTRIBUTION = 0.2135E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2019E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2641E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3993E+02

UCL95 FROM LOG JACKKNIFE = 0.1104E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1652E+03

UCL95 FROM H-STATISTIC = 0.1098E+09

1.15
1.15
1.15
1.25
1.1
210
1.15
27
1.1
11.5
1.25
1.25

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.52609E+02

all_soil_p_MCPA 2methyl 4cholorphenoxoxyacetic_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.2159E+02
SQUARE ROOT OF VARIANCE= 0.5729E+02
STANDARD DEVIATION= 0.5983E+02
SKEWNESS= 0.2930E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2772E+01
MINIMUM = 0.1100E+01
MAXIMUM = 0.2100E+03

MEAN OF LOG DATA = 0.1042E+01
STANDARD DEVIATION OF LOG DATA = 0.1722E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4363E+01

MVUE ESTIMATE OF THE MEAN = 0.9836E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.215E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5353E+01

MLE ESTIMATE OF THE MEAN = 0.1250E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5365E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6825E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.8058E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2179E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1644E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2141E+02
B = 0.1631E+02
R = 0.9655E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9097E+00
B = 0.1698E+01
R = 0.8084E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3689E+01
B = 0.8281E+01
R = 0.4738E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5508E+02

UCL95 STANDARD BOOT = 0.4883E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.4139E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4140E+03

UCL95 T-DISTRIBUTION = 0.5261E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5000E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6562E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9880E+02

UCL95 FROM LOG JACKKNIFE = 0.2130E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3377E+02

UCL95 FROM H-STATISTIC = 0.1205E+03

all_soil_p_tetrachloroethane_data

0.24
0.0019
0.145
2.5
140
0.011
0.67
0.00475
0.4
0.0031
0.006

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

COEFFICIENT OF VARIATION = 0.32162E+01
MAXIMUM DATA VALUE = 0.14000E+03

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.15350E+02

NUMBER OF DATA POINTS = 11
MEAN= 0.1309E+02
SQUARE ROOT OF VARIANCE= 0.4014E+02
STANDARD DEVIATION= 0.4210E+02
SKEWNESS= 0.2844E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.3216E+01
MINIMUM = 0.1900E-02
MAXIMUM = 0.1400E+03

MEAN OF LOG DATA = -0.2349E+01
STANDARD DEVIATION OF LOG DATA = 0.3451E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.8561E+01

MVUE ESTIMATE OF THE MEAN = 0.5830E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.347E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5256E+01

MLE ESTIMATE OF THE MEAN = 0.3685E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1422E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3458E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6563E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1321E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1234E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1245E+02
B = 0.1213E+02
R = 0.9344E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9622E+01
B = 0.1551E+02
R = 0.7840E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.7545E+03
B = 0.1507E+04
R = 0.5518E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3846E+02

UCL95 STANDARD BOOT = 0.3351E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.2517E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3031E+04

UCL95 T-DISTRIBUTION = 0.3609E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3397E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4560E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.6983E+02

UCL95 FROM LOG JACKKNIFE = 0.1535E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2932E+02

UCL95 FROM H-STATISTIC = 0.4207E+06

all_soil_p_totalpcbs_data

0.95
26.78
5.552
2.295
2.22
2.647
0.04955
1.429
4.3
0.02975
0.0382
7.02

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.16612E+01
MAXIMUM DATA VALUE = 0.26780E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.16904E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.4443E+01
SQUARE ROOT OF VARIANCE= 0.7066E+01
STANDARD DEVIATION= 0.7380E+01
SKEWNESS= 0.2554E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1661E+01
MINIMUM = 0.2975E-01
MAXIMUM = 0.2678E+02

MEAN OF LOG DATA = 0.1277E+00
STANDARD DEVIATION OF LOG DATA = 0.2214E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5432E+01

MVUE ESTIMATE OF THE MEAN = 0.8088E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.255E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5513E+01

MLE ESTIMATE OF THE MEAN = 0.1318E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1523E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.9947E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3874E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.4408E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2016E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.4342E+01
B = 0.2024E+01
R = 0.9884E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2651E+00
B = 0.5936E+00
R = 0.9332E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1396E+00
B = 0.4634E+00
R = 0.9609E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8266E+01

UCL95 STANDARD BOOT = 0.7724E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1532E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1872E+02

UCL95 T-DISTRIBUTION = 0.8269E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7947E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9626E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1397E+02

UCL95 FROM LOG JACKKNIFE = 0.1690E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3273E+02

UCL95 FROM H-STATISTIC = 0.4951E+03

all_soil_p_trichloroethylene_data

0.0015
0.007
0.3
0.076
0.99
0.0013
0.14
0.00079
0.55
0.00475
0.135

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

COEFFICIENT OF VARIATION = 0.15558E+01
MAXIMUM DATA VALUE = 0.99000E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10091E+01

NUMBER OF DATA POINTS = 11
MEAN= 0.2006E+00
SQUARE ROOT OF VARIANCE= 0.2975E+00
STANDARD DEVIATION= 0.3120E+00
SKEWNESS= 0.1707E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.1556E+01
MINIMUM = 0.7900E-03
MAXIMUM = 0.9900E+00

MEAN OF LOG DATA = -0.3542E+01
STANDARD DEVIATION OF LOG DATA = 0.2628E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6611E+01

MVUE ESTIMATE OF THE MEAN = 0.3912E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.151E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3063E+00

MLE ESTIMATE OF THE MEAN = 0.9142E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2884E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4813E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2913E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.2010E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9094E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1985E+00
B = 0.9052E-01
R = 0.9965E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1359E+00
B = 0.4766E+00
R = 0.9256E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2817E-01
B = 0.3439E+00
R = 0.9921E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3603E+00

UCL95 STANDARD BOOT = 0.3506E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.6400E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4829E+00

UCL95 T-DISTRIBUTION = 0.3711E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3553E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4071E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.6211E+00

UCL95 FROM LOG JACKKNIFE = 0.1009E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1760E+01

UCL95 FROM H-STATISTIC = 0.2222E+03

all_soil_p_xylenes total_data

31
380
0.00097
0.014
18
8.1
0.0043
0.0095
2.4
2.4
0.43

all_soil_p_xylenes total_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

COEFFICIENT OF VARIATION = 0.28130E+01
MAXIMUM DATA VALUE = 0.38000E+03

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.57230E+03

NUMBER OF DATA POINTS = 11
MEAN= 0.4021E+02
SQUARE ROOT OF VARIANCE= 0.1079E+03
STANDARD DEVIATION= 0.1131E+03
SKEWNESS= 0.2808E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.2813E+01
MINIMUM = 0.9700E-03
MAXIMUM = 0.3800E+03

MEAN OF LOG DATA = -0.5499E+00
STANDARD DEVIATION OF LOG DATA = 0.4201E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1035E+02

MVUE ESTIMATE OF THE MEAN = 0.1608E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.134E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1538E+03

MLE ESTIMATE OF THE MEAN = 0.3918E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2660E+08

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2538E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1758E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.3984E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3225E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3853E+02
B = 0.3270E+02
R = 0.9547E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1336E+01
B = 0.2135E+01
R = 0.8722E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1942E+01
B = 0.4172E+01
R = 0.5661E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1069E+03

UCL95 STANDARD BOOT = 0.9289E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.8011E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8030E+03

UCL95 T-DISTRIBUTION = 0.1020E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.9632E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1272E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1927E+03

UCL95 FROM LOG JACKKNIFE = 0.5723E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.8483E+03

UCL95 FROM H-STATISTIC = 0.3678E+10

0.0163505
0.00036075
0.00028509
0.000193934
0.000338676
0.000187379
0.00396005
0.000033056
9.56443E-05

all_soil_qcentral_2378TCDD-TEQ_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.22160E+01
MAXIMUM DATA VALUE = 0.16351E-01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.37854E-02

NUMBER OF DATA POINTS = 9
MEAN= 0.2423E-02
SQUARE ROOT OF VARIANCE= 0.5062E-02
STANDARD DEVIATION= 0.5369E-02
SKEWNESS= 0.2252E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.2216E+01
MINIMUM = 0.3306E-04
MAXIMUM = 0.1635E-01

MEAN OF LOG DATA = -0.7825E+01
STANDARD DEVIATION OF LOG DATA = 0.1889E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5422E+01

MVUE ESTIMATE OF THE MEAN = 0.1614E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.355E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1023E-02

MLE ESTIMATE OF THE MEAN = 0.2378E-02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1395E-01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1232E-02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1373E-02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2415E-02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1700E-02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2354E-02
B = 0.1711E-02
R = 0.9838E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2209E+01
B = 0.4414E+01
R = 0.6497E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4774E+01
B = 0.1059E+02
R = 0.4953E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5616E-02

UCL95 STANDARD BOOT = 0.5211E-02

UCL95 BOOTSTRAP-T FROM SORT = 0.1083E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1383E+00

UCL95 T-DISTRIBUTION = 0.5752E-02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5367E-02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6803E-02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1042E-01

UCL95 FROM LOG JACKKNIFE = 0.3785E-02

UCL95 LN CHEBYCHEV INEQUALITY = 0.6186E-02

UCL95 FROM H-STATISTIC = 0.8883E-01

0.0021
0.0255
0.00105
0.0055
0.00525
0.00105
0.018
0.11
0.00185

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.18609E+01
MAXIMUM DATA VALUE = 0.11000E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.34019E-01

NUMBER OF DATA POINTS = 9
MEAN= 0.1892E-01
SQUARE ROOT OF VARIANCE= 0.3320E-01
STANDARD DEVIATION= 0.3521E-01
SKEWNESS= 0.2216E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1861E+01
MINIMUM = 0.1050E-02
MAXIMUM = 0.1100E+00

MEAN OF LOG DATA = -0.5169E+01
STANDARD DEVIATION OF LOG DATA = 0.1594E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4668E+01

MVUE ESTIMATE OF THE MEAN = 0.1587E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.285E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.8672E-02

MLE ESTIMATE OF THE MEAN = 0.2026E-01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6927E-01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1441E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1054E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1895E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1102E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1859E-01
B = 0.1116E-01
R = 0.9854E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4116E+00
B = 0.8928E+00
R = 0.8922E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1207E+00
B = 0.4839E+00
R = 0.9559E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4033E-01

UCL95 STANDARD BOOT = 0.3707E-01

UCL95 BOOTSTRAP-T FROM SORT = 0.1132E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1142E+00

UCL95 T-DISTRIBUTION = 0.4075E-01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3823E-01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4749E-01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.7139E-01

UCL95 FROM LOG JACKKNIFE = 0.3402E-01

UCL95 LN CHEBYCHEV INEQUALITY = 0.5464E-01

UCL95 FROM H-STATISTIC = 0.2813E+00

all_soil_qcentral_arsenic_data

57
13
6.6
16
3.2
5.7
13
10.8
7.2

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.11128E+01
MAXIMUM DATA VALUE = 0.57000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.22176E+02

NUMBER OF DATA POINTS = 9
MEAN= 0.1472E+02
SQUARE ROOT OF VARIANCE= 0.1545E+02
STANDARD DEVIATION= 0.1638E+02
SKEWNESS= 0.2179E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1113E+01
MINIMUM = 0.3200E+01
MAXIMUM = 0.5700E+02

MEAN OF LOG DATA = 0.2343E+01
STANDARD DEVIATION OF LOG DATA = 0.8119E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2837E+01

MVUE ESTIMATE OF THE MEAN = 0.1385E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.117E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3858E+01

MLE ESTIMATE OF THE MEAN = 0.1448E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1399E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1353E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4649E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1471E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5167E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1455E+02
B = 0.5233E+01
R = 0.9852E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3810E+00
B = 0.7780E+00
R = 0.9320E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3012E+00
B = 0.7244E+00
R = 0.9388E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2481E+02

UCL95 STANDARD BOOT = 0.2321E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.4376E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3842E+02

UCL95 T-DISTRIBUTION = 0.2488E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2371E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2794E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3913E+02

UCL95 FROM LOG JACKKNIFE = 0.2218E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3109E+02

UCL95 FROM H-STATISTIC = 0.3270E+02

0.029
0.091
0.205
3.15
0.64
0.29
0.385
0.425
0.25

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.15988E+01
MAXIMUM DATA VALUE = 0.31500E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10669E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.6072E+00
SQUARE ROOT OF VARIANCE= 0.9153E+00
STANDARD DEVIATION= 0.9708E+00
SKEWNESS= 0.2311E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1599E+01
MINIMUM = 0.2900E-01
MAXIMUM = 0.3150E+01

MEAN OF LOG DATA = -0.1251E+01
STANDARD DEVIATION OF LOG DATA = 0.1291E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3918E+01

MVUE ESTIMATE OF THE MEAN = 0.5727E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.806E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2558E+00

MLE ESTIMATE OF THE MEAN = 0.6587E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1364E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5624E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2712E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6128E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3089E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6032E+00
B = 0.3101E+00
R = 0.9776E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5314E+00
B = 0.1035E+01
R = 0.8929E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3889E+00
B = 0.9407E+00
R = 0.8794E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1225E+01

UCL95 STANDARD BOOT = 0.1121E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.3250E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3178E+01

UCL95 T-DISTRIBUTION = 0.1209E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1140E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1406E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2054E+01

UCL95 FROM LOG JACKKNIFE = 0.1067E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1716E+01

UCL95 FROM H-STATISTIC = 0.3937E+01

all_soil_qcentral_benzoapyrene_data

0.205
0.39
0.205
0.405
0.024
2.65
0.3
1.315
0.28

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.13060E+01
MAXIMUM DATA VALUE = 0.26500E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.12436E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.6416E+00
SQUARE ROOT OF VARIANCE= 0.7900E+00
STANDARD DEVIATION= 0.8379E+00
SKEWNESS= 0.1778E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1306E+01
MINIMUM = 0.2400E-01
MAXIMUM = 0.2650E+01

MEAN OF LOG DATA = -0.1108E+01
STANDARD DEVIATION OF LOG DATA = 0.1308E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3959E+01

MVUE ESTIMATE OF THE MEAN = 0.6718E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.960E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3040E+00

MLE ESTIMATE OF THE MEAN = 0.7764E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1652E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6824E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3017E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6444E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2614E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6371E+00
B = 0.2641E+00
R = 0.9961E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3512E+00
B = 0.9050E+00
R = 0.8009E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3195E+00
B = 0.9818E+00
R = 0.7010E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1109E+01

UCL95 STANDARD BOOT = 0.1074E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.3404E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3083E+01

UCL95 T-DISTRIBUTION = 0.1161E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1101E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1278E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1890E+01

UCL95 FROM LOG JACKKNIFE = 0.1244E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.2030E+01

UCL95 FROM H-STATISTIC = 0.4842E+01

0.031
0.205
1.195
0.32
0.205
2.45
1.75
0.495
0.39

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.10665E+01
MAXIMUM DATA VALUE = 0.24500E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.15991E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.7823E+00
SQUARE ROOT OF VARIANCE= 0.7866E+00
STANDARD DEVIATION= 0.8344E+00
SKEWNESS= 0.1055E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1066E+01
MINIMUM = 0.3100E-01
MAXIMUM = 0.2450E+01

MEAN OF LOG DATA = -0.8660E+00
STANDARD DEVIATION OF LOG DATA = 0.1331E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4015E+01

MVUE ESTIMATE OF THE MEAN = 0.8765E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.128E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4034E+00

MLE ESTIMATE OF THE MEAN = 0.1020E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2252E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.9120E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3694E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.7830E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2605E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7786E+00
B = 0.2613E+00
R = 0.9983E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.8630E-01
B = 0.4469E+00
R = 0.9564E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1681E-02
B = 0.3271E+00
R = 0.9995E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1236E+01

UCL95 STANDARD BOOT = 0.1211E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1751E+01

all_soil_qcentral_benzobfluoranthene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1364E+01

UCL95 T-DISTRIBUTION = 0.1300E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1240E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1344E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2026E+01

UCL95 FROM LOG JACKKNIFE = 0.1599E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.2680E+01

UCL95 FROM H-STATISTIC = 0.6745E+01

all_soil_qcentral_copper_data

59.5
54
26
46
20.5
150
20000
225
40

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

UCL95(T-DIST.) = 0.64087E+04

NUMBER OF DATA POINTS = 9
MEAN= 0.2291E+04
SQUARE ROOT OF VARIANCE= 0.6261E+04
STANDARD DEVIATION= 0.6641E+04
SKEWNESS= 0.2474E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.2899E+01
MINIMUM = 0.2050E+02
MAXIMUM = 0.2000E+05

MEAN OF LOG DATA = 0.4689E+01
STANDARD DEVIATION OF LOG DATA = 0.2099E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5968E+01

MVUE ESTIMATE OF THE MEAN = 0.5860E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.147E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4040E+03

MLE ESTIMATE OF THE MEAN = 0.9844E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.8857E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1781E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5747E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.2266E+04

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2072E+04

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2287E+04
B = 0.2054E+04
R = 0.9349E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1170E+02
B = 0.1754E+02
R = 0.8228E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1460E+04
B = 0.2901E+04
R = 0.5777E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6709E+04

UCL95 STANDARD BOOT = 0.5675E+04

UCL95 BOOTSTRAP-T FROM SORT = 0.3765E+06

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3659E+06

UCL95 T-DISTRIBUTION = 0.6409E+04

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5933E+04

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7884E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1219E+05

UCL95 FROM LOG JACKKNIFE = 0.1247E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.2392E+04

UCL95 FROM H-STATISTIC = 0.8253E+05

all_soil_qcentral_dieldrin_data

0.035
0.0465
0.00205
0.39
0.042
0.0036
0.048
0.0585
0.0052

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.17385E+01
MAXIMUM DATA VALUE = 0.39000E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.14657E+00

NUMBER OF DATA POINTS = 9
MEAN= 0.7009E-01
SQUARE ROOT OF VARIANCE= 0.1149E+00
STANDARD DEVIATION= 0.1219E+00
SKEWNESS= 0.2327E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1739E+01
MINIMUM = 0.2050E-02
MAXIMUM = 0.3900E+00

MEAN OF LOG DATA = -0.3720E+01
STANDARD DEVIATION OF LOG DATA = 0.1656E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4825E+01

MVUE ESTIMATE OF THE MEAN = 0.7279E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.137E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4116E-01

MLE ESTIMATE OF THE MEAN = 0.9540E-01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3634E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.7501E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3847E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.7069E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3875E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6958E-01
B = 0.3886E-01
R = 0.9756E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5496E+00
B = 0.1015E+01
R = 0.8833E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6178E+00
B = 0.1223E+01
R = 0.8837E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1479E+00

UCL95 STANDARD BOOT = 0.1344E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.3445E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3058E+00

UCL95 T-DISTRIBUTION = 0.1456E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1369E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1706E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2517E+00

UCL95 FROM LOG JACKKNIFE = 0.1466E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.2568E+00

UCL95 FROM H-STATISTIC = 0.1607E+01

all_soil_qcentral_manganese_data

240
29
260
150
5450
305
310
170
660

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

2 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.20638E+01
MAXIMUM DATA VALUE = 0.54500E+04

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.12910E+04

NUMBER OF DATA POINTS = 9
MEAN= 0.8416E+03
SQUARE ROOT OF VARIANCE= 0.1637E+04
STANDARD DEVIATION= 0.1737E+04
SKEWNESS= 0.2429E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.2064E+01
MINIMUM = 0.2900E+02
MAXIMUM = 0.5450E+04

MEAN OF LOG DATA = 0.5679E+01
STANDARD DEVIATION OF LOG DATA = 0.1386E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4149E+01

MVUE ESTIMATE OF THE MEAN = 0.6456E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.985E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3091E+03

MLE ESTIMATE OF THE MEAN = 0.7639E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1843E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5805E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3819E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.8460E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5493E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.8345E+03
B = 0.5463E+03
R = 0.9599E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1257E+01
B = 0.2181E+01
R = 0.8452E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1540E+01
B = 0.3379E+01
R = 0.6032E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1966E+04

UCL95 STANDARD BOOT = 0.1750E+04

UCL95 BOOTSTRAP-T FROM SORT = 0.1270E+05

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1413E+05

UCL95 T-DISTRIBUTION = 0.1918E+04

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1794E+04

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2295E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3429E+04

UCL95 FROM LOG JACKKNIFE = 0.1291E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.2027E+04

UCL95 FROM H-STATISTIC = 0.5831E+04

all_soil_qcentral_pentachorophenol_data

0.0565
0.63
0.0033
1.4
10.15
0.0105
0.012
0.0825
2.3

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.20249E+01
MAXIMUM DATA VALUE = 0.10150E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.65183E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.1627E+01
SQUARE ROOT OF VARIANCE= 0.3106E+01
STANDARD DEVIATION= 0.3295E+01
SKEWNESS= 0.2217E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.2025E+01
MINIMUM = 0.3300E-02
MAXIMUM = 0.1015E+02

MEAN OF LOG DATA = -0.1893E+01
STANDARD DEVIATION OF LOG DATA = 0.2775E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7750E+01

MVUE ESTIMATE OF THE MEAN = 0.2288E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.818E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1892E+01

MLE ESTIMATE OF THE MEAN = 0.7075E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3323E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2450E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2187E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1635E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1041E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1602E+01
B = 0.1048E+01
R = 0.9848E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4211E+00
B = 0.9064E+00
R = 0.8926E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1327E+00
B = 0.5143E+00
R = 0.9565E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3649E+01

UCL95 STANDARD BOOT = 0.3347E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1059E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8145E+01

UCL95 T-DISTRIBUTION = 0.3670E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3434E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4301E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.6537E+01

UCL95 FROM LOG JACKKNIFE = 0.6518E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1075E+02

UCL95 FROM H-STATISTIC = 0.1417E+05

2.6115
8.7375
0.915
0.42815
4.3675
2.063
1.769
0.2143
0.4586

all_soil_qcentral_totalpcbs_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

COEFFICIENT OF VARIATION = 0.11356E+01
MAXIMUM DATA VALUE = 0.87375E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.43521E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.2396E+01
SQUARE ROOT OF VARIANCE= 0.2565E+01
STANDARD DEVIATION= 0.2721E+01
SKEWNESS= 0.1539E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1136E+01
MINIMUM = 0.2143E+00
MAXIMUM = 0.8738E+01

MEAN OF LOG DATA = 0.2932E+00
STANDARD DEVIATION OF LOG DATA = 0.1203E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3708E+01

MVUE ESTIMATE OF THE MEAN = 0.2460E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.320E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1025E+01

MLE ESTIMATE OF THE MEAN = 0.2764E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4984E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2481E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1006E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2386E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.8593E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2368E+01
B = 0.8654E+00
R = 0.9962E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1607E+00
B = 0.5346E+00
R = 0.9458E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.7857E-01
B = 0.4587E+00
R = 0.9746E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3927E+01

UCL95 STANDARD BOOT = 0.3800E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.6231E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5038E+01

UCL95 T-DISTRIBUTION = 0.4083E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3888E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4385E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.6450E+01

UCL95 FROM LOG JACKKNIFE = 0.4352E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.7039E+01

UCL95 FROM H-STATISTIC = 0.1338E+02

all_soil_qsouth_2378TCDD TEQ_data

0.00043926
0.00054683
0.006845
0.000220345
0.000041361
0.00005484
0.000080815
6.29555E-05
0.000056015
6.98465E-05
0.001655345
0.000113905
4.90225E-05
0.00137244
0.00093605
0.0010195
0.02867525
0.000075483
0.000107485
0.00052666

all_soil_qsouth_2378TCDD TEQ_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.45053E-02

all_soil_qsouth_2378TCDD TEQ_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.2147E-02
SQUARE ROOT OF VARIANCE= 0.6262E-02
STANDARD DEVIATION= 0.6425E-02
SKEWNESS= 0.3799E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.2992E+01
MINIMUM = 0.4136E-04
MAXIMUM = 0.2868E-01

MEAN OF LOG DATA = -0.8130E+01
STANDARD DEVIATION OF LOG DATA = 0.1815E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3874E+01

MVUE ESTIMATE OF THE MEAN = 0.1276E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.363E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6342E-03

MLE ESTIMATE OF THE MEAN = 0.1530E-02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.7796E-02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1123E-02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.8302E-03

AVERAGE OF BOOTSTRAPPED VALUES = 0.2157E-02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1428E-02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2091E-02
B = 0.1417E-02
R = 0.9812E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5047E+00
B = 0.1002E+01
R = 0.8003E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1187E+00
B = 0.4222E+00
R = 0.8837E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4908E-02

UCL95 STANDARD BOOT = 0.4505E-02

UCL95 BOOTSTRAP-T FROM SORT = 0.2621E-01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2325E-01

UCL95 T-DISTRIBUTION = 0.4631E-02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4511E-02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5815E-02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8569E-02

UCL95 FROM LOG JACKKNIFE = 0.2558E-02

UCL95 LN CHEBYCHEV INEQUALITY = 0.4111E-02

UCL95 FROM H-STATISTIC = 0.7677E-02

all_soil_qsouth_aldrin_data

0.065
0.011
0.001525
0.0013
0.021
0.3
0.02425
0.0925
0.21
0.0011
0.00115
0.001
0.0115
0.00105
0.0115
0.005
0.0011
0.011
0.0011
0.012

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.67830E-01

all_soil_qsouth_aldrin_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.3920E-01
SQUARE ROOT OF VARIANCE= 0.7677E-01
STANDARD DEVIATION= 0.7876E-01
SKEWNESS= 0.2464E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.2009E+01
MINIMUM = 0.1000E-02
MAXIMUM = 0.3000E+00

MEAN OF LOG DATA = -0.4862E+01
STANDARD DEVIATION OF LOG DATA = 0.1881E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3988E+01

MVUE ESTIMATE OF THE MEAN = 0.3710E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.113E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1918E-01

MLE ESTIMATE OF THE MEAN = 0.4541E-01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2627E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3598E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2173E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3923E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1739E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3873E-01
B = 0.1732E-01
R = 0.9956E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1051E+00
B = 0.3547E+00
R = 0.9063E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.9955E-02
B = 0.2362E+00
R = 0.9935E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.7049E-01

UCL95 STANDARD BOOT = 0.6783E-01

UCL95 BOOTSTRAP-T FROM SORT = 0.1290E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1816E+00

UCL95 T-DISTRIBUTION = 0.6965E-01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6817E-01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7854E-01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1179E+00

UCL95 FROM LOG JACKKNIFE = 0.7356E-01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1229E+00

UCL95 FROM H-STATISTIC = 0.2539E+00

soil_qsouth_antimony_data

1.35
35
1.1
1.3
1.25
8.3
23
2.75
1.1
14
1.35
16
6.1
47
1.1
1.05
1.15
27
38.5
1.3

all_soil_qsouth_antimony_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(HALLS BOOTSTRAP-T)= 0.18677E+02

NUMBER OF DATA POINTS = 20
MEAN= 0.1148E+02
SQUARE ROOT OF VARIANCE= 0.1435E+02
STANDARD DEVIATION= 0.1472E+02
SKEWNESS= 0.1205E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1282E+01
MINIMUM = 0.1050E+01
MAXIMUM = 0.4700E+02

MEAN OF LOG DATA = 0.1483E+01
STANDARD DEVIATION OF LOG DATA = 0.1475E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3307E+01

MVUE ESTIMATE OF THE MEAN = 0.1183E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.238E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4655E+01

MLE ESTIMATE OF THE MEAN = 0.1308E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3655E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1178E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4978E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1149E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3193E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1145E+02
B = 0.3206E+01
R = 0.9987E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3037E-01
B = 0.2474E+00
R = 0.9934E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1106E-02
B = 0.2176E+00
R = 0.9995E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1699E+02

UCL95 STANDARD BOOT = 0.1674E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1884E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1868E+02

UCL95 T-DISTRIBUTION = 0.1718E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1690E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1785E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2620E+02

UCL95 FROM LOG JACKKNIFE = 0.2039E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3264E+02

UCL95 FROM H-STATISTIC = 0.4005E+02

all_soil_qsouth_arsenic_data

5.5
5
7.1
4.2
7.9
5.1
17.5
3.3
5.8
19
30
19
4.3
17
11.8
17
33
32
12
6

all_soil_qsouth_arsenic_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.73495E+00
MAXIMUM DATA VALUE = 0.33000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.17232E+02

NUMBER OF DATA POINTS = 20
MEAN= 0.1313E+02
SQUARE ROOT OF VARIANCE= 0.9402E+01
STANDARD DEVIATION= 0.9646E+01
SKEWNESS= 0.9038E+00
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.7349E+00
MINIMUM = 0.3300E+01
MAXIMUM = 0.3300E+02

MEAN OF LOG DATA = 0.2317E+01
STANDARD DEVIATION OF LOG DATA = 0.7419E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2254E+01

MVUE ESTIMATE OF THE MEAN = 0.1314E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.106E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2341E+01

MLE ESTIMATE OF THE MEAN = 0.1336E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1145E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1313E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2371E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1314E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2100E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1312E+02
B = 0.2108E+01
R = 0.9996E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2111E-01
B = 0.2438E+00
R = 0.9948E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1491E-02
B = 0.2227E+00
R = 0.9999E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1670E+02

UCL95 STANDARD BOOT = 0.1660E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1769E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1824E+02

UCL95 T-DISTRIBUTION = 0.1685E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1667E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1714E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2277E+02

UCL95 FROM LOG JACKKNIFE = 0.1723E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2360E+02

UCL95 FROM H-STATISTIC = 0.1961E+02

all_soil_qsouth_benzne_data

2
0.0015
0.00465
0.0031
0.0044
0.17
0.0038
0.00086
0.46
0.0021
0.0015
0.0029
0.0024
0.0035
0.0037
0.00535
0.00375
0.0031
0.0018
0.0015

all_soil_qsouth_benzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.29767E+00

NUMBER OF DATA POINTS = 20
MEAN= 0.1340E+00
SQUARE ROOT OF VARIANCE= 0.4405E+00
STANDARD DEVIATION= 0.4520E+00
SKEWNESS= 0.3798E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.3373E+01
MINIMUM = 0.8600E-03
MAXIMUM = 0.2000E+01

MEAN OF LOG DATA = -0.5139E+01
STANDARD DEVIATION OF LOG DATA = 0.2042E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4266E+01

MVUE ESTIMATE OF THE MEAN = 0.3644E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.129E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2055E-01

MLE ESTIMATE OF THE MEAN = 0.4715E-01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3762E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2089E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3394E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1341E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9945E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1293E+00
B = 0.9877E-01
R = 0.9818E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4428E+00
B = 0.8818E+00
R = 0.8274E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6614E+00
B = 0.1616E+01
R = 0.5282E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3251E+00

UCL95 STANDARD BOOT = 0.2977E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.1618E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1619E+01

UCL95 T-DISTRIBUTION = 0.3087E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3003E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3920E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5858E+00

UCL95 FROM LOG JACKKNIFE = 0.7956E-01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1283E+00

UCL95 FROM H-STATISTIC = 0.3478E+00

all_soil_qsouth_benzeoa anthracene_data

0.16
0.045
2.515
0.84
0.23
0.21
0.085
0.045
0.2
0.48
1.8
0.22
1.42
0.041
0.065
1.2
0.26
1.8
0.2
0.03

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.12562E+01
MAXIMUM DATA VALUE = 0.25150E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10335E+01

all_soil_qsouth_benzeoa anthracene_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.5923E+00
SQUARE ROOT OF VARIANCE= 0.7252E+00
STANDARD DEVIATION= 0.7440E+00
SKEWNESS= 0.1323E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1256E+01
MINIMUM = 0.3000E-01
MAXIMUM = 0.2515E+01

MEAN OF LOG DATA = -0.1366E+01
STANDARD DEVIATION OF LOG DATA = 0.1404E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3193E+01

MVUE ESTIMATE OF THE MEAN = 0.6267E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.117E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2328E+00

MLE ESTIMATE OF THE MEAN = 0.6837E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1700E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6302E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2332E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.5911E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1622E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5888E+00
B = 0.1620E+00
R = 0.9985E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3612E-01
B = 0.2513E+00
R = 0.9911E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2850E-03
B = 0.2162E+00
R = 0.9994E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8745E+00

UCL95 STANDARD BOOT = 0.8579E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.9847E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1095E+01

UCL95 T-DISTRIBUTION = 0.8800E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8660E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9186E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1336E+01

UCL95 FROM LOG JACKKNIFE = 0.1034E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1667E+01

UCL95 FROM H-STATISTIC = 0.1912E+01

all_soil_qsouth_benzoapyrene_data

0.22
0.2
0.34
1.8
0.16
0.205
0.25
1.29
0.04
0.048
2.975
0.18
1.8
0.046
0.23
1.2
0.092
0.075
0.205
2.3

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.12962E+01
MAXIMUM DATA VALUE = 0.29750E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.11431E+01

NUMBER OF DATA POINTS = 20
MEAN= 0.6828E+00
SQUARE ROOT OF VARIANCE= 0.8626E+00
STANDARD DEVIATION= 0.8850E+00
SKEWNESS= 0.1348E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1296E+01
MINIMUM = 0.4000E-01
MAXIMUM = 0.2975E+01

MEAN OF LOG DATA = -0.1228E+01
STANDARD DEVIATION OF LOG DATA = 0.1366E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3132E+01

MVUE ESTIMATE OF THE MEAN = 0.6871E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.123E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2472E+00

MLE ESTIMATE OF THE MEAN = 0.7448E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1741E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6829E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2662E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6833E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1915E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6808E+00
B = 0.1922E+00
R = 0.9990E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3389E-01
B = 0.2501E+00
R = 0.9892E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.2453E-02
B = 0.2146E+00
R = 0.9996E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1014E+01

UCL95 STANDARD BOOT = 0.9983E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.1153E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1035E+01

UCL95 T-DISTRIBUTION = 0.1025E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1008E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1072E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1567E+01

UCL95 FROM LOG JACKKNIFE = 0.1143E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1792E+01

UCL95 FROM H-STATISTIC = 0.1988E+01

all_soil_qsouth_benzobfluoranthene_data

0.56
2.2
0.21
0.056
0.23
0.036
0.18
1.4
0.44
0.22
3.3
0.069
0.033
0.19
0.22
0.2
0.22
1.475
0.25
2.69

all_soil_qsouth_benzobfluoranthene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.13722E+01
MAXIMUM DATA VALUE = 0.33000E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.11783E+01

all_soil_qsouth_benzobfluoranthene_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.7090E+00
SQUARE ROOT OF VARIANCE= 0.9482E+00
STANDARD DEVIATION= 0.9728E+00
SKEWNESS= 0.1583E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1372E+01
MINIMUM = 0.3300E-01
MAXIMUM = 0.3300E+01

MEAN OF LOG DATA = -0.1197E+01
STANDARD DEVIATION OF LOG DATA = 0.1366E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3133E+01

MVUE ESTIMATE OF THE MEAN = 0.7088E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.127E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2551E+00

MLE ESTIMATE OF THE MEAN = 0.7684E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1797E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.7042E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2742E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.7100E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2123E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7070E+00
B = 0.2138E+00
R = 0.9983E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4266E-01
B = 0.2631E+00
R = 0.9824E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.4698E-02
B = 0.2141E+00
R = 0.9992E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1082E+01

UCL95 STANDARD BOOT = 0.1059E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1292E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1191E+01

UCL95 T-DISTRIBUTION = 0.1085E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1067E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1149E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1681E+01

UCL95 FROM LOG JACKKNIFE = 0.1178E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1849E+01

UCL95 FROM H-STATISTIC = 0.2052E+01

all_soil_qsouth_chromuim_data

13
106.5
13
17
20
160
24
8.2
8
74
16
91
49.5
110
16
130
660
20
130
98

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.16269E+01
MAXIMUM DATA VALUE = 0.66000E+03

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.13018E+03

NUMBER OF DATA POINTS = 20
MEAN= 0.8821E+02
SQUARE ROOT OF VARIANCE= 0.1399E+03
STANDARD DEVIATION= 0.1435E+03
SKEWNESS= 0.3353E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1627E+01
MINIMUM = 0.8000E+01
MAXIMUM = 0.6600E+03

MEAN OF LOG DATA = 0.3742E+01
STANDARD DEVIATION OF LOG DATA = 0.1206E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2885E+01

MVUE ESTIMATE OF THE MEAN = 0.8242E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.123E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2565E+02

MLE ESTIMATE OF THE MEAN = 0.8730E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1582E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.8149E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2816E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.8837E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3192E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.8730E+02
B = 0.3183E+02
R = 0.9898E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1661E+00
B = 0.4021E+00
R = 0.9498E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1040E+00
B = 0.3601E+00
R = 0.9642E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1477E+03

UCL95 STANDARD BOOT = 0.1409E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.2243E+03

all_soil_qsouth_chromuim_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2281E+03

UCL95 T-DISTRIBUTION = 0.1437E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1410E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1667E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2316E+03

UCL95 FROM LOG JACKKNIFE = 0.1302E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1971E+03

UCL95 FROM H-STATISTIC = 0.1940E+03

all_soil_qsouth_dieldrin_data

0.00041
0.034
0.825
0.46
0.0088
0.029
0.375
0.2
0.28
0.0033
0.1
0.00805
0.0021
0.021
0.0022
0.16
0.00066
0.0019
0.12
0.022

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.15964E+01
MAXIMUM DATA VALUE = 0.82500E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.50361E+00

all_soil_qsouth_dieldrin_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.1327E+00
SQUARE ROOT OF VARIANCE= 0.2064E+00
STANDARD DEVIATION= 0.2118E+00
SKEWNESS= 0.2060E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1596E+01
MINIMUM = 0.4100E-03
MAXIMUM = 0.8250E+00

MEAN OF LOG DATA = -0.3732E+01
STANDARD DEVIATION OF LOG DATA = 0.2310E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4740E+01

MVUE ESTIMATE OF THE MEAN = 0.2377E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.108E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1516E+00

MLE ESTIMATE OF THE MEAN = 0.3455E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4972E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2653E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1378E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1325E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.4632E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1315E+00
B = 0.4588E-01
R = 0.9967E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.6248E-01
B = 0.2799E+00
R = 0.9744E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1058E-01
B = 0.2342E+00
R = 0.9992E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2147E+00

UCL95 STANDARD BOOT = 0.2087E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.2748E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4007E+00

UCL95 T-DISTRIBUTION = 0.2146E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2106E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2339E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3444E+00

UCL95 FROM LOG JACKKNIFE = 0.5036E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.9154E+00

UCL95 FROM H-STATISTIC = 0.4262E+01

all_soil_qsouth_ethylbenzene_data

0.00074
0.00052
0.00142
0.00038
0.00052
0.00023
0.00465
0.00045
0.0029
0.45
0.69
0.00071
0.0044
0.0014
0.0031
0.0035
0.0005
0.00048
0.013
270

all_soil_qsouth_ethylbenzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.35322E+02

NUMBER OF DATA POINTS = 20
MEAN= 0.1356E+02
SQUARE ROOT OF VARIANCE= 0.5883E+02
STANDARD DEVIATION= 0.6036E+02
SKEWNESS= 0.4129E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.4452E+01
MINIMUM = 0.2300E-03
MAXIMUM = 0.2700E+03

MEAN OF LOG DATA = -0.5495E+01
STANDARD DEVIATION OF LOG DATA = 0.3385E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6697E+01

MVUE ESTIMATE OF THE MEAN = 0.3825E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.434E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3272E+00

MLE ESTIMATE OF THE MEAN = 0.1264E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3889E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.2017E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5075E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1368E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1316E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1285E+02
B = 0.1287E+02
R = 0.9292E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3055E+02
B = 0.4311E+02
R = 0.8551E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1360E+06
B = 0.2634E+06
R = 0.6060E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4055E+02

UCL95 STANDARD BOOT = 0.3532E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.8177E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8169E+04

UCL95 T-DISTRIBUTION = 0.3690E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3576E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4908E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.7389E+02

UCL95 FROM LOG JACKKNIFE = 0.6757E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.1845E+01

UCL95 FROM H-STATISTIC = 0.2292E+03

all_soil_qsouth_heptachlor epoxide_data

0.03
0.00105
0.0115
0.00295
0.0115
0.07
0.02425
0.23
0.00023
0.18
0.007
0.012
0.00266
0.0011
0.00057
0.012
0.0005
0.076
0.021
0.058

all_soil_qsouth_heptachlor epoxide_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.16545E+01
MAXIMUM DATA VALUE = 0.23000E+00

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.10266E+00

NUMBER OF DATA POINTS = 20
MEAN= 0.3762E-01
SQUARE ROOT OF VARIANCE= 0.6066E-01
STANDARD DEVIATION= 0.6224E-01
SKEWNESS= 0.2165E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1655E+01
MINIMUM = 0.2300E-03
MAXIMUM = 0.2300E+00

MEAN OF LOG DATA = -0.4699E+01
STANDARD DEVIATION OF LOG DATA = 0.2005E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4202E+01

MVUE ESTIMATE OF THE MEAN = 0.5326E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.182E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2947E-01

MLE ESTIMATE OF THE MEAN = 0.6799E-01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5029E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5691E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2646E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3761E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1375E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3730E-01
B = 0.1375E-01
R = 0.9967E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7981E-01
B = 0.3153E+00
R = 0.9429E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1456E-01
B = 0.2495E+00
R = 0.9878E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6201E-01

UCL95 STANDARD BOOT = 0.6022E-01

UCL95 BOOTSTRAP-T FROM SORT = 0.9324E-01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1004E+00

UCL95 T-DISTRIBUTION = 0.6168E-01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6051E-01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6771E-01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9982E-01

UCL95 FROM LOG JACKKNIFE = 0.1027E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.1850E+00

UCL95 FROM H-STATISTIC = 0.4698E+00

all_soil_qsouth_lead_data

1100
14
2300
27
48
1500
615
440
47
1600
1200
62
2300
60
15
30
29
20
2050
3100

all_soil_qsouth_lead_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(HALLS BOOTSTRAP-T)= 0.12308E+04

NUMBER OF DATA POINTS = 20
MEAN= 0.8278E+03
SQUARE ROOT OF VARIANCE= 0.9678E+03
STANDARD DEVIATION= 0.9929E+03
SKEWNESS= 0.8670E+00
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1199E+01
MINIMUM = 0.1400E+02
MAXIMUM = 0.3100E+04

MEAN OF LOG DATA = 0.5339E+01
STANDARD DEVIATION OF LOG DATA = 0.2034E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4252E+01

MVUE ESTIMATE OF THE MEAN = 0.1278E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.449E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7174E+03

MLE ESTIMATE OF THE MEAN = 0.1648E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1293E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1386E+04
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6241E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.8287E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2182E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.8270E+03
B = 0.2197E+03
R = 0.9997E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2036E-01
B = 0.2453E+00
R = 0.9962E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1396E-02
B = 0.2237E+00
R = 0.9999E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1197E+04

UCL95 STANDARD BOOT = 0.1188E+04

UCL95 BOOTSTRAP-T FROM SORT = 0.1291E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1231E+04

UCL95 T-DISTRIBUTION = 0.1212E+04

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1193E+04

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1239E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1820E+04

UCL95 FROM LOG JACKKNIFE = 0.2465E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.4484E+04

UCL95 FROM H-STATISTIC = 0.1198E+05

all_soil_qsouth_maganese_data

510
380
290
320
735
320
595
370
1000
660
380
1400
460
2100
650
755
1000
870
630
600

all_soil_qsouth_maganese_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.61705E+00
MAXIMUM DATA VALUE = 0.21000E+04

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.85320E+03

NUMBER OF DATA POINTS = 20
MEAN= 0.7013E+03
SQUARE ROOT OF VARIANCE= 0.4217E+03
STANDARD DEVIATION= 0.4327E+03
SKEWNESS= 0.1886E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.6170E+00
MINIMUM = 0.2900E+03
MAXIMUM = 0.2100E+04

MEAN OF LOG DATA = 0.6414E+01
STANDARD DEVIATION OF LOG DATA = 0.5191E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2016E+01

MVUE ESTIMATE OF THE MEAN = 0.6928E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.375E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.8359E+02

MLE ESTIMATE OF THE MEAN = 0.6981E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3882E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6914E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9358E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.7016E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9386E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6999E+03
B = 0.9375E+02
R = 0.9978E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5405E-01
B = 0.2716E+00
R = 0.9799E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2098E-01
B = 0.2609E+00
R = 0.9901E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8670E+03

UCL95 STANDARD BOOT = 0.8560E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.9688E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.9635E+03

UCL95 T-DISTRIBUTION = 0.8685E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8604E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9040E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1134E+04

UCL95 FROM LOG JACKKNIFE = 0.8532E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1066E+04

UCL95 FROM H-STATISTIC = 0.8875E+03

all_soil_qsouth_mercury_data

0.021
0.16
0.96
0.059
0.505
1
0.49
0.275
0.021
2.6
36
5.1
0.052
0.13
3.2
0.078
0.065
0.62
0.036
0.14

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.30975E+01
MAXIMUM DATA VALUE = 0.36000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.35765E+01

all_soil_qsouth_mercury_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.2576E+01
SQUARE ROOT OF VARIANCE= 0.7776E+01
STANDARD DEVIATION= 0.7978E+01
SKEWNESS= 0.3951E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.3097E+01
MINIMUM = 0.2100E-01
MAXIMUM = 0.3600E+02

MEAN OF LOG DATA = -0.1192E+01
STANDARD DEVIATION OF LOG DATA = 0.1990E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4176E+01

MVUE ESTIMATE OF THE MEAN = 0.1732E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.584E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.9510E+00

MLE ESTIMATE OF THE MEAN = 0.2200E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1578E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1574E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1158E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2578E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1735E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2504E+01
B = 0.1735E+01
R = 0.9724E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4788E+00
B = 0.8530E+00
R = 0.8927E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1309E+00
B = 0.3893E+00
R = 0.9522E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6039E+01

UCL95 STANDARD BOOT = 0.5432E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.2300E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2426E+02

UCL95 T-DISTRIBUTION = 0.5660E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5510E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7195E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1055E+02

UCL95 FROM LOG JACKKNIFE = 0.3576E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.5983E+01

UCL95 FROM H-STATISTIC = 0.1480E+02

all_soil_qsouth_nickel_data

62
120
17
320
500
100
55
2730
22
58
22
56
22
29
12
77
27
19
11
16

all_soil_qsouth_nickel_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.43055E+03

NUMBER OF DATA POINTS = 20
MEAN= 0.2138E+03
SQUARE ROOT OF VARIANCE= 0.5890E+03
STANDARD DEVIATION= 0.6043E+03
SKEWNESS= 0.3881E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.2827E+01
MINIMUM = 0.1100E+02
MAXIMUM = 0.2730E+04

MEAN OF LOG DATA = 0.3961E+01
STANDARD DEVIATION OF LOG DATA = 0.1389E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3168E+01

MVUE ESTIMATE OF THE MEAN = 0.1266E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.232E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4644E+02

MLE ESTIMATE OF THE MEAN = 0.1378E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3341E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1141E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6691E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2128E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1324E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2068E+03
B = 0.1312E+03
R = 0.9767E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4119E+00
B = 0.7642E+00
R = 0.8920E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1233E+00
B = 0.3998E+00
R = 0.9051E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4722E+03

UCL95 STANDARD BOOT = 0.4305E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.1657E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3227E+04

UCL95 T-DISTRIBUTION = 0.4474E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4360E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5614E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8178E+03

UCL95 FROM LOG JACKKNIFE = 0.2298E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.3342E+03

UCL95 FROM H-STATISTIC = 0.3780E+03

all_soil_qsouth_pentachlorophenol_data

0.0052
0.002
0.013
0.0155
0.0024
470
0.0905
0.01
0.0125
0.013
0.0055
0.002
240
2.95
0.41
0.01525
0.036
0.0675
0.0015
0.0011

all_soil_qsouth_pentachlorophenol_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.77356E+02

all_soil_qsouth_pentachlorophenol_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.3568E+02
SQUARE ROOT OF VARIANCE= 0.1125E+03
STANDARD DEVIATION= 0.1154E+03
SKEWNESS= 0.3150E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.3234E+01
MINIMUM = 0.1100E-02
MAXIMUM = 0.4700E+03

MEAN OF LOG DATA = -0.3243E+01
STANDARD DEVIATION OF LOG DATA = 0.3654E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7195E+01

MVUE ESTIMATE OF THE MEAN = 0.6865E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.961E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6107E+01

MLE ESTIMATE OF THE MEAN = 0.3094E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2451E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.2063E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9966E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3562E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2537E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3445E+02
B = 0.2573E+02
R = 0.9849E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5080E+01
B = 0.1026E+02
R = 0.5952E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6243E+04
B = 0.1337E+05
R = 0.4990E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8271E+02

UCL95 STANDARD BOOT = 0.7736E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.6283E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.6279E+04

UCL95 T-DISTRIBUTION = 0.8030E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7813E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9755E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1510E+03

UCL95 FROM LOG JACKKNIFE = 0.1517E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3416E+02

UCL95 FROM H-STATISTIC = 0.1288E+05

0.0065
0.019
0.018
0.0044
0.42
0.00465
0.0055
0.0031
0.0036
0.00465
0.0013
0.0053
0.0053
0.0038
0.0034
0.0012
0.0018
0.0042
1300
0.001

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.16911E+03

NUMBER OF DATA POINTS = 20
MEAN= 0.6503E+02
SQUARE ROOT OF VARIANCE= 0.2833E+03
STANDARD DEVIATION= 0.2907E+03
SKEWNESS= 0.4129E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.4470E+01
MINIMUM = 0.1000E-02
MAXIMUM = 0.1300E+04

MEAN OF LOG DATA = -0.4665E+01
STANDARD DEVIATION OF LOG DATA = 0.3067E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6110E+01

MVUE ESTIMATE OF THE MEAN = 0.4282E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.376E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3446E+00

MLE ESTIMATE OF THE MEAN = 0.1038E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1144E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.4035E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5020E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6481E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6340E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6160E+02
B = 0.6195E+02
R = 0.9283E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1493E+04
B = 0.2808E+04
R = 0.6278E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2928E+11
B = 0.6233E+11
R = 0.5091E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1950E+03

UCL95 STANDARD BOOT = 0.1691E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.4024E+07

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3943E+07

UCL95 T-DISTRIBUTION = 0.1774E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1719E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2361E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3556E+03

UCL95 FROM LOG JACKKNIFE = 0.4644E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.1969E+01

UCL95 FROM H-STATISTIC = 0.7639E+02

all_soil_qsouth_total PCBS_data

2.792
0.0513
1.50035
1.3015
13.5245
10.023
2.9041
0.7089
1.1415
0.05395
0.552
0.04825
0.0512
0.05465
10.905
8.19
0.60275
1.635
25.0367
32.05

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

COEFFICIENT OF VARIATION = 0.15755E+01
MAXIMUM DATA VALUE = 0.32050E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.19040E+02

NUMBER OF DATA POINTS = 20
MEAN= 0.5656E+01
SQUARE ROOT OF VARIANCE= 0.8686E+01
STANDARD DEVIATION= 0.8911E+01
SKEWNESS= 0.1891E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.1575E+01
MINIMUM = 0.4825E-01
MAXIMUM = 0.3205E+02

MEAN OF LOG DATA = 0.1615E+00
STANDARD DEVIATION OF LOG DATA = 0.2192E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4531E+01

MVUE ESTIMATE OF THE MEAN = 0.9447E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.386E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5725E+01

MLE ESTIMATE OF THE MEAN = 0.1300E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1432E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1047E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4955E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.5652E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1960E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5615E+01
B = 0.1966E+01
R = 0.9972E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5874E-01
B = 0.2804E+00
R = 0.9723E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.7775E-02
B = 0.2352E+00
R = 0.9978E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.9152E+01

UCL95 STANDARD BOOT = 0.8876E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1181E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1558E+02

UCL95 T-DISTRIBUTION = 0.9102E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8934E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9835E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1456E+02

UCL95 FROM LOG JACKKNIFE = 0.1904E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3504E+02

UCL95 FROM H-STATISTIC = 0.1269E+03

all_soil_qsouth_trichloroethylene_data

0.00365
0.0017
0.0014
0.0031
0.38
0.0055
0.0017
0.0027
0.0022
0.0029
0.00375
0.0031
0.0032
0.0076
0.0034
0.0035
0.0016
0.00125
0.0013
0.00305

all_soil_qsouth_trichloroethylene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.51594E-01

NUMBER OF DATA POINTS = 20
MEAN= 0.2183E-01
SQUARE ROOT OF VARIANCE= 0.8218E-01
STANDARD DEVIATION= 0.8432E-01
SKEWNESS= 0.4127E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.3862E+01
MINIMUM = 0.1250E-02
MAXIMUM = 0.3800E+00

MEAN OF LOG DATA = -0.5682E+01
STANDARD DEVIATION OF LOG DATA = 0.1207E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2886E+01

MVUE ESTIMATE OF THE MEAN = 0.6661E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.997E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2074E-02

MLE ESTIMATE OF THE MEAN = 0.7055E-02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1280E-01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5386E-02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3805E-02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2166E-01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1820E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2085E-01
B = 0.1801E-01
R = 0.9340E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4814E+01
B = 0.6699E+01
R = 0.8614E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2386E+02
B = 0.4156E+02
R = 0.7350E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5942E-01

UCL95 STANDARD BOOT = 0.5159E-01

UCL95 BOOTSTRAP-T FROM SORT = 0.1621E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1213E+01

UCL95 T-DISTRIBUTION = 0.5443E-01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5284E-01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7144E-01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1061E+00

UCL95 FROM LOG JACKKNIFE = 0.1196E-01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1593E-01

UCL95 FROM H-STATISTIC = 0.1569E-01

all_soil_qsouth_xylenestotal_data

0.0095
0.0017
0.0026
0.006
0.1585
0.0012
0.0044
0.00089
0.0024
0.0036
0.015
0.00078
0.00074
3.9
0.0008
0.00056
1900
2.2
0.0062
0.0018

all_soil_qsouth_xylenestotal_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 20

UCL95(STANDARD BOOTSTRAP)= 0.25159E+03

all_soil_qsouth_xylenestotal_sboot

NUMBER OF DATA POINTS = 20
MEAN= 0.9532E+02
SQUARE ROOT OF VARIANCE= 0.4140E+03
STANDARD DEVIATION= 0.4248E+03
SKEWNESS= 0.4129E+01
CRITICAL SKEWNESS = 0.7720E+00
COEFFICIENT OF VARIATION= 0.4457E+01
MINIMUM = 0.5600E-03
MAXIMUM = 0.1900E+04

MEAN OF LOG DATA = -0.4483E+01
STANDARD DEVIATION OF LOG DATA = 0.3772E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7416E+01

MVUE ESTIMATE OF THE MEAN = 0.2650E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.406E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2392E+01

MLE ESTIMATE OF THE MEAN = 0.1390E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1712E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.1978E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3819E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.9623E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9445E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.9033E+02
B = 0.9058E+02
R = 0.9290E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4127E+02
B = 0.5915E+02
R = 0.8506E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3744E+06
B = 0.7341E+06
R = 0.5772E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2853E+03

UCL95 STANDARD BOOT = 0.2516E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.8264E+05

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8243E+05

UCL95 T-DISTRIBUTION = 0.2595E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2516E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3453E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5199E+03

UCL95 FROM LOG JACKKNIFE = 0.4626E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1334E+02

UCL95 FROM H-STATISTIC = 0.8523E+04

all_soil_qnorth_1 2 dichloroethane_data

0.0036
0.00405
0.004
0.0027
0.00425
0.6
0.00285
0.0047
4
0.00445
0.0037
0.00475
0.195
0.00415
0.00285

all_soil_qnorth_1 2 dichloroethane_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.74270E+00

all_soil_qnorth_1 2 dichloroethane_sboot

NUMBER OF DATA POINTS = 15
MEAN= 0.3227E+00
SQUARE ROOT OF VARIANCE= 0.9945E+00
STANDARD DEVIATION= 0.1029E+01
SKEWNESS= 0.3345E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3190E+01
MINIMUM = 0.2700E-02
MAXIMUM = 0.4000E+01

MEAN OF LOG DATA = -0.4515E+01
STANDARD DEVIATION OF LOG DATA = 0.2287E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5130E+01

MVUE ESTIMATE OF THE MEAN = 0.9499E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.358E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6374E-01

MLE ESTIMATE OF THE MEAN = 0.1495E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2037E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4067E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1017E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.3219E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2558E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3093E+00
B = 0.2568E+00
R = 0.9709E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.8854E+00
B = 0.1621E+01
R = 0.8043E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4393E+01
B = 0.9687E+01
R = 0.4881E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8286E+00

UCL95 STANDARD BOOT = 0.7427E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.6708E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.6708E+01

UCL95 T-DISTRIBUTION = 0.7908E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7600E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1005E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1511E+01

UCL95 FROM LOG JACKKNIFE = 0.2197E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.3799E+00

UCL95 FROM H-STATISTIC = 0.3437E+01

5.27315E-05
0.0114545
0.008654
0.00005493
0.0011845
0.00010685
0.0006209
4.32535E-05
0.000096675
0.000135785
0.05513625
0.000764325
0.000078565
6.49315E-05
0.000151145

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.11056E-01

NUMBER OF DATA POINTS = 15
MEAN= 0.5240E-02
SQUARE ROOT OF VARIANCE= 0.1375E-01
STANDARD DEVIATION= 0.1423E-01
SKEWNESS= 0.3153E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2717E+01
MINIMUM = 0.4325E-04
MAXIMUM = 0.5514E-01

MEAN OF LOG DATA = -0.7887E+01
STANDARD DEVIATION OF LOG DATA = 0.2260E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5077E+01

MVUE ESTIMATE OF THE MEAN = 0.3116E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.115E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2070E-02

MLE ESTIMATE OF THE MEAN = 0.4831E-02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6196E-01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2304E-02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2875E-02

AVERAGE OF BOOTSTRAPPED VALUES = 0.5219E-02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3548E-02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5081E-02
B = 0.3516E-02
R = 0.9829E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3512E+00
B = 0.7037E+00
R = 0.9070E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.9682E-01
B = 0.3811E+00
R = 0.9600E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1205E-01

UCL95 STANDARD BOOT = 0.1106E-01

UCL95 BOOTSTRAP-T FROM SORT = 0.3399E-01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3399E-01

UCL95 T-DISTRIBUTION = 0.1171E-01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1129E-01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1448E-01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2167E-01

UCL95 FROM LOG JACKKNIFE = 0.7367E-02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1237E-01

UCL95 FROM H-STATISTIC = 0.1038E+00

0.19
0.215
1
0.2
0.95
0.175
0.2
1
0.95
0.195
1.4
0.185
47
0.9

all_soil_qnorth_246trichlorophenol_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 14

UCL95(T-DIST.) = 0.97727E+01

NUMBER OF DATA POINTS = 14
MEAN= 0.3897E+01
SQUARE ROOT OF VARIANCE= 0.1196E+02
STANDARD DEVIATION= 0.1241E+02
SKEWNESS= 0.3321E+01
CRITICAL SKEWNESS = 0.8700E+00
COEFFICIENT OF VARIATION= 0.3185E+01
MINIMUM = 0.1750E+00
MAXIMUM = 0.4700E+02

MEAN OF LOG DATA = -0.5359E+00
STANDARD DEVIATION OF LOG DATA = 0.1514E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3717E+01

MVUE ESTIMATE OF THE MEAN = 0.1589E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.305E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7250E+00

MLE ESTIMATE OF THE MEAN = 0.1840E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5487E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1224E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1069E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3904E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3208E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3732E+01
B = 0.3178E+01
R = 0.9391E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2806E+01
B = 0.3780E+01
R = 0.8503E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2319E+01
B = 0.4041E+01
R = 0.7938E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1050E+02

UCL95 STANDARD BOOT = 0.9181E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1138E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1045E+03

UCL95 T-DISTRIBUTION = 0.9773E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.9355E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1250E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1873E+02

UCL95 FROM LOG JACKKNIFE = 0.3117E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.4829E+01

UCL95 FROM H-STATISTIC = 0.8764E+01

0.195
0.2
0.215
0.03
0.175
0.2
0.95
1
1
65
270
2.9
0.185
0.9
0.95

all_soil_qnorth_24dichlorophenol_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.51861E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.2293E+02
SQUARE ROOT OF VARIANCE= 0.6795E+02
STANDARD DEVIATION= 0.7033E+02
SKEWNESS= 0.3191E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3068E+01
MINIMUM = 0.3000E-01
MAXIMUM = 0.2700E+03

MEAN OF LOG DATA = -0.1799E+00
STANDARD DEVIATION OF LOG DATA = 0.2358E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5272E+01

MVUE ESTIMATE OF THE MEAN = 0.8193E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.326E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5643E+01

MLE ESTIMATE OF THE MEAN = 0.1346E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2165E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.4448E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.8238E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2289E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1761E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2200E+02
B = 0.1789E+02
R = 0.9786E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3145E+01
B = 0.6255E+01
R = 0.6210E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1957E+03
B = 0.4202E+03
R = 0.4959E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5859E+02

UCL95 STANDARD BOOT = 0.5186E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.2188E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2227E+04

UCL95 T-DISTRIBUTION = 0.5491E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5280E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6879E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1041E+03

UCL95 FROM LOG JACKKNIFE = 0.1896E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.3342E+02

UCL95 FROM H-STATISTIC = 0.3731E+03

all_soil_qnorth_2nitroailine_data

4.8
4.95
4.55
2.05
5
0.95
1
1.05
5
0.95
20
0.9
1.1
1

all_soil_qnorth_2nitroailine_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 14

UCL95(T-DIST.) = 0.61790E+01

NUMBER OF DATA POINTS = 14
MEAN= 0.3807E+01
SQUARE ROOT OF VARIANCE= 0.4829E+01
STANDARD DEVIATION= 0.5011E+01
SKEWNESS= 0.2595E+01
CRITICAL SKEWNESS = 0.8700E+00
COEFFICIENT OF VARIATION= 0.1316E+01
MINIMUM = 0.9000E+00
MAXIMUM = 0.2000E+02

MEAN OF LOG DATA = 0.8251E+00
STANDARD DEVIATION OF LOG DATA = 0.9798E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2759E+01

MVUE ESTIMATE OF THE MEAN = 0.3520E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.385E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.9987E+00

MLE ESTIMATE OF THE MEAN = 0.3688E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4683E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3449E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1192E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3795E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1291E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3753E+01
B = 0.1279E+01
R = 0.9905E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1797E+00
B = 0.4537E+00
R = 0.9559E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1063E+00
B = 0.3951E+00
R = 0.9665E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6207E+01

UCL95 STANDARD BOOT = 0.5919E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.9106E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8484E+01

UCL95 T-DISTRIBUTION = 0.6179E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6010E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7003E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9794E+01

UCL95 FROM LOG JACKKNIFE = 0.5560E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.7984E+01

UCL95 FROM H-STATISTIC = 0.7806E+01

0.82
1.2
84
0.54
1.8
1.6
0.9
0.81
1.1
8.2
4.3
0.84
1.9
0.71
7.9

all_soil_qnorth_antimony_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.16579E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.7775E+01
SQUARE ROOT OF VARIANCE= 0.2052E+02
STANDARD DEVIATION= 0.2124E+02
SKEWNESS= 0.3394E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2731E+01
MINIMUM = 0.5400E+00
MAXIMUM = 0.8400E+02

MEAN OF LOG DATA = 0.6927E+00
STANDARD DEVIATION OF LOG DATA = 0.1334E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3311E+01

MVUE ESTIMATE OF THE MEAN = 0.4412E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.722E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1715E+01

MLE ESTIMATE OF THE MEAN = 0.4865E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1080E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3809E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2548E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.7796E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5339E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7537E+01
B = 0.5290E+01
R = 0.9621E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7625E+00
B = 0.1241E+01
R = 0.8916E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4344E+00
B = 0.1015E+01
R = 0.7097E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1844E+02

UCL95 STANDARD BOOT = 0.1658E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.7815E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.7721E+02

UCL95 T-DISTRIBUTION = 0.1743E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1679E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2193E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3228E+02

UCL95 FROM LOG JACKKNIFE = 0.8295E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1208E+02

UCL95 FROM H-STATISTIC = 0.1584E+02

6.8
8.9
11
13
10
6
27
7.9
6.3
9.1
3.1
10
5.6
40
12

all_soil_qnorth_arsenic_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

COEFFICIENT OF VARIATION = 0.80814E+00
MAXIMUM DATA VALUE = 0.40000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.15378E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.1178E+02
SQUARE ROOT OF VARIANCE= 0.9197E+01
STANDARD DEVIATION= 0.9520E+01
SKEWNESS= 0.2101E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.8081E+00
MINIMUM = 0.3100E+01
MAXIMUM = 0.4000E+02

MEAN OF LOG DATA = 0.2260E+01
STANDARD DEVIATION OF LOG DATA = 0.6211E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2206E+01

MVUE ESTIMATE OF THE MEAN = 0.1145E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.747E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1918E+01

MLE ESTIMATE OF THE MEAN = 0.1162E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.7976E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1138E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2270E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1179E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2360E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1173E+02
B = 0.2369E+01
R = 0.9960E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1290E+00
B = 0.4259E+00
R = 0.9073E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.8600E-01
B = 0.4214E+00
R = 0.8862E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1603E+02

UCL95 STANDARD BOOT = 0.1567E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.2395E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2289E+02

UCL95 T-DISTRIBUTION = 0.1611E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1582E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1725E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2277E+02

UCL95 FROM LOG JACKKNIFE = 0.1538E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2002E+02

UCL95 FROM H-STATISTIC = 0.1677E+02

all_soil_qnorth_barium_data

87
61
2900
170
1400
81
110
150
1100
7200
85
120
230
6700
260

all_soil_qnorth_barium_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(HALLS BOOTSTRAP-T)= 0.30255E+04

all_soil_qnorth_barium_sboot

NUMBER OF DATA POINTS = 15
MEAN= 0.1377E+04
SQUARE ROOT OF VARIANCE= 0.2311E+04
STANDARD DEVIATION= 0.2392E+04
SKEWNESS= 0.1797E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.1737E+01
MINIMUM = 0.6100E+02
MAXIMUM = 0.7200E+04

MEAN OF LOG DATA = 0.5864E+01
STANDARD DEVIATION OF LOG DATA = 0.1662E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3915E+01

MVUE ESTIMATE OF THE MEAN = 0.1171E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.262E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5773E+03

MLE ESTIMATE OF THE MEAN = 0.1402E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5402E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1079E+04
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.7376E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.1384E+04

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5986E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1370E+04
B = 0.6028E+03
R = 0.9964E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9277E-01
B = 0.3760E+00
R = 0.9186E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.3358E-03
B = 0.2562E+00
R = 0.9968E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2457E+04

UCL95 STANDARD BOOT = 0.2369E+04

UCL95 BOOTSTRAP-T FROM SORT = 0.4172E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3025E+04

UCL95 T-DISTRIBUTION = 0.2464E+04

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2393E+04

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2699E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.4138E+04

UCL95 FROM LOG JACKKNIFE = 0.2378E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.3751E+04

UCL95 FROM H-STATISTIC = 0.7980E+04

all_soil_qnorth_benzene_data

0.0015
0.00285
0.00076
0.00076
0.0011
0.0027
8.8
0.43
0.0037
0.0036
0.00285
0.00445
0.024
0.87
0.00475

all_soil_qnorth_benzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.16061E+01

NUMBER OF DATA POINTS = 15
MEAN= 0.6769E+00
SQUARE ROOT OF VARIANCE= 0.2183E+01
STANDARD DEVIATION= 0.2260E+01
SKEWNESS= 0.3409E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3339E+01
MINIMUM = 0.7600E-03
MAXIMUM = 0.8800E+01

MEAN OF LOG DATA = -0.4656E+01
STANDARD DEVIATION OF LOG DATA = 0.2811E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6186E+01

MVUE ESTIMATE OF THE MEAN = 0.2145E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.119E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1688E+00

MLE ESTIMATE OF THE MEAN = 0.4943E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2571E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6777E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2608E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6840E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5605E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6708E+00
B = 0.5519E+00
R = 0.9598E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9111E+00
B = 0.1617E+01
R = 0.8307E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3547E+01
B = 0.7853E+01
R = 0.4896E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1820E+01

UCL95 STANDARD BOOT = 0.1606E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1390E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1390E+02

UCL95 T-DISTRIBUTION = 0.1704E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1637E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2186E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3285E+01

UCL95 FROM LOG JACKKNIFE = 0.5271E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.9690E+00

UCL95 FROM H-STATISTIC = 0.5158E+02

all_soil_qnorth_benzoaanthracene_data

1.7
0.11
2.9
1.8
1.3
0.51
1.7
0.57
0.4
1
1.5
0.38
1.3
2.1

all_soil_qnorth_benzoaanthracene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.16064E+01

NUMBER OF DATA POINTS = 14
MEAN= 0.1234E+01
SQUARE ROOT OF VARIANCE= 0.7591E+00
STANDARD DEVIATION= 0.7878E+00
SKEWNESS= 0.3884E+00
CRITICAL SKEWNESS = 0.8700E+00
COEFFICIENT OF VARIATION= 0.6386E+00
MINIMUM = 0.1100E+00
MAXIMUM = 0.2900E+01

MEAN OF LOG DATA = -0.6719E-01
STANDARD DEVIATION OF LOG DATA = 0.8879E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2612E+01

MVUE ESTIMATE OF THE MEAN = 0.1337E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.130E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3403E+00

MLE ESTIMATE OF THE MEAN = 0.1387E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1519E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1363E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2400E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1234E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2027E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1233E+01
B = 0.2035E+00
R = 0.9998E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1164E-01
B = 0.2916E+00
R = 0.9993E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4155E-02
B = 0.2821E+00
R = 0.9998E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1576E+01

UCL95 STANDARD BOOT = 0.1567E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1628E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1591E+01

UCL95 T-DISTRIBUTION = 0.1606E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1580E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1603E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2175E+01

UCL95 FROM LOG JACKKNIFE = 0.1788E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.2858E+01

UCL95 FROM H-STATISTIC = 0.2639E+01

all_soil_qnorth_benzoapyrene_data

2.7
1.7
1.6
2
1.9
0.13
1.4
1.2
1.8
0.58
0.34
0.42
0.98
1.7

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.16694E+01

NUMBER OF DATA POINTS = 14
MEAN= 0.1318E+01
SQUARE ROOT OF VARIANCE= 0.7157E+00
STANDARD DEVIATION= 0.7427E+00
SKEWNESS= -0.7308E-01
CRITICAL SKEWNESS = 0.8700E+00
COEFFICIENT OF VARIATION= 0.5636E+00
MINIMUM = 0.1300E+00
MAXIMUM = 0.2700E+01

MEAN OF LOG DATA = 0.2962E-01
STANDARD DEVIATION OF LOG DATA = 0.8557E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2563E+01

MVUE ESTIMATE OF THE MEAN = 0.1437E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.134E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3512E+00

MLE ESTIMATE OF THE MEAN = 0.1485E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1543E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1467E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2178E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1317E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1940E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1317E+01
B = 0.1956E+00
R = 0.1000E+01

QUANTILE ANALYSIS FOR "W" VALUES
A = 0.2531E-02
B = 0.2976E+00
R = 0.9994E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3156E-02
B = 0.2838E+00
R = 0.9999E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1640E+01

UCL95 STANDARD BOOT = 0.1636E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1668E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1680E+01

UCL95 T-DISTRIBUTION = 0.1669E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1644E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1640E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2205E+01

UCL95 FROM LOG JACKKNIFE = 0.1853E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.3006E+01

UCL95 FROM H-STATISTIC = 0.2729E+01

all_soil_qnorth_benzobfluoranthene_data

0.99
0.11
1.8
1.8
0.55
2.2
1.6
0.37
1.9
1
0.48
0.39
1.8
1.5

all_soil_qnorth_benzobfluoranthene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.15092E+01

NUMBER OF DATA POINTS = 14
MEAN= 0.1178E+01
SQUARE ROOT OF VARIANCE= 0.6746E+00
STANDARD DEVIATION= 0.7001E+00
SKEWNESS= -0.1298E+00
CRITICAL SKEWNESS = 0.8700E+00
COEFFICIENT OF VARIATION= 0.5944E+00
MINIMUM = 0.1100E+00
MAXIMUM = 0.2200E+01

MEAN OF LOG DATA = -0.1011E+00
STANDARD DEVIATION OF LOG DATA = 0.8751E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2592E+01

MVUE ESTIMATE OF THE MEAN = 0.1279E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.122E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3206E+00

MLE ESTIMATE OF THE MEAN = 0.1325E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1422E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1305E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2176E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1179E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1814E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1180E+01
B = 0.1824E+00
R = 0.1000E+01

QUANTILE ANALYSIS FOR "W" VALUES
A = 0.7496E-02
B = 0.2909E+00
R = 0.9993E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1725E-02
B = 0.2647E+00
R = 0.9999E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1476E+01

UCL95 STANDARD BOOT = 0.1478E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1498E+01

all_soil_qnorth_benzobfluoranthene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1511E+01

UCL95 T-DISTRIBUTION = 0.1509E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1486E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1479E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2014E+01

UCL95 FROM LOG JACKKNIFE = 0.1691E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.2712E+01

UCL95 FROM H-STATISTIC = 0.2487E+01

all_soil_qnorth_cadmuim_data

4
0.57
0.66
5.1
0.82
51
8.9
92
6.2
2.5
0.4
1.3
1.5
1
8

all_soil_qnorth_cadmuim_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

COEFFICIENT OF VARIATION = 0.20727E+01
MAXIMUM DATA VALUE = 0.92000E+02

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.18849E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.1226E+02
SQUARE ROOT OF VARIANCE= 0.2456E+02
STANDARD DEVIATION= 0.2542E+02
SKEWNESS= 0.2488E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2073E+01
MINIMUM = 0.4000E+00
MAXIMUM = 0.9200E+02

MEAN OF LOG DATA = 0.1137E+01
STANDARD DEVIATION OF LOG DATA = 0.1603E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3803E+01

MVUE ESTIMATE OF THE MEAN = 0.9573E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.203E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4542E+01

MLE ESTIMATE OF THE MEAN = 0.1126E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3911E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.8805E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5704E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1229E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6467E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1206E+02
B = 0.6519E+01
R = 0.9938E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3549E+00
B = 0.8481E+00
R = 0.7557E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1031E+00
B = 0.4564E+00
R = 0.8506E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2410E+02

UCL95 STANDARD BOOT = 0.2292E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.9640E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.8519E+02

UCL95 T-DISTRIBUTION = 0.2382E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2306E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2756E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.4160E+02

UCL95 FROM LOG JACKKNIFE = 0.1885E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2988E+02

UCL95 FROM H-STATISTIC = 0.5744E+02

all_soil_qnorth_dibenzo ah anthracene_data

0.37
0.18
0.066
0.11
0.185
0.26
0.13
0.4
0.2

all_soil_qnorth_dibenzo ah anthracene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.28155E+00

all_soil_qnorth_dibenzo ah anthracene_sboot

NUMBER OF DATA POINTS = 9
MEAN= 0.2112E+00
SQUARE ROOT OF VARIANCE= 0.1070E+00
STANDARD DEVIATION= 0.1134E+00
SKEWNESS= 0.5596E+00
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.5371E+00
MINIMUM = 0.6600E-01
MAXIMUM = 0.4000E+00

MEAN OF LOG DATA = -0.1693E+01
STANDARD DEVIATION OF LOG DATA = 0.5760E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2399E+01

MVUE ESTIMATE OF THE MEAN = 0.2128E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.125E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4160E-01

MLE ESTIMATE OF THE MEAN = 0.2172E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1363E+00

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2134E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3885E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.2113E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3544E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2111E+00
B = 0.3562E-01
R = 0.9996E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4213E-01
B = 0.4014E+00
R = 0.9865E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1589E-01
B = 0.3733E+00
R = 0.9825E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2713E+00

UCL95 STANDARD BOOT = 0.2696E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.3077E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3001E+00

UCL95 T-DISTRIBUTION = 0.2816E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2734E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2810E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3802E+00

UCL95 FROM LOG JACKKNIFE = 0.2857E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.3987E+00

UCL95 FROM H-STATISTIC = 0.3540E+00

all_soil_qnorth_deldrin_data

0.018
1.2
0.077
0.013
0.011
0.054
0.0375
0.004
0.024
0.002
0.0064
3.2
0.1
0.0035
0.43

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

COEFFICIENT OF VARIATION = 0.24590E+01
MAXIMUM DATA VALUE = 0.32000E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.58386E+00

NUMBER OF DATA POINTS = 15
MEAN= 0.3454E+00
SQUARE ROOT OF VARIANCE= 0.8205E+00
STANDARD DEVIATION= 0.8493E+00
SKEWNESS= 0.2836E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2459E+01
MINIMUM = 0.2000E-02
MAXIMUM = 0.3200E+01

MEAN OF LOG DATA = -0.3307E+01
STANDARD DEVIATION OF LOG DATA = 0.2156E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4870E+01

MVUE ESTIMATE OF THE MEAN = 0.2553E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.869E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1626E+00

MLE ESTIMATE OF THE MEAN = 0.3738E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3798E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2177E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2079E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.3422E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2096E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3356E+00
B = 0.2118E+00
R = 0.9913E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3168E+00
B = 0.7292E+00
R = 0.8203E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1412E+00
B = 0.5242E+00
R = 0.7439E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.7363E+00

UCL95 STANDARD BOOT = 0.6871E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.2654E+01

all_soil_qnorth_dieldrin_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2644E+01

UCL95 T-DISTRIBUTION = 0.7315E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7061E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.8777E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1326E+01

UCL95 FROM LOG JACKKNIFE = 0.5839E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.9821E+00

UCL95 FROM H-STATISTIC = 0.6182E+01

all_soil_qnorth_ethylbenzene_data

40
0.99
0.00415
0.00425
0.007
0.00079
11
0.00475
0.0027
0.0037
0.00285
0.00058
0.00034
0.00405
0.00019

all_soil_qnorth_ethylbenzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.77759E+01

NUMBER OF DATA POINTS = 15
MEAN= 0.3468E+01
SQUARE ROOT OF VARIANCE= 0.1014E+02
STANDARD DEVIATION= 0.1049E+02
SKEWNESS= 0.3114E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3025E+01
MINIMUM = 0.1900E-03
MAXIMUM = 0.4000E+02

MEAN OF LOG DATA = -0.4614E+01
STANDARD DEVIATION OF LOG DATA = 0.3664E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7934E+01

MVUE ESTIMATE OF THE MEAN = 0.1320E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.128E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1198E+01

MLE ESTIMATE OF THE MEAN = 0.8143E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6692E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.2121E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2002E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.3472E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2616E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3328E+01
B = 0.2624E+01
R = 0.9857E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1384E+01
B = 0.2801E+01
R = 0.6587E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.5672E+02
B = 0.1225E+03
R = 0.4885E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8335E+01

UCL95 STANDARD BOOT = 0.7776E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1435E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1435E+03

UCL95 T-DISTRIBUTION = 0.8240E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7925E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1025E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1558E+02

UCL95 FROM LOG JACKKNIFE = 0.3313E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.6675E+01

UCL95 FROM H-STATISTIC = 0.1926E+05

all_soil_qnorth_lead_data

270
500
550
230
380
1400
1100
150
24000
200
85
64
63
340
20

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

COEFFICIENT OF VARIATION = 0.31227E+01
MAXIMUM DATA VALUE = 0.24000E+05

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.19846E+04

NUMBER OF DATA POINTS = 15
MEAN= 0.1957E+04
SQUARE ROOT OF VARIANCE= 0.5903E+04
STANDARD DEVIATION= 0.6111E+04
SKEWNESS= 0.3450E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3123E+01
MINIMUM = 0.2000E+02
MAXIMUM = 0.2400E+05

MEAN OF LOG DATA = 0.5714E+01
STANDARD DEVIATION OF LOG DATA = 0.1657E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3904E+01

MVUE ESTIMATE OF THE MEAN = 0.1001E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.223E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4917E+03

MLE ESTIMATE OF THE MEAN = 0.1196E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4566E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.8427E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6485E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.1951E+04

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1520E+04

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1880E+04
B = 0.1516E+04
R = 0.9481E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1487E+01
B = 0.2213E+01
R = 0.8757E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1044E+01
B = 0.2101E+01
R = 0.7182E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5071E+04

UCL95 STANDARD BOOT = 0.4451E+04

UCL95 BOOTSTRAP-T FROM SORT = 0.3953E+05

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3826E+05

UCL95 T-DISTRIBUTION = 0.4735E+04

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4552E+04

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6054E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9009E+04

UCL95 FROM LOG JACKKNIFE = 0.1985E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.3199E+04

UCL95 FROM H-STATISTIC = 0.6740E+04

all_soil_qnorth_pentachlorophenol_data

0.063
510
0.099
0.01
0.42
0.002
0.0055
0.03
0.047
290
0.013
0.17
0.096
0.0115
180

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(HALLS BOOTSTRAP-T)= 0.16294E+03

NUMBER OF DATA POINTS = 15
MEAN= 0.6540E+02
SQUARE ROOT OF VARIANCE= 0.1443E+03
STANDARD DEVIATION= 0.1494E+03
SKEWNESS= 0.2159E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2284E+01
MINIMUM = 0.2000E-02
MAXIMUM = 0.5100E+03

MEAN OF LOG DATA = -0.1624E+01
STANDARD DEVIATION OF LOG DATA = 0.4037E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.8706E+01

MVUE ESTIMATE OF THE MEAN = 0.6122E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.737E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5744E+02

MLE ESTIMATE OF THE MEAN = 0.6815E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2356E+07

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.5333E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9967E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.6541E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3732E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6470E+02
B = 0.3708E+02
R = 0.9932E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1081E+00
B = 0.3879E+00
R = 0.9296E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.2454E-02
B = 0.2445E+00
R = 0.9956E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1334E+03

UCL95 STANDARD BOOT = 0.1268E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.2369E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1629E+03

UCL95 T-DISTRIBUTION = 0.1333E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1288E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1518E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2378E+03

UCL95 FROM LOG JACKKNIFE = 0.1702E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.3180E+03

UCL95 FROM H-STATISTIC = 0.8184E+07

all_soil_qnorth_tetrachloroethene_data

0.0011
0.00285
1.1
0.195
0.0006
0.00044
0.0024
0.0007
0.00058
0.00047
0.0015
0.00043
0.0028
0.0099
28

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.48954E+01

NUMBER OF DATA POINTS = 15
MEAN= 0.1955E+01
SQUARE ROOT OF VARIANCE= 0.6966E+01
STANDARD DEVIATION= 0.7211E+01
SKEWNESS= 0.3465E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3689E+01
MINIMUM = 0.4300E-03
MAXIMUM = 0.2800E+02

MEAN OF LOG DATA = -0.5279E+01
STANDARD DEVIATION OF LOG DATA = 0.3305E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7194E+01

MVUE ESTIMATE OF THE MEAN = 0.3124E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.241E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2705E+00

MLE ESTIMATE OF THE MEAN = 0.1200E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2823E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.4129E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4277E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1945E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1794E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1856E+01
B = 0.1784E+01
R = 0.9412E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5137E+01
B = 0.8924E+01
R = 0.7235E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1637E+04
B = 0.3499E+04
R = 0.4986E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5627E+01

UCL95 STANDARD BOOT = 0.4895E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.2826E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2824E+03

UCL95 T-DISTRIBUTION = 0.5233E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5017E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6798E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1028E+02

UCL95 FROM LOG JACKKNIFE = 0.7118E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.1522E+01

UCL95 FROM H-STATISTIC = 0.6899E+03

all_soil_qnorth_totalpcbs_data

2.483
0.8855
1.783
122.25
0.253
0.2764
1.339
0.678
189.61
0.5601
2.395
0.05015
116.022
0.2309
0.4725

all_soil_qnorth_totalpcbs_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.53962E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.2929E+02
SQUARE ROOT OF VARIANCE= 0.5860E+02
STANDARD DEVIATION= 0.6066E+02
SKEWNESS= 0.1757E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2071E+01
MINIMUM = 0.5015E-01
MAXIMUM = 0.1896E+03

MEAN OF LOG DATA = 0.5666E+00
STANDARD DEVIATION OF LOG DATA = 0.2480E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5517E+01

MVUE ESTIMATE OF THE MEAN = 0.2145E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.937E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1539E+02

MLE ESTIMATE OF THE MEAN = 0.3817E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.8258E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1497E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2215E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2918E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1507E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2888E+02
B = 0.1496E+02
R = 0.9946E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7284E-01
B = 0.3228E+00
R = 0.9701E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1115E-01
B = 0.2217E+00
R = 0.9845E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5485E+02

UCL95 STANDARD BOOT = 0.5396E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.7161E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.7160E+02

UCL95 T-DISTRIBUTION = 0.5687E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5505E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.6264E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9929E+02

UCL95 FROM LOG JACKKNIFE = 0.5398E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.9026E+02

UCL95 FROM H-STATISTIC = 0.1479E+04

all_soil_qnorth_trichloroethylenes_data

0.195
0.0012
0.0015
0.00055
0.00093
0.00415
0.00051
0.0012
0.00071
0.0022
0.73
0.66
0.00056
0.00049
0.00076

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.20600E+00

NUMBER OF DATA POINTS = 15
MEAN= 0.1067E+00
SQUARE ROOT OF VARIANCE= 0.2361E+00
STANDARD DEVIATION= 0.2444E+00
SKEWNESS= 0.2018E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.2291E+01
MINIMUM = 0.4900E-03
MAXIMUM = 0.7300E+00

MEAN OF LOG DATA = -0.5702E+01
STANDARD DEVIATION OF LOG DATA = 0.2623E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5805E+01

MVUE ESTIMATE OF THE MEAN = 0.5279E-01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.256E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3955E-01

MLE ESTIMATE OF THE MEAN = 0.1042E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3252E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2197E-01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6307E-01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1058E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6089E-01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1037E+00
B = 0.6172E-01
R = 0.9954E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1733E+00
B = 0.5110E+00
R = 0.8372E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2362E-01
B = 0.2944E+00
R = 0.9582E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2120E+00

UCL95 STANDARD BOOT = 0.2060E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.5588E+00

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5587E+00

UCL95 T-DISTRIBUTION = 0.2178E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2104E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2456E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3887E+00

UCL95 FROM LOG JACKKNIFE = 0.1330E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.2296E+00

UCL95 FROM H-STATISTIC = 0.6105E+01

all_soil_qnorth_xylenestotal_data

0.006
0.04
300
0.00066
0.0022
0.0085
0.0075
1.7
0.00039
0.0018
0.008
0.008
0.0016
80
0.0055

all_soil_qnorth_xylenestotal_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 15

UCL95(STANDARD BOOTSTRAP)= 0.57918E+02

NUMBER OF DATA POINTS = 15
MEAN= 0.2545E+02
SQUARE ROOT OF VARIANCE= 0.7602E+02
STANDARD DEVIATION= 0.7869E+02
SKEWNESS= 0.3133E+01
CRITICAL SKEWNESS = 0.8520E+00
COEFFICIENT OF VARIATION= 0.3092E+01
MINIMUM = 0.3900E-03
MAXIMUM = 0.3000E+03

MEAN OF LOG DATA = -0.3753E+01
STANDARD DEVIATION OF LOG DATA = 0.4069E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.8773E+01

MVUE ESTIMATE OF THE MEAN = 0.7845E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.962E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7377E+01

MLE ESTIMATE OF THE MEAN = 0.9229E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3631E+06

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.4242E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1264E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2551E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1970E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2470E+02
B = 0.1980E+02
R = 0.9823E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5233E+01
B = 0.1060E+02
R = 0.5977E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.5046E+04
B = 0.1103E+05
R = 0.4632E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6534E+02

UCL95 STANDARD BOOT = 0.5792E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.4586E+04

all_soil_qnorth_xylenestotal_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4586E+04

UCL95 T-DISTRIBUTION = 0.6123E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5887E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7644E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1163E+03

UCL95 FROM LOG JACKKNIFE = 0.1801E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.4082E+02

UCL95 FROM H-STATISTIC = 0.1283E+07

all_soil_r_112trichloroethane_data

0.00245
0.0025
0.00235
9.5
0.0033
0.00265
4.45
0.00355
3.05
1.7
1.55
0.00275

all_soil_r_112trichloroethane_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.31755E+01

NUMBER OF DATA POINTS = 12
MEAN= 0.1689E+01
SQUARE ROOT OF VARIANCE= 0.2745E+01
STANDARD DEVIATION= 0.2867E+01
SKEWNESS= 0.1880E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1697E+01
MINIMUM = 0.2350E-02
MAXIMUM = 0.9500E+01

MEAN OF LOG DATA = -0.2951E+01
STANDARD DEVIATION OF LOG DATA = 0.3663E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.8699E+01

MVUE ESTIMATE OF THE MEAN = 0.5386E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.394E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4942E+01

MLE ESTIMATE OF THE MEAN = 0.4292E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3523E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5938E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6869E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1689E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.7984E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1666E+01
B = 0.7999E+00
R = 0.9957E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1283E+00
B = 0.4351E+00
R = 0.9535E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2980E-01
B = 0.3233E+00
R = 0.9957E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3121E+01

UCL95 STANDARD BOOT = 0.3002E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.4900E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4982E+01

UCL95 T-DISTRIBUTION = 0.3175E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3051E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3531E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5389E+01

UCL95 FROM LOG JACKKNIFE = 0.1827E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2748E+02

UCL95 FROM H-STATISTIC = 0.6389E+06

all_soil_r_12dichloroethane_data

0.00245
0.00355
1.7
12
0.00275
87
0.0014
0.0026
0.225
0.0015
28
73

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.32793E+02

all_soil_r_12dichloroethane_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.1683E+02
SQUARE ROOT OF VARIANCE= 0.2948E+02
STANDARD DEVIATION= 0.3079E+02
SKEWNESS= 0.1585E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1830E+01
MINIMUM = 0.1400E-02
MAXIMUM = 0.8700E+02

MEAN OF LOG DATA = -0.1913E+01
STANDARD DEVIATION OF LOG DATA = 0.4650E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1096E+02

MVUE ESTIMATE OF THE MEAN = 0.1280E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.147E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1246E+03

MLE ESTIMATE OF THE MEAN = 0.7304E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3616E+09

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1710E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1814E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.1684E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.8575E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1664E+02
B = 0.8534E+01
R = 0.9977E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1322E+00
B = 0.4751E+00
R = 0.8854E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.5060E-02
B = 0.2929E+00
R = 0.9936E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3173E+02

UCL95 STANDARD BOOT = 0.3094E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.6565E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4792E+02

UCL95 T-DISTRIBUTION = 0.3279E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3145E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3580E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5656E+02

UCL95 FROM LOG JACKKNIFE = 0.4968E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.6849E+03

UCL95 FROM H-STATISTIC = 0.3460E+11

all_soil_r_12dichloroethene total_data

3.1
4.6
0.00094
0.0047
0.0055
0.007
0.00048
51
3.4
12
0.0055
0.005

all_soil_r_12dichloroethene total_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.13722E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.6177E+01
SQUARE ROOT OF VARIANCE= 0.1393E+02
STANDARD DEVIATION= 0.1455E+02
SKEWNESS= 0.2728E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2356E+01
MINIMUM = 0.4800E-03
MAXIMUM = 0.5100E+02

MEAN OF LOG DATA = -0.2528E+01
STANDARD DEVIATION OF LOG DATA = 0.4184E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.9892E+01

MVUE ESTIMATE OF THE MEAN = 0.2472E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.232E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2357E+02

MLE ESTIMATE OF THE MEAN = 0.5052E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3198E+07

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2820E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3491E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.6234E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.4052E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6077E+01
B = 0.4036E+01
R = 0.9840E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4301E+00
B = 0.9075E+00
R = 0.8611E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1295E+00
B = 0.4956E+00
R = 0.9147E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1401E+02

UCL95 STANDARD BOOT = 0.1290E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.4982E+02

all_soil_r_12dichloroethene total_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3987E+02

UCL95 T-DISTRIBUTION = 0.1372E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1309E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1662E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2496E+02

UCL95 FROM LOG JACKKNIFE = 0.9089E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1301E+03

UCL95 FROM H-STATISTIC = 0.1328E+09

0.195
1.6
0.18
0.175
24
0.175
0.19
0.19
0.185
0.19
0.58

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

UCL95(T-DIST.) = 0.64147E+01

NUMBER OF DATA POINTS = 11
MEAN= 0.2515E+01
SQUARE ROOT OF VARIANCE= 0.6807E+01
STANDARD DEVIATION= 0.7139E+01
SKEWNESS= 0.2828E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.2839E+01
MINIMUM = 0.1750E+00
MAXIMUM = 0.2400E+02

MEAN OF LOG DATA = -0.9456E+00
STANDARD DEVIATION OF LOG DATA = 0.1536E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4112E+01

MVUE ESTIMATE OF THE MEAN = 0.1048E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.191E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.5223E+00

MLE ESTIMATE OF THE MEAN = 0.1264E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3912E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.7147E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.8027E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.2533E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2093E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2416E+01
B = 0.2071E+01
R = 0.9477E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2757E+01
B = 0.4699E+01
R = 0.7788E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1130E+03
B = 0.2463E+03
R = 0.4615E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6806E+01

UCL95 STANDARD BOOT = 0.5976E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.1399E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1398E+03

UCL95 T-DISTRIBUTION = 0.6415E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6055E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.8017E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1214E+02

UCL95 FROM LOG JACKKNIFE = 0.2169E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.3382E+01

UCL95 FROM H-STATISTIC = 0.9310E+01

all_soil_r_2378TCDDTEQ_data

0.000041763
0.00059054
9.64105E-05
0.012177
0.00153257
5.88305E-05
7.70919E-05
0.000139174
0.000017781
0.0009294
3.78765E-05
0.000075455

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.26269E+01
MAXIMUM DATA VALUE = 0.12177E-01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.17819E-02

NUMBER OF DATA POINTS = 12
MEAN= 0.1314E-02
SQUARE ROOT OF VARIANCE= 0.3306E-02
STANDARD DEVIATION= 0.3453E-02
SKEWNESS= 0.2919E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2627E+01
MINIMUM = 0.1778E-04
MAXIMUM = 0.1218E-01

MEAN OF LOG DATA = -0.8611E+01
STANDARD DEVIATION OF LOG DATA = 0.1896E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4737E+01

MVUE ESTIMATE OF THE MEAN = 0.8030E-03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.201E-02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.4785E-03

MLE ESTIMATE OF THE MEAN = 0.1099E-02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6544E-02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6451E-03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6330E-03

AVERAGE OF BOOTSTRAPPED VALUES = 0.1319E-02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9661E-03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1285E-02
B = 0.9560E-03
R = 0.9676E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7418E+00
B = 0.1304E+01
R = 0.8792E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3215E+00
B = 0.7985E+00
R = 0.8289E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3260E-02

UCL95 STANDARD BOOT = 0.2909E-02

UCL95 BOOTSTRAP-T FROM SORT = 0.1522E-01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1538E-01

UCL95 T-DISTRIBUTION = 0.3105E-02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2954E-02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3852E-02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5770E-02

UCL95 FROM LOG JACKKNIFE = 0.1782E-02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2942E-02

UCL95 FROM H-STATISTIC = 0.1649E-01

all_soil_r_246trichlorophenol_data

21
120
650
0.18
0.19
0.175
0.185
0.175
0.195
0.1
0.19
89

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.16988E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.7345E+02
SQUARE ROOT OF VARIANCE= 0.1781E+03
STANDARD DEVIATION= 0.1860E+03
SKEWNESS= 0.2781E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2532E+01
MINIMUM = 0.1000E+00
MAXIMUM = 0.6500E+03

MEAN OF LOG DATA = 0.3876E+00
STANDARD DEVIATION OF LOG DATA = 0.3273E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7810E+01

MVUE ESTIMATE OF THE MEAN = 0.6931E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.414E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6076E+02

MLE ESTIMATE OF THE MEAN = 0.3123E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6619E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3729E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9348E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.7355E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.5152E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.7178E+02
B = 0.5128E+02
R = 0.9803E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4195E+00
B = 0.8454E+00
R = 0.8897E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1271E+00
B = 0.4694E+00
R = 0.9359E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1744E+03

UCL95 STANDARD BOOT = 0.1583E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.5358E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5358E+03

UCL95 T-DISTRIBUTION = 0.1699E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1618E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2078E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3134E+03

UCL95 FROM LOG JACKKNIFE = 0.2052E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.3409E+03

UCL95 FROM H-STATISTIC = 0.6944E+06

0.185
3500
0.175
0.175
0.19
59
99
270
0.29
0.03
0.195
0.18

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.84708E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.3275E+03
SQUARE ROOT OF VARIANCE= 0.9596E+03
STANDARD DEVIATION= 0.1002E+04
SKEWNESS= 0.2982E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.3061E+01
MINIMUM = 0.3000E-01
MAXIMUM = 0.3500E+04

MEAN OF LOG DATA = 0.6253E+00
STANDARD DEVIATION OF LOG DATA = 0.3839E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.9100E+01

MVUE ESTIMATE OF THE MEAN = 0.2772E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.221E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2582E+03

MLE ESTIMATE OF THE MEAN = 0.2963E+04
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4697E+07

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1054E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4153E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.3236E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2727E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3133E+03
B = 0.2772E+03
R = 0.9534E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1641E+01
B = 0.2735E+01
R = 0.8311E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.6570E+01
B = 0.1411E+02
R = 0.5002E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8932E+03

UCL95 STANDARD BOOT = 0.7723E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.1021E+05

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1021E+05

UCL95 T-DISTRIBUTION = 0.8471E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8034E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1070E+04

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1621E+04

UCL95 FROM LOG JACKKNIFE = 0.8512E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1432E+04

UCL95 FROM H-STATISTIC = 0.1112E+09

all_soil_r_2chlorophenol_data

7.3
0.19
0.195
0.18
390
25
24
0.175
0.185
0.19
0.19
0.175

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.95100E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.3731E+02
SQUARE ROOT OF VARIANCE= 0.1067E+03
STANDARD DEVIATION= 0.1115E+03
SKEWNESS= 0.2978E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2987E+01
MINIMUM = 0.1750E+00
MAXIMUM = 0.3900E+03

MEAN OF LOG DATA = 0.7049E-01
STANDARD DEVIATION OF LOG DATA = 0.2743E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6611E+01

MVUE ESTIMATE OF THE MEAN = 0.1867E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.824E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1486E+02

MLE ESTIMATE OF THE MEAN = 0.4617E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1986E+04

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.9873E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2154E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.3756E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3077E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3694E+02
B = 0.3028E+02
R = 0.9561E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1132E+01
B = 0.1857E+01
R = 0.8522E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1917E+01
B = 0.4046E+01
R = 0.6222E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1003E+03

UCL95 STANDARD BOOT = 0.8817E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.5879E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5828E+03

UCL95 T-DISTRIBUTION = 0.9510E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.9024E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1198E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1811E+03

UCL95 FROM LOG JACKKNIFE = 0.4856E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.8510E+02

UCL95 FROM H-STATISTIC = 0.1094E+05

all_soil_r_2nitroaniline_data

0.9
1
0.95
0.9
1
0.028
7
0.9
1

2 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

2 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 9

UCL95(T-DIST.) = 0.28082E+01

NUMBER OF DATA POINTS = 9
MEAN= 0.1520E+01
SQUARE ROOT OF VARIANCE= 0.1959E+01
STANDARD DEVIATION= 0.2078E+01
SKEWNESS= 0.2363E+01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.1367E+01
MINIMUM = 0.2800E-01
MAXIMUM = 0.7000E+01

MEAN OF LOG DATA = -0.2219E+00
STANDARD DEVIATION OF LOG DATA = 0.1421E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.4238E+01

MVUE ESTIMATE OF THE MEAN = 0.1837E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.289E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.9016E+00

MLE ESTIMATE OF THE MEAN = 0.2200E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5626E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1969E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.7782E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1511E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6489E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1497E+01
B = 0.6564E+00
R = 0.9701E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1202E+01
B = 0.2341E+01
R = 0.6861E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3019E+01
B = 0.5309E+01
R = 0.7712E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2859E+01

UCL95 STANDARD BOOT = 0.2578E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.2679E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2377E+02

UCL95 T-DISTRIBUTION = 0.2808E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2659E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3242E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.4616E+01

UCL95 FROM LOG JACKKNIFE = 0.3417E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.5867E+01

UCL95 FROM H-STATISTIC = 0.1850E+02

7.2
6.4
7.2
2.5
6.2
5.5
3.6
6.1
12
5.4
4.7
6.6

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.73235E+01

NUMBER OF DATA POINTS = 12
MEAN= 0.6117E+01
SQUARE ROOT OF VARIANCE= 0.2229E+01
STANDARD DEVIATION= 0.2328E+01
SKEWNESS= 0.1051E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.3805E+00
MINIMUM = 0.2500E+01
MAXIMUM = 0.1200E+02

MEAN OF LOG DATA = 0.1745E+01
STANDARD DEVIATION OF LOG DATA = 0.3863E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2012E+01

MVUE ESTIMATE OF THE MEAN = 0.6132E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.241E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6939E+00

MLE ESTIMATE OF THE MEAN = 0.6172E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2476E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.6136E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.6525E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6111E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.6482E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6102E+01
B = 0.6457E+00
R = 0.9984E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5511E-01
B = 0.3465E+00
R = 0.9953E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4953E-01
B = 0.3922E+00
R = 0.9943E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.7225E+01

UCL95 STANDARD BOOT = 0.7177E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.7625E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.7694E+01

UCL95 T-DISTRIBUTION = 0.7323E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7222E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7440E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9120E+01

UCL95 FROM LOG JACKKNIFE = 0.7308E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.9233E+01

UCL95 FROM H-STATISTIC = 0.7802E+01

all_soil_r_benzene_data

0.0016
110
0.006
22
4.2
28
0.023
0.00068
0.0021
0.0016
150
0.0014

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.52183E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.2619E+02
SQUARE ROOT OF VARIANCE= 0.4801E+02
STANDARD DEVIATION= 0.5014E+02
SKEWNESS= 0.1770E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1915E+01
MINIMUM = 0.6800E-03
MAXIMUM = 0.1500E+03

MEAN OF LOG DATA = -0.2019E+01
STANDARD DEVIATION OF LOG DATA = 0.5034E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1185E+02

MVUE ESTIMATE OF THE MEAN = 0.2768E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.373E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2722E+03

MLE ESTIMATE OF THE MEAN = 0.4217E+05
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1339E+11

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3467E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4434E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.2619E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1386E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2583E+02
B = 0.1399E+02
R = 0.9963E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2009E+00
B = 0.6035E+00
R = 0.8259E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3326E-01
B = 0.3528E+00
R = 0.9490E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5084E+02

UCL95 STANDARD BOOT = 0.4899E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1373E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.9208E+02

UCL95 T-DISTRIBUTION = 0.5218E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5000E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5790E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.9089E+02

UCL95 FROM LOG JACKKNIFE = 0.1143E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.1493E+04

UCL95 FROM H-STATISTIC = 0.2715E+13

all_soil_r_betaBHC_data

0.105
2.2
0.0009
0.115
0.00095
0.0018
0.01
0.001
0.001
1.4
0.0009

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

UCL95(T-DIST.) = 0.75345E+00

NUMBER OF DATA POINTS = 11
MEAN= 0.3488E+00
SQUARE ROOT OF VARIANCE= 0.7062E+00
STANDARD DEVIATION= 0.7407E+00
SKEWNESS= 0.1855E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.2124E+01
MINIMUM = 0.9000E-03
MAXIMUM = 0.2200E+01

MEAN OF LOG DATA = -0.4456E+01
STANDARD DEVIATION OF LOG DATA = 0.3089E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7701E+01

MVUE ESTIMATE OF THE MEAN = 0.3565E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.177E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3061E+00

MLE ESTIMATE OF THE MEAN = 0.1372E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1621E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2499E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4309E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.3479E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2115E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3399E+00
B = 0.2183E+00
R = 0.9951E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7258E+00
B = 0.1640E+01
R = 0.6710E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1221E+01
B = 0.2943E+01
R = 0.5091E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.7382E+00

UCL95 STANDARD BOOT = 0.6958E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.5855E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5905E+01

UCL95 T-DISTRIBUTION = 0.7534E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7162E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.8496E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1347E+01

UCL95 FROM LOG JACKKNIFE = 0.1031E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1725E+01

UCL95 FROM H-STATISTIC = 0.2538E+04

all_soil_r_chlorobenzene_data

0.0026
0.0014
0.055
0.0031
120
0.064
220
31
27
0.00355
2400
0.0018

all_soil_r_chlorobenzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.58869E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.2332E+03
SQUARE ROOT OF VARIANCE= 0.6565E+03
STANDARD DEVIATION= 0.6857E+03
SKEWNESS= 0.2965E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2941E+01
MINIMUM = 0.1400E-02
MAXIMUM = 0.2400E+04

MEAN OF LOG DATA = -0.9346E+00
STANDARD DEVIATION OF LOG DATA = 0.5431E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1276E+02

MVUE ESTIMATE OF THE MEAN = 0.2075E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.326E+05
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2054E+04

MLE ESTIMATE OF THE MEAN = 0.9984E+06
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2538E+13

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2666E+04
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3392E+04

AVERAGE OF BOOTSTRAPPED VALUES = 0.2348E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1916E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2249E+03
B = 0.1908E+03
R = 0.9585E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1188E+01
B = 0.1962E+01
R = 0.8674E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2140E+01
B = 0.4672E+01
R = 0.5377E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6226E+03

UCL95 STANDARD BOOT = 0.5500E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.4515E+04

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4491E+04

UCL95 T-DISTRIBUTION = 0.5887E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5588E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7398E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1118E+04

UCL95 FROM LOG JACKKNIFE = 0.8758E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.1126E+05

UCL95 FROM H-STATISTIC = 0.1195E+16

9.8
0.00355
0.00245
0.0028
0.0025
5.6
0.0033
5.4
1.7
11
0.00275
0.00265

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.49300E+01

NUMBER OF DATA POINTS = 12
MEAN= 0.2793E+01
SQUARE ROOT OF VARIANCE= 0.3946E+01
STANDARD DEVIATION= 0.4121E+01
SKEWNESS= 0.1062E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1475E+01
MINIMUM = 0.2450E-02
MAXIMUM = 0.1100E+02

MEAN OF LOG DATA = -0.2704E+01
STANDARD DEVIATION OF LOG DATA = 0.3935E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.9321E+01

MVUE ESTIMATE OF THE MEAN = 0.1217E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.102E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1142E+02

MLE ESTIMATE OF THE MEAN = 0.1544E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3561E+06

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1390E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1650E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2795E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1136E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2783E+01
B = 0.1143E+01
R = 0.9982E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.5367E-01
B = 0.3486E+00
R = 0.9815E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.2740E-02
B = 0.2765E+00
R = 0.9990E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4776E+01

UCL95 STANDARD BOOT = 0.4664E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.6056E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5143E+01

UCL95 T-DISTRIBUTION = 0.4930E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4750E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5140E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8111E+01

UCL95 FROM LOG JACKKNIFE = 0.4354E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.6322E+02

UCL95 FROM H-STATISTIC = 0.9809E+07

all_soil_r_dieldrin_data

0.0014
1.8
0.22
0.00037
0.00195
0.01
0.001
0.0019
0.11
0.00175
1.6

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

COEFFICIENT OF VARIATION = 0.19867E+01
MAXIMUM DATA VALUE = 0.18000E+01

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.12155E+01

NUMBER OF DATA POINTS = 11
MEAN= 0.3408E+00
SQUARE ROOT OF VARIANCE= 0.6455E+00
STANDARD DEVIATION= 0.6770E+00
SKEWNESS= 0.1629E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.1987E+01
MINIMUM = 0.3700E-03
MAXIMUM = 0.1800E+01

MEAN OF LOG DATA = -0.4319E+01
STANDARD DEVIATION OF LOG DATA = 0.3092E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7708E+01

MVUE ESTIMATE OF THE MEAN = 0.4115E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.205E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3535E+00

MLE ESTIMATE OF THE MEAN = 0.1589E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1895E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3206E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.4939E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.3369E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1920E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3310E+00
B = 0.1954E+00
R = 0.9902E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3960E+00
B = 0.9951E+00
R = 0.7187E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2870E+00
B = 0.8999E+00
R = 0.6183E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.6602E+00

UCL95 STANDARD BOOT = 0.6528E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.3315E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3308E+01

UCL95 T-DISTRIBUTION = 0.7106E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6765E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7837E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1253E+01

UCL95 FROM LOG JACKKNIFE = 0.1215E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1991E+01

UCL95 FROM H-STATISTIC = 0.2982E+04

all_soil_r_ethylbenzene_data

0.00044
0.00031
8.5
0.00044
0.00038
0.00024
0.0019
21
0.0066
12
42
25

all_soil_r_ethylbenzene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.16146E+02

all_soil_r_ethylbenzene_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.9043E+01
SQUARE ROOT OF VARIANCE= 0.1312E+02
STANDARD DEVIATION= 0.1370E+02
SKEWNESS= 0.1345E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1515E+01
MINIMUM = 0.2400E-03
MAXIMUM = 0.4200E+02

MEAN OF LOG DATA = -0.3034E+01
STANDARD DEVIATION OF LOG DATA = 0.5348E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1257E+02

MVUE ESTIMATE OF THE MEAN = 0.2089E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.318E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2065E+03

MLE ESTIMATE OF THE MEAN = 0.7810E+05
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1268E+12

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3098E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3472E+03

AVERAGE OF BOOTSTRAPPED VALUES = 0.9069E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.3840E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.9001E+01
B = 0.3865E+01
R = 0.9979E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.6909E-01
B = 0.3686E+00
R = 0.9780E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.3618E-02
B = 0.2969E+00
R = 0.9996E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1575E+02

UCL95 STANDARD BOOT = 0.1539E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.2060E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2024E+02

UCL95 T-DISTRIBUTION = 0.1615E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1555E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1719E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2672E+02

UCL95 FROM LOG JACKKNIFE = 0.9334E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.1132E+04

UCL95 FROM H-STATISTIC = 0.4976E+14

all_soil_r_heptachlor_data

0.00095
0.001
0.01
0.001
0.21
0.105
0.0009
0.0018
1.6
0.0009
0.115

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 11

UCL95(T-DIST.) = 0.44507E+00

NUMBER OF DATA POINTS = 11
MEAN= 0.1860E+00
SQUARE ROOT OF VARIANCE= 0.4520E+00
STANDARD DEVIATION= 0.4741E+00
SKEWNESS= 0.2739E+01
CRITICAL SKEWNESS = 0.9240E+00
COEFFICIENT OF VARIATION= 0.2548E+01
MINIMUM = 0.9000E-03
MAXIMUM = 0.1600E+01

MEAN OF LOG DATA = -0.4658E+01
STANDARD DEVIATION OF LOG DATA = 0.2778E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.6965E+01

MVUE ESTIMATE OF THE MEAN = 0.1663E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.699E+00
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1348E+00

MLE ESTIMATE OF THE MEAN = 0.4498E+00
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.2131E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1335E+00
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1777E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.1849E+00

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1349E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1829E+00
B = 0.1349E+00
R = 0.9720E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.6824E+00
B = 0.1246E+01
R = 0.8692E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.2346E+00
B = 0.6450E+00
R = 0.9160E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4579E+00

UCL95 STANDARD BOOT = 0.4068E+00

UCL95 BOOTSTRAP-T FROM SORT = 0.1961E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1433E+01

UCL95 T-DISTRIBUTION = 0.4451E+00

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4212E+00

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5473E+00

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8250E+00

UCL95 FROM LOG JACKKNIFE = 0.4555E+00

UCL95 LN CHEBYCHEV INEQUALITY = 0.7686E+00

UCL95 FROM H-STATISTIC = 0.2042E+03

51
24.5
49
51
76
43
36
5.2
85

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NORMAL-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

UCL95(T-DIST.) = 0.61790E+02

NUMBER OF DATA POINTS = 9
MEAN= 0.4674E+02
SQUARE ROOT OF VARIANCE= 0.2288E+02
STANDARD DEVIATION= 0.2427E+02
SKEWNESS= -0.2609E-01
CRITICAL SKEWNESS = 0.9636E+00
COEFFICIENT OF VARIATION= 0.5191E+00
MINIMUM = 0.5200E+01
MAXIMUM = 0.8500E+02

MEAN OF LOG DATA = 0.3636E+01
STANDARD DEVIATION OF LOG DATA = 0.8316E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2878E+01

MVUE ESTIMATE OF THE MEAN = 0.5112E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.443E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1460E+02

MLE ESTIMATE OF THE MEAN = 0.5360E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5351E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5301E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.7747E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.4674E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.7572E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.4673E+02
B = 0.7613E+01
R = 0.9999E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1750E-02
B = 0.3909E+00
R = 0.9990E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4018E-02
B = 0.4066E+00
R = 0.9956E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5928E+02

UCL95 STANDARD BOOT = 0.5919E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.6236E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.6246E+02

UCL95 T-DISTRIBUTION = 0.6179E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6005E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.5998E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.8290E+02

UCL95 FROM LOG JACKKNIFE = 0.6742E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1164E+03

UCL95 FROM H-STATISTIC = 0.1249E+03

all_soil_r_mercury_data

2
3000
0.06
0.064
0.047
0.17
0.037
1.1
0.063
0.19
2.6
0.076

all_soil_r_mercury_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.69945E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.2505E+03
SQUARE ROOT OF VARIANCE= 0.8290E+03
STANDARD DEVIATION= 0.8659E+03
SKEWNESS= 0.3015E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.3456E+01
MINIMUM = 0.3700E-01
MAXIMUM = 0.3000E+04

MEAN OF LOG DATA = -0.9117E+00
STANDARD DEVIATION OF LOG DATA = 0.3182E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.7604E+01

MVUE ESTIMATE OF THE MEAN = 0.1585E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.901E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1371E+02

MLE ESTIMATE OF THE MEAN = 0.6356E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1005E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = -0.6919E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1878E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.2469E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2357E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2374E+03
B = 0.2382E+03
R = 0.9286E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1106E+03
B = 0.1489E+03
R = 0.8541E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1319E+07
B = 0.2518E+07
R = 0.6274E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.7503E+03

UCL95 STANDARD BOOT = 0.6346E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.3612E+06

all_soil_r_mercury_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2962E+06

UCL95 T-DISTRIBUTION = 0.6994E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.6617E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.8942E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1368E+04

UCL95 FROM LOG JACKKNIFE = 0.2681E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.7714E+02

UCL95 FROM H-STATISTIC = 0.9371E+05

all_soil_r_naphthalene_data

0.185
0.195
8.1
0.19
6.2
0.175
0.19
4.6
0.175
0.18
0.19
120

all_soil_r_naphthalene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.29442E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.1170E+02
SQUARE ROOT OF VARIANCE= 0.3277E+02
STANDARD DEVIATION= 0.3422E+02
SKEWNESS= 0.2979E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2925E+01
MINIMUM = 0.1750E+00
MAXIMUM = 0.1200E+03

MEAN OF LOG DATA = -0.2729E+00
STANDARD DEVIATION OF LOG DATA = 0.2233E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5474E+01

MVUE ESTIMATE OF THE MEAN = 0.5587E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.178E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3835E+01

MLE ESTIMATE OF THE MEAN = 0.9218E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1113E+03

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3632E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5372E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1157E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.9379E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1122E+02
B = 0.9502E+01
R = 0.9531E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1263E+01
B = 0.1926E+01
R = 0.8823E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1077E+01
B = 0.2297E+01
R = 0.6226E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3116E+02

UCL95 STANDARD BOOT = 0.2700E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1886E+03

all_soil_r_naphthalene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2262E+03

UCL95 T-DISTRIBUTION = 0.2944E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.2795E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3703E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5586E+02

UCL95 FROM LOG JACKKNIFE = 0.1328E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.2273E+02

UCL95 FROM H-STATISTIC = 0.3678E+03

all_soil_r_nitrobenzene_data

27
0.195
1.1
0.18
0.19
0.19
2
0.175
0.19
0.185
0.175
48

all_soil_r_nitrobenzene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

1 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.14465E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.6632E+01
SQUARE ROOT OF VARIANCE= 0.1446E+02
STANDARD DEVIATION= 0.1511E+02
SKEWNESS= 0.2116E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2278E+01
MINIMUM = 0.1750E+00
MAXIMUM = 0.4800E+02

MEAN OF LOG DATA = -0.4625E+00
STANDARD DEVIATION OF LOG DATA = 0.2058E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.5088E+01

MVUE ESTIMATE OF THE MEAN = 0.3521E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.993E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2257E+01

MLE ESTIMATE OF THE MEAN = 0.5233E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4316E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2245E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.3365E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.6565E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.4168E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.6424E+01
B = 0.4362E+01
R = 0.9905E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1100E+01
B = 0.2342E+01
R = 0.6477E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1053E+02
B = 0.2320E+02
R = 0.4727E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.1452E+02

UCL95 STANDARD BOOT = 0.1342E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1731E+03

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1729E+03

UCL95 T-DISTRIBUTION = 0.1446E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1381E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1665E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.2613E+02

UCL95 FROM LOG JACKKNIFE = 0.8289E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.1361E+02

UCL95 FROM H-STATISTIC = 0.1230E+03

0.95
23
1
0.9
10.5
0.9
1
1
1
0.9

all_soil_r_pnitroaniline_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 10

UCL95(T-DIST.) = 0.83360E+01

NUMBER OF DATA POINTS = 10
MEAN= 0.4115E+01
SQUARE ROOT OF VARIANCE= 0.6908E+01
STANDARD DEVIATION= 0.7282E+01
SKEWNESS= 0.2045E+01
CRITICAL SKEWNESS = 0.9420E+00
COEFFICIENT OF VARIATION= 0.1770E+01
MINIMUM = 0.9000E+00
MAXIMUM = 0.2300E+02

MEAN OF LOG DATA = 0.5119E+00
STANDARD DEVIATION OF LOG DATA = 0.1191E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.3510E+01

MVUE ESTIMATE OF THE MEAN = 0.3058E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.401E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1216E+01

MLE ESTIMATE OF THE MEAN = 0.3393E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.6007E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2670E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1811E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.4112E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2185E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.4037E+01
B = 0.2259E+01
R = 0.9880E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7163E+01
B = 0.1430E+02
R = 0.5953E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1615E+03
B = 0.3545E+03
R = 0.4578E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8240E+01

UCL95 STANDARD BOOT = 0.7707E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.4930E+03

all_soil_r_pnitroaniline_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.5042E+03

UCL95 T-DISTRIBUTION = 0.8336E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.7903E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.9495E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1441E+02

UCL95 FROM LOG JACKKNIFE = 0.5989E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.8494E+01

UCL95 FROM H-STATISTIC = 0.1367E+02

all_soil_r_tetrachloroethene_data

0.012
0.01
1200
2
0.0036
0.00355
0.00245
880
0.0046
0.0026
610
2.3

all_soil_r_tetrachloroethene_mstat

0 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.44458E+03

all_soil_r_tetrachloroethene_sboot

NUMBER OF DATA POINTS = 12
MEAN= 0.2245E+03
SQUARE ROOT OF VARIANCE= 0.4064E+03
STANDARD DEVIATION= 0.4244E+03
SKEWNESS= 0.1448E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1890E+01
MINIMUM = 0.2450E-02
MAXIMUM = 0.1200E+04

MEAN OF LOG DATA = -0.1319E+01
STANDARD DEVIATION OF LOG DATA = 0.5414E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1273E+02

MVUE ESTIMATE OF THE MEAN = 0.1357E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.212E+05
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1343E+04

MLE ESTIMATE OF THE MEAN = 0.6197E+06
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1436E+13

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5209E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2424E+04

AVERAGE OF BOOTSTRAPPED VALUES = 0.2269E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1184E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2235E+03
B = 0.1168E+03
R = 0.9972E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.7223E-01
B = 0.3780E+00
R = 0.9567E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = 0.1816E-01
B = 0.2580E+00
R = 0.9955E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.4266E+03

UCL95 STANDARD BOOT = 0.4216E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.6425E+03

all_soil_r_tetrachloroethene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4434E+03

UCL95 T-DISTRIBUTION = 0.4446E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.4261E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.4808E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.7722E+03

UCL95 FROM LOG JACKKNIFE = 0.4875E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.7358E+04

UCL95 FROM H-STATISTIC = 0.6515E+15

all_soil_r_toluene_data

200
340
360
0.00245
0.00355
0.0033
0.0018
0.0029
0.046
830
410
0.00275

all_soil_r_toluene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.31467E+03

NUMBER OF DATA POINTS = 12
MEAN= 0.1783E+03
SQUARE ROOT OF VARIANCE= 0.2518E+03
STANDARD DEVIATION= 0.2629E+03
SKEWNESS= 0.1356E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1474E+01
MINIMUM = 0.1800E-02
MAXIMUM = 0.8300E+03

MEAN OF LOG DATA = -0.7295E+00
STANDARD DEVIATION OF LOG DATA = 0.5959E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1399E+02

MVUE ESTIMATE OF THE MEAN = 0.9036E+04
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.172E+06
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.8991E+04

MLE ESTIMATE OF THE MEAN = 0.2479E+08
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1274E+16

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1417E+05
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1617E+05

AVERAGE OF BOOTSTRAPPED VALUES = 0.1779E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.7227E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1765E+03
B = 0.7220E+02
R = 0.9987E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.6915E-01
B = 0.3561E+00
R = 0.9811E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1402E-01
B = 0.3002E+00
R = 0.9981E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3017E+03

UCL95 STANDARD BOOT = 0.2968E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.3859E+03

all_soil_r_toluene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3314E+03

UCL95 T-DISTRIBUTION = 0.3147E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3032E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3350E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.5176E+03

UCL95 FROM LOG JACKKNIFE = 0.4322E+05

UCL95 LN CHEBYCHEV INEQUALITY = 0.4923E+05

UCL95 FROM H-STATISTIC = 0.2028E+19

all_soil_r_totalpcbs_data

0.0497
12.2
208.64
0.04505
6.302
1.9066
0.04287
0.3004
0.0468
0.04775
0.0449
264.5

all_soil_r_totalpcbs_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.88935E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.4118E+02
SQUARE ROOT OF VARIANCE= 0.8819E+02
STANDARD DEVIATION= 0.9211E+02
SKEWNESS= 0.1849E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2237E+01
MINIMUM = 0.4287E-01
MAXIMUM = 0.2645E+03

MEAN OF LOG DATA = -0.3129E+00
STANDARD DEVIATION OF LOG DATA = 0.3395E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.8086E+01

MVUE ESTIMATE OF THE MEAN = 0.4374E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.279E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.3897E+02

MLE ESTIMATE OF THE MEAN = 0.2326E+03
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.7396E+05

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2833E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.5569E+02

AVERAGE OF BOOTSTRAPPED VALUES = 0.4096E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2528E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.3991E+02
B = 0.2567E+02
R = 0.9917E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.9678E+00
B = 0.2130E+01
R = 0.6407E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.7559E+01
B = 0.1685E+02
R = 0.4628E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8523E+02

UCL95 STANDARD BOOT = 0.8255E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1008E+04

all_soil_r_totalpcbs_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1014E+04

UCL95 T-DISTRIBUTION = 0.8894E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8492E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1001E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1600E+03

UCL95 FROM LOG JACKKNIFE = 0.1283E+03

UCL95 LN CHEBYCHEV INEQUALITY = 0.2179E+03

UCL95 FROM H-STATISTIC = 0.9143E+06

1_1_trichloroethylene_data

0.019
2200
1.2
810
0.00355
0.016
1.55
0.0003
0.00245
0.00074
29
0.012

all_soil_r_trichloroethylene_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

COEFFICIENT OF VARIATION = 0.25858E+01
MAXIMUM DATA VALUE = 0.22000E+04

CV>=1 OR N<30, USE LOG-JACKKNIFE

UCL95(LOG-JACKKNIFE)= 0.27144E+04

NUMBER OF DATA POINTS = 12
MEAN= 0.2535E+03
SQUARE ROOT OF VARIANCE= 0.6276E+03
STANDARD DEVIATION= 0.6555E+03
SKEWNESS= 0.2492E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.2586E+01
MINIMUM = 0.3000E-03
MAXIMUM = 0.2200E+04

MEAN OF LOG DATA = -0.1759E+01
STANDARD DEVIATION OF LOG DATA = 0.5365E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1261E+02

MVUE ESTIMATE OF THE MEAN = 0.7777E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.119E+05
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.7691E+03

MLE ESTIMATE OF THE MEAN = 0.3060E+06
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.5438E+12

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.3004E+03
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1344E+04

AVERAGE OF BOOTSTRAPPED VALUES = 0.2512E+03

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1799E+03

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2418E+03
B = 0.1828E+03
R = 0.9895E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.2962E+01
B = 0.6027E+01
R = 0.6147E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.5577E+03
B = 0.1200E+04
R = 0.4912E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.5717E+03

UCL95 STANDARD BOOT = 0.5472E+03

UCL95 BOOTSTRAP-T FROM SORT = 0.2007E+05

all_soil_r_trichloroethylene_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2002E+05

UCL95 T-DISTRIBUTION = 0.5933E+03

UCL95 FROM CENTRAL LIMIT THEOREM = 0.5647E+03

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.7102E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1099E+04

UCL95 FROM LOG JACKKNIFE = 0.2714E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.4215E+04

UCL95 FROM H-STATISTIC = 0.2215E+15

_soil_r_totalxylenes_data

0.00095
0.041
43
110
97
0.00099
0.0013
14
0.00095
0.0091
280
0.007

all_soil_r_totalxylenes_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 12

UCL95(T-DIST.) = 0.88797E+02

NUMBER OF DATA POINTS = 12
MEAN= 0.4534E+02
SQUARE ROOT OF VARIANCE= 0.8025E+02
STANDARD DEVIATION= 0.8382E+02
SKEWNESS= 0.2039E+01
CRITICAL SKEWNESS = 0.9060E+00
COEFFICIENT OF VARIATION= 0.1849E+01
MINIMUM = 0.9500E-03
MAXIMUM = 0.2800E+03

MEAN OF LOG DATA = -0.1586E+01
STANDARD DEVIATION OF LOG DATA = 0.5321E+01

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1251E+02

MVUE ESTIMATE OF THE MEAN = 0.8356E+03
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.126E+05
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.8258E+03

MLE ESTIMATE OF THE MEAN = 0.2888E+06
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.4072E+12

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1207E+04
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.1376E+04

AVERAGE OF BOOTSTRAPPED VALUES = 0.4568E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2335E+02

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.4507E+02
B = 0.2334E+02
R = 0.9942E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1339E+00
B = 0.4446E+00
R = 0.9512E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1918E-01
B = 0.3091E+00
R = 0.9933E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.8842E+02

UCL95 STANDARD BOOT = 0.8410E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.1407E+03

all_soil_r_totalxylenes_sboot

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.1016E+03

UCL95 T-DISTRIBUTION = 0.8880E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8514E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1004E+03

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1535E+03

UCL95 FROM LOG JACKKNIFE = 0.3677E+04

UCL95 LN CHEBYCHEV INEQUALITY = 0.4527E+04

UCL95 FROM H-STATISTIC = 0.1510E+15

sediment_river_arsenic_data

1.8
1.4
2
2.1
2
6.1
1.4
1.4
1
1.8
2.5
1.9
1.85
1.6
3.1
1.4
3
2.9
4.35
5.4
4.8
2.1
5.25
2.7
2.2
2.9
4.8
7.5
2.6
2.6
3.9
1.8
3.7
2.9

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

0 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS CONFIRMED LOGNORMAL-SEE FILES SW.OUT AND AD.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 34

COEFFICIENT OF VARIATION = 0.52929E+00
MAXIMUM DATA VALUE = 0.75000E+01

UCL95(H-STAT.)= 0.34106E+01

NUMBER OF DATA POINTS = 34
MEAN= 0.2904E+01
SQUARE ROOT OF VARIANCE= 0.1515E+01
STANDARD DEVIATION= 0.1537E+01
SKEWNESS= 0.1222E+01
CRITICAL SKEWNESS = 0.6292E+00
COEFFICIENT OF VARIATION= 0.5293E+00
MINIMUM = 0.1000E+01
MAXIMUM = 0.7500E+01

MEAN OF LOG DATA = 0.9466E+00
STANDARD DEVIATION OF LOG DATA = 0.4871E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.1907E+01

MVUE ESTIMATE OF THE MEAN = 0.2890E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.147E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.2520E+00

MLE ESTIMATE OF THE MEAN = 0.2901E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1501E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.2889E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2674E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.2904E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.2575E+00

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.2902E+01
B = 0.2589E+00
R = 0.9996E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.1677E-01
B = 0.1822E+00
R = 0.9963E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.1296E-02
B = 0.1742E+00
R = 0.9999E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.3343E+01

UCL95 STANDARD BOOT = 0.3328E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.3439E+01

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.3421E+01

UCL95 T-DISTRIBUTION = 0.3351E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.3338E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.3397E+01

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.4083E+01

UCL95 FROM LOG JACKKNIFE = 0.3342E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.4016E+01

UCL95 FROM H-STATISTIC = 0.3411E+01

surfacewater_river_24dichlorophenol_data

5
1.5
4.1
5
5
5
5
5
5
5
5
5
5
5
3.2
5
5
5
1.7
1.7
2
1.2
1.2
5
5
5
5
2.8
5
5
5
5
69
5
5
3

6 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

6 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 36

UCL95(STANDARD BOOTSTRAP)= 0.89468E+01

NUMBER OF DATA POINTS = 36
MEAN= 0.6011E+01
SQUARE ROOT OF VARIANCE= 0.1073E+02
STANDARD DEVIATION= 0.1088E+02
SKEWNESS= 0.5606E+01
CRITICAL SKEWNESS = 0.6144E+00
COEFFICIENT OF VARIATION= 0.1810E+01
MINIMUM = 0.1200E+01
MAXIMUM = 0.6900E+02

MEAN OF LOG DATA = 0.1436E+01
STANDARD DEVIATION OF LOG DATA = 0.6619E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2041E+01

MVUE ESTIMATE OF THE MEAN = 0.5195E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.375E+01
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.6180E+00

MLE ESTIMATE OF THE MEAN = 0.5233E+01
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.3880E+01

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.5143E+01
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.9213E+00

AVERAGE OF BOOTSTRAPPED VALUES = 0.6003E+01

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.1789E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.5923E+01
B = 0.1757E+01
R = 0.9616E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.4635E+00
B = 0.6802E+00
R = 0.8599E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.7933E+00
B = 0.1174E+01
R = 0.8671E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.9603E+01

UCL95 STANDARD BOOT = 0.8947E+01

UCL95 BOOTSTRAP-T FROM SORT = 0.2157E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.2099E+02

UCL95 T-DISTRIBUTION = 0.9077E+01

UCL95 FROM CENTRAL LIMIT THEOREM = 0.8994E+01

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.1081E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.1412E+02

UCL95 FROM LOG JACKKNIFE = 0.6701E+01

UCL95 LN CHEBYCHEV INEQUALITY = 0.7958E+01

UCL95 FROM H-STATISTIC = 0.6576E+01

surfacewater_river_pchloroaniline_data

1.2
10
9.4
10
2
10
10
8.1
10
10
10
2.3
2.2
3.2
10
1.8
3.4
5.7
10
10
10
10
16
10
14
10
10
160
10
10
4
10
10
1.4
10
5.2

surfacewater_river_pchloroaniline_mstat

1 OUTLIERS FOUND (ASSUMING NORMAL DISTRIBUTION)
SEE FILE OUTLX.OUT FOR MORE DETAILS

4 OUTLIERS FOUND (ASSUMING LOGNORMAL DISTRIBUTION)
SEE FILE OUTLY.OUT FOR MORE DETAILS

DISTRIBUTION IS NON-PARAMETRIC-SEE FILE SW.OUT FOR DETAILS

RESULTS OF UCL95 ANALYSIS-SEE FILES SBOOT.OUT AND SBOOT.DIA FOR DETAILS

NUMBER OF DATA POINTS= 36

UCL95(STANDARD BOOTSTRAP)= 0.19022E+02

NUMBER OF DATA POINTS = 36
MEAN= 0.1222E+02
SQUARE ROOT OF VARIANCE= 0.2525E+02
STANDARD DEVIATION= 0.2561E+02
SKEWNESS= 0.5553E+01
CRITICAL SKEWNESS = 0.6144E+00
COEFFICIENT OF VARIATION= 0.2096E+01
MINIMUM = 0.1200E+01
MAXIMUM = 0.1600E+03

MEAN OF LOG DATA = 0.1985E+01
STANDARD DEVIATION OF LOG DATA = 0.8755E+00

H95 STATISTIC BY LAGRANGIAN INTERPOLATION = 0.2247E+01

MVUE ESTIMATE OF THE MEAN = 0.1053E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION = 0.107E+02
MVUE ESTIMATE OF THE STANDARD DEVIATION OF THE MEAN = 0.1733E+01

MLE ESTIMATE OF THE MEAN = 0.1068E+02
MLE ESTIMATE OF THE STANDARD DEVIATION = 0.1146E+02

JACKNIFE MEAN BASED UPON LOGNORMAL MVUE = 0.1043E+02
JACKNIFE STANDARD DEVIATION OF THE MEAN = 0.2165E+01

AVERAGE OF BOOTSTRAPPED VALUES = 0.1218E+02

SQUARE ROOT OF VARIANCE OF BOOTSTRAPPED VALUES = 0.4158E+01

QUANTILE ANALYSIS FOR BOOTSTRAPPED MEANS
A = 0.1202E+02
B = 0.4136E+01
R = 0.9670E+00

QUANTILE ANALYSIS FOR "W" VALUES
A = -0.3788E+00
B = 0.5922E+00
R = 0.8851E+00

QUANTILE ANALYSIS FOR "Q" VALUES
A = -0.4448E+00
B = 0.7401E+00
R = 0.8914E+00

UCL95 DIRECTLY FROM BOOT SORT = 0.2057E+02

UCL95 STANDARD BOOT = 0.1902E+02

UCL95 BOOTSTRAP-T FROM SORT = 0.4580E+02

UCL95 HALLS BOOTSTRAP-T FROM SORT = 0.4181E+02

UCL95 T-DISTRIBUTION = 0.1943E+02

UCL95 FROM CENTRAL LIMIT THEOREM = 0.1924E+02

UCL95 FROM MODIFIED CENTRAL LIMIT THEOREM = 0.2346E+02

UCL95 FROM REGULAR CHEBYCHEV INEQUALITY= 0.3130E+02

UCL95 FROM LOG JACKKNIFE = 0.1409E+02

UCL95 LN CHEBYCHEV INEQUALITY = 0.1827E+02

UCL95 FROM H-STATISTIC = 0.1489E+02

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Combined Soil	O	Dioxin	2,3,7,8-TCDD-TEQ	6 : 6 : 6	0.006410843	0.0303515			3.04E-02	Max (<8 samples)	mg/kg
Combined Soil	O	PCB	Total PCBs	6 : 6 : 6	69.74128	297.95			2.98E+02	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	Aldrin	2 : 6 : 6	0.14565	0.72			7.20E-01	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	delta-BHC	4 : 6 : 6	0.917158333	2.85			2.85E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	Dieldrin	5 : 6 : 6	1.266483333	3.8			3.80E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	gamma-BHC (Lindane)	3 : 6 : 6	0.506158333	2.88			2.88E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	Heptachlor	5 : 6 : 6	0.786375	2.775			2.78E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Pesticide	Heptachlor Epoxide	2 : 6 : 6	0.14615	0.47			4.70E-01	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	1,4-Dichlorobenzene	2 : 5 : 6	18.717	47			4.70E+01	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	2,4,6-Trichlorophenol	2 : 5 : 6	2.577	6.9			6.90E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	2-Nitroaniline	2 : 4 : 6	1.12575	2.5			2.50E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	Benzo(a)anthracene	4 : 5 : 6	4.6106	12			1.20E+01	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	Benzo(a)pyrene	3 : 5 : 6	2.883	7.1			7.10E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	Benzo(b)fluoranthene	5 : 5 : 6	3.1716	7.9			7.90E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Semivolatile	Dibenzo(a,h)anthracene	3 : 4 : 6	0.852	3			3.00E+00	Max (<8 samples)	mg/kg
Combined Soil	O	Volatile	Benzene	4 : 6 : 6	96.44845	500			5.00E+02	Max (<8 samples)	mg/kg
Combined Soil	O	Volatile	Chlorobenzene	4 : 6 : 6	220.0471167	760			7.60E+02	Max (<8 samples)	mg/kg
Combined Soil	O	Volatile	Ethylbenzene	5 : 6 : 6	485.02928	2800			2.80E+03	Max (<8 samples)	mg/kg
Combined Soil	O	Volatile	Toluene	4 : 6 : 6	69.51421667	390			3.90E+02	Max (<8 samples)	mg/kg
Combined Soil	O	Volatile	Xylenes, Total	5 : 6 : 6	2463.443633	14000			1.40E+04	Max (<8 samples)	mg/kg
Combined Soil	O North	Dioxin	2,3,7,8-TCDD-TEQ	3 : 3 : 3	0.325051667	0.49375			4.97E-01	Max (<8 samples)	mg/kg
Combined Soil	O North	Metal	Arsenic	3 : 3 : 3	20	37			3.70E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Metal	Cadmium	3 : 3 : 3	39.33333333	86			8.60E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Metal	Mercury	3 : 3 : 3	165	360			3.60E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	PCB	Total PCBs	3 : 3 : 3	1784.433333	3026			3.03E+03	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	4,4'-DDE	2 : 3 : 3	17.00058333	33			3.30E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	4,4'-DDT	2 : 3 : 3	20.43391667	58			5.80E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	Aldrin	2 : 3 : 3	2.2003	4.5			4.50E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	alpha-BHC	1 : 3 : 3	0.598633333	1.5			1.50E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	beta-BHC	2 : 3 : 3	7.256966667	21			2.10E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	Dieldrin	3 : 3 : 3	19.46713333	50			5.00E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	Heptachlor	1 : 3 : 3	3.398633333	9.9			9.90E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Pesticide	Heptachlor Epoxide	1 : 3 : 3	1.2503	2.7			2.70E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	1,2-Dichlorobenzene	3 : 3 : 3	246.678	520			5.20E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	1,3-Dichlorobenzene	2 : 3 : 3	5.925	12			1.20E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	1,4-Dichlorobenzene	2 : 3 : 3	63.725	120			1.20E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	2,4,6-Trichlorophenol	2 : 3 : 3	24.05833333	61			6.10E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	2-Methylnaphthalene	2 : 3 : 3	82.725	200			2.00E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	2-Nitroaniline	1 : 3 : 3	22.96666667	62			6.20E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	4-Nitroaniline	2 : 3 : 3	343.3	1000			1.00E+03	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Benzo(a)anthracene	3 : 3 : 3	15.347	36			3.60E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Benzo(a)pyrene	3 : 3 : 3	6.515333333	11			1.10E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Benzo(b)fluoranthene	3 : 3 : 3	6.129666667	12			1.20E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	bis(2-Chloroethyl)ether	1 : 3 : 3	1.141666667	2.1			2.10E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Dibenzo(a,h)anthracene	2 : 3 : 3	2.125	4.6			4.60E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Hexachlorobenzene	1 : 3 : 3	1.941666667	4.5			4.50E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Naphthalene	2 : 3 : 3	18.39166667	41			4.10E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Semivolatile	Nitrobenzene	1 : 3 : 3	4.108333333	11			1.10E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Benzene	3 : 3 : 3	43.53	69			6.90E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Chlorobenzene	3 : 3 : 3	321.9333333	480			4.80E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Dichloromethane	2 : 3 : 3	36.73666667	87			8.70E+01	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Ethylbenzene	3 : 3 : 3	504.8	760			7.60E+02	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Tetrachloroethene	2 : 2 : 3	3.545	6.8			6.80E+00	Max (<8 samples)	mg/kg
Combined Soil	O North	Volatile	Xylenes, Total	3 : 3 : 3	2593.333333	3900			3.90E+03	Max (<8 samples)	mg/kg
Combined Soil	P	Dioxin	2,3,7,8-TCDD-TEQ	11 : 12 : 12	0.000283361	0.00126212	0.00044232	LOG-JACKKNIFE	4.42E-04	LOG-JACKKNIFE	mg/kg
Combined Soil	P	Metal	Arsenic	12 : 12 : 12	12.90833333	27	16.901	T-DIST.	1.69E+01	T-DIST.	mg/kg
Combined Soil	P	Metal	Cadmium	12 : 12 : 12	10.66416667	93	13.337	LOG-JACKKNIFE	1.33E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	P	PCB	Total PCBs	10 : 12 : 12	4.442541667	26.78	16.904	LOG-JACKKNIFE	1.69E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	P	Pesticide	Dieldrin	8 : 12 : 12	0.125541667	0.56	0.28249	LOG-JACKKNIFE	2.83E-01	LOG-JACKKNIFE	mg/kg
Combined Soil	P	Pesticide	MCPA (2-Methyl-4-Chlorophenoxyacetic Acid)	1 : 12 : 12	21.5875	210	52.609	T-DIST.	5.26E+01	T-DIST.	mg/kg
Combined Soil	P	Semivolatile	1,4-Dichlorobenzene	5 : 12 : 12	24.42083333	160	66.963	LOG-JACKKNIFE	6.70E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	P	Semivolatile	Benzo(a)pyrene	3 : 4 : 12	0.263	0.67			0.67	Max (<8 samples)	mg/kg
Combined Soil	P	Volatile	Benzene	8 : 11 : 11	0.6615	2.3	1.1196	T-DIST.	1.12E+00	T-DIST.	mg/kg

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Combined Soil	P	Volatile	Ethylbenzene	9 : 11 : 11	8.690400909	78	110.38	LOG-JACKKNIFE	7.80E+01	Max (UCL>Max)	mg/kg
Combined Soil	P	Volatile	Tetrachloroethene	9 : 11 : 11	13.08925	140	15.35	LOG-JACKKNIFE	1.54E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	P	Volatile	Trichloroethylene	6 : 11 : 11	0.200576364	0.99	1.0091	LOG-JACKKNIFE	9.90E-01	Max (UCL>Max)	mg/kg
Combined Soil	P	Volatile	Xylenes, Total	8 : 11 : 11	40.21443364	380	572.3	LOG-JACKKNIFE	3.60E+02	Max (UCL>Max)	mg/kg
Combined Soil	Q Central	Dioxin	2,3,7,8-TCDD-TEQ	8 : 9 : 9	0.002422787	0.0103505	0.0037854	LOG-JACKKNIFE	3.79E-03	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Metal	Arsenic	9 : 9 : 9	14.72222222	57	22.176	LOG-JACKKNIFE	2.22E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Metal	Copper	9 : 9 : 9	2291.222222	20000	6408.7	T-DIST.	6.41E+03	T-DIST.	mg/kg
Combined Soil	Q Central	Metal	Manganese	9 : 9 : 9	841.5555556	5450	1291	LOG-JACKKNIFE	1.29E+03	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	PCB	Total PCBs	8 : 9 : 9	2.396061111	8.7375	4.3521	LOG-JACKKNIFE	4.35E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Pesticide	Aldrin	2 : 9 : 9	0.018922222	0.11	0.034019	LOG-JACKKNIFE	3.40E-02	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Pesticide	Dieldrin	6 : 9 : 9	0.070094444	0.39	0.14657	LOG-JACKKNIFE	1.47E-01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Semivolatile	Benzo(a)anthracene	8 : 9 : 9	0.607222222	3.15	1.0669	LOG-JACKKNIFE	1.07E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Semivolatile	Benzo(a)pyrene	7 : 9 : 9	0.641555556	2.65	1.2436	LOG-JACKKNIFE	1.24E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Semivolatile	Benzo(b)fluoranthene	6 : 9 : 9	0.782333333	2.45	1.5991	LOG-JACKKNIFE	1.60E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q Central	Semivolatile	Pentachlorophenol	8 : 9 : 9	1.6272	10.15	6.5183	LOG-JACKKNIFE	6.52E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q North	Dioxin	2,3,7,8-TCDD-TEQ	13 : 15 : 15	0.005239956	0.05513625	0.011056	STANDARD BOOTSTRAP	1.11E-02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Metal	Antimony	13 : 15 : 15	7.774666667	84	16.58	STANDARD BOOTSTRAP	1.66E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Metal	Arsenic	15 : 15 : 15	11.78	40	15.378	LOG-JACKKNIFE	1.54E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q North	Metal	Barium	15 : 15 : 15	1376.933333	7200	3025.5	HALLS BOOTSTRAP-T	3.03E+03	HALLS BOOTSTRAP-T	mg/kg
Combined Soil	Q North	Metal	Cadmium	15 : 15 : 15	12.26333333	92	18.849	LOG-JACKKNIFE	1.89E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q North	Metal	Lead	14 : 15 : 15	1956.8	24000	1984.6	LOG-JACKKNIFE	1.96E+03	Mean (Lead)	mg/kg
Combined Soil	Q North	PCB	Total PCBs	13 : 15 : 15	29.28590333	189.61	53.962	STANDARD BOOTSTRAP	5.40E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Pesticide	Dieldrin	10 : 15 : 15	0.34536	3.2	0.58386	LOG-JACKKNIFE	5.84E-01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q North	Semivolatile	2,4,6-Trichlorophenol	2 : 14 : 15	3.897142857	47	9.7727	T-DIST.	9.77E+00	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	2,4-Dichlorophenol	5 : 15 : 15	22.92666667	270	51.861	STANDARD BOOTSTRAP	5.19E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Semivolatile	2-Nitroaniline	1 : 14 : 15	3.807142857	20	6.179	T-DIST.	6.18E+00	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	Benzo(a)anthracene	13 : 14 : 15	1.233571429	2.9	1.6064	T-DIST.	1.61E+00	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	Benzo(a)pyrene	13 : 14 : 15	1.317857143	2.7	1.6694	T-DIST.	1.67E+00	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	Benzo(b)fluoranthene	14 : 14 : 15	1.177857143	2.2	1.5092	T-DIST.	1.51E+00	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	Dibenzo(a,h)anthracene	8 : 9 : 15	0.211222222	0.4	0.28155	T-DIST.	2.82E-01	T-DIST.	mg/kg
Combined Soil	Q North	Semivolatile	Pentachlorophenol	13 : 15 : 15	65.3978	510	162.94	HALLS BOOTSTRAP-T	1.63E+02	HALLS BOOTSTRAP-T	mg/kg
Combined Soil	Q North	Volatile	1,2-Dichloroethane	1 : 15 : 15	0.322736667	4	0.7427	STANDARD BOOTSTRAP	7.43E-01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Volatile	Benzene	8 : 15 : 15	0.676868	8.8	1.6061	STANDARD BOOTSTRAP	1.61E+00	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Volatile	Ethylbenzene	8 : 15 : 15	3.468356667	40	7.7759	STANDARD BOOTSTRAP	7.78E+00	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Volatile	Tetrachloroethene	13 : 15 : 15	1.954584667	28	4.8954	STANDARD BOOTSTRAP	4.90E+00	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Volatile	Trichloroethylene	13 : 15 : 15	0.106650667	0.73	0.206	STANDARD BOOTSTRAP	2.06E-01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q North	Volatile	Xylenes, Total	10 : 15 : 15	25.45267667	300	57.918	STANDARD BOOTSTRAP	5.79E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Dioxin	2,3,7,8-TCDD-TEQ	20 : 20 : 20	0.00214742	0.02967525	0.0045053	STANDARD BOOTSTRAP	4.51E-03	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Metal	Antimony	10 : 20 : 20	11.485	47	18.677	HALLS BOOTSTRAP-T	1.87E+01	HALLS BOOTSTRAP-T	mg/kg
Combined Soil	Q South	Metal	Arsenic	20 : 20 : 20	13.125	33	17.232	LOG-JACKKNIFE	1.72E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Metal	Chromium	20 : 20 : 20	88.21	660	130.18	LOG-JACKKNIFE	1.30E+02	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Metal	Lead	20 : 20 : 20	827.85	3100	1230.8	HALLS BOOTSTRAP-T	8.28E+02	Mean (Lead)	mg/kg
Combined Soil	Q South	Metal	Manganese	20 : 20 : 20	701.25	2100	853.2	LOG-JACKKNIFE	8.53E+02	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Metal	Mercury	20 : 20 : 20	2.5756	36	3.5765	LOG-JACKKNIFE	3.58E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Metal	Nickel	20 : 20 : 20	213.75	2730	430.55	STANDARD BOOTSTRAP	4.31E+02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	PCB	Total PCBs	16 : 20 : 20	5.6563325	32.05	19.04	LOG-JACKKNIFE	1.90E+01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Pesticide	Aldrin	3 : 20 : 20	0.03920375	0.3	0.06783	STANDARD BOOTSTRAP	6.78E-02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Pesticide	Dieldrin	16 : 20 : 20	0.132671	0.825	0.50361	LOG-JACKKNIFE	5.04E-01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Pesticide	Heptachlor Epoxide	11 : 20 : 20	0.0376155	0.23	0.10266	LOG-JACKKNIFE	1.03E-01	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Semivolatile	Benzo(a)anthracene	17 : 20 : 20	0.5923	2.515	1.0335	LOG-JACKKNIFE	1.03E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Semivolatile	Benzo(a)pyrene	14 : 20 : 20	0.6828	2.975	1.1431	LOG-JACKKNIFE	1.14E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Semivolatile	Benzo(b)fluoranthene	13 : 20 : 20	0.70895	3.3	1.1783	LOG-JACKKNIFE	1.18E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	Q South	Semivolatile	Pentachlorophenol	14 : 20 : 20	35.6826475	470	77.356	STANDARD BOOTSTRAP	7.74E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Volatile	Benzene	12 : 20 : 20	0.1339955	2	0.29767	STANDARD BOOTSTRAP	2.98E-01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Volatile	Ethylbenzene	16 : 20 : 20	13.558945	270	35.322	STANDARD BOOTSTRAP	3.53E+01	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Volatile	Toluene	12 : 20 : 20	65.025835	1300	169.11	STANDARD BOOTSTRAP	1.69E+02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Volatile	Trichloroethylene	10 : 20 : 20	0.02183	0.38	0.051594	STANDARD BOOTSTRAP	5.16E-02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	Q South	Volatile	Xylenes, Total	18 : 20 : 20	95.3158335	1900	251.59	STANDARD BOOTSTRAP	2.52E+02	STANDARD BOOTSTRAP	mg/kg
Combined Soil	R	Dioxin	2,3,7,8-TCDD-TEQ	5 : 12 : 12	0.001314491	0.012177	0.0017819	LOG-JACKKNIFE	1.78E-03	LOG-JACKKNIFE	mg/kg
Combined Soil	R	Metal	Arsenic	12 : 12 : 12	6.116666667	12	7.3235	T-DIST.	7.32E+00	T-DIST.	mg/kg
Combined Soil	R	Metal	Mercury	12 : 12 : 12	250.5339167	3000	699.45	T-DIST.	6.99E+02	T-DIST.	mg/kg
Combined Soil	R	PCB	Total PCBs	8 : 12 : 12	41.1771725	264.5	88.935	T-DIST.	8.89E+01	T-DIST.	mg/kg
Combined Soil	R	Pesticide	beta-BHC	2 : 11 : 12	0.348777273	2.2	0.75345	T-DIST.	7.53E-01	T-DIST.	mg/kg

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Combined Soil	R	Pesticide	Dieldrin	7 : 11 : 12	0.340760909	1.8	1.2155	LOG-JACKKNIFE	1.22E+00	LOG-JACKKNIFE	mg/kg
Combined Soil	R	Pesticide	Heptachlor	1 : 11 : 12	0.18605	1.6	0.44507	T-DIST.	4.45E-01	T-DIST.	mg/kg
Combined Soil	R	Pesticide	MCPP	8 : 9 : 12	46.74444444	85	61.79	T-DIST.	6.16E+01	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	1,4-Dichlorobenzene	3 : 11 : 12	2.514545455	24	6.4147	T-DIST.	6.42E+00	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	2,4,6-Trichlorophenol	5 : 12 : 12	73.44916667	650	169.88	T-DIST.	1.70E+02	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	2,4-Dichlorophenol	6 : 12 : 12	327.4516667	3500	847.08	T-DIST.	8.47E+02	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	2-Chlorophenol	4 : 12 : 12	37.315	390	95.1	T-DIST.	9.51E+01	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	2-Nitroaniline	2 : 9 : 12	1.519777778	7	2.8082	T-DIST.	2.81E+00	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	Naphthalene	4 : 12 : 12	11.69833333	120	29.442	T-DIST.	2.94E+01	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	Nitrobenzene	3 : 12 : 12	6.631666667	48	14.465	T-DIST.	1.45E+01	T-DIST.	mg/kg
Combined Soil	R	Semivolatile	P-Nitroaniline	1 : 10 : 12	4.115	23	8.336	T-DIST.	8.34E+00	T-DIST.	mg/kg
Combined Soil	R	Volatile	1,1,2-Trichloroethane	1 : 12 : 12	1.689129167	9.5	3.1755	T-DIST.	3.18E+00	T-DIST.	mg/kg
Combined Soil	R	Volatile	1,2-Dichloroethane	7 : 12 : 12	16.82827083	87	32.793	T-DIST.	3.28E+01	T-DIST.	mg/kg
Combined Soil	R	Volatile	1,2-Dichloroethene (total)	5 : 12 : 12	6.177426667	51	13.722	T-DIST.	1.37E+01	T-DIST.	mg/kg
Combined Soil	R	Volatile	Benzene	12 : 12 : 12	26.186365	150	52.183	T-DIST.	5.22E+01	T-DIST.	mg/kg
Combined Soil	R	Volatile	Chlorobenzene	11 : 12 : 12	233.1776208	2400	588.69	T-DIST.	5.89E+02	T-DIST.	mg/kg
Combined Soil	R	Volatile	Chloroform	5 : 12 : 12	2.793333333	11	4.93	T-DIST.	4.93E+00	T-DIST.	mg/kg
Combined Soil	R	Volatile	Ethylbenzene	12 : 12 : 12	9.042525833	42	16.146	T-DIST.	1.62E+01	T-DIST.	mg/kg
Combined Soil	R	Volatile	Tetrachloroethene	10 : 12 : 12	224.5282333	1200	444.58	T-DIST.	4.45E+02	T-DIST.	mg/kg
Combined Soil	R	Volatile	Toluene	8 : 12 : 12	178.3385625	830	314.67	T-DIST.	3.15E+02	T-DIST.	mg/kg
Combined Soil	R	Volatile	Trichloroethylene	9 : 12 : 12	253.48367	2200	2714.4	LOG-JACKKNIFE	2.20E+03	Max (UCL>Max)	mg/kg
Combined Soil	R	Volatile	Xylenes, Total	11 : 12 : 12	45.33844083	280	88.797	T-DIST.	8.88E+01	T-DIST.	mg/kg
Combined Soil	S	Dioxin	2,3,7,8-TCDD-TEQ	6 : 6 : 6	0.004671223	0.0258706			0.0258706	Max (<8 samples)	mg/kg
Combined Soil	S	Metal	Chromium	6 : 6 : 6	179.1666667	480			480	Max (<8 samples)	mg/kg
Combined Soil	S	Metal	Lead	6 : 6 : 6	838	2400			8.38E+02	Mean (Lead)	mg/kg
Combined Soil	S	PCB	Total PCBs	6 : 6 : 6	175.73295	1008.5			1008.5	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	4,4'-DDT	5 : 6 : 6	2.8275	16			16	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	Aldrin	2 : 5 : 6	0.06049	0.19			0.19	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	beta-BHC	4 : 6 : 6	4.376378333	26			26	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	Dieldrin	4 : 5 : 6	0.1134	0.38			0.38	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	gamma-BHC (Lindane)	2 : 6 : 6	1.272575	7.5			7.5	Max (<8 samples)	mg/kg
Combined Soil	S	Pesticide	Heptachlor	4 : 6 : 6	0.272508333	1.5			1.5	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	1,3-Dichlorobenzene	2 : 5 : 6	3.387	12			12	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	1,4-Dichlorobenzene	3 : 6 : 6	39.00583333	200			200	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	2,4,6-Trichlorophenol	1 : 4 : 6	3.03375	8.2			8.2	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	2-Nitroaniline	2 : 3 : 6	2.156666667	4.6			4.6	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Benzo(a)anthracene	2 : 4 : 6	2.96125	8			8	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Benzo(a)pyrene	2 : 4 : 6	2.32	5.4			5.4	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Benzo(b)fluoranthene	2 : 4 : 6	2.6475	6.6			6.6	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	bis(2-Ethylhexyl)phthalate	6 : 6 : 6	50.25	130			130	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Dibenzo(a,h)anthracene	1 : 2 : 6	0.9925	1.8			1.8	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Naphthalene	5 : 6 : 6	21.0475	48			48	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	P-Nitroaniline	1 : 4 : 6	19.3625	57			57	Max (<8 samples)	mg/kg
Combined Soil	S	Semivolatile	Pentachlorophenol	2 : 6 : 6	114.6015	440			440	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	4-Methyl-2-pentanone (MIBK)	3 : 6 : 6	103.3384167	400			400	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Benzene	2 : 6 : 6	11.77268333	35			35	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Chlorobenzene	4 : 6 : 6	265.2655283	1200			1200	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Dichloromethane	4 : 6 : 6	16.43435	57			57	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Ethylbenzene	5 : 6 : 6	301.3339667	1100			1100	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Tetrachloroethene	5 : 6 : 6	12.967255	33			33	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Toluene	4 : 6 : 6	1346.667683	6000			6000	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Trichloroethylene	5 : 6 : 6	54.117195	240			240	Max (<8 samples)	mg/kg
Combined Soil	S	Volatile	Xylenes, Total	5 : 6 : 6	1768.33495	7300			7300	Max (<8 samples)	mg/kg
Fish (fillet)	DDA (Buffalo Fillet)	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	7.3938E-07	7.3938E-07			0.00000073938	Max	
Fish (fillet)	PDA (Buffalo Fillet)	Dioxin	2,3,7,8-TCDD-TEQ	3 : 3 : 3	5.24543E-07	6.2528E-07			0.00000062528	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	3.8429E-06	3.8429E-06			0.0000038429	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Metal	Arsenic	1 : 1 : 1	0.78	0.78			0.78	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Metal	Mercury	1 : 1 : 1	0.25	0.25			0.25	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	PCB	Total PCBs	1 : 1 : 1	3.868	3.868			3.868	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Pesticide	4,4'-DDT	1 : 1 : 1	0.36	0.36			0.36	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Pesticide	alpha-Chlordane	1 : 1 : 1	0.01	0.01			0.01	Max	
Fish (fillet)	Pond (Site Q) (Black Bullhead Fille	Pesticide	Dieldrin	1 : 1 : 1	0.1	0.1			0.1	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	1.84023E-05	1.84023E-05			0.0000184023	Max	

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Metal	Arsenic	1 : 1 : 1	0.82	0.82			0.82	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Metal	Mercury	1 : 1 : 1	0.071	0.071			0.071	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	PCB	Total PCBs	1 : 1 : 1	10.021	10.021			10.021	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Pesticide	4,4'-DDT	1 : 1 : 1	0.33	0.33			0.33	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Pesticide	alpha-Chlordane	1 : 1 : 1	0.016	0.016			0.016	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Pesticide	beta-BHC	1 : 1 : 1	0.017	0.017			0.017	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Pesticide	Dieldrin	1 : 1 : 1	0.19	0.19			0.19	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Semivolatile	Benzo(a)anthracene	1 : 1 : 1	0.14	0.14			0.14	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Semivolatile	Benzo(a)pyrene	1 : 1 : 1	0.18	0.18			0.18	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Semivolatile	bis(2-Ethylhexyl)phthalate	1 : 1 : 1	0.5	0.5			0.5	Max	
Fish (fillet)	Pond (Site Q) (Carp - Fillet)	Semivolatile	Dibenzo(a,h)anthracene	1 : 1 : 1	0.14	0.14			0.14	Max	
Fish (fillet)	UDA (Buffalo Fillet)	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	4.57275E-06	4.57275E-06			0.00000457275	Max	
Fish (fillet)	UDA (Buffalo Fillet)	Pesticide	4,4'-DDE	1 : 1 : 1	0.017	0.017			0.017	Max	
Fish (fillet)	UDA (Buffalo Fillet)	Pesticide	Dieldrin	1 : 1 : 1	0.0081	0.0081			0.0081	Max	
Leachate	O	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	0.00068705	0.00068705			0.00068705	Max (<8 samples)	ug/L
Leachate	O	Metal	Manganese	1 : 1 : 1	18000	18000			18000	Max (<8 samples)	ug/L
Leachate	O	Metal	Thallium	1 : 1 : 1	3.7	3.7			3.7	Max (<8 samples)	ug/L
Leachate	O	PCB	Total PCBs	1 : 1 : 1	54.9	54.9			54.9	Max (<8 samples)	ug/L
Leachate	O	Pesticide	2,4,5-T	1 : 1 : 1	480	480			480	Max (<8 samples)	ug/L
Leachate	O	Pesticide	2,4-D	1 : 1 : 1	930	930			930	Max (<8 samples)	ug/L
Leachate	O	Pesticide	beta-BHC	1 : 1 : 1	2.5	2.5			2.5	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	2,4,6-Trichlorophenol	1 : 1 : 1	380	380			380	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	2,4-Dichlorophenol	1 : 1 : 1	320	320			320	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	2-Chlorophenol	1 : 1 : 1	330	330			330	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	2-Nitroaniline	1 : 1 : 1	260	260			260	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	3-Methylphenol/4-Methylphenol (m&p-Cresol)	1 : 1 : 1	640	640			640	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	Naphthalene	1 : 1 : 1	570	570			570	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	Nitrobenzene	1 : 1 : 1	80	80			80	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	P-Chloroaniline	1 : 1 : 1	4200	4200			4200	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	P-Nitroaniline	1 : 1 : 1	700	700			700	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	Pentachlorophenol	1 : 1 : 1	760	760			760	Max (<8 samples)	ug/L
Leachate	O	Semivolatile	Phenol	1 : 1 : 1	3800	3800			3800	Max (<8 samples)	ug/L
Leachate	O	Volatile	4-Methyl-2-pentanone (MIBK)	1 : 1 : 1	210	210			210	Max (<8 samples)	ug/L
Leachate	O	Volatile	Benzene	1 : 1 : 1	920	920			920	Max (<8 samples)	ug/L
Leachate	O	Volatile	Chlorobenzene	1 : 1 : 1	1700	1700			1700	Max (<8 samples)	ug/L
Leachate	Q	Metal	Antimony	1 : 1 : 1	16	16			16	Max (<8 samples)	ug/L
Leachate	Q	Metal	Manganese	1 : 1 : 1	1800	1800			1800	Max (<8 samples)	ug/L
Leachate	Q	Metal	Nickel	1 : 1 : 1	310	310			310	Max (<8 samples)	ug/L
Leachate	Q	Metal	Zinc	1 : 1 : 1	7450	7450			7450	Max (<8 samples)	ug/L
Leachate	Q	PCB	Total PCBs	1 : 1 : 1	1.0435	1.0435			1.0435	Max (<8 samples)	ug/L
Leachate	Q	Pesticide	2,4-D	1 : 1 : 1	96500	96500			96500	Max (<8 samples)	ug/L
Leachate	Q	Pesticide	beta-BHC	1 : 1 : 1	13.5	13.5			13.5	Max (<8 samples)	ug/L
Leachate	Q	Pesticide	Endrin Ketone	1 : 1 : 1	3.2	3.2			3.2	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	2,4,6-Trichlorophenol	1 : 1 : 1	12500	12500			12500	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	2,4-Dichlorophenol	1 : 1 : 1	170000	170000			170000	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	2,4-Dimethylphenol	1 : 1 : 1	240	240			240	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	2-Chlorophenol	1 : 1 : 1	7900	7900			7900	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	2-Nitroaniline	1 : 1 : 1	15500	15500			15500	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	3-Methylphenol/4-Methylphenol (m&p-Cresol)	1 : 1 : 1	1600	1600			1600	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	Naphthalene	1 : 1 : 1	1200	1200			1200	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	Nitrobenzene	1 : 1 : 1	1300	1300			1300	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	P-Chloroaniline	1 : 1 : 1	9300	9300			9300	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	P-Nitroaniline	1 : 1 : 1	1070	1070			1070	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	Pentachlorophenol	1 : 1 : 1	4600	4600			4600	Max (<8 samples)	ug/L
Leachate	Q	Semivolatile	Phenol	1 : 1 : 1	8050	8050			8050	Max (<8 samples)	ug/L
Leachate	Q	Volatile	1,2-Dichloroethane	1 : 1 : 1	2150	2150			2150	Max (<8 samples)	ug/L
Leachate	Q	Volatile	4-Methyl-2-pentanone (MIBK)	1 : 1 : 1	750	750			750	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Acetone	1 : 1 : 1	1400	1400			1400	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Benzene	1 : 1 : 1	425	425			425	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Chlorobenzene	1 : 1 : 1	1150	1150			1150	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Dichloromethane	1 : 1 : 1	47	47			47	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Tetrachloroethene	1 : 1 : 1	82.5	82.5			82.5	Max (<8 samples)	ug/L
Leachate	Q	Volatile	Trichloroethylene	1 : 1 : 1	20	20			20	Max (<8 samples)	ug/L

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Leachate	R	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	0.00314	0.00314			0.00314	Max (<8 samples)	ug/L
Leachate	R	Metal	Beryllium	1 : 1 : 1	31	31			31	Max (<8 samples)	ug/L
Leachate	R	Metal	Chromium	1 : 1 : 1	600	600			600	Max (<8 samples)	ug/L
Leachate	R	Metal	Cobalt	1 : 1 : 1	2600	2600			2600	Max (<8 samples)	ug/L
Leachate	R	Metal	Manganese	1 : 1 : 1	250000	250000			250000	Max (<8 samples)	ug/L
Leachate	R	Metal	Mercury	1 : 1 : 1	13	13			13	Max (<8 samples)	ug/L
Leachate	R	Metal	Nickel	1 : 1 : 1	1800	1800			1800	Max (<8 samples)	ug/L
Leachate	R	Metal	Thallium	1 : 1 : 1	120	120			120	Max (<8 samples)	ug/L
Leachate	R	Metal	Vanadium	1 : 1 : 1	360	360			360	Max (<8 samples)	ug/L
Leachate	R	Metal	Zinc	1 : 1 : 1	99000	99000			99000	Max (<8 samples)	ug/L
Leachate	R	PCB	Total PCBs	1 : 1 : 1	3981.6	3981.6			3981.6	Max (<8 samples)	ug/L
Leachate	R	Pesticide	2,4-D	1 : 1 : 1	3800	3800			3800	Max (<8 samples)	ug/L
Leachate	R	Pesticide	4,4'-DDT	1 : 1 : 1	210	210			210	Max (<8 samples)	ug/L
Leachate	R	Pesticide	beta-BHC	1 : 1 : 1	200	200			200	Max (<8 samples)	ug/L
Leachate	R	Pesticide	Dieldrin	1 : 1 : 1	190	190			190	Max (<8 samples)	ug/L
Leachate	R	Pesticide	gamma-BHC (Lindane)	1 : 1 : 1	28	28			28	Max (<8 samples)	ug/L
Leachate	R	Pesticide	Heptachlor	1 : 1 : 1	210	210			210	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	2-Chlorophenol	1 : 1 : 1	11000	11000			11000	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	3-Methylphenol/4-Methylphenol (m&p-Cresol)	1 : 1 : 1	4500	4500			4500	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	Benzo(g,h,i)perylene	1 : 1 : 1	1400	1400			1400	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	P-Chloroaniline	1 : 1 : 1	42000	42000			42000	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	P-Nitroaniline	1 : 1 : 1	18000	18000			18000	Max (<8 samples)	ug/L
Leachate	R	Semivolatile	Phenol	1 : 1 : 1	1100000	1100000			1100000	Max (<8 samples)	ug/L
Leachate	R	Volatile	1,2-Dichloroethane	1 : 1 : 1	50000	50000			50000	Max (<8 samples)	ug/L
Leachate	R	Volatile	1,2-Dichloroethene (total)	1 : 1 : 1	13000	13000			13000	Max (<8 samples)	ug/L
Leachate	R	Volatile	2-Butanone (MEK)	1 : 1 : 1	7900	7900			7900	Max (<8 samples)	ug/L
Leachate	R	Volatile	Acetone	1 : 1 : 1	32000	32000			32000	Max (<8 samples)	ug/L
Leachate	R	Volatile	Benzene	1 : 1 : 1	6800	6800			6800	Max (<8 samples)	ug/L
Leachate	R	Volatile	Chlorobenzene	1 : 1 : 1	1300	1300			1300	Max (<8 samples)	ug/L
Leachate	R	Volatile	Chloroform	1 : 1 : 1	2000	2000			2000	Max (<8 samples)	ug/L
Leachate	R	Volatile	Dichloromethane	1 : 1 : 1	1900	1900			1900	Max (<8 samples)	ug/L
Leachate	R	Volatile	Tetrachloroethene	1 : 1 : 1	33000	33000			33000	Max (<8 samples)	ug/L
Leachate	R	Volatile	Toluene	1 : 1 : 1	21000	21000			21000	Max (<8 samples)	ug/L
Leachate	R	Volatile	Trichloroethylene	1 : 1 : 1	150000	150000			150000	Max (<8 samples)	ug/L
Mid Groundwater	Q - AA-Q-6-24	Volatile	Benzene	1 : 1 : 1	475	475			475	Max (<8 samples)	ug/L
Mid Groundwater	R - AA-R-1-28	Volatile	Benzene	1 : 1 : 1	510	510			510	Max (<8 samples)	ug/L
Mid Groundwater	R - AA-R-1-28	Volatile	Chlorobenzene	1 : 1 : 1	2000	2000			2000	Max (<8 samples)	ug/L
Mid Groundwater	R - AA-R-1-28	Volatile	Chloromethane	1 : 1 : 1	3.2	3.2			3.2	Max (<8 samples)	ug/L
Sediment	River	Metal	Arsenic	34 : 34 : 34	2.904411765	7.5	3.4106	H-STAT.	3.41E+00	H-STAT.	mg/kg
Shallow Groundwater	O - AA-O-1-16	Metal	Arsenic	1 : 1 : 1	70	70			70	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Metal	Lead	1 : 1 : 1	19	19			19	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Metal	Manganese	1 : 1 : 1	4100	4100			4100	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Semivolatile	Benzo(a)pyrene	1 : 1 : 1	1.6	1.6			1.6	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Semivolatile	Benzo(b)fluoranthene	1 : 1 : 1	1.1	1.1			1.1	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Semivolatile	Benzo(k)fluoranthene	1 : 1 : 1	1.2	1.2			1.2	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Semivolatile	Dibenzo(a,h)anthracene	1 : 1 : 1	2.7	2.7			2.7	Max (<8 samples)	ug/L
Shallow Groundwater	O - AA-O-1-16	Semivolatile	Indeno(1,2,3-cd)pyrene	1 : 1 : 1	3	3			3	Max (<8 samples)	ug/L
Surface Soil	O	Dioxin	2,3,7,8-TCDD-TEQ	2 : 2 : 2	0.002986615	0.005933			5.93E-03	Max (<8 samples)	mg/kg
Surface Soil	O	PCB	Total PCBs	2 : 2 : 2	5.39549	10.764			1.08E+01	Max (<8 samples)	mg/kg
Surface Soil	O	Pesticide	Dieldrin	1 : 2 : 2	0.09095	0.18			1.80E-01	Max (<8 samples)	mg/kg
Surface Soil	O North	Dioxin	2,3,7,8-TCDD-TEQ	1 : 1 : 1	0.050805	0.050805			5.08E-02	Max (<8 samples)	mg/kg
Surface Soil	O North	Metal	Mercury	1 : 1 : 1	43	43			4.30E+01	Max (<8 samples)	mg/kg
Surface Soil	O North	PCB	Total PCBs	1 : 1 : 1	709.2	709.2			7.09E+02	Max (<8 samples)	mg/kg
Surface Soil	P	Metal	Arsenic	4 : 4 : 4	14.1	26			26	Max (<8 samples)	mg/kg
Surface Soil	P	PCB	Total PCBs	3 : 4 : 4	1.784375	7.02			7.02	Max (<8 samples)	mg/kg
Surface Soil	P	Semivolatile	Benzo(a)pyrene	2 : 3 : 4	0.300666667	0.67			0.67	Max (<8 samples)	mg/kg
Surface Soil	Q Central	Dioxin	2,3,7,8-TCDD-TEQ	3 : 3 : 3	0.00113618	0.0033075			0.0033075	Max (<8 samples)	mg/kg
Surface Soil	Q Central	Metal	Arsenic	3 : 3 : 3	7.3	13			13	Max (<8 samples)	mg/kg
Surface Soil	Q Central	PCB	Total PCBs	3 : 3 : 3	1.078616667	2.57475			2.57475	Max (<8 samples)	mg/kg
Surface Soil	Q North	Metal	Cadmium	5 : 5 : 5	20.146	92			92	Max (<8 samples)	mg/kg
Surface Soil	Q North	PCB	Total PCBs	5 : 5 : 5	0.57272	1.87			1.87	Max (<8 samples)	mg/kg
Surface Soil	Q North	Semivolatile	Benzo(a)pyrene	5 : 5 : 5	1.242	1.8			1.8	Max (<8 samples)	mg/kg
Surface Soil	Q North	Semivolatile	Dibenzo(a,h)anthracene	4 : 5 : 5	0.2122	0.37			0.37	Max (<8 samples)	mg/kg

Medium	Site	analyte type	Constituent	FOD	MLE EPC (average)	Max	UCL	UCL type	RME EPC	RME EPC Reason	units
Surface Soil	Q South	Dioxin	2,3,7,8-TCDD-TEQ	12 : 12 : 12	0.00068948	0.00682	0.0016934	T-DIST.	1.69E-03	T-DIST.	mg/kg
Surface Soil	Q South	Metal	Antimony	3 : 12 : 12	6.954166667	47	14.25	T-DIST.	1.43E+01	T-DIST.	mg/kg
Surface Soil	Q South	Metal	Arsenic	12 : 12 : 12	9.658333333	33	13.449	LOG-JACKKNIFE	1.35E+01	LOG-JACKKNIFE	mg/kg
Surface Soil	Q South	Metal	Chromium	12 : 12 : 12	84.05833333	660	180.58	T-DIST.	1.81E+02	T-DIST.	mg/kg
Surface Soil	Q South	Metal	Manganese	12 : 12 : 12	603.3333333	2100	859.95	T-DIST.	8.60E+02	T-DIST.	mg/kg
Surface Soil	Q South	PCB	Total PCBs	9 : 12 : 12	2.748483333	13.402	5.1027	T-DIST.	5.10E+00	T-DIST.	mg/kg
Surface Soil	Q South	Pesticide	Dieldrin	9 : 12 : 12	0.079614167	0.375	0.26909	LOG-JACKKNIFE	2.69E-01	LOG-JACKKNIFE	mg/kg
Surface Soil	Q South	Semivolatile	Benzo(a)anthracene	10 : 12 : 12	0.557166667	2.515	1.0339	LOG-JACKKNIFE	1.03E+00	LOG-JACKKNIFE	mg/kg
Surface Soil	Q South	Semivolatile	Benzo(a)pyrene	9 : 12 : 12	0.598416667	2.975	1.0506	LOG-JACKKNIFE	1.05E+00	LOG-JACKKNIFE	mg/kg
Surface Soil	Q South	Semivolatile	Benzo(b)fluoranthene	8 : 12 : 12	0.72575	3.3	1.3467	LOG-JACKKNIFE	1.35E+00	LOG-JACKKNIFE	mg/kg
Surface Soil	S	PCB	Total PCBs	2 : 2 : 2	504.31435	1008.5			1008.5	Max (<8 samples)	mg/kg
Surface Soil	S	Pesticide	4,4'-DDT	2 : 2 : 2	8.0055	16			16	Max (<8 samples)	mg/kg
Surface Soil	S	Pesticide	beta-BHC	2 : 2 : 2	13.000385	26			26	Max (<8 samples)	mg/kg
Surface Soil	S	Pesticide	gamma-BHC (Lindane)	1 : 2 : 2	3.750475	7.5			7.5	Max (<8 samples)	mg/kg
Surface Soil	S	Pesticide	Heptachlor	1 : 2 : 2	0.750475	1.5			1.5	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	2,4,6-Trichlorophenol	1 : 2 : 2	4.1925	8.2			8.2	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	2-Nitroaniline	1 : 2 : 2	2.775	4.6			4.6	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	Benzo(a)anthracene	2 : 2 : 2	4.0475	8			8	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	Benzo(a)pyrene	2 : 2 : 2	2.765	5.4			5.4	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	Benzo(b)fluoranthene	2 : 2 : 2	3.42	6.6			6.6	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	Dibenzo(a,h)anthracene	1 : 2 : 2	0.9925	1.8			1.8	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	P-Nitroaniline	1 : 2 : 2	28.975	57			57	Max (<8 samples)	mg/kg
Surface Soil	S	Semivolatile	Pentachlorophenol	2 : 2 : 2	220.0055	440			440	Max (<8 samples)	mg/kg
Surface Water	Pond (Site Q)	Metal	Lead	1 : 1 : 1	14	14			14	Max (<8 samples)	ug/L
Surface Water	Pond (Site Q)	Metal	Manganese	1 : 1 : 1	460	460			460	Max (<8 samples)	ug/L
Surface Water	River	Pesticide	MCPA (2-Methyl-4-Chlorophenoxyacetic Acid)	1 : 1 : 36	31	31			31	Max (<8 samples)	ug/L
Surface Water	River	Pesticide	MCPP	1 : 1 : 36	53	53			53	Max (<8 samples)	ug/L
Surface Water	River	Semivolatile	2,4-Dichlorophenol	11 : 36 : 36	6.011111111	69	8.9468	STANDARD BOOTSTRAP	8.95E+00	STANDARD BOOTSTRAP	ug/L
Surface Water	River	Semivolatile	P-Chloroaniline	17 : 36 : 36	12.21944444	160	19.022	STANDARD BOOTSTRAP	1.90E+01	STANDARD BOOTSTRAP	ug/L

Notes:

EPC - Exposure Point Concentration.

FOD - Frequency of Detection (number of detects:number used to calculate statistics:total number of samples collected).

Max - Maximum Detected Concentration.

MLE - Most Likely Exposure.

RME - Reasonable Maximum Exposure.

UCL - 95% Upper Confidence Level.

APPENDIX J

CALCULATION OF INDOOR AIR VOC CONCENTRATIONS FROM GROUNDWATER

Appendix J

Calculation of Indoor Air Concentrations for Volatilization from Underlying Groundwater

For the groundwater-to-indoor air pathway, indoor air exposure point concentrations were predicted using the Johnson and Ettinger model (USEPA, 2003c). The Johnson and Ettinger model considers both diffusion of compounds migrating from the subsurface and convection, which is driven by the pressure difference between the subsurface and the building. Equations and parameters required for the implementation of this model are provided in *User's Guide For Evaluating Subsurface Vapor Intrusion Into Buildings* (USEPA, 2003c). The spreadsheet "GW-ADV.XLS", available from the USEPA for implementation of the Johnson and Ettinger model was used in this risk assessment.

Model Parameters

With the exceptions discussed below, parameters used in the model were the default parameters provided by USEPA (USEPA, 2003c). Major assumptions used in modeling indoor air for each of the site/locations are listed below.

An average soil/groundwater temperature of 14 degrees Celcius and a depth below grade to bottom of enclosed space floor of 15 cm, representing slab-on-grade construction, were used for all modeling locations.

Groundwater location Q-AA-Q-6-24

- Three soil strata were identified.
- Of the 12 Soil Conservation Service (SCS) soil classifications available for use in the USEPA spreadsheet, sand and silt were selected as most representative of site conditions.
- Depth below grade to water table: 579.12 cm (19 feet).

Groundwater location R-AA-R-1-28

- One soil stratum was identified.
- Of the 12 Soil Conservation Service (SCS) soil classifications available for use in the USEPA spreadsheet, silty clay was selected as most representative of site conditions. However, use of silty clay resulted in capillary zone water filled porosity greater than total porosity at the top of the water table. The model will not run under this condition. Therefore, sand was used in place of silty clay, as the most conservative SCS soil type for the model.

- Depth below grade to water table: 701.04 cm (23 feet).

Leachate location O

- Two soil strata were identified.
- Of the 12 Soil Conservation Service (SCS) soil classifications available for use in the USEPA spreadsheet, silty clay and sand were selected as most representative of site conditions. However, use of silty clay as stratum A resulted in an error (data is out of range). Therefore, sand was used for both stratum A and stratum B. Sand is the most conservative SCS soil type for the model.
- Depth below grade to water table: 442.57 cm (14.52 feet).

Leachate location Q

- One soil stratum was identified.
- Of the 12 Soil Conservation Service (SCS) soil classifications available for use in the USEPA spreadsheet, sand was selected as most representative of site conditions.
- Depth below grade to water table: 314.86 cm (10.33 feet).

Leachate location R

- Two soil strata were identified.
- Of the 12 Soil Conservation Service (SCS) soil classifications available for use in the USEPA spreadsheet, sand and silty clay were selected as most representative of site conditions.
- Depth below grade to water table: 549.55 cm (18.03 feet).

Results

Modeling assumptions, inputs, and results are presented in the attached modeling printouts.

The modeling printouts are presented in the following order (identifiers for each run of the model are presented in the upper left hand corner of each page):

Groundwater location Q-AA-Q-6-24:

- Benzene

Groundwater location R-AA-R-1-28:

- Benzene
- Chlorobenzene
- Chloromethane

Leachate location O:

- Benzene
- Chlorobenzene
- 4-Methyl-2-pentanone (MIBK)

Leachate location Q:

- 1,2-Dichloroethane
- Acetone
- Benzene
- Chlorobenzene
- Dichloromethane (Methylene chloride)
- 4-Methyl-2-pentanone (MIBK)
- Tetrachloroethene
- Trichloroethylene

Leachate location R:

- 1,2-Dichloroethane
- 1,2-Dichloroethene (total) (cis-1,2-Dichloroethene used as surrogate)
- Acetone
- Benzene
- Chlorobenzene

- Chloroform
- Dichloromethane (Methylene chloride)
- 2-Butanone (MEK)
- Tetrachloroethene
- Trichloroethylene
- Toluene

References sited in this appendix are presented in Section 8 of the main text.

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	4.75E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	579.12 (19 ft)	162.56 (5.33 ft)	162.56 (5.33 ft)	254 (8.33 ft)	C	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-fillec porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	SI	1.35	0.489	0.167	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	564.12	0.321	0.322	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,081	3.28E-03	1.39E-01	1.77E-04	1.42E-02	8.45E-03	1.42E-02	5.69E-04	7.40E-03	564.12

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.39E+02	0.10	8.46E+01	1.42E-02	3.40E+02	9.20E+75	1.82E-04	2.53E-02	7.8E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

MORE ↓

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	5.10E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	701.04 (23 ft)	701.04 (23 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.38	0.481	0.216		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Groundwater location
R-AA-R-1-28

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	686.04	0.321	0.265	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{oz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,081	3.28E-03	1.39E-01	1.77E-04	1.42E-02	0.00E+00	0.00E+00	5.69E-04	8.91E-03	686.04

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.39E+02	0.10	8.46E+01	1.42E-02	3.40E+02	9.20E+75	1.80E-04	2.51E-02	7.8E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	2.00E+03	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	701.04 (23 ft)	701.04 (23 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
S	1.66	0.375	0.054		1.38	0.481	0.216		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Groundwater location
R-AA-R-1-28

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	686.04	0.321	0.265	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,763	1.96E-03	8.33E-02	1.77E-04	1.18E-02	0.00E+00	0.00E+00	4.75E-04	7.41E-03	686.04

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.33E+01	0.10	8.46E+01	1.18E-02	3.40E+02	3.74E+91	1.53E-04	1.27E-02	NA	6.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
74873	3.20E+00	Methyl chloride (chloromethane)

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	701.04 (23 ft)	701.04 (23 ft)	0	0	A	S	S		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters: S	1.66	0.375	0.054	Lookup Soil Parameters	1.38	0.481	0.216	Lookup Soil Parameters	1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Groundwater location
R-AA-R-1-28

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	686.04	0.321	0.265	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	4,700	6.49E-03	2.76E-01	1.77E-04	2.04E-02	0.00E+00	0.00E+00	8.09E-04	1.27E-02	686.04

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.82E+02	0.10	8.46E+01	2.04E-02	3.40E+02	1.13E+53	2.46E-04	2.17E-01	1.0E-06	9.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	9.20E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water teble, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	442.57 (14.52 ft)	60.96 (2 ft)	381.61 (12.52 ft)	0	B	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space *floor* thickness, L_{crack} (cm)	ENTER Soil-bldg. *pressure* differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space *floor* length, L_B (cm)	ENTER Enclosed space *floor* width, W_B (cm)	ENTER Enclosed *space* height, H_B (cm)	ENTER Floor-wall *seam crack* width, w (cm)	ENTER Indoor *air exchange* rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
O

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	427.57	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,081	3.28E-03	1.39E-01	1.77E-04	1.42E-02	0.00E+00	0.00E+00	5.69E-04	7.27E-03	427.57

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.39E+02	0.10	8.46E+01	1.42E-02	3.40E+02	9.20E+75	2.28E-04	3.18E-02	7.8E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

MORE ↓

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.70E+03	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	442.57 (14.52 ft)	60.96 (2 ft)	381.61 (12.52 ft)	0	B	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
O

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	427.57	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,763	1.96E-03	8.33E-02	1.77E-04	1.18E-02	0.00E+00	0.00E+00	4.75E-04	6.05E-03	427.57

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.33E+01	0.10	8.46E+01	1.18E-02	3.40E+02	3.74E+91	1.94E-04	1.62E-02	NA	6.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108101	2.10E+02	Methylisobutylketone (4-methyl-2-pentanone)

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	442.57 (14.52 ft)	60.96 (2 ft)	381.61 (12.52 ft)	0	B	S	S		

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.68	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
O

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{oz} (cm)	Total porosity in capillary zone, n_{oz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,oz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,oz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	427.57	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{oz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,808	7.30E-05	3.10E-03	1.77E-04	1.21E-02	0.00E+00	0.00E+00	6.65E-04	7.19E-03	427.57

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.10E+00	0.10	8.46E+01	1.21E-02	3.40E+02	1.33E+89	2.26E-04	7.01E-04	NA	8.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
107062	2.15E+03	1,2-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,479	5.64E-04	2.40E-02	1.77E-04	1.68E-02	0.00E+00	0.00E+00	6.96E-04	7.26E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.40E+01	0.10	8.46E+01	1.68E-02	3.40E+02	1.89E+64	3.08E-04	7.37E-03	2.6E-05	NA

END

Leachate loc.
Q

DATA EN ET

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67641	1.40E+03	Acetone

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{oz} (cm)	Total porosity in capillary zone, n_{oz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{oz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	7,510	2.38E-05	1.01E-03	1.77E-04	2.01E-02	0.00E+00	0.00E+00	1.62E-03	1.22E-02	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.01E+00	0.10	8.46E+01	2.01E-02	3.40E+02	7.89E+53	4.60E-04	4.65E-04	NA	3.5E-01

END

Leachate loc
Q

DATA EN :ET

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	4.25E+02	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.823	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,081	3.28E-03	1.39E-01	1.77E-04	1.42E-02	0.00E+00	0.00E+00	5.69E-04	6.02E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.39E+02	0.10	8.46E+01	1.42E-02	3.40E+02	9.20E+75	2.63E-04	3.66E-02	7.8E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.15E+03	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,763	1.96E-03	8.33E-02	1.77E-04	1.18E-02	0.00E+00	0.00E+00	4.75E-04	5.01E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.33E+01	0.10	8.46E+01	1.18E-02	3.40E+02	3.74E+91	2.25E-04	1.87E-02	NA	6.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

MORE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092	4.70E+01	Methylene chloride

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	6,992	1.39E-03	5.90E-02	1.77E-04	1.63E-02	0.00E+00	0.00E+00	6.61E-04	6.96E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.90E+01	0.10	8.46E+01	1.63E-02	3.40E+02	1.54E+66	2.97E-04	1.75E-02	4.7E-07	3.0E+00

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108101	7.50E+02	Methylisobutylketone (4-methyl-2-pentanone)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.823	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,808	7.30E-05	3.10E-03	1.77E-04	1.21E-02	0.00E+00	0.00E+00	6.65E-04	6.13E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.10E+00	0.10	8.46E+01	1.21E-02	3.40E+02	1.33E+89	2.67E-04	8.28E-04	NA	8.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	8.25E+01	Tetrachloroethylene

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.823	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,513	9.92E-03	4.21E-01	1.77E-04	1.16E-02	0.00E+00	0.00E+00	4.63E-04	4.90E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.21E+02	0.10	8.46E+01	1.16E-02	3.40E+02	7.00E+92	2.21E-04	9.29E-02	3.0E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	2.00E+01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	314.86 (10.33 ft)	314.86 (10.33 ft)	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054		1.66	0.375	0.054		1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
Q

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{oz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,oz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,oz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	299.86	0.321	0.321	0.321	0.003	9.99E-08	0.998	9.98E-08	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,507	5.93E-03	2.52E-01	1.77E-04	1.28E-02	0.00E+00	0.00E+00	5.09E-04	5.39E-03	299.86

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.52E+02	0.10	8.46E+01	1.28E-02	3.40E+02	4.15E+84	2.39E-04	6.02E-02	1.1E-04	4.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
107062	5.00E+04	1,2-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,479	5.64E-04	2.40E-02	1.77E-04	5.41E-03	1.68E-02	0.00E+00	6.96E-04	8.24E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.40E+01	0.10	1.07E+00	5.41E-03	3.40E+02	3.34E+02	1.97E-05	4.72E-04	2.6E-05	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	1.30E+04	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,oz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,oz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{oz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	7,694	2.47E-03	1.05E-01	1.77E-04	3.82E-03	1.19E-02	0.00E+00	4.79E-04	5.77E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.05E+02	0.10	1.07E+00	3.82E-03	3.40E+02	3.72E+03	1.90E-05	2.00E-03	NA	3.5E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

MORE ↓

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67641	3.20E+04	Acetone

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	7,510	2.38E-05	1.01E-03	1.77E-04	6.73E-03	2.01E-02	0.00E+00	1.62E-03	1.22E-02	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.01E+00	0.10	1.07E+00	6.73E-03	3.40E+02	1.07E+02	2.04E-05	2.06E-05	NA	3.5E-01

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	6.80E+03	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,081	3.28E-03	1.39E-01	1.77E-04	4.57E-03	1.42E-02	0.00E+00	5.69E-04	6.88E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.39E+02	0.10	1.07E+00	4.57E-03	3.40E+02	9.72E+02	1.94E-05	2.70E-03	7.8E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.30E+03	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,763	1.96E-03	8.33E-02	1.77E-04	3.79E-03	1.18E-02	0.00E+00	4.75E-04	5.72E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.33E+01	0.10	1.07E+00	3.79E-03	3.40E+02	3.98E+03	1.90E-05	1.58E-03	NA	6.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663	2.00E+03	Chloroform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	7,513	2.25E-03	9.56E-02	1.77E-04	5.40E-03	1.68E-02	0.00E+00	6.74E-04	8.14E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.56E+01	0.10	1.07E+00	5.40E-03	3.40E+02	3.37E+02	1.97E-05	1.88E-03	2.3E-05	NA

END

Leachate loc
R

DATA EN EET

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092	1.90E+03	Methylene chloride

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	6,992	1.39E-03	5.90E-02	1.77E-04	5.25E-03	1.63E-02	0.00E+00	6.61E-04	7.94E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.90E+01	0.10	1.07E+00	5.25E-03	3.40E+02	3.99E+02	1.97E-05	1.16E-03	4.7E-07	3.0E+00

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
78933	7.90E+03	Methylethylketone (2-butanone)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,370	3.25E-05	1.38E-03	1.77E-04	4.38E-03	1.31E-02	0.00E+00	1.04E-03	7.91E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.38E+00	0.10	1.07E+00	4.38E-03	3.40E+02	1.31E+03	1.96E-05	2.70E-05	NA	1.0E+00

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	3.30E+04	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
			Totals must add up to value of L_{WT} (cell G28)							
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{oz} (cm)	Total porosity in capillary zone, n_{oz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,oz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,oz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{oz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,513	9.92E-03	4.21E-01	1.77E-04	3.74E-03	1.16E-02	0.00E+00	4.63E-04	5.61E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.21E+02	0.10	1.07E+00	3.74E-03	3.40E+02	4.49E+03	1.89E-05	7.98E-03	3.0E-06	NA

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and Initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	1.50E+05	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	8,507	5.93E-03	2.52E-01	1.77E-04	4.10E-03	1.28E-02	0.00E+00	5.09E-04	6.17E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.52E+02	0.10	1.07E+00	4.10E-03	3.40E+02	2.13E+03	1.91E-05	4.82E-03	1.1E-04	4.0E-02

END

GW-ADV
Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108883	2.10E+04	Toluene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
14	15	549.55 (18.03 ft)	91.44 (3 ft)	458.11 (15.03 ft)	0	B	S	SIC		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SIC	1.38	0.481	0.216	S	1.66	0.375	0.054		1.5	0.43	0.3

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	850	850	300	0.1	0.828	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Leachate location
R

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	534.55	0.265	0.321	0.130	0.284	1.49E-09	0.844	1.26E-09	17.05	0.375	0.122	0.253	3,400

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.99E+04	7.74E+05	4.40E-04	15	9,111	3.67E-03	1.56E-01	1.77E-04	4.52E-03	1.41E-02	0.00E+00	5.61E-04	6.80E-03	534.55

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.56E+02	0.10	1.07E+00	4.52E-03	3.40E+02	1.05E+03	1.93E-05	3.02E-03	NA	4.0E-01

END

APPENDIX K

CALCULATION OF EXCAVATION AIR VOC CONCENTRATIONS FROM STANDING WATER - EXCAVATION TRENCH

APPENDIX K
CALCULATION OF EXCAVATION AIR VOC CONCENTRATIONS FROM STANDING WATER - EXCAVATION TRENCH

Excavation trench air concentrations of a COPC resulting from volatilization from groundwater and leachate infiltrating an excavation trench can be predicted by use of the method recommended by USEPA (1987) for predicting volatilization from standing water.

Model to Predict Air Concentration

In this model, the air concentration of a COPC is estimated at the downwind boundary of the water. For the purposes of calculating this concentration, a rectangular box with the base corresponding to the water surface is considered. The height of the box, H_b, is the height to which the chemical emissions from the water surface are uniformly mixed with the air. L_b is the dimension of the box parallel to the direction of the wind. W_b is the width of the box perpendicular to the airflow. If U is the wind speed, then, by conservation of mass, the air concentration, C_a, of chemical within the box is given by:

$$C_a = \frac{Q}{H_b W_b U} \quad (1)$$

The diffusion height, H_b, above the water surface is approximately equal to 0.05 L_b (Jackson, 1976). With this substitution, the equation for the air concentration becomes:

$$C_a = \frac{Q}{0.05AU} \quad (2)$$

Where:

Q = chemical emission rate (g/s)

A = water surface area (m^2) (12 m^2; best professional judgement estimate of utility repair/installation trench)

U = wind speed (m/s) (2.25 m/s; default value USEPA, 1991)

The chemical emission rate, Q, can be expressed as follows:

$$Q = KAC_L \quad (3)$$

Where:

Q = chemical emission rate (g/s)

K = overall mass transfer coefficient (m/s)

A = water surface area (m^2) ($12m^2$; best professional judgement estimate of utility repair/installation trench)

C_L = chemical concentration in water (g/m^3)

With the substitution of equation (3) into equation (2), the equation for air concentration becomes:

$$Ca = \frac{KC_L}{0.05u} \quad (4)$$

As wind speed, u, and the chemical concentration in water, C_L, are known or can be measured, the chemical concentration in air is then a function of the overall mass transfer coefficient.

Mass Transfer Coefficient

The overall mass transfer coefficient, K, is given by:

$$\frac{1}{K} = \frac{1}{K_L} + \frac{1}{K_G K_{eq}} \quad (5)$$

Where:

K_L = Liquid phase mass transfer coefficient (m/s)

K_G = Gas phase mass transfer coefficient (m/s)

K_{eq}=Equilibrium mass transfer coefficient (unitless)

The equilibrium mass transfer coefficient is given by the following:

$$K_{eq} = \frac{H}{RT} \quad (6)$$

Where:

H = Henry's Law constant for the chemical (atm m^3/g-mol)

R = Universal Gas Constant (8.21×10^{-5} atm m^3/g-mol/°K)

T = Water Temperature (°K)

The Henry's Law constants are chemical-specific and were obtained from the USEPA Soil Screening Guidance (USEPA, 1996) and the Syracuse Research Corporation Interactive PhysProp Database (SRC, 2003).

The liquid phase mass transfer coefficient is given by:

$$K_L = 2.78 \times 10^{-6} \left(\frac{D_w}{D_{ether}} \right)^{2/3} \quad (7)$$

Where:

D_w = Diffusivity of the compound in water (cm^2/s)

D_{ether} = Diffusivity of ether in water (8.5×10^{-6} cm^2/s; USEPA, 1987).

The diffusivity of each chemical in water was obtained from the USEPA Soil Screening Guidance (USEPA, 1996) or was calculated by ENSR.

The gas phase mass transfer coefficient is given by:

$$K_G = 4.82 \times 10^{-3} U^{0.78} Sc_G^{-0.67} d_e^{-0.11} \quad (8)$$

Where:

U = wind speed (m/s)

Sc_G = Schmidt number = $\mu_G/(\rho_G D_a)$

μ_G = viscosity of air (1.81×10^{-4} g/cm-s)

ρ_G = density of air (1.2×10^{-3} g/cm^3)

D_a = diffusivity of the chemical in air (cm^2/s)

d_e = effective diameter (m) = $(4A/\pi)^{0.5}$

For each of the compounds the molecular diffusivity in air was obtained from the USEPA Soil Screening Guidance (USEPA, 1996) or was calculated by ENSR.

Attenuation Factor

For the purpose of calculating the concentration in air from a given concentration in water, it is convenient to define an attenuation factor, α, which is given as the ratio of the ambient air concentration given in equation (4) to the concentration in water:

$$\alpha = \frac{C_a}{C_L} = \frac{K}{0.05U} \quad (9)$$

If the concentration in the water is given per liter and the air concentration is given per cubic meter, then the attenuation factor becomes:

$$\alpha(L/m^3) = \frac{20000K}{U} \quad (10)$$

where the mass transfer coefficient, K, is defined as above.

Model Application and Results

Table K-1 summarizes model inputs and intermediate steps in the modeling process. Table 5-15 presents the RME and MLE groundwater source concentrations utilized in predicting trench air concentrations. Table 5-16 presents the predicted RME and MLE trench air concentrations for volatile COPCs.

Uncertainty Analysis

It should be noted that the volatilization model described above does not consider the effect of one chemical in solution upon the volatilization of another. This effect should be minor, however, considering the low concentrations of these chemicals in water. Also, the assumption of a water temperature of 25°C is conservative considering the increase of the Henry's Law parameter with temperature.

References

Jackson, N.A. 1976. The Propagation of Modified Flow Downstream of a Change in Roughness. Quarterly Journal of the Royal Meteorological Society. 102:924.

SRC, 2003. Syracuse Research Corporation. Interactive PhysProp Database. http://esc.syrres.com/interkow/physdemo.htm.

USEPA. 1996. Soil Screening Guidance: User's Guidance Manual. Office of Solid Waste and Emergency Response. EPA/540/R-96/018

USEPA. 1987. Hazardous Waste Treatment, Storage and Disposal Facilities (TDSF) – Air Emission Models. EPA-450/3-87-026. December 1987.

USEPA. 1991. Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals). Interim. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency.

TABLE K-1
USE OF GROUNDWATER CONCENTRATIONS FOR ESTIMATING CONCENTRATIONS IN EXCAVATION TRENCH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

*** Input Parameters ***	
Water temperature (degK)	298.15
Viscosity of water (cp)	0.8904
Wetted area (m**2)	2025
Wind speed (m/s)	2.25
*** Constants ***	
Gas const. (atm m**3/(mol degK))	8.21E-05
Diff. of ether in H2O (cm**2/s)	8.50E-06
Viscosity of air (g/(cm s))	1.81E-04
Density of air (g/cm**3)	1.20E-03
*** Calculated Parameter ***	
Effective diameter of source (m)	50.777

*** Chemical-Specific Parameters ***

Constituent	CAS Number	Molecular Weight (g/mol)		Henry's Law Coefficient (atm*m**3/g-mole)		Diffusivity In Air (cm**2/s)		Diffusivity In Water (cm**2/s)		Keq	Kl (m/s)	SCg	Kg (m/s)	K (m/s)	Q (m3/s)	Groundwater-to-Air Attenuation Factor (L/m3)
1,2-Dichloroethane	107-06-2	98.96	(a)	9.79E-04	(b)	1.04E-01	(b)	9.90E-06	(b)	4.00E-02	3.08E-06	1.45E+00	4.59E-03	3.03E-06	6.13E-03	2.69E-02
1,2-Dichloroethene (total)	540-59-0	96.94	(a)	4.08E-03	(b)(e)	7.36E-02	(b)(e)	1.13E-05	(b)(e)	1.67E-01	3.36E-06	2.05E+00	3.64E-03	3.34E-06	6.77E-03	2.97E-02
2-Butanone (MEK)	78-93-3	72.11	(a)	5.69E-05	(c)	9.77E-02	(d)	1.03E-05	(d)	2.32E-03	3.16E-06	1.54E+00	4.40E-03	2.41E-06	4.88E-03	2.14E-02
4-Methyl-2-pentanone (MIBK)	108-10-1	100.16	(a)	1.38E-04	(c)	7.89E-02	(d)	8.22E-06	(d)	5.64E-03	2.72E-06	1.91E+00	3.82E-03	2.41E-06	4.89E-03	2.15E-02
Acetone	67-64-1	58.08	(a)	3.88E-05	(b)	1.24E-01	(b)	1.14E-05	(b)	1.59E-03	3.38E-06	1.22E+00	5.17E-03	2.39E-06	4.85E-03	2.13E-02
Benzene	71-43-2	78.11	(a)	5.55E-03	(b)	8.80E-02	(b)	9.80E-06	(b)	2.27E-01	3.06E-06	1.71E+00	4.11E-03	3.05E-06	6.17E-03	2.71E-02
Chlorobenzene	108-90-7	112.56	(a)	3.70E-03	(b)	7.30E-02	(b)	8.70E-06	(b)	1.51E-01	2.82E-06	2.07E+00	3.62E-03	2.81E-06	5.69E-03	2.50E-02
Chloroform	67-66-3	119.38	(a)	3.67E-03	(b)	1.04E-01	(b)	1.00E-05	(b)	1.50E-01	3.10E-06	1.45E+00	4.59E-03	3.08E-06	6.25E-03	2.74E-02
Chloromethane	74-87-3	50.49	(a)	8.82E-03	(c)	1.40E-01	(d)	1.50E-05	(d)	3.60E-01	4.06E-06	1.07E+00	5.61E-03	4.06E-06	8.21E-03	3.61E-02
Dichloromethane	75-09-2	84.93	(a)	2.19E-03	(b)	1.01E-01	(b)	1.17E-05	(b)	8.95E-02	3.44E-06	1.49E+00	4.50E-03	3.41E-06	6.91E-03	3.03E-02
Tetrachloroethene	127-18-4	165.83	(a)	1.84E-02	(b)	7.20E-02	(b)	8.20E-06	(b)	7.52E-01	2.71E-06	2.09E+00	3.59E-03	2.71E-06	5.49E-03	2.41E-02
Toluene	108-88-3	92.14	(a)	6.64E-03	(b)	8.70E-02	(b)	8.60E-06	(b)	2.71E-01	2.80E-06	1.73E+00	4.07E-03	2.79E-06	5.66E-03	2.48E-02
Trichloroethylene	79-01-6	131.39	(a)	1.03E-02	(b)	7.90E-02	(b)	9.10E-06	(b)	4.21E-01	2.91E-06	1.91E+00	3.82E-03	2.90E-06	5.88E-03	2.58E-02

Notes:
CAS - Chemical Abstract Service.
References for physical constants:
(a) U.S. EPA. 1992. Handbook of RCRA Ground-water Monitoring Constituents. PB92-233287.
(b) U.S. EPA. 1996a. Soil Screening Guidance. PB96-963502.
(c) Syracuse Research Corporation. Interactive PhysProp Database. http://esc.syrres.com/interkow/physdemo.htm.
(d) Calculated value.
(e) Value for cis-1,2-Dichloroethene.

APPENDIX L

CALCULATION OF OUTDOOR AIR VOC CONCENTRATIONS FROM SOIL AND GROUNDWATER

Appendix L

Calculation of Ambient Air Concentrations for Volatilization from Underlying Groundwater

Ambient air concentrations resulting from migration of volatile constituents of potential concern (COPC) from underlying soil and groundwater to outdoor air were predicted based on the method recommended by the American Society for Testing and Materials in ASTM E 2081 *Standard Provisional Guide for Risk-Based Corrective Action* (ASTM, 2000). Calculations were completed using the *RBCA Tool Kit for Chemical Releases* software, Version 1.3a, designed by Groundwater Services, Inc. (2000) to implement the calculations recommended in ASTM PS-104. The goal of the approach recommended in ASTM E 2081 is to estimate potential impacts of volatile constituents migrating from soil and groundwater to the outdoor air breathing zone.

The approach recommended in ASTM E 2081 for predicting migration of COPC vapors from groundwater and soil to ambient outdoor air is a simple one in which the relationships between outdoor air and dissolved groundwater concentrations and outdoor air and surficial soil concentraions are represented by a chemical-specific volatilization factor, and is dependent upon the following assumptions:

- The concentration of dissolved constituents in soil and groundwater remains constant over time (i.e., serves as an infinite source of volatile constituents).
- The soil vapor concentrations of volatile constituents reach immediate equilibrium with the dissolved concentration of these same constituents in groundwater.
- There is no loss of constituent (through biodegradation, or other loss mechanism) as the volatile constituent migrates, via diffusion, to the ground surface.
- Air dispersion of volatile constituents within the breathing zone is predicted through the use of a box model resulting in steady, well mixed atmospheric dispersion of volatile constituents as they rise into the breathing zone.

Equations for the implementation of ASTM E 2081 are available in the American Society for Testing and Materials in ASTM E 2081 *Standard Provisional Guide for Risk-Based Corrective Action* (ASTM, 2000) and the *RBCA Tool Kit Chemical Releases Guidance Manual* developed by GSI (2001). Chemical-specific parameters selected by GSI for use in their *RBCA Tool Kit for Chemical Releases* software were utilized in this risk assessment.

Default parameters provided in the model were used with the following with the exception of the following site-specific soil and groundwater parameters:

- Predominant SCS soil type;
- Depth to water bearing unit (cm);

- Depth to top and base of affected soils (cm);

All parameters, default and site-specific, are summarized in the attached modeling printouts. The modeling printouts are presented in the following order, Maximum Likely Exposure (MLE) Scenario followed by Reasonable Maximum Exposure (RME) Scenario:

Volatilization from Combined Soil

- Site O
- Site O North
- Site P
- Site Q North
- Site Q South
- Site R
- Site S

Note that the soil parameters are the same for the MLE and RME scenarios. Therefore, only the MLE input sheet is presented.

Volatilization from Groundwater/Leachate

- Groundwater location Q-AA-Q-6-24
- Groundwater location R-AA-R-1-28
- Leachate Site O
- Leachate Site Q
- Leachate Site R

REFERENCES:

ASTM, 2000. Standard Provisional Guidance for Risk Based Corrective Action. ASTM Designation: E 2081-00. American Society for Testing and Material. West Conshohocken, PA.

GSI, 2001. RBCA Tool Kit for Chemical Releases Software. Version 1.3a. Groundwater Services, Inc. Houston, Texas.

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - O_MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

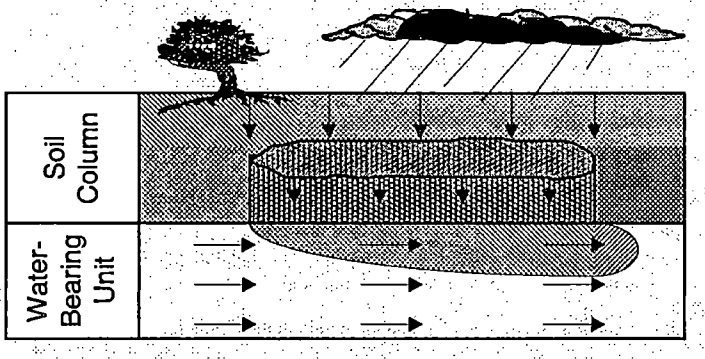
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	295	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	335.28		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type	SW/SP: Sand		
or Enter Directly	*or*		
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	*or*	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 335 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	9.6E+1	1.4E+4	5.8E+2			6.7E-3	1.7E-1		
Chlorobenzene	2.2E+2	1.4E+4	1.4E+3			1.5E-2	1.6E-1		
Ethylbenzene	4.9E+2	1.4E+4	1.2E+3			3.3E-2	3.9E-1		
Toluene	7.0E+1	1.4E+4	8.0E+2			4.8E-3	8.7E-2		
Xylene (mixed isomers)	2.5E+3	1.4E+4	1.1E+3			1.7E-1	2.3E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - O_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 335 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	5.0E+2	1.4E+4	5.8E+2			3.5E-2	8.6E-1		
Chlorobenzene	7.6E+2	1.4E+4	1.4E+3			5.2E-2	5.4E-1		
Ethylbenzene	2.8E+3	1.4E+4	1.2E+3			1.9E-1	2.3E+0		
Toluene	3.9E+2	1.4E+4	8.0E+2			2.7E-2	4.9E-1		
Xylene (mixed isomers)	1.4E+4	1.4E+4	1.1E+3			9.7E-1	1.3E+1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - O_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - O North_MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

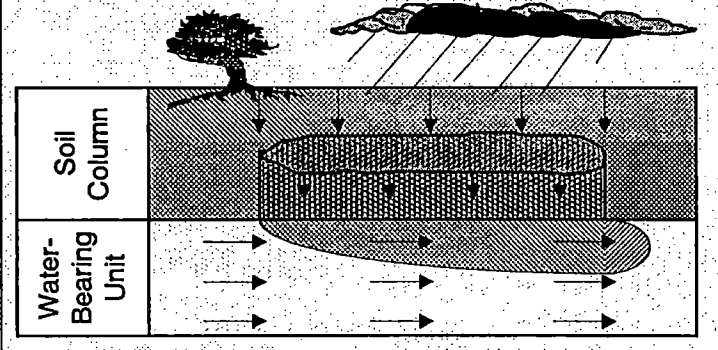
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	295	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	457.2		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type	SW/SP: Sand		
or Enter Directly	*or*		
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	*or*	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 457 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	4.4E+1	1.0E+4	5.8E+2			4.1E-3	7.6E-2		
Chlorobenzene	3.2E+2	1.0E+4	1.4E+3			3.1E-2	2.3E-1		
Methylene chloride	3.7E+1	1.0E+4	4.4E+2			3.5E-3	8.3E-2		
Ethylbenzene	5.0E+2	1.0E+4	1.2E+3			4.8E-2	4.1E-1		
Tetrachloroethene	3.5E+0	1.0E+4	5.6E+2			3.4E-4	6.3E-3		
Xylene (mixed isomers)	2.6E+3	1.0E+4	1.1E+3			2.5E-1	2.4E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - O North_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SOILS (15 - 457 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	6.9E+1	1.0E+4	5.8E+2			6.6E-3	1.2E-1		
Chlorobenzene	4.8E+2	1.0E+4	1.4E+3			4.6E-2	3.4E-1		
Methylene chloride	8.7E+1	1.0E+4	4.4E+2			8.3E-3	2.0E-1		
Ethylbenzene	7.6E+2	1.0E+4	1.2E+3			7.2E-2	6.2E-1		
Tetrachloroethene	6.8E+0	1.0E+4	5.6E+2			6.5E-4	1.2E-2		
Xylene (mixed isomers)	3.9E+3	1.0E+4	1.1E+3			3.7E-1	3.6E+0		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - O North_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - P - MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

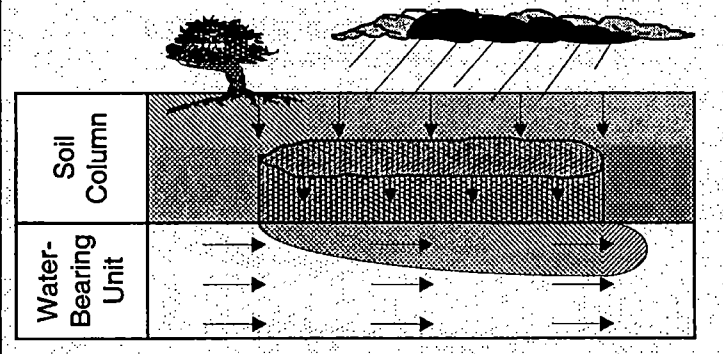
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	295	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	914.4		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
	or		
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate: (cm/yr)

or NA

or

Average annual precipitation: (cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet

Set Units | Help

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 914 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	6.6E-1	5.2E+3	5.8E+2			1.3E-4	1.1E-3		
Ethylbenzene	8.7E+0	6.1E+3	1.2E+3			1.4E-3	7.1E-3		
Tetrachloroethene	1.3E+1	5.2E+3	5.6E+2			2.5E-3	2.3E-2		
Trichloroethene	2.0E-1	5.2E+3	6.3E+2			3.9E-5	3.2E-4		
Xylene (mixed isomers)	4.0E+1	5.4E+3	1.1E+3			7.4E-3	3.7E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - P - MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 914 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Benzene	1.1E+0	5.2E+3	5.8E+2			2.2E-4	1.9E-3		
Ethylbenzene	7.8E+1	6.1E+3	1.2E+3			1.3E-2	6.4E-2		
Tetrachloroethene	1.5E+1	5.2E+3	5.6E+2			3.0E-3	2.8E-2		
Trichloroethene	9.9E-1	5.2E+3	6.3E+2			1.9E-4	1.6E-3		
Xylene (mixed isomers)	3.8E+2	5.4E+3	1.1E+3			7.0E-2	3.5E-1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - P - RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - Q North_MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

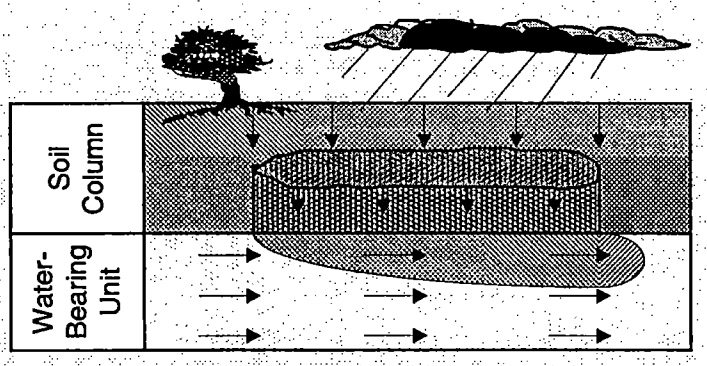
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	295	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	548.64		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
	or		
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 549 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Dichloroethane, 1,2-	3.2E-1	8.7E+3	1.1E+3			3.7E-5	2.9E-4		
Benzene	6.8E-1	8.7E+3	5.8E+2			7.8E-5	1.2E-3		
Ethylbenzene	3.5E+0	8.7E+3	1.2E+3			4.0E-4	2.8E-3		
Tetrachloroethene	2.0E+0	8.7E+3	5.6E+2			2.2E-4	3.5E-3		
Trichloroethene	1.1E-1	8.7E+3	6.3E+2			1.2E-5	1.7E-4		
Xylene (mixed isomers)	2.5E+1	8.7E+3	1.1E+3			2.9E-3	2.3E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - Q North_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 549 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Dichloroethane, 1,2-	7.4E-1	8.7E+3	1.1E+3			8.5E-5	6.8E-4		
Benzene	1.6E+0	8.7E+3	5.8E+2			1.9E-4	2.8E-3		
Ethylbenzene	7.8E+0	8.7E+3	1.2E+3			8.9E-4	6.3E-3		
Tetrachloroethene	4.9E+0	8.7E+3	5.6E+2			5.6E-4	8.8E-3		
Trichloroethene	2.1E-1	8.7E+3	6.3E+2			2.4E-5	3.2E-4		
Xylene (mixed isomers)	5.8E+1	8.7E+3	1.1E+3			6.7E-3	5.3E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - Q North_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 — Job ID: 06105-009-302
Location: Combined Soil - Q South_MLE — Date: 26-Jun-03
Compl. By: Julie Kabel

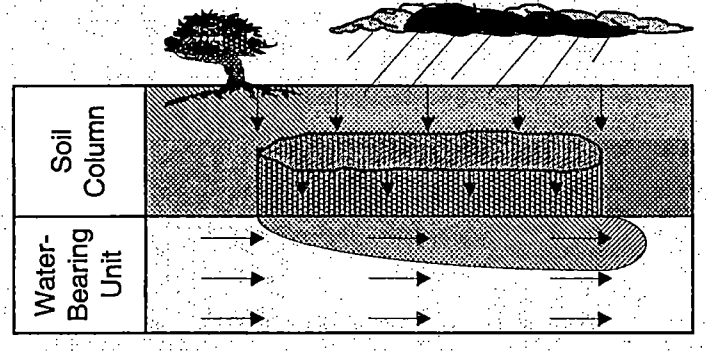
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	295	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	548.64		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

Vadose Zone / Capillary Fringe

Predominant USCS Soil Type

SW/SP: Sand

or — Enter Directly

	Vadose Zone	Capillary Fringe	
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate: (cm/yr)

or — NA

or

Average annual precipitation: (cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01 (-)
Soil/water pH	6.8 (-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet

Set Units | | Help

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 549 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Benzene	1.3E-1	8.7E+3	5.8E+2			1.5E-5	2.3E-4		
Ethylbenzene	1.4E+1	8.7E+3	1.2E+3			1.6E-3	1.1E-2		
Toluene	6.5E+1	8.7E+3	8.0E+2			7.5E-3	8.1E-2		
Trichloroethene	2.2E-2	8.7E+3	6.3E+2			2.5E-6	3.4E-5		
Xylene (mixed isomers)	9.5E+1	8.7E+3	1.1E+3			1.1E-2	8.8E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - Q South_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 549 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Benzene	3.0E-1	8.7E+3	5.8E+2			3.4E-5	5.2E-4		
Ethylbenzene	3.5E+1	8.7E+3	1.2E+3			4.1E-3	2.9E-2		
Toluene	1.7E+2	8.7E+3	8.0E+2			1.9E-2	2.1E-1		
Trichloroethene	5.2E-2	8.7E+3	6.3E+2			5.9E-6	8.1E-5		
Xylene (mixed isomers)	2.5E+2	8.7E+3	1.1E+3			2.9E-2	2.3E-1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - Q South_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - R_MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

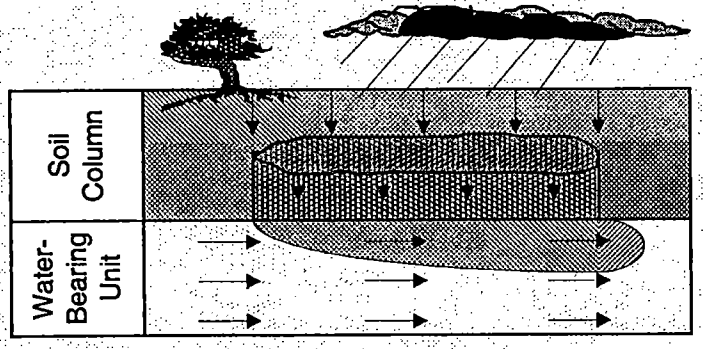
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	29	(cm)
Soil column thickness	271	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	792.48		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

	Vadose Zone	Capillary Fringe	
Predominant USCS Soil Type	CL: Silty Clay		
or — Enter Directly			
Total porosity	0.36		(-)
Volumetric water content	0.34	0.35	(-)
Volumetric air content	0.02	0.010	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E-3		(cm/d)
Vapor permeability	1.0E-13		(cm^2)
Capillary zone thickness	2.9E+1		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or — NA		
or		
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 792 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium: Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-site (0 cm) Commercial	On-site (0 cm) Construction Worker	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Trichloroethane, 1,1,2-	1.7E+0	6.3E+4	1.3E+4			2.7E-5	1.3E-4		
Dichloroethane, 1,2-	1.7E+1	1.1E+5	2.3E+4			1.5E-4	7.4E-4		
Dichloroethene, cis-1,2-	6.2E+0	1.2E+5	2.3E+4			5.4E-5	2.7E-4		
Benzene	2.6E+1	1.1E+5	2.2E+4			2.4E-4	1.2E-3		
Chlorobenzene	2.3E+2	2.1E+5	4.1E+4			1.1E-3	5.6E-3		
Chloroform	2.8E+0	1.3E+5	2.5E+4			2.2E-5	1.1E-4		
Ethylbenzene	9.0E+0	2.6E+5	5.2E+4			3.5E-5	1.7E-4		
Tetrachloroethene	2.2E+2	1.5E+5	3.1E+4			1.4E-3	7.2E-3		
Toluene	1.8E+2	1.5E+5	3.1E+4			1.2E-3	5.8E-3		
Trichloroethene	2.5E+2	4.8E+4	9.7E+3			5.2E-3	2.6E-2		
Xylene (mixed isomers)	4.5E+1	2.1E+5	4.2E+4			2.2E-4	1.1E-3		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - R_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 792 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Trichloroethane, 1,1,2-	3.2E+0	6.3E+4	1.3E+4			5.0E-5	2.5E-4		
Dichloroethane, 1,2-	3.3E+1	1.1E+5	2.3E+4			2.9E-4	1.4E-3		
Dichloroethene, cis-1,2-	1.4E+1	1.2E+5	2.3E+4			1.2E-4	5.9E-4		
Benzene	5.2E+1	1.1E+5	2.2E+4			4.8E-4	2.4E-3		
Chlorobenzene	5.9E+2	2.1E+5	4.1E+4			2.8E-3	1.4E-2		
Chloroform	4.9E+0	1.3E+5	2.5E+4			3.9E-5	1.9E-4		
Ethylbenzene	1.6E+1	2.6E+5	5.2E+4			6.2E-5	3.1E-4		
Tetrachloroethene	4.5E+2	1.5E+5	3.1E+4			2.9E-3	1.4E-2		
Toluene	3.2E+2	1.5E+5	3.1E+4			2.0E-3	1.0E-2		
Trichloroethene	2.2E+3	4.8E+4	9.7E+3			4.5E-2	2.3E-1		
Xylene (mixed isomers)	8.9E+1	2.1E+5	4.2E+4			4.2E-4	2.1E-3		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - R_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Combined Soil - S_MLE | Date: 26-Jun-03
Compl. By: Julie Kabel

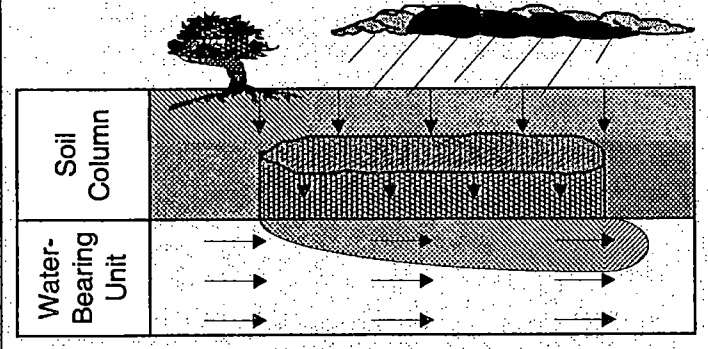
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	300	(cm)
Capillary zone thickness	29	(cm)
Soil column thickness	271	(cm)

Affected Soil Zone

Depth to top of affected soils	15.24		(cm)
Depth to base of affected soils	304.8		(cm)
Affected soil area	2E+07	2E+07	(cm^2)
Length of affected soil parallel to assumed wind direction	4500	4500	(cm)
Length of affected soil parallel to assumed GW flow direction			(cm)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

CL: Silty Clay

or Enter Directly

or

Total porosity	0.36		(-)
Volumetric water content	0.34	0.35	(-)
Volumetric air content	0.02	0.010	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E-3		(cm/d)
Vapor permeability	1.0E-13		(cm^2)
Capillary zone thickness	2.9E+1		(cm)

Net Rainfall Infiltration

Net infiltration estimate: (cm/yr)

or NA *or*

Average annual precipitation: (cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01 (-)
Soil/water pH	6.8 (-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 305 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Methyl-2-pentanone, 4-	1.0E+2	2.0E+4	4.1E+3			5.1E-3	2.5E-2		
Benzene	1.2E+1	1.1E+5	2.2E+4			1.1E-4	5.4E-4		
Chlorobenzene	2.7E+2	2.1E+5	4.1E+4			1.3E-3	6.4E-3		
Methylene chloride	1.6E+1	6.6E+4	1.3E+4			2.5E-4	1.2E-3		
Ethylbenzene	3.0E+2	2.6E+5	5.2E+4			1.2E-3	5.8E-3		
Tetrachloroethene	1.3E+1	1.5E+5	3.1E+4			8.4E-5	4.2E-4		
Toluene	1.3E+3	1.5E+5	3.1E+4			8.7E-3	4.4E-2		
Trichloroethene	5.4E+1	4.8E+4	9.7E+3			1.1E-3	5.6E-3		
Xylene (mixed isomers)	1.8E+3	2.1E+5	4.2E+4			8.4E-3	4.2E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - S_MLE
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (15 - 305 cm):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)	On-site (0 cm)		Off-site 1 (0 cm)	Off-site 2 (0 cm)
		Commercial	Construction Worker	None	None	Commercial	Construction Worker	None	None
Methyl-2-pentanone, 4-	4.0E+2	2.0E+4	4.1E+3			2.0E-2	9.9E-2		
Benzene	3.5E+1	1.1E+5	2.2E+4			3.2E-4	1.6E-3		
Chlorobenzene	1.2E+3	2.1E+5	4.1E+4			5.8E-3	2.9E-2		
Methylene chloride	5.7E+1	6.6E+4	1.3E+4			8.6E-4	4.3E-3		
Ethylbenzene	1.1E+3	2.6E+5	5.2E+4			4.2E-3	2.1E-2		
Tetrachloroethene	3.3E+1	1.5E+5	3.1E+4			2.1E-4	1.1E-3		
Toluene	6.0E+3	1.5E+5	3.1E+4			3.9E-2	1.9E-1		
Trichloroethene	2.4E+2	4.8E+4	9.7E+3			5.0E-3	2.5E-2		
Xylene (mixed isomers)	7.3E+3	2.1E+5	4.2E+4			3.5E-2	1.7E-1		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Combined Soil - S_RME
Completed By: Julie Kabel

Date Completed: 26-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Q - AA-Q-6-24 | Date: 1-Jun-03
Compl. By: Julie Kabel

1. Soil Source Zone Characteristics

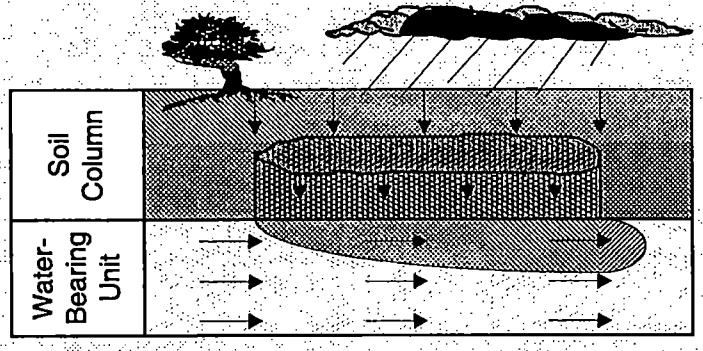
Hydrogeology

General Case Construction

Depth to water-bearing unit	579.12	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	574.12	(cm)

Affected Soil Zone

Depth to top of affected soils		(cm)
Depth to base of affected soils		(cm)
Affected soil area		(cm^2)
Length of affected soil parallel to assumed wind direction		(cm)
Length of affected soil parallel to assumed GW flow direction		(cm)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

or

Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Benzene	4.8E-1	1.2E+4			4.0E-5		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Q - AA-Q-6-24
Completed By: Julie Kabel

Date Completed: 1-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: R - AA-R-1-28 | Date: 1-Jun-03
Compl. By: Julie Kabel

1. Soil Source Zone Characteristics

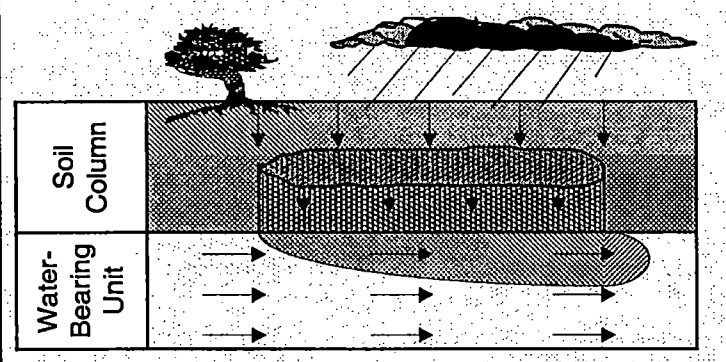
Hydrogeology

General Case Construction

Depth to water-bearing unit	701.04	(cm)
Capillary zone thickness	29	(cm)
Soil column thickness	672.04	(cm)

Affected Soil Zone

Depth to top of affected soils		(cm)
Depth to base of affected soils		(cm)
Affected soil area		(cm^2)
Length of affected soil parallel to assumed wind direction		(cm)
Length of affected soil parallel to assumed GW flow direction		(cm)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

CL: Silty Clay

or Enter Directly

	Vadose Zone	Capillary Fringe	
	or		
Total porosity	0.36		(-)
Volumetric water content	0.34	0.35	(-)
Volumetric air content	0.02	0.010	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E-3		(cm/d)
Vapor permeability	1.0E-13		(cm^2)
Capillary zone thickness	2.9E+1		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 cm) Commercial	*Off-site 1* (0 cm) None	*Off-site 2* (0 cm) None	On-site (0 cm) Commercial	*Off-site 1* (0 cm) None	*Off-site 2* (0 cm) None
Benzene	5.1E-1	2.9E+6			1.8E-7		
Chloromethane	3.2E-3	1.9E+5			1.7E-8		
Chlorobenzene	2.0E+0	3.4E+6			5.8E-7		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: R - AA-R-1-28
Completed By: Julie Kabel

Date Completed: 1-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Leachate O | Date: 1-Jun-03
Compl. By: Julie Kabel

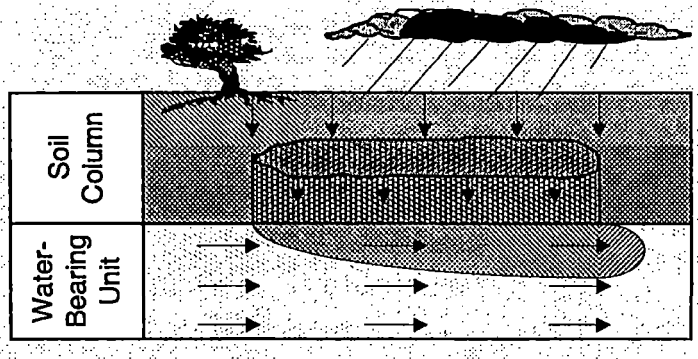
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	60.96	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	55.96	(cm)

Affected Soil Zone

Depth to top of affected soils		(cm)
Depth to base of affected soils		(cm)
Affected soil area		(cm^2)
Length of affected soil parallel to assumed wind direction		(cm)
Length of affected soil parallel to assumed GW flow direction		(cm)



2. Surface Soil Column

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
	or		
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate			(cm/yr)
or NA		or	
Average annual precipitation			(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Benzene	9.2E-1	1.0E+4			9.0E-5		
Methyl-2-pentanone, 4-	2.1E-1	5.6E+3			3.7E-5		
Chlorobenzene	1.7E+0	1.5E+4			1.2E-4		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Leachate O
Completed By: Julie Kabel

Date Completed: 1-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Leachate Q | Date: 1-Jun-03
Compl. By: Julie Kabel

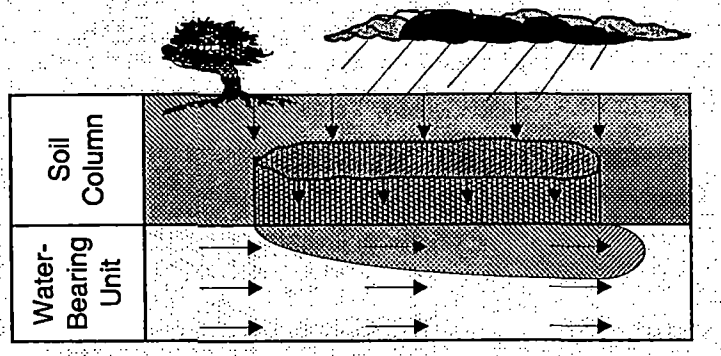
1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	243.84	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	238.84	(cm)

Affected Soil Zone

Depth to top of affected soils		(cm)
Depth to base of affected soils		(cm)
Affected soil area		(cm^2)
Length of affected soil parallel to assumed wind direction		(cm)
Length of affected soil parallel to assumed GW flow direction		(cm)



2. Surface Soil Column

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate | | (cm/yr)

or NA *or*

Average annual precipitation | | (cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 cm) Commercial	*Off-site 1* (0 cm) None	*Off-site 2* (0 cm) None	On-site (0 cm) Commercial	*Off-site 1* (0 cm) None	*Off-site 2* (0 cm) None
Dichloroethane, 1,2-	2.2E+0	2.1E+4			1.0E-4		
Methyl-2-pentanone, 4-	7.5E-1	1.5E+4			4.9E-5		
Acetone	1.4E+0	1.5E+5			9.6E-6		
Benzene	4.3E-1	1.1E+4			3.9E-5		
Chlorobenzene	1.2E+0	1.6E+4			7.2E-5		
Methylene chloride	4.7E-2	1.5E+4			3.2E-6		
Tetrachloroethene	8.3E-2	5.5E+3			1.5E-5		
Trichloroethene	2.0E-2	2.3E+3			8.7E-6		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Leachate Q
Completed By: Julie Kabel

Date Completed: 1-Jun-03
Job ID: 06105-009-302

Site-Specific Soil Parameters

Site Name: Sauget Area 2 | Job ID: 06105-009-302
Location: Leachate R | Date: 1-Jun-03
Compl. By: Julie Kabel

1. Soil Source Zone Characteristics

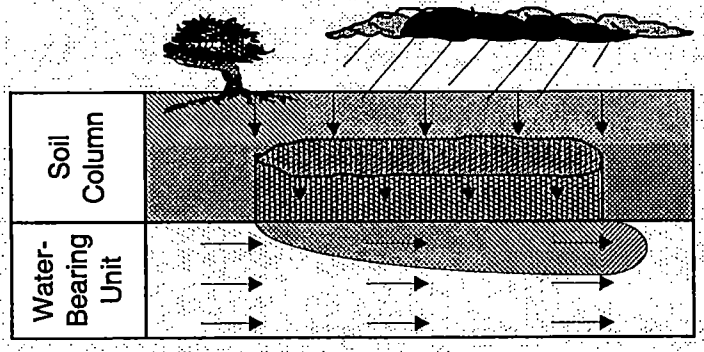
Hydrogeology

General Case Construction

Depth to water-bearing unit	548.64	(cm)
Capillary zone thickness	5	(cm)
Soil column thickness	543.64	(cm)

Affected Soil Zone

Depth to top of affected soils		(cm)
Depth to base of affected soils		(cm)
Affected soil area		(cm^2)
Length of affected soil parallel to assumed wind direction		(cm)
Length of affected soil parallel to assumed GW flow direction		(cm)



2. Surface Soil Column

Vadose Zone | Capillary Fringe

Predominant USCS Soil Type

SW/SP: Sand

or Enter Directly

	Vadose Zone	Capillary Fringe	
Total porosity	0.41		(-)
Volumetric water content	0.08	0.369	(-)
Volumetric air content	0.33	0.041	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	8.6E+2		(cm/d)
Vapor permeability	1.0E-8		(cm^2)
Capillary zone thickness	5.0E+0		(cm)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | Help

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None	On-site (0 cm) Commercial	Off-site 1 (0 cm) None	Off-site 2 (0 cm) None
Dichloroethane, 1,2-	5.0E+1	2.5E+4			2.0E-3		
Dichloroethene, cis-1,2-	1.3E+1	3.5E+3			3.8E-3		
Methyl ethyl ketone	7.9E+0	1.1E+5			7.3E-5		
Acetone	3.2E+1	3.1E+5			1.0E-4		
Benzene	6.8E+0	1.2E+4			5.7E-4		
Chlorobenzene	1.3E+0	1.8E+4			7.3E-5		
Chloroform	2.0E+0	1.4E+4			1.4E-4		
Methylene chloride	1.9E+0	1.7E+4			1.1E-4		
Tetrachloroethene	3.3E+1	5.9E+3			5.6E-3		
Toluene	2.1E+1	1.1E+4			1.9E-3		
Trichloroethene	1.5E+2	2.9E+3			5.1E-2		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Sauget Area 2
Site Location: Leachate R
Completed By: Julie Kabel

Date Completed: 1-Jun-03
Job ID: 06105-009-302

APPENDIX M

RISK CALCULATION SPREADSHEETS

Indoor Industrial Worker
Outdoor Industrial Worker
Trespassing Teenager
Construction Worker
Recreational Fisher

Indoor Industrial Worker

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Indoor Industrial Worker

ASSUMPTIONS FOR INHALATION OF	INDOOR WORKER -RME INDOOR AIR	Assumed Value	Units	Calculated Value
Inhalation Rate	RME Indoor Industrial Worker	1.6	(m^3 air/hour)	
Body Weight	RME Indoor Industrial Worker	70	(kg)	
Exposure Time	RME Indoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	RME Indoor Industrial Worker	250	(days)/365 (days) =	6.85E-01
Exposure Duration (cancer)	RME Indoor Industrial Worker	25	(yrs)/70(yrs) =	3.57E-01
Exposure Duration (noncancer)	RME Indoor Industrial Worker	25	(yrs)/25(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR WORKER -RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Indoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	4.47E-02	4.47E-02	4.07E-03
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	4.47E-02	4.47E-02	3.44E-04
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	2.95E-02	2.95E-02	2.38E-03
Chloromethane	1.00E+00	1	6.30E-03	4.47E-02	4.47E-02	2.82E-04
Dichloromethane	1.00E+00	1	1.65E-03	4.47E-02	4.47E-02	7.36E-05
Tetrachloroethene	1.00E+00	1	2.10E-02	4.47E-02	4.47E-02	9.39E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	4.47E-02	4.47E-02	1.79E-02

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR WORKER -RME

		Mid				Shallow		Leachate					
	Reference	Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs													
1,2-Dichloroethane	4.07E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.37E-06	3.00E-08	4.72E-07	1.92E-09
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-06	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-08	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	7.01E-07	NC	8.28E-07	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.65E-07	NC	2.06E-08	NC
Benzene	3.44E-04	2.53E-05	8.72E-09	2.51E-05	8.64E-09	--	NCOPC	3.18E-05	1.10E-08	3.66E-05	1.26E-08	2.70E-06	9.30E-10
Chlorobenzene	NC	--	NCOPC	1.27E-05	NC	--	NCOPC	1.62E-05	NC	1.87E-05	NC	1.58E-06	NC
Chloroform	2.38E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.88E-06	4.48E-09
Chloromethane	2.82E-04	--	NCOPC	2.17E-04	6.11E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	7.36E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.75E-05	1.29E-09	1.16E-06	8.53E-11
Tetrachloroethene	9.39E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.29E-05	8.73E-08	7.98E-06	7.49E-09
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	NC
Trichloroethylene	1.79E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.02E-05	1.08E-06	4.82E-06	8.62E-08
	Total:		8.72E-09		6.98E-08		NCOPC		1.10E-08		1.21E-06		1.01E-07

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR WORKER -RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	RME Indoor Industrial Worker ADDinh (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	1.25E-01	1.25E-01	8.95E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	1.25E-01	1.25E-01	4.38E-01
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	1.25E-01	1.25E-01	1.46E-01
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	1.25E-01	1.25E-01	1.46E+01
Chlorobenzene	1.00E+00	1	1.70E-02	1.25E-01	1.25E-01	7.37E+00
Chloroform	1.00E+00	1	1.43E-02	1.25E-01	1.25E-01	8.76E+00
Chloromethane	1.00E+00	1	2.57E-02	1.25E-01	1.25E-01	4.87E+00
Dichloromethane	1.00E+00	1	8.60E-01	1.25E-01	1.25E-01	1.46E-01
Tetrachloroethene	1.00E+00	1	1.70E-01	1.25E-01	1.25E-01	7.37E-01
Toluene	1.00E+00	1	1.14E-01	1.25E-01	1.25E-01	1.10E+00
Trichloroethylene	1.00E+00	1	1.00E-02	1.25E-01	1.25E-01	1.25E+01

TABLE
POTENTIAL HAZARD INDEX
NONCARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR WORKER -RME

Constituent	Reference HQ (per mg/m^3)	Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
		EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	8.95E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.37E-06	6.59E-04	4.72E-07	4.23E-05
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-06	NC
2-Butanone (MEK)	4.38E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-08	1.18E-08
4-Methyl-2-pentanone (MIBK)	1.46E-01	--	NCOPC	--	NCOPC	--	NCOPC	7.01E-07	1.02E-07	8.28E-07	1.21E-07	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.65E-07	NC	2.06E-08	NC
Benzene	1.46E+01	2.53E-05	3.70E-04	2.51E-05	3.67E-04	--	NCOPC	3.18E-05	4.65E-04	3.66E-05	5.35E-04	2.70E-06	3.94E-05
Chlorobenzene	7.37E+00	--	NCOPC	1.27E-05	9.36E-05	--	NCOPC	1.62E-05	1.19E-04	1.87E-05	1.38E-04	1.58E-06	1.17E-05
Chloroform	8.76E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.88E-06	1.65E-05
Chloromethane	4.87E+00	--	NCOPC	2.17E-04	1.06E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.46E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.75E-05	2.55E-06	1.16E-06	1.69E-07
Tetrachloroethene	7.37E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.29E-05	6.85E-05	7.98E-06	5.88E-06
Toluene	1.10E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	3.32E-06
Trichloroethylene	1.25E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.02E-05	7.54E-04	4.82E-06	6.03E-05
Total HI:			**3.70E-04**		**1.52E-03**		**NCOPC**		**5.84E-04**		**2.16E-03**		**1.80E-04**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Indoor Industrial Worker

ASSUMPTIONS FOR INDOOR INDUSTRIAL WORKER -MLE INHALATION OF INDOOR AIR		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Indoor Industrial Worker	1.0	(m^3 air/hour)	
Body Weight	MLE Indoor Industrial Worker	70	(kg)	
Exposure Time	MLE Indoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	MLE Indoor Industrial Worker	250	(days)/365 (days) =	6.85E-01
Exposure Duration (cancer)	MLE Indoor Industrial Worker	7	(yrs)/70(yrs) =	1.00E-01
Exposure Duration (noncancer)	MLE Indoor Industrial Worker	7	(yrs)/7(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR INDUSTRIAL WORKER -MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Indoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	7.83E-03	7.83E-03	7.12E-04
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	7.83E-03	7.83E-03	6.03E-05
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	5.17E-03	5.17E-03	4.16E-04
Chloromethane	1.00E+00	1	6.30E-03	7.83E-03	7.83E-03	4.93E-05
Dichloromethane	1.00E+00	1	1.65E-03	7.83E-03	7.83E-03	1.29E-05
Tetrachloroethene	1.00E+00	1	2.10E-02	7.83E-03	7.83E-03	1.64E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	7.83E-03	7.83E-03	3.13E-03

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR INDUSTRIAL WORKER -MLE

		Mid				Shallow		Leachate					
	Reference	Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs													
1,2-Dichloroethane	7.12E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.37E-06	5.25E-09	4.72E-07	3.37E-10
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-06	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-08	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	7.01E-07	NC	8.28E-07	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.65E-07	NC	2.06E-08	NC
Benzene	6.03E-05	2.53E-05	1.53E-09	2.51E-05	1.51E-09	--	NCOPC	3.18E-05	1.92E-09	3.66E-05	2.21E-09	2.70E-06	1.63E-10
Chlorobenzene	NC	--	NCOPC	1.27E-05	NC	--	NCOPC	1.62E-05	NC	1.87E-05	NC	1.58E-06	NC
Chloroform	4.16E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.88E-06	7.83E-10
Chloromethane	4.93E-05	--	NCOPC	2.17E-04	1.07E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.29E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.75E-05	2.26E-10	1.16E-06	1.49E-11
Tetrachloroethene	1.64E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.29E-05	1.53E-08	7.98E-06	1.31E-09
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	NC
Trichloroethylene	3.13E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.02E-05	1.89E-07	4.82E-06	1.51E-08
	Total:		1.53E-09		1.22E-08		NCOPC		1.92E-09		2.12E-07		1.77E-08

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR INDUSTRIAL WORKER -MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Indoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	7.83E-02	7.33E-02	5.59E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	7.83E-02	7.33E-02	2.74E-01
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	7.83E-02	7.33E-02	9.13E-02
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	7.83E-02	7.33E-02	9.13E+00
Chlorobenzene	1.00E+00	1	1.70E-02	7.83E-02	7.33E-02	4.60E+00
Chloroform	1.00E+00	1	1.43E-02	7.83E-02	7.33E-02	5.47E+00
Chloromethane	1.00E+00	1	2.57E-02	7.83E-02	7.33E-02	3.04E+00
Dichloromethane	1.00E+00	1	8.60E-01	7.83E-02	7.33E-02	9.10E-02
Tetrachloroethene	1.00E+00	1	1.70E-01	7.83E-02	7.33E-02	4.60E-01
Toluene	1.00E+00	1	1.14E-01	7.83E-02	7.33E-02	6.87E-01
Trichloroethylene	1.00E+00	1	1.00E-02	7.83E-02	7.33E-02	7.83E+00

TABLE
POTENTIAL HAZARD INDEX
NONCARCINOGENIC ASSESSMENT
INHALATION OF
INDOOR AIR
INDOOR INDUSTRIAL WORKER -MLE

		Mid				Shallow		Leachate					
	Reference	Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	5.59E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.37E-06	4.12E-04	4.72E-07	2.64E-05
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-06	NC
2-Butanone (MEK)	2.74E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-08	7.40E-09
4-Methyl-2-pentanone (MIBK)	9.13E-02	--	NCOPC	--	NCOPC	--	NCOPC	7.01E-07	6.40E-08	8.28E-07	7.56E-08	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.65E-07	NC	2.06E-08	NC
Benzene	9.13E+00	2.53E-05	2.31E-04	2.51E-05	2.29E-04	--	NCOPC	3.18E-05	2.90E-04	3.66E-05	3.35E-04	2.70E-06	2.47E-05
Chlorobenzene	4.60E+00	--	NCOPC	1.27E-05	5.85E-05	--	NCOPC	1.62E-05	7.46E-05	1.87E-05	8.63E-05	1.58E-06	7.28E-06
Chloroform	5.47E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.88E-06	1.03E-05
Chloromethane	3.04E+00	--	NCOPC	2.17E-04	6.60E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	9.10E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.75E-05	1.59E-08	1.16E-06	1.06E-07
Tetrachloroethene	4.60E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.29E-05	4.28E-05	7.98E-06	3.67E-06
Toluene	6.87E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	2.07E-06
Trichloroethylene	7.83E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.02E-05	4.71E-04	4.82E-06	3.77E-05
	Total HI:		2.31E-04		9.48E-04		NCOPC		3.65E-04		1.35E-03		1.12E-04

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - *Exposure Point Concentration.*
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

Outdoor Industrial Worker

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated	
Receptor:	RME Outdoor Industrial Worker

ASSUMPTIONS FOR OUTDOOR INDUSTRIAL WORKER - RME INCIDENTIAL INGESTION AND DERMAL CONTACT SURFACE SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	RME Outdoor Industrial Worker	50	(mg soil/day)	
Soil on Skin	RME Outdoor Industrial Worker	0.02	(mg/cm^2)	
Skin Exposed	RME Outdoor Industrial Worker	3339	(cm^2)	
Body Weight	RME Outdoor Industrial Worker	70	(kg)	
Exposure Frequency	RME Outdoor Industrial Worker	190	(days)/365(days) =	5.21E-01
Exposure Duration (cancer)	RME Outdoor Industrial Worker	25	(years)/70(years) =	3.57E-01
Exposure Duration (noncancer)	RME Outdoor Industrial Worker	25	(yrs)/25(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration in Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	1.33E-07	1.33E-07	1.77E-09	1.77E-09	1.46E-09	1.95E-11	1.48E-09
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	3.85E-08	3.85E-08	3.55E-09	3.55E-09	2.81E-08	2.59E-09	3.07E-08
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	3.85E-08	3.85E-08	3.55E-09	3.55E-09	2.81E-07	2.59E-08	3.07E-07
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	3.85E-08	3.85E-08	3.55E-09	3.55E-09	2.81E-08	2.59E-09	3.07E-08
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	3.85E-08	3.85E-08	3.55E-09	3.55E-09	2.81E-07	2.59E-08	3.07E-07
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	1.33E-07	1.33E-07	1.77E-09	1.77E-09	4.51E-08	6.03E-10	4.58E-08
beta-BHC	1.00E+00	1	0.01	1.80E+00	1.33E-07	1.33E-07	1.77E-09	1.77E-09	2.39E-07	3.19E-09	2.42E-07
Dieldrin	1.00E+00	1	0.01	1.60E+01	1.33E-07	1.33E-07	1.77E-09	1.77E-09	2.12E-06	2.84E-08	2.15E-06
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	1.33E-07	1.33E-07	1.77E-09	1.77E-09	1.73E-07	2.31E-09	1.75E-07
Heptachlor	1.00E+00	1	0.01	4.50E+00	1.33E-07	1.33E-07	1.77E-09	1.77E-09	5.98E-07	7.98E-09	6.06E-07
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	1.33E-07	1.33E-07	1.77E-09	1.77E-09	1.59E-08	2.13E-10	1.61E-08
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	1.10E-07	1.10E-07	7.09E-09	7.09E-09	2.20E-07	1.42E-08	2.35E-07
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	5.31E-08	5.31E-08	7.09E-09	7.09E-09	7.97E-03	1.06E-03	9.03E-03
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	3.98E-08	3.98E-08	1.77E-10	1.77E-10	5.98E-08	2.66E-10	6.00E-08
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
SVOCs																	
2,4,6-Trichlorophenol	1.48E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.20E+00	1.21E-08
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.60E+00	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	NC
Benzo(a)anthracene	3.07E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+00	3.16E-08	--	NCOPC	8.00E+00	2.46E-07
Benzo(a)pyrene	3.07E-07	--	NCOPC	--	NCOPC	6.70E-01	2.06E-07	1.80E+00	5.53E-07	--	NCOPC	1.05E+00	3.22E-07	--	NCOPC	5.40E+00	1.66E-06
Benzo(b)fluoranthene	3.07E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E+00	4.14E-08	--	NCOPC	6.60E+00	2.03E-07
Dibenzo(a,h)anthracene	3.07E-07	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-01	1.14E-07	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	5.53E-07
Pesticides																	
4,4'-DDT	4.58E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	7.32E-07
beta-BHC	2.42E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+01	6.30E-06
Dieldrin	2.15E-06	1.80E-01	3.88E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.69E-01	5.79E-07	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	1.75E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	1.31E-06
Heptachlor	6.06E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E+00	9.08E-07
Herbicides																	
Pentachlorophenol	1.61E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.40E+02	7.11E-06
PCBs																	
Total PCBs	2.35E-07	1.08E+01	2.53E-06	7.09E+02	1.66E-04	7.02E+00	1.65E-06	1.87E+00	4.39E-07	2.57E+00	6.04E-07	5.10E+00	1.20E-06	--	NCOPC	1.01E+03	2.37E-04
Dioxin																	
2,3,7,8-TCDD-TEQ	9.03E-03	5.93E-03	5.36E-05	5.08E-02	4.59E-04	--	NCOPC	--	NCOPC	3.31E-03	2.99E-05	1.69E-03	1.53E-05	--	NCOPC	--	NCOPC
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.43E+01	NC	--	NCOPC	--	NCOPC
Arsenic	6.00E-08	--	NCOPC	--	NCOPC	2.60E+01	1.56E-06	--	NCOPC	1.30E+01	7.80E-07	1.35E+01	8.10E-07	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.20E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.81E+02	NC	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	4.30E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**5.65E-05**		**6.25E-04**		**3.41E-06**		**1.10E-06**		**3.13E-05**		**1.82E-05**		**NCOPC**		**2.56E-04**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	3.72E-07	3.72E-07	4.97E-09	4.97E-09	3.72E-03	4.97E-05	3.77E-03
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	3.72E-07	3.72E-07	4.97E-09	4.97E-09	1.24E-04	1.66E-06	1.26E-04
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	3.72E-07	3.72E-07	4.97E-09	4.97E-09	7.44E-04	9.93E-06	7.54E-04
beta-BHC	1.00E+00	1	0.01	3.00E-04	3.72E-07	3.72E-07	4.97E-09	4.97E-09	1.24E-03	1.66E-05	1.26E-03
Dieldrin	1.00E+00	1	0.01	5.00E-05	3.72E-07	3.72E-07	4.97E-09	4.97E-09	7.44E-03	9.93E-05	7.54E-03
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	3.72E-07	3.72E-07	4.97E-09	4.97E-09	1.24E-03	1.66E-05	1.26E-03
Heptachlor	1.00E+00	1	0.01	5.00E-04	3.72E-07	3.72E-07	4.97E-09	4.97E-09	7.44E-04	9.93E-06	7.54E-04
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	3.72E-07	3.72E-07	4.97E-09	4.97E-09	1.24E-05	1.66E-07	1.26E-05
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	3.09E-07	3.09E-07	1.99E-08	1.99E-08	1.54E-02	9.93E-04	1.64E-02
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	3.72E-07	3.72E-07	3.48E-09	3.48E-09	9.30E-04	6.69E-06	9.38E-04
Arsenic	1.00E+00	0.3	0.001	3.00E-04	1.12E-07	1.12E-07	4.97E-10	4.97E-10	3.72E-04	1.66E-06	3.73E-04
Cadmium	1.00E+00	1	0.04	1.00E-03	3.72E-07	3.72E-07	1.99E-08	1.99E-08	3.72E-04	1.99E-05	3.92E-04
Chromium	1.00E+00	0.3	0	3.00E-03	1.12E-07	1.12E-07	0.00E+00	NA	3.72E-05	NC	3.72E-05
Manganese	1.00E+00	1	0.01	2.40E-02	3.72E-07	3.72E-07	4.97E-09	4.97E-09	1.55E-05	2.07E-07	1.57E-05
Mercury	1.00E+00	2	0.007	3.00E-04	7.44E-07	7.44E-07	3.48E-09	3.48E-09	2.48E-03	1.16E-05	2.49E-03

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
SVOCs																	
2,4,6-Trichlorophenol	3.77E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.20E+00	3.09E-02
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.60E+00	NC
4-Nitroaniline	1.26E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	7.16E-03
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+00	NC	--	NCOPC	8.00E+00	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	6.70E-01	NC	1.80E+00	NC	--	NCOPC	1.05E+00	NC	--	NCOPC	5.40E+00	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E+00	NC	--	NCOPC	6.60E+00	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	NC
Pesticides																	
4,4'-DDT	7.54E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	1.21E-02
beta-BHC	1.26E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+01	3.27E-02
Dieldrin	7.54E-03	1.80E-01	1.36E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.69E-01	2.03E-03	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	1.26E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	9.42E-03
Heptachlor	7.54E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E+00	1.13E-03
Herbicides																	
Pentachlorophenol	1.26E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.40E+02	5.53E-03
PCBs																	
Total PCBs	1.64E-02	1.08E+01	1.77E-01	7.09E+02	1.16E+01	7.02E+00	1.15E-01	1.87E+00	3.07E-02	2.57E+00	4.23E-02	5.10E+00	8.36E-02	--	NCOPC	1.01E+03	1.66E+01
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	5.93E-03	NC	5.08E-02	NC	--	NCOPC	--	NCOPC	3.31E-03	NC	1.69E-03	NC	--	NCOPC	--	NCOPC
Metals																	
Antimony	9.38E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.43E+01	1.34E-02	--	NCOPC	--	NCOPC
Arsenic	3.73E-04	--	NCOPC	--	NCOPC	2.60E+01	9.71E-03	--	NCOPC	1.30E+01	4.86E-03	1.35E+01	5.04E-03	--	NCOPC	--	NCOPC
Cadmium	3.92E-04	--	NCOPC	--	NCOPC	--	NCOPC	9.20E+01	3.60E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	3.72E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.81E+02	6.73E-03	--	NCOPC	--	NCOPC
Manganese	1.57E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E+02	1.35E-02	--	NCOPC	--	NCOPC
Mercury	2.49E-03	--	NCOPC	4.30E+01	1.07E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total HI:		**1.79E-01**		**1.18E+01**		**1.25E-01**		**6.67E-02**		**4.71E-02**		**1.24E-01**		**NCOPC**		**1.67E+01**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Outdoor Industrial Worker

ASSUMPTIONS FOR OUTDOOR INDUSTRIAL WORKER - RME INHALATION OF OUTDOOR AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Outdoor Industrial Worker	1.6	(m^3 air/hour)	
Body Weight	RME Outdoor Industrial Worker	70	(kg)	
Exposure Time	RME Outdoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	RME Outdoor Industrial Worker	190	(days)/365 (days) =	5.21E-01
Exposure Duration (cancer)	RME Outdoor Industrial Worker	25	(yrs)/70(yrs) =	3.57E-01
Exposure Duration (noncancer)	RME Outdoor Industrial Worker	25	(yrs)/25(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	3.40E-02	3.40E-02	1.90E-03
1,2-Dichloroethane	1.00E+00	1	9.10E-02	3.40E-02	3.40E-02	3.09E-03
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	3.40E-02	3.40E-02	2.62E-04
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	2.24E-02	2.24E-02	1.81E-03
Dichloromethane	1.00E+00	1	1.65E-03	3.40E-02	3.40E-02	5.59E-05
Ethylbenzene	1.00E+00	1	NA	3.40E-02	3.40E-02	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	3.40E-02	3.40E-02	7.14E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	3.40E-02	3.40E-02	1.36E-02
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NC
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	3.40E-02	3.40E-02	3.69E-04
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	3.40E-02	3.40E-02	1.05E-02
Benzo(a)pyrene	1.00E+00	1	3.10E+00	3.40E-02	3.40E-02	1.05E-01
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	3.40E-02	3.40E-02	1.05E-02
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	3.40E-02	3.40E-02	1.05E-01
Pesticides (b)						
4,4'-DDT	1.00E+00	1	3.40E-01	3.40E-02	3.40E-02	1.15E-02
beta-BHC	1.00E+00	1	1.86E+00	3.40E-02	3.40E-02	6.31E-02
Dieldrin	1.00E+00	1	1.61E+01	3.40E-02	3.40E-02	5.47E-01
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	3.40E-02	3.40E-02	1.55E-01
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	3.40E-02	3.40E-02	6.80E-02
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	1.87E-02	1.87E-02	2.80E+03
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	3.40E-02	3.40E-02	5.13E-01
Cadmium	1.00E+00	1	6.30E+00	3.40E-02	3.40E-02	2.14E-01
Chromium	1.00E+00	1	4.20E+01	3.40E-02	3.40E-02	1.43E+00
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs (a)																	
1,1,2-Trichloroethane	1.90E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-05	9.52E-08	--	NCOPC
1,2-Dichloroethane	3.09E-03	--	NCOPC	--	NCOPC	--	NCOPC	8.50E-05	2.63E-07	--	NCOPC	--	NCOPC	2.90E-04	8.97E-07	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-02	NC
Benzene	2.62E-04	3.50E-02	9.16E-06	6.60E-03	1.73E-06	2.20E-04	5.76E-08	1.90E-04	4.97E-08	--	NCOPC	3.40E-05	8.90E-09	4.80E-04	1.26E-07	3.20E-04	8.38E-08
Chlorobenzene	NC	5.20E-02	NC	4.60E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-03	NC	5.80E-03	NC
Chloroform	1.81E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.90E-05	7.04E-08	--	NCOPC
Dichloromethane	5.59E-05	--	NCOPC	8.30E-03	4.64E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E-04	4.81E-08
Ethylbenzene	NC	1.90E-01	NC	7.20E-02	NC	1.30E-02	NC	8.90E-04	NC	--	NCOPC	4.10E-03	NC	6.20E-05	NC	4.20E-03	NC
Tetrachloroethene	7.14E-04	--	NCOPC	6.50E-04	4.64E-07	3.00E-03	2.14E-06	5.60E-04	4.00E-07	--	NCOPC	--	NCOPC	2.90E-03	2.07E-06	2.10E-04	1.50E-07
Toluene	NC	2.70E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-02	NC	2.00E-03	NC	3.90E-02	NC
Trichloroethylene	1.36E-02	--	NCOPC	--	NCOPC	1.90E-04	2.58E-06	2.40E-05	3.26E-07	--	NCOPC	5.90E-06	8.02E-08	4.50E-02	6.12E-04	5.00E-03	6.80E-05
Xylenes, Total	NC	9.70E-01	NC	3.70E-01	NC	7.00E-02	NC	6.70E-03	NC	--	NCOPC	2.90E-02	NC	4.20E-05	NC	3.50E-02	NC
SVOCs (b)																	
2,4,6-Trichlorophenol	3.69E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	4.12E-12
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.27E-09	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.77E-08	NC
Benzo(a)anthracene	1.05E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-09	1.48E-11	--	NCOPC	1.09E-08	1.15E-10
Benzo(a)pyrene	1.05E-01	--	NCOPC	--	NCOPC	9.13E-10	9.63E-11	2.45E-09	2.59E-10	--	NCOPC	1.43E-09	1.51E-10	--	NCOPC	7.36E-09	7.76E-10
Benzo(b)fluoranthene	1.05E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.84E-09	1.94E-11	--	NCOPC	9.00E-09	9.48E-11
Dibenzo(a,h)anthracene	1.05E-01	--	NCOPC	--	NCOPC	--	NCOPC	5.04E-10	5.32E-11	--	NCOPC	--	NCOPC	--	NCOPC	2.45E-09	2.59E-10
Pesticides (b)																	
4,4'-DDT	1.15E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.18E-08	2.52E-10
beta-BHC	6.31E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.54E-08	2.24E-09
Dieldrin	5.47E-01	2.45E-10	1.34E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.67E-10	2.01E-10	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-08	NC
Heptachlor	1.55E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.04E-09	3.16E-10
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-07	NC
PCBs (b)																	
Total PCBs	6.80E-02	1.47E-08	1.00E-09	6.43E-07	4.37E-08	9.57E-09	6.51E-10	2.55E-09	1.73E-10	3.51E-09	2.39E-10	6.95E-09	4.73E-10	--	NCOPC	1.37E-06	9.35E-08
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	2.80E+03	8.08E-12	2.27E-08	4.61E-11	1.29E-07	--	NCOPC	--	NCOPC	4.51E-12	1.26E-08	2.30E-12	6.46E-09	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.95E-08	NC	--	NCOPC	--	NCOPC
Arsenic	5.13E-01	--	NCOPC	--	NCOPC	3.54E-08	1.82E-08	--	NCOPC	1.77E-08	9.10E-09	1.84E-08	9.45E-09	--	NCOPC	--	NCOPC
Cadmium	2.14E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.25E-07	2.69E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.43E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	3.52E-07	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-06	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	3.90E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**9.19E-06**		**2.83E-06**		**4.80E-06**		**1.07E-06**		**2.20E-08**		**4.58E-07**		**6.15E-04**		**6.84E-05**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	9.52E-02	9.52E-02	6.80E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	9.52E-02	9.52E-02	1.11E-01
Benzene	1.00E+00	1	8.57E-03	9.52E-02	9.52E-02	1.11E+01
Chlorobenzene	1.00E+00	1	1.70E-02	9.52E-02	9.52E-02	5.60E+00
Chloroform	1.00E+00	1	1.43E-02	9.52E-02	9.52E-02	6.66E+00
Dichloromethane	1.00E+00	1	8.60E-01	9.52E-02	9.52E-02	1.11E-01
Ethylbenzene	1.00E+00	1	2.86E-01	9.52E-02	9.52E-02	3.33E-01
Tetrachloroethene	1.00E+00	1	1.70E-01	9.52E-02	9.52E-02	5.60E-01
Toluene	1.00E+00	1	1.14E-01	9.52E-02	9.52E-02	8.35E-01
Trichloroethylene	1.00E+00	1	1.00E-02	9.52E-02	9.52E-02	9.52E+00
Xylenes, Total	1.00E+00	1	2.86E-02	9.52E-02	9.52E-02	3.33E+00
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	1	5.71E-05	9.52E-02	9.52E-02	1.67E+03
4-Nitroaniline	1.00E+00	1	1.14E-03	9.52E-02	9.52E-02	8.35E+01
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	9.52E-02	9.52E-02	3.33E+03
Manganese	1.00E+00	1	1.43E-05	9.52E-02	9.52E-02	6.66E+03
Mercury	1.00E+00	1	8.57E-05	9.52E-02	9.52E-02	1.11E+03

TABLE
POTENTIAL NONCARCINOGENIC RISK
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m³)	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-05	NC	--	NCOPC
1,2-Dichloroethane	6.80E+01	--	NCOPC	--	NCOPC	--	NCOPC	8.50E-05	5.78E-03	--	NCOPC	--	NCOPC	2.90E-04	1.97E-02	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-04	NC	--	NCOPC
4-Methyt-2-pentanone (MIBK)	1.11E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-02	2.22E-03
Benzene	1.11E+01	3.50E-02	3.89E-01	6.60E-03	7.33E-02	2.20E-04	2.44E-03	1.90E-04	2.11E-03	--	NCOPC	3.40E-05	3.78E-04	4.80E-04	5.33E-03	3.20E-04	3.55E-03
Chlorobenzene	5.60E+00	5.20E-02	2.91E-01	4.60E-02	2.58E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-03	1.57E-02	5.80E-03	3.25E-02
Chloroform	6.66E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.90E-05	2.60E-04	--	NCOPC
Dichloromethane	1.11E-01	--	NCOPC	8.30E-03	9.19E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E-04	9.52E-05
Ethylbenzene	3.33E-01	1.90E-01	6.32E-02	7.20E-02	2.40E-02	1.30E-02	4.33E-03	8.90E-04	2.96E-04	--	NCOPC	4.10E-03	1.36E-03	6.20E-05	2.06E-05	4.20E-03	1.40E-03
Tetrachloroethene	5.60E-01	--	NCOPC	6.50E-04	3.64E-04	3.00E-03	1.68E-03	5.60E-04	3.14E-04	--	NCOPC	--	NCOPC	2.90E-03	1.62E-03	2.10E-04	1.18E-04
Toluene	8.35E-01	2.70E-02	2.25E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-02	1.59E-02	2.00E-03	1.67E-03	3.90E-02	3.26E-02
Trichloroethylene	9.52E+00	--	NCOPC	--	NCOPC	1.90E-04	1.81E-03	2.40E-05	2.28E-04	--	NCOPC	5.90E-06	5.62E-05	4.50E-02	4.28E-01	5.00E-03	4.76E-02
Xylenes, Total	3.33E+00	9.70E-01	3.23E+00	3.70E-01	1.23E+00	7.00E-02	2.33E-01	6.70E-03	2.23E-02	--	NCOPC	2.90E-02	9.66E-02	4.20E-05	1.40E-04	3.50E-02	1.17E-01
SVOCs (b)																	
2,4,6-Trichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	NC
2-Nitroaniline	1.67E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.27E-09	1.04E-05
4-Nitroaniline	8.35E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.77E-08	6.49E-06
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-09	NC	--	NCOPC	1.09E-08	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	9.13E-10	NC	2.45E-09	NC	--	NCOPC	1.43E-09	NC	--	NCOPC	7.36E-09	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.84E-09	NC	--	NCOPC	9.00E-09	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.04E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.45E-09	NC
Pesticides (b)																	
4,4'-DDT	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.18E-08	NC
beta-BHC	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.54E-08	NC
Dieldrin	NC	2.45E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.67E-10	NC	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-08	NC
Heptachlor	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.04E-09	NC
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-07	NC
PCBs (b)																	
Total PCBs	NC	1.47E-08	NC	6.43E-07	NC	9.57E-09	NC	2.55E-09	NC	3.51E-09	NC	6.95E-09	NC	--	NCOPC	1.37E-06	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	8.08E-12	NC	4.61E-11	NC	--	NCOPC	--	NCOPC	4.51E-12	NC	2.30E-12	NC	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.95E-08	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	--	NCOPC	3.54E-08	NC	--	NCOPC	1.77E-08	NC	1.84E-08	NC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.25E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	3.33E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	8.21E-04	--	NCOPC	--	NCOPC
Manganese	6.66E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-06	7.81E-03	--	NCOPC	--	NCOPC
Mercury	1.11E+03	--	NCOPC	3.90E-08	4.33E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**4.00E+00**		**1.59E+00**		**2.43E-01**		**3.10E-02**		**NC**		**1.23E-01**		**4.73E-01**		**2.37E-01**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Outdoor Industrial Worker

ASSUMPTIONS FOR OUTDOOR INDUSTRIAL WORKER - RME INHALATION OF OUTDOOR AIR VOCs		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Outdoor Industrial Worker	1.6	(m^3 air/hour)	
Body Weight	RME Outdoor Industrial Worker	70	(kg)	
Exposure Time	RME Outdoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	RME Outdoor Industrial Worker	190	(days)/365 (days) =	5.21E-01
Exposure Duration (cancer)	RME Outdoor Industrial Worker	25	(yrs)/70(yrs) =	3.57E-01
Exposure Duration (noncancer)	RME Outdoor Industrial Worker	25	(yrs)/25(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	3.40E-02	3.40E-02	3.09E-03
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	3.40E-02	3.40E-02	2.62E-04
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	2.24E-02	2.24E-02	1.81E-03
Chloromethane	1.00E+00	1	6.30E-03	3.40E-02	3.40E-02	2.14E-04
Dichloromethane	1.00E+00	1	1.65E-03	3.40E-02	3.40E-02	5.59E-05
Tetrachloroethene	1.00E+00	1	2.10E-02	3.40E-02	3.40E-02	7.14E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	3.40E-02	3.40E-02	1.36E-02

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Reference Risk (per mg/m³)	Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
		EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk
VOCs													
1,2-Dichloroethane	3.09E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	3.09E-07	2.00E-03	6.19E-06
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	NC	4.90E-05	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	2.62E-04	4.00E-05	1.05E-08	1.80E-07	4.71E-11	--	NCOPC	9.00E-05	2.36E-08	3.90E-05	1.02E-08	5.70E-04	1.49E-07
Chlorobenzene	NC	--	NCOPC	5.80E-07	NC	--	NCOPC	1.20E-04	NC	7.20E-05	NC	7.30E-05	NC
Chloroform	1.81E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	2.53E-07
Chloromethane	2.14E-04	--	NCOPC	1.70E-08	3.64E-12	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	5.59E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	1.79E-10	1.10E-04	6.15E-09
Tetrachloroethene	7.14E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	1.07E-08	5.60E-03	4.00E-06
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	NC
Trichloroethylene	1.36E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	1.18E-07	5.10E-02	6.93E-04
Total:			**1.05E-08**		**5.08E-11**		**NCOPC**		**2.36E-08**		**4.49E-07**		**7.04E-04**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
OUTDOOR INDUSTRIAL WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	9.52E-02	9.52E-02	6.80E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	9.52E-02	9.52E-02	3.33E-01
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	9.52E-02	9.52E-02	1.11E-01
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	9.52E-02	9.52E-02	1.11E+01
Chlorobenzene	1.00E+00	1	1.70E-02	9.52E-02	9.52E-02	5.60E+00
Chloroform	1.00E+00	1	1.43E-02	9.52E-02	9.52E-02	6.66E+00
Chloromethane	1.00E+00	1	2.57E-02	9.52E-02	9.52E-02	3.70E+00
Dichloromethane	1.00E+00	1	8.60E-01	9.52E-02	9.52E-02	1.11E-01
Tetrachloroethene	1.00E+00	1	1.70E-01	9.52E-02	9.52E-02	5.60E-01
Toluene	1.00E+00	1	1.14E-01	9.52E-02	9.52E-02	8.35E-01
Trichloroethylene	1.00E+00	1	1.00E-02	9.52E-02	9.52E-02	9.52E+00

TABLE
POTENTIAL HAZARD INDEX
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
OUTDOOR INDUSTRIAL WORKER - RME

		Mid				Shallow		Leachate					
	Reference	Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	6.80E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	6.80E-03	2.00E-03	1.36E-01
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	3.33E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	2.43E-05
4-Methyl-2-pentanone (MIBK)	1.11E-01	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	4.11E-06	4.90E-05	5.44E-06	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	1.11E+01	4.00E-05	4.44E-04	1.80E-07	2.00E-06	--	NCOPC	9.00E-05	9.99E-04	3.90E-05	4.33E-04	5.70E-04	6.33E-03
Chlorobenzene	5.60E+00	--	NCOPC	5.80E-07	3.25E-06	--	NCOPC	1.20E-04	6.72E-04	7.20E-05	4.03E-04	7.30E-05	4.09E-04
Chloroform	6.66E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	9.32E-04
Chloromethane	3.70E+00	--	NCOPC	1.70E-08	6.29E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.11E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	3.54E-07	1.10E-04	1.22E-05
Tetrachloroethene	5.60E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	8.40E-06	5.60E-03	3.14E-03
Toluene	8.35E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	1.59E-03
Trichloroethylene	9.52E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	8.28E-05	5.10E-02	4.85E-01
	Total HI:		4.44E-04		5.31E-06		NCOPC		1.68E-03		7.73E-03		6.34E-01

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated	
Receptor:	MLE Outdoor Industrial Worker

ASSUMPTIONS FOR OUTDOOR INDUSTRIAL WORKER - MLE INCIDENTIAL INGESTION AND DERMAL CONTACT SURFACE SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	MLE Outdoor Industrial Worker	30	(mg soil/day)	
Soil on Skin	MLE Outdoor Industrial Worker	0.02	(mg/cm^2)	
Skin Exposed	MLE Outdoor Industrial Worker	3339	(cm^2)	
Body Weight	MLE Outdoor Industrial Worker	70	(kg)	
Exposure Frequency	MLE Outdoor Industrial Worker	190	(days)/365(days) =	5.21E-01
Exposure Duration (cancer)	MLE Outdoor Industrial Worker	7	(years)/70(years) =	1.00E-01
Exposure Duration (noncancer)	MLE Outdoor Industrial Worker	7	(yrs)/7(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration in Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	2.23E-08	2.23E-08	4.97E-10	4.97E-10	2.45E-10	5.46E-12	2.51E-10
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	6.47E-09	6.47E-09	9.93E-10	9.93E-10	4.72E-09	7.25E-10	5.45E-09
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	6.47E-09	6.47E-09	9.93E-10	9.93E-10	4.72E-08	7.25E-09	5.45E-08
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	6.47E-09	6.47E-09	9.93E-10	9.93E-10	4.72E-09	7.25E-10	5.45E-09
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	6.47E-09	6.47E-09	9.93E-10	9.93E-10	4.72E-08	7.25E-09	5.45E-08
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	2.23E-08	2.23E-08	4.97E-10	4.97E-10	7.59E-09	1.69E-10	7.75E-09
beta-BHC	1.00E+00	1	0.01	1.80E+00	2.23E-08	2.23E-08	4.97E-10	4.97E-10	4.02E-08	8.94E-10	4.11E-08
Dieldrin	1.00E+00	1	0.01	1.60E+01	2.23E-08	2.23E-08	4.97E-10	4.97E-10	3.57E-07	7.95E-09	3.65E-07
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	2.23E-08	2.23E-08	4.97E-10	4.97E-10	2.90E-08	6.46E-10	2.96E-08
Heptachlor	1.00E+00	1	0.01	4.50E+00	2.23E-08	2.23E-08	4.97E-10	4.97E-10	1.00E-07	2.23E-09	1.03E-07
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	2.23E-08	2.23E-08	4.97E-10	4.97E-10	2.68E-09	5.96E-11	2.74E-09
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	1.85E-08	1.85E-08	1.99E-09	1.99E-09	3.70E-08	3.97E-09	4.10E-08
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	8.92E-09	8.92E-09	1.99E-09	1.99E-09	1.34E-03	2.98E-04	1.64E-03
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	6.69E-09	6.69E-09	4.97E-11	4.97E-11	1.00E-08	7.45E-11	1.01E-08
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
SVOCs																	
2,4,6-Trichlorophenol	2.51E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.19E+00	1.05E-09
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.78E+00	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.90E+01	NC
Benzo(a)anthracene	5.45E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.57E-01	3.04E-09	--	NCOPC	4.05E+00	2.21E-08
Benzo(a)pyrene	5.45E-08	--	NCOPC	--	NCOPC	3.01E-01	1.64E-08	1.24E+00	6.77E-08	--	NCOPC	5.98E-01	3.26E-08	--	NCOPC	2.77E+00	1.51E-07
Benzo(b)fluoranthene	5.45E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.26E-01	3.95E-09	--	NCOPC	3.42E+00	1.86E-08
Dibenzo(a,h)anthracene	*5.45E-08*	--	NCOPC	--	NCOPC	--	NCOPC	2.12E-01	1.16E-08	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	5.41E-08
Pesticides																	
4,4'-DDT	7.75E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.01E+00	6.21E-08
beta-BHC	4.11E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	5.34E-07
Dieldrin	3.65E-07	9.10E-02	3.32E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.96E-02	2.91E-08	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	2.96E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.75E+00	1.11E-07
Heptachlor	1.03E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-01	7.70E-08
Herbicides																	
Pentachlorophenol	2.74E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E+02	6.02E-07
PCBs																	
Total PCBs	4.10E-08	5.40E+00	2.21E-07	7.09E+02	2.91E-05	1.78E+00	7.32E-08	5.73E-01	2.35E-08	1.08E+00	4.42E-08	2.75E+00	1.13E-07	--	NCOPC	5.04E+02	2.07E-05
Dioxin																	
2,3,7,8-TCDD-TEQ	1.64E-03	2.99E-03	4.89E-06	5.08E-02	8.31E-05	--	NCOPC	--	NCOPC	1.14E-03	1.86E-06	6.89E-04	1.13E-06	--	NCOPC	--	NCOPC
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.95E+00	NC	--	NCOPC	--	NCOPC
Arsenic	1.01E-08	--	NCOPC	--	NCOPC	1.41E+01	1.43E-07	--	NCOPC	7.30E+00	7.38E-08	9.66E+00	9.77E-08	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.01E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.41E+01	NC	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.03E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	4.30E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**5.14E-06**		**1.12E-04**		**2.32E-07**		**1.03E-07**		**1.98E-06**		**1.41E-06**		**NCOPC**		**2.23E-05**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration In Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	2.23E-07	2.23E-07	4.97E-09	4.97E-09	2.23E-03	4.97E-05	2.28E-03
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	2.23E-07	2.23E-07	4.97E-09	4.97E-09	7.44E-05	1.66E-06	7.60E-05
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	2.23E-07	2.23E-07	4.97E-09	4.97E-09	4.46E-04	9.93E-06	4.56E-04
beta-BHC	1.00E+00	1	0.01	3.00E-04	2.23E-07	2.23E-07	4.97E-09	4.97E-09	7.44E-04	1.66E-05	7.60E-04
Dieldrin	1.00E+00	1	0.01	5.00E-05	2.23E-07	2.23E-07	4.97E-09	4.97E-09	4.46E-03	9.93E-05	4.56E-03
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	2.23E-07	2.23E-07	4.97E-09	4.97E-09	7.44E-04	1.66E-05	7.60E-04
Heptachlor	1.00E+00	1	0.01	5.00E-04	2.23E-07	2.23E-07	4.97E-09	4.97E-09	4.46E-04	9.93E-06	4.56E-04
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	2.23E-07	2.23E-07	4.97E-09	4.97E-09	7.44E-06	1.66E-07	7.60E-06
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	1.85E-07	1.85E-07	1.99E-08	1.99E-08	9.26E-03	9.93E-04	1.03E-02
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	2.23E-07	2.23E-07	3.48E-09	3.48E-09	5.58E-04	8.69E-06	5.66E-04
Arsenic	1.00E+00	0.3	0.001	3.00E-04	6.69E-08	6.69E-08	4.97E-10	4.97E-10	2.23E-04	1.66E-06	2.25E-04
Cadmium	1.00E+00	1	0.04	1.00E-03	2.23E-07	2.23E-07	1.99E-08	1.99E-08	2.23E-04	1.99E-05	2.43E-04
Chromium	1.00E+00	0.3	0	3.00E-03	6.69E-08	6.69E-08	0.00E+00	NA	2.23E-05	NC	2.23E-05
Manganese	1.00E+00	1	0.01	2.40E-02	2.23E-07	2.23E-07	4.97E-09	4.97E-09	9.30E-06	2.07E-07	9.50E-06
Mercury	1.00E+00	2	0.007	3.00E-04	4.46E-07	4.46E-07	3.48E-09	3.48E-09	1.49E-03	1.16E-05	1.50E-03

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
OUTDOOR INDUSTRIAL WORKER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
SVOCs																	
2,4,6-Trichlorophenol	2.28E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.19E+00	9.56E-03
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.78E+00	NC
4-Nitroaniline	7.60E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.90E+01	2.20E-03
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.57E-01	NC	--	NCOPC	4.05E+00	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	3.01E-01	NC	1.24E+00	NC	--	NCOPC	5.98E-01	NC	--	NCOPC	2.77E+00	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.26E-01	NC	--	NCOPC	3.42E+00	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.12E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	NC
Pesticides																	
4,4'-DDT	4.56E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.01E+00	3.65E-03
beta-BHC	7.60E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	9.88E-03
Dieldrin	4.56E-03	9.10E-02	4.15E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.96E-02	3.63E-04	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	7.60E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.75E+00	2.85E-03
Heptachlor	4.56E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-01	3.42E-04
Herbicides																	
Pentachlorophenol	7.60E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E+02	1.67E-03
PCBs																	
Total PCBs	1.03E-02	5.40E+00	5.53E-02	7.09E+02	7.27E+00	1.76E+00	1.83E-02	5.73E-01	5.87E-03	1.08E+00	1.11E-02	2.75E+00	2.82E-02	--	NCOPC	5.04E+02	5.17E+00
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	2.99E-03	NC	5.08E-02	NC	--	NCOPC	--	NCOPC	1.14E-03	NC	6.89E-04	NC	--	NCOPC	--	NCOPC
Metals																	
Antimony	5.66E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.95E+00	3.94E-03	--	NCOPC	--	NCOPC
Arsenic	2.25E-04	--	NCOPC	--	NCOPC	1.41E+01	3.17E-03	--	NCOPC	7.30E+00	1.64E-03	9.66E+00	2.17E-03	--	NCOPC	--	NCOPC
Cadmium	2.43E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.01E+01	4.89E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	2.23E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.41E+01	1.88E-03	--	NCOPC	--	NCOPC
Manganese	9.50E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.03E+02	5.73E-03	--	NCOPC	--	NCOPC
Mercury	1.50E-03	--	NCOPC	4.30E+01	6.45E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total HI:		**5.57E-02**		**7.33E+00**		**2.15E-02**		**1.08E-02**		**1.27E-02**		**4.23E-02**		**NCOPC**		**5.20E+00**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Outdoor Industrial Worker

ASSUMPTIONS FOR OUTDOOR INDUSTRIAL WORKER - MLE INHALATION OF OUTDOOR AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Outdoor Industrial Worker	1	(m^3 air/hour)	
Body Weight	MLE Outdoor Industrial Worker	70	(kg)	
Exposure Time	MLE Outdoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	MLE Outdoor Industrial Worker	190	(days)/365 (days) =	5.21E-01
Exposure Duration (cancer)	MLE Outdoor Industrial Worker	7	(yrs)/70(yrs) =	1.00E-01
Exposure Duration (noncancer)	MLE Outdoor Industrial Worker	7	(yrs)/7(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	5.95E-03	5.95E-03	3.33E-04
1,2-Dichloroethane	1.00E+00	1	9.10E-02	5.95E-03	5.95E-03	5.41E-04
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	5.95E-03	5.95E-03	4.58E-05
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	3.93E-03	3.93E-03	3.16E-04
Dichloromethane	1.00E+00	1	1.65E-03	5.95E-03	5.95E-03	9.79E-06
Ethylbenzene	1.00E+00	1	NA	5.95E-03	5.95E-03	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	5.95E-03	5.95E-03	1.25E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	5.95E-03	5.95E-03	2.38E-03
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NC
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	5.95E-03	5.95E-03	6.45E-05
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	5.95E-03	5.95E-03	1.84E-03
Benzo(a)pyrene	1.00E+00	1	3.10E+00	5.95E-03	5.95E-03	1.84E-02
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	5.95E-03	5.95E-03	1.84E-03
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	5.95E-03	5.95E-03	1.84E-02
Pesticides (b)						
4,4'-DDT	1.00E+00	1	3.40E-01	5.95E-03	5.95E-03	2.02E-03
beta-BHC	1.00E+00	1	1.86E+00	5.95E-03	5.95E-03	1.10E-02
Dieldrin	1.00E+00	1	1.61E+01	5.95E-03	5.95E-03	9.58E-02
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	5.95E-03	5.95E-03	2.71E-02
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	5.95E-03	5.95E-03	1.19E-02
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	3.27E-03	3.27E-03	4.91E+02
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	5.95E-03	5.95E-03	8.98E-02
Cadmium	1.00E+00	1	6.30E+00	5.95E-03	5.95E-03	3.75E-02
Chromium	1.00E+00	1	4.20E+01	5.95E-03	5.95E-03	2.50E-01
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Reference Risk (per mg/m³)	O EPC (mg/m³)	O Risk	O North EPC (mg/m³)	O North Risk	P EPC (mg/m³)	P Risk	Q North EPC (mg/m³)	Q North Risk	Q Central EPC (mg/m³)	Q Central Risk	Q South EPC (mg/m³)	Q South Risk	R EPC (mg/m³)	R Risk	S EPC (mg/m³)	S Risk
VOCs (a)																	
1,1,2-Trichloroethane	3.33E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-05	9.00E-09	--	NCOPC
1,2-Dichloroethane	5.41E-04	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	2.00E-08	--	NCOPC	--	NCOPC	1.50E-04	8.12E-08	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.40E-05	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.10E-03	NC
Benzene	4.58E-05	6.70E-03	3.07E-07	4.10E-03	1.88E-07	1.30E-04	5.96E-09	7.80E-05	3.57E-09	--	NCOPC	1.50E-05	6.87E-10	2.40E-04	1.10E-08	1.10E-04	5.04E-09
Chlorobenzene	NC	1.50E-02	NC	3.10E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-03	NC	1.30E-03	NC
Chloroform	3.16E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E-05	6.95E-09	--	NCOPC
Dichloromethane	9.79E-06	--	NCOPC	3.50E-03	3.43E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	2.45E-09
Ethylbenzene	NC	3.30E-02	NC	4.60E-02	NC	1.40E-03	NC	4.00E-04	NC	--	NCOPC	1.60E-03	NC	3.50E-05	NC	1.20E-03	NC
Tetrachloroethene	1.25E-04	--	NCOPC	3.40E-04	4.25E-08	2.50E-03	3.12E-07	2.20E-04	2.75E-08	--	NCOPC	--	NCOPC	1.40E-03	1.75E-07	8.40E-05	1.05E-08
Toluene	NC	4.60E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-03	NC	1.20E-03	NC	8.70E-03	NC
Trichloroethylene	2.38E-03	--	NCOPC	--	NCOPC	3.90E-05	9.28E-08	1.20E-05	2.86E-08	--	NCOPC	2.50E-06	5.95E-09	5.20E-03	1.24E-05	1.10E-03	2.62E-06
Xylenes, Total	NC	1.70E-01	NC	2.50E-01	NC	7.40E-03	NC	2.90E-03	NC	--	NCOPC	1.10E-02	NC	2.20E-04	NC	8.40E-03	NC
SVOCs (b)																	
2,4,6-Trichlorophenol	6.45E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.72E-09	3.69E-13
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.78E-09	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.95E-08	NC
Benzo(a)anthracene	1.84E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.60E-10	1.40E-12	--	NCOPC	5.52E-09	1.02E-11
Benzo(a)pyrene	1.84E-02	--	NCOPC	--	NCOPC	4.10E-10	7.56E-12	1.69E-09	3.12E-11	--	NCOPC	8.16E-10	1.50E-11	--	NCOPC	3.77E-09	6.95E-11
Benzo(b)fluoranthene	1.84E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.89E-10	1.82E-12	--	NCOPC	4.66E-09	8.60E-12
Dibenzo(a,h)anthracene	1.84E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.89E-10	5.34E-12	--	NCOPC	--	NCOPC	--	NCOPC	1.35E-09	2.50E-11
Pesticides (b)																	
4,4'-DDT	2.02E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-08	2.20E-11
beta-BHC	1.10E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.77E-08	1.96E-10
Dieldrin	9.58E-02	1.24E-10	1.19E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-10	1.04E-11	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.11E-09	NC
Heptachlor	2.71E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-09	2.77E-11
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.00E-07	NC
PCBs (b)																	
Total PCBs	1.19E-02	7.36E-09	8.75E-11	6.43E-07	7.65E-09	2.43E-09	2.89E-11	7.81E-10	9.29E-12	1.47E-09	1.75E-11	3.75E-09	4.46E-11	--	NCOPC	6.88E-07	8.18E-09
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	4.91E+02	4.07E-12	2.00E-09	4.61E-11	2.26E-08	--	NCOPC	--	NCOPC	1.55E-12	7.60E-10	9.40E-13	4.61E-10	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.48E-09	NC	--	NCOPC	--	NCOPC
Arsenic	6.98E-02	--	NCOPC	--	NCOPC	1.92E-08	1.73E-09	--	NCOPC	9.95E-09	8.94E-10	1.32E-08	1.18E-09	--	NCOPC	--	NCOPC
Cadmium	3.75E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.75E-08	1.03E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	2.50E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.15E-07	2.86E-08	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.23E-07	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	3.90E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Total:			3.09E-07		2.95E-07		4.13E-07		8.07E-08		1.67E-09		3.70E-08		1.27E-05		2.64E-06

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	5.95E-02	5.95E-02	4.25E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	5.95E-02	5.95E-02	6.94E-02
Benzene	1.00E+00	1	8.57E-03	5.95E-02	5.95E-02	6.94E+00
Chlorobenzene	1.00E+00	1	1.70E-02	5.95E-02	5.95E-02	3.50E+00
Chloroform	1.00E+00	1	1.43E-02	5.95E-02	5.95E-02	4.16E+00
Dichloromethane	1.00E+00	1	8.60E-01	5.95E-02	5.95E-02	6.92E-02
Ethylbenzene	1.00E+00	1	2.86E-01	5.95E-02	5.95E-02	2.08E-01
Tetrachloroethene	1.00E+00	1	1.70E-01	5.95E-02	5.95E-02	3.50E-01
Toluene	1.00E+00	1	1.14E-01	5.95E-02	5.95E-02	5.22E-01
Trichloroethylene	1.00E+00	1	1.00E-02	5.95E-02	5.95E-02	5.95E+00
Xylenes, Total	1.00E+00	1	2.86E-02	5.95E-02	5.95E-02	2.08E+00
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	1	5.71E-05	5.95E-02	5.95E-02	1.04E+03
4-Nitroanilline	1.00E+00	1	1.14E-03	5.95E-02	5.95E-02	5.22E+01
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	5.95E-02	5.95E-02	2.08E+03
Manganese	1.00E+00	1	1.43E-05	5.95E-02	5.95E-02	4.16E+03
Mercury	1.00E+00	1	8.57E-05	5.95E-02	5.95E-02	6.94E+02

TABLE
POTENTIAL NONCARCINOGENIC RISK
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
OUTDOOR INDUSTRIAL WORKER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m³)	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-05	NC	--	NCOPC
1,2-Dichloroethane	4.25E+01	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	1.57E-03	--	NCOPC	--	NCOPC	1.50E-04	6.37E-03	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.40E-05	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	6.94E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.10E-03	3.54E-04
Benzene	6.94E+00	6.70E-03	4.65E-02	4.10E-03	2.85E-02	1.30E-04	9.02E-04	7.80E-05	5.41E-04	--	NCOPC	1.50E-05	1.04E-04	2.40E-04	1.67E-03	1.10E-04	7.63E-04
Chlorobenzene	3.50E+00	1.50E-02	5.25E-02	3.10E-02	1.08E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-03	3.85E-03	1.30E-03	4.55E-03
Chloroform	4.16E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E-05	9.15E-05	--	NCOPC
Dichloromethane	6.92E-02	--	NCOPC	3.50E-03	2.42E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	1.73E-05
Ethylbenzene	2.08E-01	3.30E-02	6.86E-03	4.80E-02	9.98E-03	1.40E-03	2.91E-04	4.00E-04	8.32E-05	--	NCOPC	1.60E-03	3.33E-04	3.50E-05	7.28E-06	1.20E-03	2.50E-04
Tetrachloroethene	3.50E-01	--	NCOPC	3.40E-04	1.19E-04	2.50E-03	8.75E-04	2.20E-04	7.70E-05	--	NCOPC	--	NCOPC	1.40E-03	4.90E-04	8.40E-05	2.94E-05
Toluene	5.22E-01	4.60E-03	2.50E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-03	3.91E-03	1.20E-03	6.26E-04	8.70E-03	4.54E-03
Trichloroethylene	5.95E+00	--	NCOPC	--	NCOPC	3.90E-05	2.32E-04	1.20E-05	7.14E-05	--	NCOPC	2.50E-06	1.49E-05	5.20E-03	3.09E-02	1.10E-03	6.54E-03
Xylenes, Total	2.08E+00	1.70E-01	3.54E-01	2.50E-01	5.21E-01	7.40E-03	1.54E-02	2.90E-03	6.04E-03	--	NCOPC	1.10E-02	2.29E-02	2.20E-04	4.58E-04	8.40E-03	1.75E-02
SVOCs (b)																	
2,4,6-Trichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.72E-09	NC
2-Nitroaniline	1.04E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.78E-09	3.94E-06
4-Nitroaniline	5.22E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.95E-08	2.06E-06
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.60E-10	NC	--	NCOPC	5.52E-09	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	4.10E-10	NC	1.69E-09	NC	--	NCOPC	8.16E-10	NC	--	NCOPC	3.77E-09	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.89E-10	NC	--	NCOPC	4.66E-09	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.89E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E-09	NC
Pesticides (b)																	
4,4'-DDT	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-08	NC
beta-BHC	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.77E-08	NC
Dieldrin	NC	1.24E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-10	NC	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.11E-09	NC
Heptachlor	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-09	NC
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.00E-07	NC
PCBs (b)																	
Total PCBs	NC	7.36E-09	NC	6.43E-07	NC	2.43E-09	NC	7.81E-10	NC	1.47E-09	NC	3.75E-09	NC	--	NCOPC	6.88E-07	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	4.07E-12	NC	4.61E-11	NC	--	NCOPC	--	NCOPC	1.55E-12	NC	9.40E-13	NC	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.48E-09	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	--	NCOPC	1.92E-08	NC	--	NCOPC	9.95E-09	NC	1.32E-08	NC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.75E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	2.08E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.15E-07	2.38E-04	--	NCOPC	--	NCOPC
Manganese	4.16E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.23E-07	3.43E-03	--	NCOPC	--	NCOPC
Mercury	6.94E+02	--	NCOPC	3.90E-08	2.71E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Total:			4.62E-01		6.68E-01		1.77E-02		8.38E-03		NC		3.09E-02		4.45E-02		3.45E-02

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Outdoor Industrial Worker

ASSUMPTIONS FOR ON-SITE OUTDOOR INDUSTRIAL WORKER - MLE INHALATION OF OUTDOOR AIR VOCs		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Outdoor Industrial Worker	1.0	(m^3 air/hour)	
Body Weight	MLE Outdoor Industrial Worker	70	(kg)	
Exposure Time	MLE Outdoor Industrial Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	MLE Outdoor Industrial Worker	190	(days)/365 (days) =	5.21E-01
Exposure Duration (cancer)	MLE Outdoor Industrial Worker	7	(yrs)/70(yrs) =	1.00E-01
Exposure Duration (noncancer)	MLE Outdoor Industrial Worker	7	(yrs)/7(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
ON-SITE OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Outdoor Industrial Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	5.95E-03	5.95E-03	5.41E-04
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	5.95E-03	5.95E-03	4.58E-05
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	3.93E-03	3.93E-03	3.16E-04
Chloromethane	1.00E+00	1	6.30E-03	5.95E-03	5.95E-03	3.75E-05
Dichloromethane	1.00E+00	1	1.65E-03	5.95E-03	5.95E-03	9.79E-06
Tetrachloroethene	1.00E+00	1	2.10E-02	5.95E-03	5.95E-03	1.25E-04
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	5.95E-03	5.95E-03	2.38E-03

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
ON-SITE OUTDOOR INDUSTRIAL WORKER - MLE

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs													
1,2-Dichloroethane	5.41E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	5.41E-08	2.00E-03	1.08E-06
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	NC	4.90E-05	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	4.58E-05	4.00E-05	1.83E-09	1.80E-07	8.25E-12	--	NCOPC	9.00E-05	4.12E-09	3.90E-05	1.79E-09	5.70E-04	2.61E-08
Chlorobenzene	NC	--	NCOPC	5.80E-07	NC	--	NCOPC	1.20E-04	NC	7.20E-05	NC	7.30E-05	NC
Chloroform	3.16E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	4.43E-08
Chloromethane	3.75E-05	--	NCOPC	1.70E-08	6.37E-13	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	9.79E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	3.13E-11	1.10E-04	1.08E-09
Tetrachloroethene	1.25E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	1.87E-09	5.60E-03	7.00E-07
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	NC
Trichloroethylene	2.38E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	2.07E-08	5.10E-02	1.21E-04
	Total:		1.83E-09		8.88E-12		NCOPC		4.12E-09		7.85E-08		1.23E-04

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
ON-SITE OUTDOOR INDUSTRIAL WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Outdoor Industrial Worker (mg/kg-day)	Chronic Average Daily Dose-Inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	5.95E-02	5.95E-02	4.25E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	5.95E-02	5.95E-02	2.08E-01
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	5.95E-02	5.95E-02	6.94E-02
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	5.95E-02	5.95E-02	6.94E+00
Chlorobenzene	1.00E+00	1	1.70E-02	5.95E-02	5.95E-02	3.50E+00
Chloroform	1.00E+00	1	1.43E-02	5.95E-02	5.95E-02	4.16E+00
Chloromethane	1.00E+00	1	2.57E-02	5.95E-02	5.95E-02	2.31E+00
Dichloromethane	1.00E+00	1	8.60E-01	5.95E-02	5.95E-02	6.92E-02
Tetrachloroethene	1.00E+00	1	1.70E-01	5.95E-02	5.95E-02	3.50E-01
Toluene	1.00E+00	1	1.14E-01	5.95E-02	5.95E-02	5.22E-01
Trichloroethylene	1.00E+00	1	1.00E-02	5.95E-02	5.95E-02	5.95E+00

TABLE
POTENTIAL HAZARD INDEX
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR VOCs
ON-SITE OUTDOOR INDUSTRIAL WORKER - MLE

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	4.25E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	4.25E-03	2.00E-03	8.50E-02
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	2.08E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	1.52E-05
4-Methyl-2-pentanone (MIBK)	6.94E-02	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	2.57E-06	4.90E-05	3.40E-06	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	6.94E+00	4.00E-05	2.78E-04	1.80E-07	1.25E-06	--	NCOPC	9.00E-05	6.25E-04	3.90E-05	2.71E-04	5.70E-04	3.96E-03
Chlorobenzene	3.50E+00	--	NCOPC	5.80E-07	2.03E-06	--	NCOPC	1.20E-04	4.20E-04	7.20E-05	2.52E-04	7.30E-05	2.55E-04
Chloroform	4.16E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	5.82E-04
Chloromethane	2.31E+00	--	NCOPC	1.70E-08	3.93E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	6.92E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	2.21E-07	1.10E-04	7.61E-06
Tetrachloroethene	3.50E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	5.25E-06	5.60E-03	1.96E-03
Toluene	5.22E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	9.92E-04
Trichloroethylene	5.95E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	5.18E-05	5.10E-02	3.03E-01
	Total HI:		2.78E-04		3.32E-06		NCOPC		1.05E-03		4.83E-03		3.96E-01

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

Trespassing Teenager

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated	
Receptor:	RME Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - RME INCIDENTIAL INGESTION AND DERMAL CONTACT SURFACE SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	RME Trespassing Teenager	100	(mg soil/day)	
Soil on Skin	RME Trespassing Teenager	0.04	(mg/cm^2)	
Skin Exposed	RME Trespassing Teenager	4672	(cm^2)	
Body Weight	RME Trespassing Teenager	47	(kg)	
Exposure Frequency	RME Trespassing Teenager	26	(days)/365(days) =	7.12E-02
Exposure Duration (cancer)	RME Trespassing Teenager	11	(years)/70(years) =	1.57E-01
Exposure Duration (noncancer)	RME Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration in Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	2.38E-08	2.38E-08	4.45E-10	4.45E-10	2.62E-10	4.90E-12	2.67E-10
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	6.91E-09	6.91E-09	8.90E-10	8.90E-10	5.04E-09	6.50E-10	5.69E-09
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	6.91E-09	6.91E-09	8.90E-10	8.90E-10	5.04E-08	6.50E-09	5.69E-08
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	6.91E-09	6.91E-09	8.90E-10	8.90E-10	5.04E-09	6.50E-10	5.69E-09
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	6.91E-09	6.91E-09	8.90E-10	8.90E-10	5.04E-08	6.50E-09	5.69E-08
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	2.38E-08	2.38E-08	4.45E-10	4.45E-10	8.10E-09	1.51E-10	8.25E-09
beta-BHC	1.00E+00	1	0.01	1.80E+00	2.38E-08	2.38E-08	4.45E-10	4.45E-10	4.29E-08	8.01E-10	4.37E-08
Dieldrin	1.00E+00	1	0.01	1.60E+01	2.38E-08	2.38E-08	4.45E-10	4.45E-10	3.81E-07	7.12E-09	3.88E-07
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	2.38E-08	2.38E-08	4.45E-10	4.45E-10	3.10E-08	5.79E-10	3.15E-08
Heptachlor	1.00E+00	1	0.01	4.50E+00	2.38E-08	2.38E-08	4.45E-10	4.45E-10	1.07E-07	2.00E-09	1.09E-07
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	2.38E-08	2.38E-08	4.45E-10	4.45E-10	2.86E-09	5.34E-11	2.91E-09
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	1.98E-08	1.98E-08	1.78E-09	1.78E-09	3.95E-08	3.56E-09	4.31E-08
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	9.53E-09	9.53E-09	1.78E-09	1.78E-09	1.43E-03	2.67E-04	1.70E-03
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	7.14E-09	7.14E-09	4.45E-11	4.45E-11	1.07E-08	6.68E-11	1.08E-08
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
SVOCs																	
2,4,6-Trichlorophenol	2.67E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.20E+00	2.19E-09
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.60E+00	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	NC
Benzo(a)anthracene	5.69E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+00	5.86E-09	--	NCOPC	8.00E+00	4.55E-08
Benzo(a)pyrene	5.69E-08	--	NCOPC	--	NCOPC	6.70E-01	3.81E-08	1.80E+00	1.02E-07	--	NCOPC	1.05E+00	5.98E-08	--	NCOPC	5.40E+00	3.07E-07
Benzo(b)fluoranthene	5.69E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E+00	7.68E-09	--	NCOPC	6.60E+00	3.76E-08
Dibenzo(a,h)anthracene	5.69E-08	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-01	2.11E-08	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	1.02E-07
Pesticides																	
4,4'-DDT	8.25E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	1.32E-07
beta-BHC	4.37E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+01	1.14E-06
Dieldrin	3.88E-07	1.80E-01	6.99E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.69E-01	1.04E-07	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	3.15E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	2.37E-07
Heptachlor	1.09E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E+00	1.64E-07
Herbicides																	
Pentachlorophenol	2.91E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.40E+02	1.28E-06
PCBs																	
Total PCBs	4.31E-08	1.08E+01	4.65E-07	7.09E+02	3.06E-05	7.02E+00	3.03E-07	1.87E+00	8.06E-08	2.57E+00	1.11E-07	5.10E+00	2.20E-07	--	NCOPC	1.01E+03	4.35E-05
Dioxin																	
2,3,7,8-TCDD-TEQ	1.70E-03	5.93E-03	1.01E-05	5.08E-02	8.62E-05	--	NCOPC	--	NCOPC	3.31E-03	5.61E-06	1.69E-03	2.87E-06	--	NCOPC	--	NCOPC
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.43E+01	NC	--	NCOPC	--	NCOPC
Arsenic	1.08E-08	--	NCOPC	--	NCOPC	2.60E+01	2.80E-07	--	NCOPC	1.30E+01	1.40E-07	1.35E+01	1.46E-07	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.20E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.81E+02	NC	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	4.30E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**1.06E-05**		**1.17E-04**		**6.21E-07**		**2.04E-07**		**5.86E-06**		**3.41E-06**		**NCOPC**		**4.69E-05**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	1.52E-07	1.52E-07	2.83E-09	2.83E-09	1.52E-03	2.83E-05	1.54E-03
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	1.52E-07	1.52E-07	2.83E-09	2.83E-09	5.05E-05	9.44E-07	5.15E-05
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	1.52E-07	1.52E-07	2.83E-09	2.83E-09	3.03E-04	5.66E-06	3.09E-04
beta-BHC	1.00E+00	1	0.01	3.00E-04	1.52E-07	1.52E-07	2.83E-09	2.83E-09	5.05E-04	9.44E-06	5.15E-04
Dieldrin	1.00E+00	1	0.01	5.00E-05	1.52E-07	1.52E-07	2.83E-09	2.83E-09	3.03E-03	5.66E-05	3.09E-03
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	1.52E-07	1.52E-07	2.83E-09	2.83E-09	5.05E-04	9.44E-06	5.15E-04
Heptachlor	1.00E+00	1	0.01	5.00E-04	1.52E-07	1.52E-07	2.83E-09	2.83E-09	3.03E-04	5.66E-06	3.09E-04
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	1.52E-07	1.52E-07	2.83E-09	2.83E-09	5.05E-06	9.44E-08	5.15E-06
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	1.26E-07	1.26E-07	1.13E-08	1.13E-08	6.29E-03	5.66E-04	6.86E-03
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	1.52E-07	1.52E-07	1.98E-09	1.98E-09	3.79E-04	4.96E-06	3.84E-04
Arsenic	1.00E+00	0.3	0.001	3.00E-04	4.55E-08	4.55E-08	2.83E-10	2.83E-10	1.52E-04	9.44E-07	1.53E-04
Cadmium	1.00E+00	1	0.04	1.00E-03	1.52E-07	1.52E-07	1.13E-08	1.13E-08	1.52E-04	1.13E-05	1.63E-04
Chromium	1.00E+00	0.3	0	3.00E-03	4.55E-08	4.55E-08	0.00E+00	NA	1.52E-05	NC	1.52E-05
Manganese	1.00E+00	1	0.01	2.40E-02	1.52E-07	1.52E-07	2.83E-09	2.83E-09	6.31E-06	1.18E-07	6.43E-06
Mercury	1.00E+00	2	0.007	3.00E-04	3.03E-07	3.03E-07	1.98E-09	1.98E-09	1.01E-03	6.61E-06	1.02E-03

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
SVOCs																	
2,4,6-Trichlorophenol	1.54E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.20E+00	1.27E-02
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.60E+00	NC
4-Nitroaniline	5.15E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	2.93E-03
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+00	NC	--	NCOPC	8.00E+00	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	6.70E-01	NC	1.80E+00	NC	--	NCOPC	1.05E+00	NC	--	NCOPC	5.40E+00	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E+00	NC	--	NCOPC	6.60E+00	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	NC
Pesticides																	
4,4'-DDT	3.09E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	4.94E-03
beta-BHC	5.15E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+01	1.34E-02
Dieldrin	3.09E-03	1.80E-01	5.56E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.69E-01	8.31E-04	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	5.15E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	3.86E-03
Heptachlor	3.09E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E+00	4.63E-04
Herbicides																	
Pentachlorophenol	5.15E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.40E+02	2.26E-03
PCBs																	
Total PCBs	6.86E-03	1.08E+01	7.40E-02	7.09E+02	4.86E+00	7.02E+00	4.81E-02	1.87E+00	1.28E-02	2.57E+00	1.77E-02	5.10E+00	3.50E-02	--	NCOPC	1.01E+03	6.91E+00
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	5.93E-03	NC	5.08E-02	NC	--	NCOPC	--	NCOPC	3.31E-03	NC	1.69E-03	NC	--	NCOPC	--	NCOPC
Metals																	
Antimony	3.84E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.43E+01	5.49E-03	--	NCOPC	--	NCOPC
Arsenic	1.53E-04	--	NCOPC	--	NCOPC	2.60E+01	3.97E-03	--	NCOPC	1.30E+01	1.98E-03	1.35E+01	2.06E-03	--	NCOPC	--	NCOPC
Cadmium	1.63E-04	--	NCOPC	--	NCOPC	--	NCOPC	9.20E+01	1.50E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.52E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.81E+02	2.74E-03	--	NCOPC	--	NCOPC
Manganese	6.43E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E+02	5.53E-03	--	NCOPC	--	NCOPC
Mercury	1.02E-03	--	NCOPC	4.30E+01	4.37E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total HI:		**7.46E-02**		**4.90E+00**		**5.21E-02**		**2.78E-02**		**1.96E-02**		**5.16E-02**		**NCOPC**		**6.95E+00**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - RME INHALATION OF OUTDOOR AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Trespassing Teenager	1.2	(m^3 air/hour)	
Body Weight	RME Trespassing Teenager	47	(kg)	
Exposure Time	RME Trespassing Teenager	2	(hrs/day) =	2.00E+00
Exposure Frequency	RME Trespassing Teenager	26	(days)/365 (days) =	7.12E-02
Exposure Duration (cancer)	RME Trespassing Teenager	11	(yrs)/70(yrs) =	1.57E-01
Exposure Duration (noncancer)	RME Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	5.72E-04	5.72E-04	3.20E-05
1,2-Dichloroethane	1.00E+00	1	9.10E-02	5.72E-04	5.72E-04	5.20E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	5.72E-04	5.72E-04	4.40E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	3.77E-04	3.77E-04	3.04E-05
Dichloromethane	1.00E+00	1	1.65E-03	5.72E-04	5.72E-04	9.40E-07
Ethylbenzene	1.00E+00	1	NA	5.72E-04	5.72E-04	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	5.72E-04	5.72E-04	1.20E-05
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	5.72E-04	5.72E-04	2.29E-04
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NC
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	5.72E-04	5.72E-04	6.20E-06
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	5.72E-04	5.72E-04	1.77E-04
Benzo(a)pyrene	1.00E+00	1	3.10E+00	5.72E-04	5.72E-04	1.77E-03
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	5.72E-04	5.72E-04	1.77E-04
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	5.72E-04	5.72E-04	1.77E-03
Pesticides (b)						
4,4'-DDT	1.00E+00	1	3.40E-01	5.72E-04	5.72E-04	1.94E-04
beta-BHC	1.00E+00	1	1.86E+00	5.72E-04	5.72E-04	1.06E-03
Dieldrin	1.00E+00	1	1.61E+01	5.72E-04	5.72E-04	9.20E-03
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	5.72E-04	5.72E-04	2.60E-03
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	5.72E-04	5.72E-04	1.14E-03
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	3.14E-04	3.14E-04	4.72E+01
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	5.72E-04	5.72E-04	8.63E-03
Cadmium	1.00E+00	1	6.30E+00	5.72E-04	5.72E-04	3.60E-03
Chromium	1.00E+00	1	4.20E+01	5.72E-04	5.72E-04	2.40E-02
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m³)	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk
VOCs (a)																	
1,1,2-Trichloroethane	3.20E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-05	1.60E-09	--	NCOPC
1,2-Dichloroethane	5.20E-05	--	NCOPC	--	NCOPC	--	NCOPC	8.50E-05	4.42E-09	--	NCOPC	--	NCOPC	2.90E-04	1.51E-08	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-02	NC
Benzene	4.40E-06	3.50E-02	1.54E-07	6.60E-03	2.90E-08	2.20E-04	9.68E-10	1.90E-04	8.36E-10	--	NCOPC	3.40E-05	1.50E-10	4.80E-04	2.11E-09	3.20E-04	1.41E-09
Chlorobenzene	NC	5.20E-02	NC	4.60E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-03	NC	5.80E-03	NC
Chloroform	3.04E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.90E-05	1.18E-09	--	NCOPC
Dichloromethane	9.40E-07	--	NCOPC	8.30E-03	7.80E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E-04	8.09E-10
Ethylbenzene	NC	1.90E-01	NC	7.20E-02	NC	1.30E-02	NC	6.90E-04	NC	--	NCOPC	4.10E-03	NC	6.20E-05	NC	4.20E-03	NC
Tetrachloroethene	1.20E-05	--	NCOPC	6.50E-04	7.80E-09	3.00E-03	3.60E-08	5.60E-04	6.72E-09	--	NCOPC	--	NCOPC	2.90E-03	3.48E-08	2.10E-04	2.52E-09
Toluene	NC	2.70E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-02	NC	2.00E-03	NC	3.90E-02	NC
Trichloroethylene	2.29E-04	--	NCOPC	--	NCOPC	1.90E-04	4.34E-08	2.40E-05	5.49E-09	--	NCOPC	5.90E-06	1.35E-09	4.50E-02	1.03E-05	5.00E-03	1.14E-06
Xylenes, Total	NC	9.70E-01	NC	3.70E-01	NC	7.00E-02	NC	6.70E-03	NC	--	NCOPC	2.90E-02	NC	4.20E-05	NC	3.50E-02	NC
SVOCs (b)																	
2,4,6-Trichlorophenol	6.20E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	6.93E-14
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.27E-09	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.77E-08	NC
Benzo(a)anthracene	1.77E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-09	2.49E-13	--	NCOPC	1.09E-08	1.93E-12
Benzo(a)pyrene	1.77E-03	--	NCOPC	--	NCOPC	9.13E-10	1.62E-12	2.45E-09	4.35E-12	--	NCOPC	1.43E-09	2.54E-12	--	NCOPC	7.36E-09	1.30E-11
Benzo(b)fluoranthene	1.77E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.84E-09	3.26E-13	--	NCOPC	9.00E-09	1.59E-12
Dibenzo(a,h)anthracene	1.77E-03	--	NCOPC	--	NCOPC	--	NCOPC	5.04E-10	8.94E-13	--	NCOPC	--	NCOPC	--	NCOPC	2.45E-09	4.35E-12
Pesticides (b)																	
4,4'-DDT	1.94E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.18E-08	4.23E-12
beta-BHC	1.06E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.54E-08	3.76E-11
Dieldrin	9.20E-03	2.45E-10	2.26E-12	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.67E-10	3.37E-12	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-08	NC
Heptachlor	2.60E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.04E-09	5.32E-12
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-07	NC
PCBs (b)																	
Total PCBs	1.14E-03	1.47E-08	1.68E-11	6.43E-07	7.35E-10	9.57E-09	1.09E-11	2.55E-09	2.91E-12	3.51E-09	4.01E-12	6.95E-09	7.95E-12	--	NCOPC	1.37E-06	1.57E-09
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	4.72E+01	8.08E-12	3.81E-10	4.61E-11	2.17E-09	--	NCOPC	--	NCOPC	4.51E-12	2.13E-10	2.30E-12	1.09E-10	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.95E-08	NC	--	NCOPC	--	NCOPC
Arsenic	8.63E-03	--	NCOPC	--	NCOPC	3.54E-08	3.06E-10	--	NCOPC	1.77E-08	1.53E-10	1.84E-08	1.59E-10	--	NCOPC	--	NCOPC
Cadmium	3.60E-03	--	NCOPC	--	NCOPC	--	NCOPC	1.25E-07	4.52E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	2.40E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	5.92E-09	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-06	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	3.90E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Total:			1.54E-07		4.76E-08		8.07E-08		1.79E-08		3.70E-10		7.70E-09		1.03E-05		1.15E-06

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	3.64E-03	3.64E-03	2.60E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	3.64E-03	3.64E-03	4.24E-03
Benzene	1.00E+00	1	8.57E-03	3.64E-03	3.64E-03	4.24E-01
Chlorobenzene	1.00E+00	1	1.70E-02	3.64E-03	3.64E-03	2.14E-01
Chloroform	1.00E+00	1	1.43E-02	3.64E-03	3.64E-03	2.54E-01
Dichloromethane	1.00E+00	1	8.60E-01	3.64E-03	3.64E-03	4.23E-03
Ethylbenzene	1.00E+00	1	2.86E-01	3.64E-03	3.64E-03	1.27E-02
Tetrachloroethene	1.00E+00	1	1.70E-01	3.64E-03	3.64E-03	2.14E-02
Toluene	1.00E+00	1	1.14E-01	3.64E-03	3.64E-03	3.19E-02
Trichloroethylene	1.00E+00	1	1.00E-02	3.64E-03	3.64E-03	3.64E-01
Xylenes, Total	1.00E+00	1	2.86E-02	3.64E-03	3.64E-03	1.27E-01
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	1	5.71E-05	3.64E-03	3.64E-03	6.37E+01
4-Nitroaniline	1.00E+00	1	1.14E-03	3.64E-03	3.64E-03	3.19E+00
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	3.64E-03	3.64E-03	1.27E+02
Manganese	1.00E+00	1	1.43E-05	3.64E-03	3.64E-03	2.55E+02
Mercury	1.00E+00	1	8.57E-05	3.64E-03	3.64E-03	4.24E+01

TABLE
POTENTIAL NONCARCINOGENIC RISK
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-05	NC	--	NCOPC
1,2-Dichloroethane	2.60E+00	--	NCOPC	--	NCOPC	--	NCOPC	8.50E-05	2.21E-04	--	NCOPC	--	NCOPC	2.90E-04	7.53E-04	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	4.24E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E-02	8.49E-05
Benzene	4.24E-01	3.50E-02	1.49E-02	6.60E-03	2.80E-03	2.20E-04	9.34E-05	1.90E-04	8.06E-05	--	NCOPC	3.40E-05	1.44E-05	4.80E-04	2.04E-04	3.20E-04	1.36E-04
Chlorobenzene	2.14E-01	5.20E-02	1.11E-02	4.60E-02	9.84E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-03	5.99E-04	5.80E-03	1.24E-03
Chloroform	2.54E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.90E-05	9.92E-06	--	NCOPC
Dichloromethane	4.23E-03	--	NCOPC	8.30E-03	3.51E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.60E-04	3.64E-06
Ethylbenzene	1.27E-02	1.90E-01	2.42E-03	7.20E-02	9.16E-04	1.30E-02	1.65E-04	8.90E-04	1.13E-05	--	NCOPC	4.10E-03	5.21E-05	6.20E-05	7.89E-07	4.20E-03	5.34E-05
Tetrachloroethene	2.14E-02	--	NCOPC	6.50E-04	1.39E-05	3.00E-03	6.42E-05	5.60E-04	1.20E-05	--	NCOPC	--	NCOPC	2.90E-03	6.21E-05	2.10E-04	4.49E-06
Toluene	3.19E-02	2.70E-02	8.61E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-02	6.06E-04	2.00E-03	6.38E-05	3.90E-02	1.24E-03
Trichloroethylene	3.64E-01	--	NCOPC	--	NCOPC	1.90E-04	6.91E-05	2.40E-05	8.73E-06	--	NCOPC	5.90E-06	2.15E-06	4.50E-02	1.64E-02	5.00E-03	1.82E-03
Xylenes, Total	1.27E-01	9.70E-01	1.23E-01	3.70E-01	4.71E-02	7.00E-02	8.91E-03	6.70E-03	8.53E-04	--	NCOPC	2.90E-02	3.69E-03	4.20E-05	5.35E-06	3.50E-02	4.46E-03
SVOCs (b)																	
2,4,6-Trichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	NC
2-Nitroaniline	8.37E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.27E-09	3.99E-07
4-Nitroaniline	3.19E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.77E-08	2.48E-07
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-09	NC	--	NCOPC	1.09E-08	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	9.13E-10	NC	2.45E-09	NC	--	NCOPC	1.43E-09	NC	--	NCOPC	7.36E-09	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.84E-09	NC	--	NCOPC	9.00E-09	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.04E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.45E-09	NC
Pesticides (b)																	
4,4'-DDT	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.18E-08	NC
beta-BHC	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.54E-08	NC
Dieldrin	NC	2.45E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.67E-10	NC	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-08	NC
Heptachlor	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.04E-09	NC
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-07	NC
PCBs (b)																	
Total PCBs	NC	1.47E-08	NC	6.43E-07	NC	9.57E-09	NC	2.55E-09	NC	3.51E-09	NC	6.95E-09	NC	--	NCOPC	1.37E-06	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	8.08E-12	NC	4.61E-11	NC	--	NCOPC	--	NCOPC	4.51E-12	NC	2.30E-12	NC	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.95E-08	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	--	NCOPC	3.54E-08	NC	--	NCOPC	1.77E-08	NC	1.84E-08	NC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.25E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.27E+02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	3.14E-05	--	NCOPC	--	NCOPC
Manganese	2.55E+02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-06	2.99E-04	--	NCOPC	--	NCOPC
Mercury	4.24E+01	--	NCOPC	3.90E-08	1.65E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		1.53E-01		6.07E-02		9.30E-03		1.19E-03		NC		4.70E-03		1.81E-02		9.04E-03

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - RME INHALATION OF OUTDOOR AIR -VOCs		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Trespassing Teenager	1.2	(m^3 air/hour)	
Body Weight	RME Trespassing Teenager	47	(kg)	
Exposure Time	RME Trespassing Teenager	2	(hrs/day) =	2.00E+00
Exposure Frequency	RME Trespassing Teenager	26	(days)/365 (days) =	7.12E-02
Exposure Duration (cancer)	RME Trespassing Teenager	11	(yrs)/70(yrs) =	1.57E-01
Exposure Duration (noncancer)	RME Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	5.72E-04	5.72E-04	5.20E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	5.72E-04	5.72E-04	4.40E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	3.77E-04	3.77E-04	3.04E-05
Chloromethane	1.00E+00	1	6.30E-03	5.72E-04	5.72E-04	3.60E-06
Dichloromethane	1.00E+00	1	1.65E-03	5.72E-04	5.72E-04	9.40E-07
Tetrachloroethene	1.00E+00	1	2.10E-02	5.72E-04	5.72E-04	1.20E-05
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	5.72E-04	5.72E-04	2.29E-04

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - RME

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs													
1,2-Dichloroethane	5.20E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	5.20E-09	2.00E-03	1.04E-07
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	NC	4.90E-05	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	4.40E-06	4.00E-05	1.76E-10	1.80E-07	7.92E-13	--	NCOPC	9.00E-05	3.96E-10	3.90E-05	1.72E-10	5.70E-04	2.51E-09
Chlorobenzene	NC	--	NCOPC	5.80E-07	NC	--	NCOPC	1.20E-04	NC	7.20E-05	NC	7.30E-05	NC
Chloroform	3.04E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	4.25E-09
Chloromethane	3.60E-06	--	NCOPC	1.70E-08	6.12E-14	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	9.40E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	3.01E-12	1.10E-04	1.03E-10
Tetrachloroethene	1.20E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	1.80E-10	5.60E-03	6.72E-08
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	NC
Trichloroethylene	2.29E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	1.99E-09	5.10E-02	1.17E-05
	Total:		***1.76E-10***		***8.53E-13***		***NCOPC***		***3.96E-10***		***7.55E-09***		***1.18E-05***

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	3.64E-03	3.64E-03	2.60E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	3.64E-03	3.64E-03	1.27E-02
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	3.64E-03	3.64E-03	4.24E-03
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	3.64E-03	3.64E-03	4.24E-01
Chlorobenzene	1.00E+00	1	1.70E-02	3.64E-03	3.64E-03	2.14E-01
Chloroform	1.00E+00	1	1.43E-02	3.64E-03	3.64E-03	2.54E-01
Chloromethane	1.00E+00	1	2.57E-02	3.64E-03	3.64E-03	1.41E-01
Dichloromethane	1.00E+00	1	8.60E-01	3.64E-03	3.64E-03	4.23E-03
Tetrachloroethene	1.00E+00	1	1.70E-01	3.64E-03	3.64E-03	2.14E-02
Toluene	1.00E+00	1	1.14E-01	3.64E-03	3.64E-03	3.19E-02
Trichloroethylene	1.00E+00	1	1.00E-02	3.64E-03	3.64E-03	3.64E-01

TABLE
POTENTIAL HAZARD INDEX
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - RME

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	2.60E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	2.60E-04	2.00E-03	5.20E-03
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	1.27E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	9.29E-07
4-Methyl-2-pentanone (MIBK)	4.24E-03	--	NCOPC	--	NCOPC	--	NCOPC	6.70E-05	1.57E-07	4.90E-05	2.08E-07	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	4.24E-01	4.00E-05	1.70E-05	1.80E-07	7.64E-08	--	NCOPC	9.00E-05	3.82E-05	3.90E-05	1.66E-05	5.70E-04	2.42E-04
Chlorobenzene	2.14E-01	--	NCOPC	5.80E-07	1.24E-07	--	NCOPC	1.20E-04	2.57E-05	7.20E-05	1.54E-05	7.30E-05	1.56E-05
Chloroform	2.54E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	3.56E-05
Chloromethane	1.41E-01	--	NCOPC	1.70E-08	2.40E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	4.23E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	1.35E-08	1.10E-04	4.65E-07
Tetrachloroethene	2.14E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	3.21E-07	5.60E-03	1.20E-04
Toluene	3.19E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	6.06E-05
Trichloroethylene	3.64E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	3.16E-06	5.10E-02	1.86E-02
	Total HI:		1.70E-05		2.03E-07		NCOPC		6.40E-05		2.95E-04		2.42E-02

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated	
Receptor:	RME Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - RME INCIDENTIAL INGESTION AND DERMAL CONTACT SEDIMENT		Assumed Value	Units	Calculated Value
Sediment Ingestion Rate	RME Trespassing Teenager	100	(mg soil/day)	
Sediment on Skin	RME Trespassing Teenager	1	(mg/cm^2)	
Skin Exposed	RME Trespassing Teenager	6026	(cm^2)	
Body Weight	RME Trespassing Teenager	47	(kg)	
Exposure Frequency	RME Trespassing Teenager	13	(days)/365(days) =	3.56E-02
Exposure Duration (cancer)	RME Trespassing Teenager	11	(years)/70(years) =	1.57E-01
Exposure Duration (noncancer)	RME Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
TRESPASSING TEENAGER - RME

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Metals											
Arsenic	3.41E+00	0.3	0.001	1.50E+00	1.22E-08	1.22E-08	2.45E-09	2.45E-09	1.83E-08	3.67E-09	2.19E-08
								Total:	1.83E-08	3.67E-09	2.19E-08

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
TRESPASSING TEENAGER - RME

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Metals											
Arsenic	3.41E+00	0.3	0.001	3.00E-04	7.75E-08	7.75E-08	1.56E-08	1.56E-08	2.58E-04	5.19E-05	3.10E-04
								Total:	2.58E-04	5.19E-05	3.10E-04

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - RME INCIDENTAL INGESTION AND DERMAL CONTACT OF SURFACE WATER		Assumed Value	Units	Calculated Value
Water Ingestion Rate	RME Trespassing Teenager	0.005	(l/day)	
Skin Exposed	RME Trespassing Teenager	6026	(cm^2)	
Body Weight	RME Trespassing Teenager	47	(kg)	
Exposure Time (dermal route only)	RME Trespassing Teenager	1	(hr/day)	
Exposure Frequency	RME Trespassing Teenager	13	(days)/365 (days) =	3.56E-02
Exposure Duration (cancer)	RME Trespassing Teenager	11	(yrs)/ 70(yrs) =	1.57E-01
Exposure Duration (noncancer)	RME Trespassing Teenager	11	(yrs)/ 11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	RME Trespassing Teenager ADDing (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	RME Trespassing Teenager ADDder (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs												
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
Herbicides												
MCPA	1.00E+00	NA	NA	2.31E-02	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	1.56E-02	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
TRESPASSING TEENAGER - RME

Constituent	Reference Risk (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk
SVOCs					
2,4-Dichlorophenol	NC	--	NCOPC	8.95E-03	NC
4-Chloroaniline	NC	--	NCOPC	1.90E-02	NC
Herbicides					
MCPA	NC	--	NCOPC	3.10E-02	NC
MCPP	NC	--	NCOPC	5.30E-02	NC
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	NC	4.60E-01	NC	--	NCOPC
	Total:		**NC**		**NC**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
TRESPASSING TEENAGER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	RME Trespassing Teenager ADDing (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	RME Trespassing Teenager ADDder (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs												
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	3.79E-06	3.79E-06	1.05E-04	1.05E-04	1.26E-03	3.50E-02	3.63E-02
4-Chloroanliine	1.00E+00	1	1	6.33E-03	4.00E-03	3.79E-06	3.79E-06	2.89E-05	2.89E-05	9.47E-04	7.22E-03	8.17E-03
Herbicides												
MCPA	1.00E+00	1	1	2.31E-02	5.00E-04	3.79E-06	3.79E-06	1.06E-04	1.06E-04	7.58E-03	2.11E-01	2.19E-01
MCPP	1.00E+00	1	1	1.56E-02	1.00E-03	3.79E-06	3.79E-06	7.12E-05	7.12E-05	3.79E-03	7.12E-02	7.50E-02
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.60E-04	2.40E-02	3.79E-06	3.79E-06	7.31E-06	7.31E-06	1.58E-04	3.04E-04	4.62E-04

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
TRESPASSING TEENAGER - RME

Constituent	Reference HQ (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	HQ	EPC (mg/L)	HQ
SVOCs					
2,4-Dichlorophenol	3.63E-02	--	NCOPC	8.95E-03	3.25E-04
4-Chloroaniline	8.17E-03	--	NCOPC	1.90E-02	1.55E-04
Herbicides					
MCPA	2.19E-01	--	NCOPC	3.10E-02	6.78E-03
MCPP	7.50E-02	--	NCOPC	5.30E-02	3.97E-03
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	4.62E-04	4.60E-01	2.13E-04	--	NCOPC
	Total HI:		**2.13E-04**		**1.12E-02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated	
Receptor:	MLE Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - MLE INCIDENTIAL INGESTION AND DERMAL CONTACT SURFACE SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	MLE Trespassing Teenager	50	(mg soil/day)	
Soil on Skin	MLE Trespassing Teenager	0.04	(mg/cm^2)	
Skin Exposed	MLE Trespassing Teenager	4672	(cm^2)	
Body Weight	MLE Trespassing Teenager	47	(kg)	
Exposure Frequency	MLE Trespassing Teenager	13	(days)/365(days) =	3.56E-02
Exposure Duration (cancer)	MLE Trespassing Teenager	11	(years)/70(years) =	1.57E-01
Exposure Duration (noncancer)	MLE Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	5.95E-09	5.95E-09	2.23E-10	2.23E-10	6.55E-11	2.45E-12	6.79E-11
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	1.73E-09	1.73E-09	4.45E-10	4.45E-10	1.26E-09	3.25E-10	1.59E-09
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	1.73E-09	1.73E-09	4.45E-10	4.45E-10	1.26E-08	3.25E-09	1.59E-08
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	1.73E-09	1.73E-09	4.45E-10	4.45E-10	1.26E-09	3.25E-10	1.59E-09
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	1.73E-09	1.73E-09	4.45E-10	4.45E-10	1.26E-08	3.25E-09	1.59E-08
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	5.95E-09	5.95E-09	2.23E-10	2.23E-10	2.02E-09	7.57E-11	2.10E-09
beta-BHC	1.00E+00	1	0.01	1.80E+00	5.95E-09	5.95E-09	2.23E-10	2.23E-10	1.07E-08	4.01E-10	1.11E-08
Dieldrin	1.00E+00	1	0.01	1.60E+01	5.95E-09	5.95E-09	2.23E-10	2.23E-10	9.53E-08	3.56E-09	9.88E-08
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	5.95E-09	5.95E-09	2.23E-10	2.23E-10	7.74E-09	2.89E-10	8.03E-09
Heptachlor	1.00E+00	1	0.01	4.50E+00	5.95E-09	5.95E-09	2.23E-10	2.23E-10	2.68E-08	1.00E-09	2.78E-08
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	5.95E-09	5.95E-09	2.23E-10	2.23E-10	7.14E-10	2.67E-11	7.41E-10
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	4.94E-09	4.94E-09	8.90E-10	8.90E-10	9.88E-09	1.78E-09	1.17E-08
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	2.38E-09	2.38E-09	8.90E-10	8.90E-10	3.57E-04	1.34E-04	4.91E-04
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	1.79E-09	1.79E-09	2.23E-11	2.23E-11	2.68E-09	3.34E-11	2.71E-09
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
SVOCs																	
2,4,6-Trichlorophenol	6.79E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.19E+00	2.85E-10
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.78E+00	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.90E+01	NC
Benzo(a)anthracene	1.59E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.57E-01	8.83E-10	--	NCOPC	4.05E+00	6.42E-09
Benzo(a)pyrene	1.59E-08	--	NCOPC	--	NCOPC	3.01E-01	4.77E-09	1.24E+00	1.97E-08	--	NCOPC	5.98E-01	9.49E-09	--	NCOPC	2.77E+00	4.38E-08
Benzo(b)fluoranthene	1.59E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.26E-01	1.15E-09	--	NCOPC	3.42E+00	5.42E-09
Dibenzo(a,h)anthracene	1.59E-08	--	NCOPC	--	NCOPC	--	NCOPC	2.12E-01	3.36E-09	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	1.57E-08
Pesticides																	
4,4'-DDT	2.10E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.01E+00	1.68E-08
beta-BHC	1.11E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	1.45E-07
Dieldrin	9.88E-08	9.10E-02	8.99E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.96E-02	7.87E-09	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	8.03E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.75E+00	3.01E-08
Heptachlor	2.78E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-01	2.09E-08
Herbicides																	
Pentachlorophenol	7.41E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E+02	1.63E-07
PCBs																	
Total PCBs	1.17E-08	5.40E+00	6.29E-08	7.09E+02	8.27E-06	1.78E+00	2.08E-08	5.73E-01	6.68E-09	1.08E+00	1.26E-08	2.75E+00	3.21E-08	--	NCOPC	5.04E+02	5.88E-06
Dioxin																	
2,3,7,8-TCDD-TEQ	4.91E-04	2.99E-03	1.47E-06	5.08E-02	2.49E-05	--	NCOPC	--	NCOPC	1.14E-03	5.58E-07	6.89E-04	3.38E-07	--	NCOPC	--	NCOPC
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.95E+00	NC	--	NCOPC	--	NCOPC
Arsenic	2.71E-09	--	NCOPC	--	NCOPC	1.41E+01	3.82E-08	--	NCOPC	7.30E+00	1.98E-08	9.66E+00	2.62E-08	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.01E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.41E+01	NC	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.03E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	4.30E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total:		**1.54E-06**		**3.32E-05**		**6.38E-08**		**2.97E-08**		**5.90E-07**		**4.16E-07**		**NCOPC**		**6.33E-06**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs											
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	3.79E-08	3.79E-08	1.42E-09	1.42E-09	3.79E-04	1.42E-05	3.93E-04
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	3.79E-08	3.79E-08	1.42E-09	1.42E-09	1.26E-05	4.72E-07	1.31E-05
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	3.79E-08	3.79E-08	1.42E-09	1.42E-09	7.58E-05	2.83E-06	7.86E-05
beta-BHC	1.00E+00	1	0.01	3.00E-04	3.79E-08	3.79E-08	1.42E-09	1.42E-09	1.26E-04	4.72E-06	1.31E-04
Dieldrin	1.00E+00	1	0.01	5.00E-05	3.79E-08	3.79E-08	1.42E-09	1.42E-09	7.58E-04	2.83E-05	7.86E-04
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	3.79E-08	3.79E-08	1.42E-09	1.42E-09	1.26E-04	4.72E-06	1.31E-04
Heptachlor	1.00E+00	1	0.01	5.00E-04	3.79E-08	3.79E-08	1.42E-09	1.42E-09	7.58E-05	2.83E-06	7.86E-05
Herbicides											
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	3.79E-08	3.79E-08	1.42E-09	1.42E-09	1.26E-06	4.72E-08	1.31E-06
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	3.14E-08	3.14E-08	5.66E-09	5.66E-09	1.57E-03	2.83E-04	1.86E-03
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	3.79E-08	3.79E-08	9.91E-10	9.91E-10	9.47E-05	2.48E-06	9.72E-05
Arsenic	1.00E+00	0.3	0.001	3.00E-04	1.14E-08	1.14E-08	1.42E-10	1.42E-10	3.79E-05	4.72E-07	3.84E-05
Cadmium	1.00E+00	1	0.04	1.00E-03	3.79E-08	3.79E-08	5.66E-09	5.66E-09	3.79E-05	5.66E-06	4.36E-05
Chromium	1.00E+00	0.3	0	3.00E-03	1.14E-08	1.14E-08	0.00E+00	NA	3.79E-06	NC	3.79E-06
Manganese	1.00E+00	1	0.01	2.40E-02	3.79E-08	3.79E-08	1.42E-09	1.42E-09	1.58E-06	5.90E-08	1.64E-06
Mercury	1.00E+00	2	0.007	3.00E-04	7.58E-08	7.58E-08	9.91E-10	9.91E-10	2.53E-04	3.30E-06	2.56E-04

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SURFACE SOIL
TRESPASSING TEENAGER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
SVOCs																	
2,4,6-Trichlorophenol	3.93E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.19E+00	1.65E-03
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.78E+00	NC
4-Nitroaniline	1.31E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.90E+01	3.80E-04
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.57E-01	NC	--	NCOPC	4.05E+00	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	3.01E-01	NC	1.24E+00	NC	--	NCOPC	5.98E-01	NC	--	NCOPC	2.77E+00	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.26E-01	NC	--	NCOPC	3.42E+00	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.12E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	NC
Pesticides																	
4,4'-DDT	7.86E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.01E+00	6.29E-04
beta-BHC	1.31E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	1.70E-03
Dieldrin	7.86E-04	9.10E-02	7.15E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.96E-02	6.26E-05	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	1.31E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.75E+00	4.91E-04
Heptachlor	7.86E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-01	5.90E-05
Herbicides																	
Pentachlorophenol	1.31E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E+02	2.88E-04
PCBs																	
Total PCBs	1.86E-03	5.40E+00	1.00E-02	7.09E+02	1.32E+00	1.78E+00	3.31E-03	5.73E-01	1.06E-03	1.08E+00	2.00E-03	2.75E+00	5.10E-03	--	NCOPC	5.04E+02	9.36E-01
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	2.99E-03	NC	5.08E-02	NC	--	NCOPC	--	NCOPC	1.14E-03	NC	6.89E-04	NC	--	NCOPC	--	NCOPC
Metals																	
Antimony	9.72E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.95E+00	6.76E-04	--	NCOPC	--	NCOPC
Arsenic	3.84E-05	--	NCOPC	--	NCOPC	1.41E+01	5.41E-04	--	NCOPC	7.30E+00	2.80E-04	9.66E+00	3.71E-04	--	NCOPC	--	NCOPC
Cadmium	4.36E-05	--	NCOPC	--	NCOPC	--	NCOPC	2.01E+01	8.77E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	3.79E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.41E+01	3.18E-04	--	NCOPC	--	NCOPC
Manganese	1.64E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.03E+02	9.88E-04	--	NCOPC	--	NCOPC
Mercury	2.56E-04	--	NCOPC	4.30E+01	1.10E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
	Total HI:		**1.01E-02**		**1.33E+00**		**3.85E-03**		**1.94E-03**		**2.28E-03**		**7.52E-03**		**NCOPC**		**9.41E-01**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - MLE INHALATION OF OUTDOOR AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Trespassing Teenager	1.0	(m^3 air/hour)	
Body Weight	MLE Trespassing Teenager	47	(kg)	
Exposure Time	MLE Trespassing Teenager	2	(hrs/day) =	2.00E+00
Exposure Frequency	MLE Trespassing Teenager	13	(days)/365 (days) =	3.56E-02
Exposure Duration (cancer)	MLE Trespassing Teenager	11	(yrs)/70(yrs) =	1.57E-01
Exposure Duration (noncancer)	MLE Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	2.38E-04	2.38E-04	1.33E-05
1,2-Dichloroethane	1.00E+00	1	9.10E-02	2.38E-04	2.38E-04	2.17E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	2.38E-04	2.38E-04	1.83E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	1.57E-04	1.57E-04	1.27E-05
Dichloromethane	1.00E+00	1	1.65E-03	2.38E-04	2.38E-04	3.92E-07
Ethylbenzene	1.00E+00	1	NA	2.38E-04	2.38E-04	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	2.38E-04	2.38E-04	5.00E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	2.38E-04	2.38E-04	9.53E-05
Xylenes, Total	*1.00E+00*	*NA*	*NA*	*NA*	*NA*	*NC*
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	2.38E-04	2.38E-04	2.58E-06
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	2.38E-04	2.38E-04	7.38E-05
Benzo(a)pyrene	1.00E+00	1	3.10E+00	2.38E-04	2.38E-04	7.38E-04
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	2.38E-04	2.38E-04	7.38E-05
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	2.38E-04	2.38E-04	7.38E-04
Pesticides (b)						
4,4'-DDT	1.00E+00	1	3.40E-01	2.38E-04	2.38E-04	8.09E-05
beta-BHC	1.00E+00	1	1.86E+00	2.38E-04	2.38E-04	4.42E-04
Dieldrin	1.00E+00	1	1.61E+01	2.38E-04	2.38E-04	3.83E-03
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	2.38E-04	2.38E-04	1.08E-03
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	2.38E-04	2.38E-04	4.76E-04
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	1.31E-04	1.31E-04	1.96E+01
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	2.38E-04	2.38E-04	3.60E-03
Cadmium	1.00E+00	1	6.30E+00	2.38E-04	2.38E-04	1.50E-03
Chromium	1.00E+00	1	4.20E+01	2.38E-04	2.38E-04	1.00E-02
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m³)	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk
VOCs (a)																	
1,1,2-Trichloroethane	1.33E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-05	3.60E-10	--	NCOPC
1,2-Dichloroethane	2.17E-05	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	8.02E-10	--	NCOPC	--	NCOPC	1.50E-04	3.25E-09	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.40E-05	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.10E-03	NC
Benzene	1.83E-06	6.70E-03	1.23E-08	4.10E-03	7.52E-09	1.30E-04	2.38E-10	7.80E-05	1.43E-10	--	NCOPC	1.50E-05	2.75E-11	2.40E-04	4.40E-10	1.10E-04	2.02E-10
Chlorobenzene	NC	1.50E-02	NC	3.10E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-03	NC	1.30E-03	NC
Chloroform	1.27E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E-05	2.78E-10	--	NCOPC
Dichloromethane	3.92E-07	--	NCOPC	3.50E-03	1.37E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	9.79E-11
Ethylbenzene	NC	3.30E-02	NC	4.80E-02	NC	1.40E-03	NC	4.00E-04	NC	--	NCOPC	1.60E-03	NC	3.50E-05	NC	1.20E-03	NC
Tetrachloroethene	5.00E-06	--	NCOPC	3.40E-04	1.70E-09	2.50E-03	1.25E-08	2.20E-04	1.10E-09	--	NCOPC	--	NCOPC	1.40E-03	7.00E-09	8.40E-05	4.20E-10
Toluene	NC	4.80E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-03	NC	1.20E-03	NC	8.70E-03	NC
Trichloroethylene	9.53E-05	--	NCOPC	--	NCOPC	3.90E-05	3.72E-09	1.20E-05	1.14E-09	--	NCOPC	2.50E-06	2.38E-10	5.20E-03	4.95E-07	1.10E-03	1.05E-07
Xylenes, Total	NC	1.70E-01	NC	2.50E-01	NC	7.40E-03	NC	2.90E-03	NC	--	NCOPC	1.10E-02	NC	2.20E-04	NC	8.40E-03	NC
SVOCs (b)																	
2,4,6-Trichlorophenol	2.58E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.72E-09	1.48E-14
2-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.78E-09	NC
4-Nitroaniline	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.95E-08	NC
Benzo(a)anthracene	7.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.60E-10	5.61E-14	--	NCOPC	5.52E-09	4.07E-13
Benzo(a)pyrene	7.38E-04	--	NCOPC	--	NCOPC	4.10E-10	3.03E-13	1.69E-09	1.25E-12	--	NCOPC	8.16E-10	6.02E-13	--	NCOPC	3.77E-09	2.78E-12
Benzo(b)fluoranthene	7.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.89E-10	7.31E-14	--	NCOPC	4.66E-09	3.44E-13
Dibenzo(a,h)anthracene	7.38E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.89E-10	2.14E-13	--	NCOPC	--	NCOPC	--	NCOPC	1.35E-09	9.99E-13
Pesticides (b)																	
4,4'-DDT	8.09E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-08	8.82E-13
beta-BHC	4.42E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.77E-08	7.83E-12
Dieldrin	3.83E-03	1.24E-10	4.75E-13	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-10	4.16E-13	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.11E-09	NC
Heptachlor	1.08E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-09	1.11E-12
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.00E-07	NC
PCBs (b)																	
Total PCBs	4.76E-04	7.36E-09	3.50E-12	6.43E-07	3.06E-10	2.43E-09	1.16E-12	7.81E-10	3.72E-13	1.47E-09	7.00E-13	3.75E-09	1.78E-12	--	NCOPC	6.88E-07	3.27E-10
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	1.96E+01	4.07E-12	8.00E-11	4.61E-11	9.05E-10	--	NCOPC	--	NCOPC	1.55E-12	3.04E-11	9.40E-13	1.85E-11	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.48E-09	NC	--	NCOPC	--	NCOPC
Arsenic	3.60E-03	--	NCOPC	--	NCOPC	1.92E-08	6.91E-11	--	NCOPC	9.95E-09	3.58E-11	1.32E-08	4.74E-11	--	NCOPC	--	NCOPC
Cadmium	1.50E-03	--	NCOPC	--	NCOPC	--	NCOPC	2.75E-08	4.12E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.00E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.15E-07	1.15E-09	--	NCOPC	--	NCOPC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.23E-07	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	3.90E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Total:			1.24E-08		1.18E-08		1.65E-08		3.23E-09		6.69E-11		1.48E-09		5.07E-07		1.06E-07

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	1.52E-03	1.52E-03	1.08E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	1.52E-03	1.52E-03	1.77E-03
Benzene	1.00E+00	1	8.57E-03	1.52E-03	1.52E-03	1.77E-01
Chlorobenzene	1.00E+00	1	1.70E-02	1.52E-03	1.52E-03	8.92E-02
Chloroform	1.00E+00	1	1.43E-02	1.52E-03	1.52E-03	1.06E-01
Dichloromethane	1.00E+00	1	8.60E-01	1.52E-03	1.52E-03	1.76E-03
Ethylbenzene	1.00E+00	1	2.86E-01	1.52E-03	1.52E-03	5.30E-03
Tetrachloroethene	1.00E+00	1	1.70E-01	1.52E-03	1.52E-03	8.92E-03
Toluene	1.00E+00	1	1.14E-01	1.52E-03	1.52E-03	1.33E-02
Trichloroethylene	1.00E+00	1	1.00E-02	1.52E-03	1.52E-03	1.52E-01
Xylenes, Total	1.00E+00	1	2.86E-02	1.52E-03	1.52E-03	5.30E-02
SVOCs (b)						
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	1	5.71E-05	1.52E-03	1.52E-03	2.65E+01
4-Nitroaniline	1.00E+00	1	1.14E-03	1.52E-03	1.52E-03	1.33E+00
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	1.52E-03	1.52E-03	5.30E+01
Manganese	1.00E+00	1	1.43E-05	1.52E-03	1.52E-03	1.06E+02
Mercury	1.00E+00	1	8.57E-05	1.52E-03	1.52E-03	1.77E+01

TABLE
POTENTIAL NONCARCINOGENIC RISK
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR FROM SOIL
TRESPASSING TEENAGER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-05	NC	--	NCOPC
1,2-Dichloroethane	1.08E+00	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	4.01E-05	--	NCOPC	--	NCOPC	1.50E-04	1.62E-04	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.40E-05	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	1.77E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.10E-03	9.02E-06
Benzene	1.77E-01	6.70E-03	1.18E-03	4.10E-03	7.25E-04	1.30E-04	2.30E-05	7.80E-05	1.38E-05	--	NCOPC	1.50E-05	2.65E-06	2.40E-04	4.24E-05	1.10E-04	1.95E-05
Chlorobenzene	8.92E-02	1.50E-02	1.34E-03	3.10E-02	2.76E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-03	9.81E-05	1.30E-03	1.16E-04
Chloroform	1.06E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.20E-05	2.33E-06	--	NCOPC
Dichloromethane	1.76E-03	--	NCOPC	3.50E-03	6.17E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	4.41E-07
Ethylbenzene	5.30E-03	3.30E-02	1.75E-04	4.80E-02	2.54E-04	1.40E-03	7.42E-06	4.00E-04	2.12E-06	--	NCOPC	1.80E-03	9.48E-06	3.50E-05	1.85E-07	1.20E-03	6.36E-06
Tetrachloroethene	6.92E-03	--	NCOPC	3.40E-04	3.03E-06	2.50E-03	2.23E-05	2.20E-04	1.96E-06	--	NCOPC	--	NCOPC	1.40E-03	1.25E-05	8.40E-05	7.49E-07
Toluene	1.33E-02	4.80E-03	6.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E-03	9.97E-05	1.20E-03	1.60E-05	8.70E-03	1.16E-04
Trichloroethylene	1.52E-01	--	NCOPC	--	NCOPC	3.90E-05	5.91E-06	1.20E-05	1.82E-06	--	NCOPC	2.50E-06	3.79E-07	5.20E-03	7.88E-04	1.10E-03	1.67E-04
Xylenes, Total	5.30E-02	1.70E-01	9.02E-03	2.50E-01	1.33E-02	7.40E-03	3.93E-04	2.90E-03	1.54E-04	--	NCOPC	1.10E-02	5.84E-04	2.20E-04	1.17E-05	8.40E-03	4.46E-04
SVOCs (b)																	
2,4,6-Trichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.72E-09	NC
2-Nitroaniline	2.65E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.78E-09	1.00E-07
4-Nitroaniline	1.33E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.95E-08	5.25E-08
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.60E-10	NC	--	NCOPC	5.52E-09	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	4.10E-10	NC	1.69E-09	NC	--	NCOPC	8.16E-10	NC	--	NCOPC	3.77E-09	NC
Benzo(b)fluoranthene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.89E-10	NC	--	NCOPC	4.66E-09	NC
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.89E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.35E-09	NC
Pesticides (b)																	
4,4'-DDT	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-08	NC
beta-BHC	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.77E-08	NC
Dieldrin	NC	1.24E-10	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.09E-10	NC	--	NCOPC	--	NCOPC
gamma-BHC (Lindane)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.11E-09	NC
Heptachlor	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.02E-09	NC
Herbicides (b)																	
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.00E-07	NC
PCBs (b)																	
Total PCBs	NC	7.36E-09	NC	6.43E-07	NC	2.43E-09	NC	7.81E-10	NC	1.47E-09	NC	3.75E-09	NC	--	NCOPC	6.88E-07	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	4.07E-12	NC	4.61E-11	NC	--	NCOPC	--	NCOPC	1.55E-12	NC	9.40E-13	NC	--	NCOPC	--	NCOPC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.48E-09	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	--	NCOPC	1.92E-08	NC	--	NCOPC	9.95E-09	NC	1.32E-08	NC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.75E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	5.30E+01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.15E-07	6.07E-06	--	NCOPC	--	NCOPC
Manganese	1.06E+02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.23E-07	8.73E-05	--	NCOPC	--	NCOPC
Mercury	1.77E+01	--	NCOPC	3.90E-08	6.89E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Total:			1.18E-02		1.70E-02		4.51E-04		2.14E-04		NC		7.88E-04		1.13E-03		6.80E-04

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - MLE INHALATION OF OUTDOOR AIR -VOCs		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Trespassing Teenager	1.0	(m^3 air/hour)	
Body Weight	MLE Trespassing Teenager	47	(kg)	
Exposure Time	MLE Trespassing Teenager	2	(hrs/day) =	2.00E+00
Exposure Frequency	MLE Trespassing Teenager	13	(days)/365 (days) =	3.56E-02
Exposure Duration (cancer)	MLE Trespassing Teenager	11	(yrs)/70(yrs) =	1.57E-01
Exposure Duration (noncancer)	MLE Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	2.38E-04	2.38E-04	2.17E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	2.38E-04	2.38E-04	1.83E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	1.57E-04	1.57E-04	1.27E-05
Chloromethane	1.00E+00	1	6.30E-03	2.38E-04	2.38E-04	1.50E-06
Dichloromethane	1.00E+00	1	1.65E-03	2.38E-04	2.38E-04	3.92E-07
Tetrachloroethene	1.00E+00	1	2.10E-02	2.38E-04	2.38E-04	5.00E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	2.38E-04	2.38E-04	9.53E-05

TABLE
POTENTIAL CARCINOGENIC RISK
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - MLE

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs													
1,2-Dichloroethane	2.17E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	2.17E-09	2.00E-03	4.33E-08
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	NC	4.90E-05	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	1.83E-06	4.00E-05	7.34E-11	1.80E-07	3.30E-13	--	NCOPC	9.00E-05	1.65E-10	3.90E-05	7.15E-11	5.70E-04	1.05E-09
Chlorobenzene	NC	--	NCOPC	5.80E-07	NC	--	NCOPC	1.20E-04	NC	7.20E-05	NC	7.30E-05	NC
Chloroform	1.27E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	1.77E-09
Chloromethane	1.50E-06	--	NCOPC	1.70E-08	2.55E-14	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	3.92E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	1.25E-12	1.10E-04	4.31E-11
Tetrachloroethene	5.00E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	7.50E-11	5.60E-03	2.80E-08
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	NC
Trichloroethylene	9.53E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	8.29E-10	5.10E-02	4.86E-06
	Total:		7.34E-11		3.56E-13		NCOPC		1.65E-10		3.14E-09		4.93E-06

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	1.40E-03	1.52E-03	1.52E-03	1.08E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	2.86E-01	1.52E-03	1.52E-03	5.30E-03
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	1.52E-03	1.52E-03	1.77E-03
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	8.57E-03	1.52E-03	1.52E-03	1.77E-01
Chlorobenzene	1.00E+00	1	1.70E-02	1.52E-03	1.52E-03	8.92E-02
Chloroform	1.00E+00	1	1.43E-02	1.52E-03	1.52E-03	1.06E-01
Chloromethane	1.00E+00	1	2.57E-02	1.52E-03	1.52E-03	5.89E-02
Dichloromethane	1.00E+00	1	8.60E-01	1.52E-03	1.52E-03	1.76E-03
Tetrachloroethene	1.00E+00	1	1.70E-01	1.52E-03	1.52E-03	8.92E-03
Toluene	1.00E+00	1	1.14E-01	1.52E-03	1.52E-03	1.33E-02
Trichloroethylene	1.00E+00	1	1.00E-02	1.52E-03	1.52E-03	1.52E-01

TABLE
POTENTIAL HAZARD INDEX
CARCINOGENIC ASSESSMENT
INHALATION OF
OUTDOOR AIR -VOCs
TRESPASSING TEENAGER - MLE

		Mid				Shallow		Leachate					
		Q - AA-Q-6-24		R - AA-R-1-28		O - AA-O-1-16		O		Q		R	
Constituent	Reference HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs													
1,2-Dichloroethane	1.08E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-04	1.08E-04	2.00E-03	2.17E-03
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.80E-03	NC
2-Butanone (MEK)	5.30E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.30E-05	3.87E-07
4-Methyl-2-pentanone (MIBK)	1.77E-03	--	NCOPC	--	NCOPC	--	NCOPC	3.70E-05	6.54E-08	4.90E-05	8.66E-08	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-06	NC	1.00E-04	NC
Benzene	1.77E-01	4.00E-05	7.07E-06	1.80E-07	3.18E-08	--	NCOPC	9.00E-05	1.59E-05	3.90E-05	6.90E-06	5.70E-04	1.01E-04
Chlorobenzene	8.92E-02	--	NCOPC	5.80E-07	5.17E-08	--	NCOPC	1.20E-04	1.07E-05	7.20E-05	6.42E-06	7.30E-05	6.51E-06
Chloroform	1.06E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-04	1.48E-05
Chloromethane	5.89E-02	--	NCOPC	1.70E-08	1.00E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.76E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.20E-06	5.64E-09	1.10E-04	1.94E-07
Tetrachloroethene	8.92E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.50E-05	1.34E-07	5.60E-03	4.99E-05
Toluene	1.33E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-03	2.53E-05
Trichloroethylene	1.52E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-06	1.32E-06	5.10E-02	7.73E-03
	Total HI:		**7.07E-06**		**8.45E-08**		**NCOPC**		**2.67E-05**		**1.23E-04**		**1.01E-02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated	
Receptor:	MLE Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - MLE INCIDENTIAL INGESTION AND DERMAL CONTACT SEDIMENT		Assumed Value	Units	Calculated Value
Sediment Ingestion Rate	MLE Trespassing Teenager	50	(mg soil/day)	
Sediment on Skin	MLE Trespassing Teenager	1	(mg/cm^2)	
Skin Exposed	MLE Trespassing Teenager	6026	(cm^2)	
Body Weight	MLE Trespassing Teenager	47	(kg)	
Exposure Frequency	MLE Trespassing Teenager	7	(days)/365(days) =	1.92E-02
Exposure Duration (cancer)	MLE Trespassing Teenager	11	(years)/70(years) =	1.57E-01
Exposure Duration (noncancer)	MLE Trespassing Teenager	11	(yrs)/11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
TRESPASSING TEENAGER - MLE

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Metals											
Arsenic	2.90E+00	0.3	0.001	1.50E+00	2.79E-09	2.79E-09	1.12E-09	1.12E-09	4.19E-09	1.68E-09	5.87E-09
								Total:	4.19E-09	1.68E-09	5.87E-09

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
TRESPASSING TEENAGER - MLE

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Metals											
Arsenic	2.90E+00	0.3	0.001	3.00E-04	1.78E-08	1.78E-08	7.14E-09	7.14E-09	5.93E-05	2.38E-05	8.31E-05
								Total:	5.93E-05	2.38E-05	8.31E-05

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Trespassing Teenager

ASSUMPTIONS FOR TRESPASSING TEENAGER - MLE INCIDENTAL INGESTION AND DERMAL CONTACT SURFACE WATER		Assumed Value	Units	Calculated Value
Water Ingestion Rate	MLE Trespassing Teenager	0.005	(l/day)	
Skin Exposed	MLE Trespassing Teenager	6026	(cm^2)	
Body Weight	MLE Trespassing Teenager	47	(kg)	
Exposure Time (dermal route only)	MLE Trespassing Teenager	1	(hr/day)	
Exposure Frequency	MLE Trespassing Teenager	7	(days)/365 (days) =	1.92E-02
Exposure Duration (cancer)	MLE Trespassing Teenager	11	(yrs)/ 70(yrs) =	1.57E-01
Exposure Duration (noncancer)	MLE Trespassing Teenager	11	(yrs)/ 11(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs												
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
Herbicides												
MCPA	1.00E+00	NA	NA	2.31E-02	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	1.56E-02	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Lead	1.00E+00	NA	NA	(l)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
TRESPASSING TEENAGER - MLE

Constituent	Reference Risk (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk
SVOCs					
2,4-Dichlorophenol	NC	--	NCOPC	6.01E-03	NC
4-Chloroaniline	NC	--	NCOPC	1.22E-02	NC
Herbicides					
MCPA	NC	--	NCOPC	3.10E-02	NC
MCPP	NC	--	NCOPC	5.30E-02	NC
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	NC	4.60E-01	NC	--	NCOPC
	Total:		**NC**		**NC**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
TRESPASSING TEENAGER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	ADDing MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Trespassing Teenager (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs												
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	2.04E-06	2.04E-06	5.66E-05	5.66E-05	6.80E-04	1.89E-02	1.95E-02
4-Chloroaniline	1.00E+00	1	1	6.33E-03	4.00E-03	2.04E-06	2.04E-06	1.56E-05	1.56E-05	5.10E-04	3.89E-03	4.40E-03
Herbicides												
MCPA	1.00E+00	1	1	2.31E-02	5.00E-04	2.04E-06	2.04E-06	5.66E-05	5.66E-05	4.08E-03	1.14E-01	1.16E-01
MCPP	1.00E+00	1	1	1.56E-02	1.00E-03	2.04E-06	2.04E-06	3.83E-05	3.83E-05	2.04E-03	3.83E-02	4.04E-02
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.60E-04	2.40E-02	2.04E-06	2.04E-06	3.93E-06	3.93E-06	8.50E-05	1.64E-04	2.49E-04

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
TRESPASSING TEENAGER - MLE

Constituent	Reference HQ (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	HQ	EPC (mg/L)	HQ
SVOCs					
2,4-Dichlorophenol	1.95E-02	--	NCOPC	6.01E-03	1.17E-04
4-Chloroaniline	4.40E-03	--	NCOPC	1.22E-02	5.37E-05
Herbicides					
MCPA	1.18E-01	--	NCOPC	3.10E-02	3.65E-03
MCPP	4.04E-02	--	NCOPC	5.30E-02	2.14E-03
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	2.49E-04	4.60E-01	1.15E-04	--	NCOPC
	Total HI:		**1.15E-04**		**5.96E-03**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

Construction Worker

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated	
Receptor:	RME Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - RME INCIDENTIAL INGESTION AND DERMAL CONTACT WITH COMBINED SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	RME Construction/Utility Worker	100	(mg soil/day)	
Soil on Skin	RME Construction/Utility Worker	0.19	(mg/cm^2)	
Skin Exposed	RME Construction/Utility Worker	3339	(cm^2)	
Body Weight	RME Construction/Utility Worker	70	(kg)	
Exposure Frequency	RME Construction/Utility Worker	40	(days)/365(days) =	1.10E-01
Exposure Duration (cancer)	RME Construction/Utility Worker	1	(years)/70(years) =	1.43E-02
Exposure Duration (noncancer)	RME Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration in Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	ADDing RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
VOCs											
1,1,2-Trichloroethane	1.00E+00	1	0.01	5.70E-02	2.24E-09	2.24E-09	1.42E-10	1.42E-10	1.27E-10	8.09E-12	1.36E-10
1,2-Dichloroethane	1.00E+00	1	0.01	9.10E-02	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.04E-10	1.29E-11	2.16E-10
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	0.02	1.50E-02	2.24E-09	2.24E-09	2.84E-10	2.84E-10	3.35E-11	4.26E-12	3.78E-11
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chloroform	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dichloromethane	1.00E+00	1	0.016	7.50E-03	2.24E-09	2.24E-09	2.27E-10	2.27E-10	1.68E-11	1.70E-12	1.85E-11
Ethylbenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Tetrachloroethene	1.00E+00	1	0.01	5.40E-01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	1.21E-09	7.66E-11	1.28E-09
Toluene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	0.01	4.00E-01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	8.95E-10	5.68E-11	9.51E-10
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
SVOCs											
1,2-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
1,3-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
1,4-Dichlorobenzene	1.00E+00	1	0.01	2.40E-02	2.24E-09	2.24E-09	1.42E-10	1.42E-10	5.37E-11	3.41E-12	5.71E-11
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.46E-11	1.56E-12	2.62E-11
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	6.49E-10	6.49E-10	2.84E-10	2.84E-10	4.73E-10	2.07E-10	6.81E-10
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	6.49E-10	6.49E-10	2.84E-10	2.84E-10	4.73E-09	2.07E-09	6.81E-09
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	6.49E-10	6.49E-10	2.84E-10	2.84E-10	4.73E-10	2.07E-10	6.81E-10
bis(2-Chloroethyl)ether	1.00E+00	1	0.01	1.10E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.46E-09	1.56E-10	2.62E-09
bis(2-Ethylhexyl)phthalate	1.00E+00	1	0.004	1.40E-02	2.24E-09	2.24E-09	5.68E-11	5.68E-11	3.13E-11	7.95E-13	3.21E-11
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	6.49E-10	6.49E-10	2.84E-10	2.84E-10	4.73E-09	2.07E-09	6.81E-09
Hexachlorobenzene	1.00E+00	0.83	0.04	1.60E+00	1.86E-09	1.86E-09	5.68E-10	5.68E-10	2.97E-09	9.08E-10	3.88E-09
Naphthalene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDE	1.00E+00	1	0.01	3.40E-01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	7.60E-10	4.82E-11	8.09E-10
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	7.60E-10	4.82E-11	8.09E-10
Aldrin	1.00E+00	1	0.01	1.70E+01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	3.80E-08	2.41E-09	4.04E-08
alpha-BHC	1.00E+00	1	0.01	6.30E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	1.41E-08	8.94E-10	1.50E-08
beta-BHC	1.00E+00	1	0.01	1.80E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	4.03E-09	2.55E-10	4.28E-09
delta-BHC	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	1	0.01	1.60E+01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	3.58E-08	2.27E-09	3.81E-08
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.91E-09	1.84E-10	3.09E-09
Heptachlor	1.00E+00	1	0.01	4.50E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	1.01E-08	6.38E-10	1.07E-08
Heptachlor Epoxide	1.00E+00	1	0.01	9.10E+00	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.04E-08	1.29E-09	2.16E-08

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	ADDing RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Herbicides											
MCPA	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	2.24E-09	2.24E-09	1.42E-10	1.42E-10	2.68E-10	1.70E-11	2.85E-10
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	1.86E-09	1.86E-09	5.68E-10	5.68E-10	3.71E-09	1.14E-09	4.85E-09
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	8.95E-10	8.95E-10	5.68E-10	5.68E-10	1.34E-04	8.51E-05	2.19E-04
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	6.71E-10	6.71E-10	1.42E-11	1.42E-11	1.01E-09	2.13E-11	1.03E-09
Barium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Copper	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
VOCs																	
1,1,2-Trichloroethane	1.36E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.18E+00	4.31E-10	--	NCOPC
1,2-Dichloroethane	2.16E-10	--	NCOPC	--	NCOPC	--	NCOPC	7.43E-01	1.61E-10	--	NCOPC	--	NCOPC	3.28E+01	7.10E-09	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.37E+01	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.00E+02	NC
Benzene	3.78E-11	5.00E+02	1.89E-08	6.90E+01	2.61E-09	1.12E+00	4.23E-11	1.61E+00	6.09E-11	--	NCOPC	2.98E-01	1.13E-11	5.22E+01	1.97E-09	3.50E+01	1.32E-09
Chlorobenzene	NC	7.60E+02	NC	4.80E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.89E+02	NC	1.20E+03	NC
Chloroform	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.93E+00	NC	--	NCOPC
Dichloromethane	1.65E-11	--	NCOPC	8.70E+01	1.61E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	1.05E-09
Ethylbenzene	NC	2.80E+03	NC	7.60E+02	NC	7.80E+01	NC	7.78E+00	NC	--	NCOPC	3.53E+01	NC	1.62E+01	NC	1.10E+03	NC
Tetrachloroethene	1.28E-09	--	NCOPC	6.80E+00	8.73E-09	1.54E+01	1.98E-08	4.90E+00	6.29E-09	--	NCOPC	--	NCOPC	4.45E+02	5.72E-07	3.30E+01	4.24E-08
Toluene	NC	3.90E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E+02	NC	3.15E+02	NC	6.00E+03	NC
Trichloroethylene	9.51E-10	--	NCOPC	--	NCOPC	9.90E-01	9.42E-10	2.06E-01	1.96E-10	--	NCOPC	5.16E-02	4.91E-11	2.20E+03	2.09E-06	2.40E+02	2.28E-07
Xylenes, Total	NC	1.40E+04	NC	3.90E+03	NC	3.80E+02	NC	5.79E+01	NC	--	NCOPC	2.52E+02	NC	8.88E+01	NC	7.30E+03	NC
SVOCs																	
1,2-Dichlorobenzene	NC	--	NCOPC	5.20E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	NC	--	NCOPC	1.20E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E+01	NC
1,4-Dichlorobenzene	5.71E-11	4.70E+01	2.68E-09	1.20E+02	6.85E-09	6.70E+01	3.82E-09	--	NCOPC	--	NCOPC	--	NCOPC	6.42E+00	3.66E-10	2.00E+02	1.14E-08
2,4,6-Trichlorophenol	2.62E-11	6.90E+00	1.81E-10	6.10E+01	1.60E-09	--	NCOPC	9.77E+00	2.56E-10	--	NCOPC	--	NCOPC	1.70E+02	4.45E-09	8.20E+00	2.15E-10
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.19E+01	NC	--	NCOPC	--	NCOPC	8.47E+02	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.51E+01	NC	--	NCOPC
2-Methylnaphthalene	NC	--	NCOPC	2.00E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	2.50E+00	NC	6.20E+01	NC	--	NCOPC	6.18E+00	NC	--	NCOPC	--	NCOPC	2.81E+00	NC	4.60E+00	NC
4-Nitroaniline	NC	--	NCOPC	1.00E+03	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.34E+00	NC	5.70E+01	NC
Benzo(a)anthracene	6.81E-10	1.20E+01	8.17E-09	3.60E+01	2.45E-08	--	NCOPC	1.61E+00	1.10E-09	1.07E+00	7.28E-10	1.03E+00	7.01E-10	--	NCOPC	8.00E+00	5.44E-09
Benzo(a)pyrene	6.81E-09	7.10E+00	4.83E-08	1.10E+01	7.49E-08	6.70E-01	4.56E-09	1.67E+00	1.14E-08	1.24E+00	8.44E-09	1.14E+00	7.76E-09	--	NCOPC	5.40E+00	3.68E-08
Benzo(b)fluoranthene	6.81E-10	7.90E+00	5.38E-09	1.20E+01	8.17E-09	--	NCOPC	1.51E+00	1.03E-09	1.60E+00	1.09E-09	1.18E+00	8.03E-10	--	NCOPC	8.60E+00	4.49E-09
bis(2-Chloroethyl)ether	2.62E-09	--	NCOPC	2.10E+00	5.49E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	3.21E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+02	4.17E-09
Dibenzo(a,h)anthracene	6.81E-09	3.00E+00	2.04E-08	4.60E+00	3.13E-08	--	NCOPC	2.82E-01	1.92E-09	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	1.23E-08
Hexachlorobenzene	3.88E-09	--	NCOPC	4.50E+00	1.75E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	4.10E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.94E+01	NC	4.80E+01	NC
Nitrobenzene	NC	--	NCOPC	1.10E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.45E+01	NC	--	NCOPC
Pesticides																	
4,4'-DDE	8.09E-10	--	NCOPC	3.30E+01	2.67E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	8.09E-10	--	NCOPC	5.80E+01	4.69E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	1.29E-08
Aldrin	4.04E-08	7.20E-01	2.91E-08	4.50E+00	1.82E-07	--	NCOPC	--	NCOPC	3.40E-02	1.37E-09	6.78E-02	2.74E-09	--	NCOPC	1.90E-01	7.68E-09
alpha-BHC	1.50E-08	--	NCOPC	1.50E+00	2.25E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	4.28E-09	--	NCOPC	2.10E+01	8.99E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.53E-01	3.22E-09	2.60E+01	1.11E-07
delta-BHC	NC	2.85E+00	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	3.81E-08	3.80E+00	1.45E-07	5.00E+01	1.90E-06	2.83E-01	1.08E-08	5.84E-01	2.22E-08	1.47E-01	5.59E-09	5.04E-01	1.92E-08	1.22E+00	4.64E-08	3.60E-01	1.45E-08
gamma-BHC (Lindane)	3.09E-09	2.88E+00	8.90E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	2.32E-08
Heptachlor	1.07E-08	2.78E+00	2.98E-08	9.90E+00	1.06E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.45E-01	4.76E-09	1.50E+00	1.61E-08
Heptachlor Epoxide	2.16E-08	4.70E-01	1.02E-08	2.70E+00	5.84E-08	--	NCOPC	--	NCOPC	--	NCOPC	1.03E-01	2.23E-09	--	NCOPC	--	NCOPC
Herbicides																	
MCPA	NC	--	NCOPC	--	NCOPC	5.26E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.18E+01	NC	--	NCOPC
Pentachlorophenol	2.85E-10	--	NCOPC	--	NCOPC	--	NCOPC	1.63E+02	4.65E-08	6.52E+00	1.86E-09	7.74E+01	2.21E-08	--	NCOPC	4.40E+02	1.26E-07

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
PCBs																	
Total PCBs	4.85E-09	2.98E+02	1.44E-06	3.03E+03	1.47E-05	1.69E+01	8.19E-08	5.40E+01	2.62E-07	4.35E+00	2.11E-08	1.90E+01	9.21E-08	8.89E+01	4.31E-07	1.01E+03	4.89E-06
Dioxin																	
2,3,7,8-TCDD-TEQ	2.19E-04	3.04E-02	6.67E-06	4.97E-01	1.09E-04	4.42E-04	9.69E-08	1.11E-02	2.43E-06	3.79E-03	8.31E-07	4.51E-03	9.89E-07	1.78E-03	3.90E-07	2.59E-02	5.67E-06
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.66E+01	NC	--	NCOPC	1.87E+01	NC	--	NCOPC	--	NCOPC
Arsenic	1.03E-09	--	NCOPC	3.70E+01	3.80E-08	1.69E+01	1.74E-08	1.54E+01	1.58E-08	2.22E+01	2.28E-08	1.72E+01	1.77E-08	7.32E+00	7.52E-09	--	NCOPC
Barium	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.03E+03	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	8.60E+01	NC	1.33E+01	NC	1.89E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+02	NC	--	NCOPC	4.80E+02	NC
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.41E+03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.96E+03	NC	--	NCOPC	8.28E+02	NC	--	NCOPC	8.38E+02	NC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.29E+03	NC	8.53E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	3.60E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.58E+00	NC	6.99E+02	NC	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.31E+02	NC	--	NCOPC	--	NCOPC
	Total:		**8.44E-06**		**1.26E-04**		**2.36E-07**		**2.80E-06**		**8.94E-07**		**1.15E-06**		**3.56E-06**		**1.12E-05**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hezard Index - Dermal Contact	Total Hazard Index
VOCs											
1,1,2-Trichloroethane	1.00E+00	1	0.01	4.00E-03	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.91E-05	2.48E-06	4.16E-05
1,2-Dichloroethane	1.00E+00	1	0.01	2.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	7.83E-06	4.97E-07	8.32E-06
1,2-Dichloroethene (total)	1.00E+00	1	0.01	2.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	7.83E-06	4.97E-07	8.32E-06
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	0.01	8.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.96E-06	1.24E-07	2.08E-06
Benzene	1.00E+00	1	0.02	4.00E-03	1.57E-07	1.57E-07	1.99E-08	1.99E-08	3.91E-05	4.97E-06	4.41E-05
Chlorobenzene	1.00E+00	1	0.01	2.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	7.83E-06	4.97E-07	8.32E-06
Chloroform	1.00E+00	1	0.01	1.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.57E-05	9.93E-07	1.66E-05
Dichloromethane	1.00E+00	1	0.016	6.00E-02	1.57E-07	1.57E-07	1.59E-08	1.59E-08	2.61E-06	2.65E-07	2.87E-06
Ethylbenzene	1.00E+00	1	0.01	1.00E-01	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.57E-06	9.93E-08	1.66E-06
Tetrachloroethene	1.00E+00	1	0.01	1.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.57E-05	9.93E-07	1.66E-05
Toluene	1.00E+00	1	0.01	2.00E-01	1.57E-07	1.57E-07	9.93E-09	9.93E-09	7.83E-07	4.97E-08	8.32E-07
Trichloroethylene	1.00E+00	1	0.01	3.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-04	3.31E-05	5.55E-04
Xylenes, Total	1.00E+00	1	0.011	2.00E-01	1.57E-07	1.57E-07	1.09E-08	1.09E-08	7.83E-07	5.46E-08	8.37E-07
SVOCs											
1,2-Dichlorobenzene	1.00E+00	1	0.01	9.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.74E-06	1.10E-07	1.85E-06
1,3-Dichlorobenzene	1.00E+00	1	0.01	9.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.74E-04	1.10E-05	1.85E-04
1,4-Dichlorobenzene	1.00E+00	1	0.01	3.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-06	3.31E-07	5.55E-06
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.57E-03	9.93E-05	1.66E-03
2,4-Dichlorophenol	1.00E+00	1	0.01	3.00E-03	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-05	3.31E-06	5.55E-05
2-Chlorophenol	1.00E+00	1	0.01	5.00E-03	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-05	1.99E-06	3.33E-05
2-Methylnaphthalene	1.00E+00	0.29	0.1	2.00E-02	4.54E-08	4.54E-08	9.93E-08	9.93E-08	2.27E-06	4.97E-06	7.24E-06
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-05	3.31E-06	5.55E-05
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
bis(2-Chloroethyl)ether	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	1	0.004	2.00E-02	1.57E-07	1.57E-07	3.97E-09	3.97E-09	7.83E-06	1.99E-07	8.03E-06
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Hexachlorobenzene	1.00E+00	0.83	0.04	8.00E-04	1.30E-07	1.30E-07	3.97E-08	3.97E-08	1.62E-04	4.97E-05	2.12E-04
Naphthalene	1.00E+00	0.29	0.1	2.00E-02	4.54E-08	4.54E-08	9.93E-08	9.93E-08	2.27E-06	4.97E-06	7.24E-06
Nitrobenzene	1.00E+00	1	0.01	5.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-04	1.99E-05	3.33E-04
Pesticides											
4,4'-DDE	1.00E+00	1	0.01	5.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-04	1.99E-05	3.33E-04
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-04	1.99E-05	3.33E-04
Aldrin	1.00E+00	1	0.01	3.00E-05	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-03	3.31E-04	5.55E-03
alpha-BHC	1.00E+00	1	0.01	3.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-04	3.31E-05	5.55E-04
beta-BHC	1.00E+00	1	0.01	3.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-04	3.31E-05	5.55E-04
delta-BHC	1.00E+00	1	0.01	3.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-04	3.31E-05	5.55E-04
Dieldrin	1.00E+00	1	0.01	5.00E-05	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-03	1.99E-04	3.33E-03
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-04	3.31E-05	5.55E-04
Heptachlor	1.00E+00	1	0.01	5.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-04	1.99E-05	3.33E-04
Heptachlor Epoxide	1.00E+00	1	0.01	1.30E-05	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.20E-02	7.64E-04	1.28E-02

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Herbicides											
MCPA	1.00E+00	1	0.01	5.00E-04	1.57E-07	1.57E-07	9.93E-09	9.93E-09	3.13E-04	1.99E-05	3.33E-04
MCPP	1.00E+00	1	0.01	1.00E-03	1.57E-07	1.57E-07	9.93E-09	9.93E-09	1.57E-04	9.93E-06	1.66E-04
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	5.22E-06	3.31E-07	5.55E-06
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	1.30E-07	1.30E-07	3.97E-08	3.97E-08	6.50E-03	1.99E-03	8.48E-03
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	1.57E-07	1.57E-07	6.95E-09	6.95E-09	3.91E-04	1.74E-05	4.09E-04
Arsenic	1.00E+00	0.3	0.001	3.00E-04	4.70E-08	4.70E-08	9.93E-10	9.93E-10	1.57E-04	3.31E-06	1.60E-04
Barium	1.00E+00	1	0.001	7.00E-02	1.57E-07	1.57E-07	9.93E-10	9.93E-10	2.24E-06	1.42E-08	2.25E-06
Cadmium	1.00E+00	1	0.04	1.00E-03	1.57E-07	1.57E-07	3.97E-08	3.97E-08	1.57E-04	3.97E-05	1.96E-04
Chromium	1.00E+00	0.3	0	3.00E-03	4.70E-08	4.70E-08	0.00E+00	NA	1.57E-05	NC	1.57E-05
Copper	1.00E+00	1	0.002	3.70E-02	1.57E-07	1.57E-07	1.99E-09	1.99E-09	4.23E-06	5.37E-08	4.28E-06
Lead	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	0.01	2.40E-02	1.57E-07	1.57E-07	9.93E-09	9.93E-09	6.52E-06	4.14E-07	6.94E-06
Mercury	1.00E+00	2	0.007	3.00E-04	3.13E-07	3.13E-07	6.95E-09	6.95E-09	1.04E-03	2.32E-05	1.07E-03
Nickel	1.00E+00	1	0.08	2.00E-02	1.57E-07	1.57E-07	7.95E-08	7.95E-08	7.83E-06	3.97E-06	1.18E-05

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - RME
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HI (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
VOCs																	
1,1,2-Trichloroethane	4.16E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.18E+00	1.32E-04	--	NCOPC
1,2-Dichloroethane	8.32E-06	--	NCOPC	--	NCOPC	--	NCOPC	7.43E-01	6.19E-06	--	NCOPC	--	NCOPC	3.28E+01	2.73E-04	--	NCOPC
1,2-Dichloroethene (total)	8.32E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.37E+01	1.14E-04	--	NCOPC
4-Methyl-2-pentanone (MIBK)	2.08E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.00E+02	8.32E-04
Benzene	4.41E-05	5.00E+02	2.21E-02	6.90E+01	3.04E-03	1.12E+00	4.94E-05	1.61E+00	7.10E-05	--	NCOPC	2.98E-01	1.31E-05	5.22E+01	2.30E-03	3.50E+01	1.54E-03
Chlorobenzene	8.32E-06	7.60E+02	6.33E-03	4.80E+02	4.00E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.69E+02	4.90E-03	1.20E+03	9.99E-03
Chloroform	1.66E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.93E+00	8.21E-05	--	NCOPC
Dichloromethane	2.87E-06	--	NCOPC	8.70E+01	2.50E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.70E+01	1.64E-04
Ethylbenzene	1.66E-06	2.80E+03	4.66E-03	7.60E+02	1.27E-03	7.80E+01	1.30E-04	7.78E+00	1.30E-05	--	NCOPC	3.53E+01	5.88E-05	1.62E+01	2.70E-05	1.10E+03	1.83E-03
Tetrachloroethene	1.66E-05	--	NCOPC	6.80E+00	1.13E-04	1.54E+01	2.56E-04	4.90E+00	8.16E-05	--	NCOPC	--	NCOPC	4.45E+02	7.41E-03	3.30E+01	5.49E-04
Toluene	8.32E-07	3.90E+02	3.25E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E+02	1.41E-04	3.15E+02	2.62E-04	6.00E+03	4.99E-03
Trichloroethylene	5.55E-04	--	NCOPC	--	NCOPC	9.90E-01	5.49E-04	2.06E-01	1.14E-04	--	NCOPC	5.16E-02	2.86E-05	2.20E+03	1.22E+00	2.40E+02	1.33E-01
Xylenes, Total	8.37E-07	1.40E+04	1.17E-02	3.90E+03	3.27E-03	3.80E+02	3.18E-04	5.79E+01	4.85E-05	--	NCOPC	2.52E+02	2.11E-04	8.88E+01	7.44E-05	7.30E+03	6.11E-03
SVOCs																	
1,2-Dichlorobenzene	1.85E-06	--	NCOPC	5.20E+02	9.62E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	1.85E-04	--	NCOPC	1.20E+01	2.22E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E+01	2.22E-03
1,4-Dichlorobenzene	5.55E-06	4.70E+01	2.61E-04	1.20E+02	6.66E-04	6.70E+01	3.72E-04	--	NCOPC	--	NCOPC	--	NCOPC	6.42E+00	3.56E-05	2.00E+02	1.11E-03
2,4,6-Trichlorophenol	1.66E-03	6.90E+00	1.15E-02	6.10E+01	1.02E-01	--	NCOPC	9.77E+00	1.63E-02	--	NCOPC	--	NCOPC	1.70E+02	2.83E-01	8.20E+00	1.37E-02
2,4-Dichlorophenol	5.55E-05	--	NCOPC	--	NCOPC	--	NCOPC	5.19E+01	2.88E-03	--	NCOPC	--	NCOPC	8.47E+02	4.70E-02	--	NCOPC
2-Chlorophenol	3.33E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.51E+01	3.17E-03	--	NCOPC
2-Methylnaphthalene	7.24E-06	--	NCOPC	2.00E+02	1.45E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	2.50E+00	NC	6.20E+01	NC	--	NCOPC	6.18E+00	NC	--	NCOPC	--	NCOPC	2.81E+00	NC	4.60E+00	NC
4-Nitroaniline	5.55E-05	--	NCOPC	1.00E+03	5.55E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.34E+00	4.63E-04	5.70E+01	3.16E-03
Benzo(a)anthracene	NC	1.20E+01	NC	3.60E+01	NC	--	NCOPC	1.61E+00	NC	1.07E+00	NC	1.03E+00	NC	--	NCOPC	8.00E+00	NC
Benzo(a)pyrene	NC	7.10E+00	NC	1.10E+01	NC	6.70E-01	NC	1.67E+00	NC	1.24E+00	NC	1.14E+00	NC	--	NCOPC	5.40E+00	NC
Benzo(b)fluoranthene	NC	7.90E+00	NC	1.20E+01	NC	--	NCOPC	1.51E+00	NC	1.60E+00	NC	1.18E+00	NC	--	NCOPC	6.60E+00	NC
bis(2-Chloroethyl)ether	NC	--	NCOPC	2.10E+00	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	8.03E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+02	1.04E-03
Dibenzo(a,h)anthracene	NC	3.00E+00	NC	4.60E+00	NC	--	NCOPC	2.82E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E+00	NC
Hexachlorobenzene	2.12E-04	--	NCOPC	4.50E+00	9.54E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	7.24E-08	--	NCOPC	4.10E+01	2.97E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.94E+01	2.13E-04	4.80E+01	3.47E-04
Nitrobenzene	3.33E-04	--	NCOPC	1.10E+01	3.66E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.45E+01	4.83E-03	--	NCOPC
Pesticides																	
4,4'-DDE	3.33E-04	--	NCOPC	3.30E+01	1.10E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	3.33E-04	--	NCOPC	5.80E+01	1.93E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.60E+01	5.33E-03
Aldrin	5.55E-03	7.20E-01	4.00E-03	4.50E+00	2.50E-02	--	NCOPC	--	NCOPC	3.40E-02	1.89E-04	6.78E-02	3.76E-04	--	NCOPC	1.90E-01	1.05E-03
alpha-BHC	5.55E-04	--	NCOPC	1.50E+00	8.32E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	5.55E-04	--	NCOPC	2.10E+01	1.17E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.53E-01	4.16E-04	2.60E+01	1.44E-02
delta-BHC	5.55E-04	2.85E+00	1.58E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	3.33E-03	3.80E+00	1.27E-02	5.00E+01	1.66E-01	2.83E-01	9.42E-04	5.84E-01	1.94E-03	1.47E-01	4.89E-04	5.04E-01	1.68E-03	1.22E+00	4.06E-03	3.80E-01	1.27E-03
gamma-BHC (Lindane)	5.55E-04	2.88E+00	1.60E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.50E+00	4.16E-03
Heptachlor	3.33E-04	2.78E+00	9.26E-04	9.90E+00	3.30E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.45E-01	1.48E-04	1.50E+00	4.99E-04
Heptachlor Epoxide	1.28E-02	4.70E-01	6.02E-03	2.70E+00	3.46E-02	--	NCOPC	--	NCOPC	--	NCOPC	1.03E-01	1.32E-03	--	NCOPC	--	NCOPC
Herbicides																	
MCPA	3.33E-04	--	NCOPC	--	NCOPC	5.26E+01	1.75E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	1.66E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.18E+01	1.03E-02	--	NCOPC
Pentachlorophenol	5.55E-08	--	NCOPC	--	NCOPC	--	NCOPC	1.63E+02	9.05E-04	6.52E+00	3.62E-05	7.74E+01	4.30E-04	--	NCOPC	4.40E+02	2.44E-03

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - *RME*
SAUGET AREA 2 RI/FS

Constituent	Reference HI (per mg/kg)	O EPC (mg/kg)	O HQ	O North EPC (mg/kg)	O North HQ	P EPC (mg/kg)	P HQ	Q North EPC (mg/kg)	Q North HQ	Q Central EPC (mg/kg)	Q Central HQ	Q South EPC (mg/kg)	Q South HQ	R EPC (mg/kg)	R HQ	S EPC (mg/kg)	S HQ
PCBs																	
Total PCBs	8.48E-03	2.98E+02	2.53E+00	3.03E+03	2.57E+01	1.69E+01	1.43E-01	5.40E+01	4.58E-01	4.35E+00	3.69E-02	1.90E+01	1.61E-01	8.89E+01	7.54E-01	1.01E+03	8.56E+00
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	3.04E-02	NC	4.97E-01	NC	4.42E-04	NC	1.11E-02	NC	3.79E-03	NC	4.51E-03	NC	1.78E-03	NC	2.59E-02	NC
Metals																	
Antimony	4.09E-04	--	NCOPC	--	NCOPC	--	NCOPC	1.66E+01	6.79E-03	--	NCOPC	1.87E+01	7.64E-03	--	NCOPC	--	NCOPC
Arsenic	1.60E-04	--	NCOPC	3.70E+01	5.92E-03	1.69E+01	2.70E-03	1.54E+01	2.46E-03	2.22E+01	3.55E-03	1.72E+01	2.75E-03	7.32E+00	1.17E-03	--	NCOPC
Barium	2.25E-06	--	NCOPC	--	NCOPC	--	NCOPC	3.03E+03	6.82E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	1.96E-04	--	NCOPC	8.60E+01	1.69E-02	1.33E+01	2.61E-03	1.89E+01	3.71E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.57E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+02	2.04E-03	--	NCOPC	4.80E+02	7.51E-03
Copper	4.28E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.41E+03	2.75E-02	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.96E+03	NC	--	NCOPC	8.28E+02	NC	--	NCOPC	8.38E+02	NC
Manganese	6.94E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.29E+03	8.95E-03	8.53E+02	5.92E-03	--	NCOPC	--	NCOPC
Mercury	1.07E-03	--	NCOPC	3.60E+02	3.84E-01	--	NCOPC	--	NCOPC	--	NCOPC	3.58E+00	3.82E-03	6.99E+02	7.46E-01	--	NCOPC
Nickel	1.18E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.31E+02	5.09E-03	--	NCOPC	--	NCOPC
	Total HI:		**2.61E+00**		**2.66E+01**		**1.69E-01**		**5.00E-01**		**7.76E-02**		**1.93E-01**		**3.09E+00**		**8.77E+00**

Notes:
-- Not a constituent of concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - RME INHALATION OF EXCAVATION AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Construction/Utility Worker	2.5	(m^3 air/hour)	
Body Weight	RME Construction/Utility Worker	70	(kg)	
Exposure Time	RME Construction/Utility Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	RME Construction/Utility Worker	40	(days)/365 (days) =	1.10E-01
Exposure Duration (cancer)	RME Construction/Utility Worker	1	(yrs)/70(yrs) =	1.43E-02
Exposure Duration (noncancer)	RME Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	4.47E-04	4.47E-04	2.50E-05
1,2-Dichloroethane	1.00E+00	1	9.10E-02	4.47E-04	4.47E-04	4.07E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	4.47E-04	4.47E-04	3.44E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	2.95E-04	2.95E-04	2.38E-05
Dichloromethane	1.00E+00	1	1.65E-03	4.47E-04	4.47E-04	7.36E-07
Ethylbenzene	1.00E+00	1	NA	4.47E-04	4.47E-04	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	4.47E-04	4.47E-04	9.39E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	4.47E-04	4.47E-04	1.79E-04
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NC
SVOCs (b)						
1,2-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NC
1,3-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NC
1,4-Dichlorobenzene	1.00E+00	1	2.20E-02	4.47E-04	4.47E-04	9.84E-06
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	4.47E-04	4.47E-04	4.85E-06
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	4.47E-04	4.47E-04	1.39E-04
Benzo(a)pyrene	1.00E+00	1	3.10E+00	4.47E-04	4.47E-04	1.39E-03
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	4.47E-04	4.47E-04	1.39E-04
bis(2-Chloroethyl)ether	1.00E+00	1	1.16E+00	4.47E-04	4.47E-04	5.17E-04
bis(2-Ethylhexyl)phthalate	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	4.47E-04	4.47E-04	1.39E-03
Hexachlorobenzene	1.00E+00	1	1.61E+00	4.47E-04	4.47E-04	7.20E-04
Naphthalene	1.00E+00	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDE	1.00E+00	NA	NA	NA	NA	NC
4,4'-DDT	1.00E+00	1	3.40E-01	4.47E-04	4.47E-04	1.52E-04
Aldrin	1.00E+00	1	1.72E+01	4.47E-04	4.47E-04	7.67E-03
alpha-BHC	1.00E+00	1	6.30E+00	4.47E-04	4.47E-04	2.82E-03
beta-BHC	1.00E+00	1	1.86E+00	4.47E-04	4.47E-04	8.30E-04
delta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	1	1.61E+01	4.47E-04	4.47E-04	7.20E-03
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	4.47E-04	4.47E-04	2.04E-03
Heptachlor Epoxide	1.00E+00	1	9.10E+00	4.47E-04	4.47E-04	4.07E-03
Herbicides (b)						
MCPA	1.00E+00	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	4.47E-04	4.47E-04	8.95E-04
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	2.46E-04	2.46E-04	3.69E+01
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	4.47E-04	4.47E-04	6.75E-03
Barium	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	1	6.30E+00	4.47E-04	4.47E-04	2.82E-03
Chromium	1.00E+00	1	4.20E+01	4.47E-04	4.47E-04	1.88E-02
Copper	1.00E+00	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	NA	NA	NC

TABLE
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs (a)																	
1,1,2-Trichloroethane	2.50E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	6.26E-09	--	NCOPC
1,2-Dichloroethane	4.07E-05	--	NCOPC	--	NCOPC	--	NCOPC	6.80E-04	2.77E-08	--	NCOPC	--	NCOPC	1.40E-03	5.70E-08	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.90E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.90E-02	NC
Benzene	3.44E-06	8.60E-01	2.96E-06	1.20E-01	4.13E-07	1.90E-03	6.54E-09	2.80E-03	9.64E-09	--	NCOPC	5.20E-04	1.79E-09	2.40E-03	8.27E-09	1.60E-03	5.51E-09
Chlorobenzene	NC	5.40E-01	NC	3.40E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-02	NC	2.90E-02	NC
Chloroform	2.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-04	4.52E-09	--	NCOPC
Dichloromethane	7.36E-07	--	NCOPC	2.00E-01	1.47E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.30E-03	3.16E-09
Ethylbenzene	NC	2.30E+00	NC	6.20E-01	NC	6.40E-02	NC	6.30E-03	NC	--	NCOPC	2.90E-02	NC	3.10E-04	NC	2.10E-02	NC
Tetrachloroethene	9.39E-06	--	NCOPC	1.20E-02	1.13E-07	2.80E-02	2.63E-07	8.80E-03	8.27E-08	--	NCOPC	--	NCOPC	1.40E-02	1.32E-07	1.10E-03	1.03E-08
Toluene	NC	4.90E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	NC	1.00E-02	NC	1.90E-01	NC
Trichloroethylene	1.79E-04	--	NCOPC	--	NCOPC	1.60E-03	2.86E-07	3.20E-04	5.73E-08	--	NCOPC	8.10E-05	1.45E-08	2.30E-01	4.12E-05	2.50E-02	4.47E-06
Xylenes, Total	NC	1.30E+01	NC	3.60E+00	NC	3.50E-01	NC	5.30E-02	NC	--	NCOPC	2.30E-01	NC	2.10E-03	NC	1.70E-01	NC
SVOCs (b)																	
1,2-Dichlorobenzene	NC	--	NCOPC	3.12E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	NC	--	NCOPC	7.20E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.20E-07	NC
1,4-Dichlorobenzene	9.84E-06	2.82E-06	2.78E-11	7.20E-06	7.09E-11	4.02E-06	3.96E-11	--	NCOPC	--	NCOPC	--	NCOPC	3.85E-07	3.79E-12	1.20E-05	1.18E-10
2,4,6-Trichlorophenol	4.85E-06	4.14E-07	2.01E-12	3.66E-06	1.78E-11	--	NCOPC	5.86E-07	2.84E-12	--	NCOPC	--	NCOPC	1.02E-05	4.95E-11	4.92E-07	2.39E-12
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.11E-06	NC	--	NCOPC	--	NCOPC	5.08E-05	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.71E-06	NC	--	NCOPC
2-Methylnaphthalene	NC	--	NCOPC	1.20E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	1.50E-07	NC	3.72E-06	NC	--	NCOPC	3.71E-07	NC	--	NCOPC	--	NCOPC	1.69E-07	NC	2.76E-07	NC
4-Nitroaniline	NC	--	NCOPC	6.00E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-07	NC	3.42E-06	NC
Benzo(a)anthracene	1.39E-04	7.20E-07	9.98E-11	2.16E-06	3.00E-10	--	NCOPC	9.66E-08	1.34E-11	6.42E-08	8.90E-12	6.18E-08	8.57E-12	--	NCOPC	4.80E-07	6.66E-11
Benzo(a)pyrene	1.39E-03	4.26E-07	5.91E-10	6.60E-07	9.15E-10	4.02E-08	5.57E-11	1.00E-07	1.39E-10	7.44E-08	1.03E-10	6.84E-08	9.48E-11	--	NCOPC	3.24E-07	4.49E-10
Benzo(b)fluoranthene	1.39E-04	4.74E-07	6.57E-11	7.20E-07	9.98E-11	--	NCOPC	9.06E-08	1.26E-11	9.60E-08	1.33E-11	7.08E-08	9.82E-12	--	NCOPC	3.96E-07	5.49E-11
bis(2-Chloroethyl)ether	5.17E-04	--	NCOPC	1.26E-07	6.51E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-06	NC
Dibenzo(a,h)anthracene	1.39E-03	1.80E-07	2.50E-10	2.76E-07	3.83E-10	--	NCOPC	1.69E-08	2.35E-11	--	NCOPC	--	NCOPC	--	NCOPC	1.08E-07	1.50E-10
Hexachlorobenzene	7.20E-04	--	NCOPC	2.70E-07	1.94E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	2.46E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.76E-06	NC	2.88E-06	NC
Nitrobenzene	NC	--	NCOPC	6.60E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-07	NC	--	NCOPC
Pesticides (b)																	
4,4'-DDE	NC	--	NCOPC	1.98E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	1.52E-04	--	NCOPC	3.48E-06	5.28E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-07	1.46E-10
Aldrin	7.67E-03	4.32E-08	3.31E-10	2.70E-07	2.07E-09	--	NCOPC	--	NCOPC	2.04E-09	1.56E-11	4.07E-09	3.12E-11	--	NCOPC	1.14E-08	8.75E-11
alpha-BHC	2.82E-03	--	NCOPC	9.00E-08	2.54E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	8.30E-04	--	NCOPC	1.26E-08	1.05E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.52E-08	3.75E-11	1.56E-06	1.29E-09
delta-BHC	NC	1.71E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	7.20E-03	2.28E-07	1.64E-09	3.00E-06	2.16E-08	1.70E-08	1.22E-10	3.50E-08	2.52E-10	8.82E-09	6.35E-11	3.02E-08	2.18E-10	7.32E-08	5.27E-10	2.28E-08	1.64E-10
gamma-BHC (Lindane)	NC	1.73E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.50E-07	NC
Heptachlor	2.04E-03	1.67E-07	3.39E-10	5.94E-07	1.21E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.67E-08	5.43E-11	9.00E-08	1.83E-10
Heptachlor Epoxide	4.07E-03	2.82E-08	1.15E-10	1.62E-07	6.59E-10	--	NCOPC	--	NCOPC	--	NCOPC	6.18E-09	2.52E-11	--	NCOPC	--	NCOPC
Herbicides (b)																	
MCPA	NC	--	NCOPC	--	NCOPC	3.16E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.71E-06	NC	--	NCOPC
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.78E-06	NC	3.91E-07	NC	4.64E-06	NC	--	NCOPC	2.64E-05	NC

TABLE
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
PCBs (b)																	
Total PCBs	8.95E-04	1.79E-05	1.60E-08	1.82E-04	1.63E-07	1.01E-06	9.07E-10	3.24E-06	2.90E-09	2.61E-07	2.33E-10	1.14E-06	1.02E-09	5.33E-06	4.77E-09	6.05E-05	5.41E-08
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	3.69E+01	1.82E-09	6.73E-08	2.98E-08	1.10E-06	2.65E-11	9.79E-10	6.66E-10	2.46E-08	2.27E-10	8.39E-09	2.71E-10	9.99E-09	1.07E-10	3.94E-09	1.55E-09	5.73E-08
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.96E-07	NC	--	NCOPC	1.12E-06	NC	--	NCOPC	--	NCOPC
Arsenic	6.75E-03	--	NCOPC	2.22E-06	1.50E-08	1.01E-06	6.85E-09	9.24E-07	6.24E-09	1.33E-06	9.00E-09	1.03E-06	6.97E-09	4.39E-07	2.97E-09	--	NCOPC
Barium	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.82E-04	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	2.82E-03	--	NCOPC	5.16E-06	1.45E-08	7.98E-07	2.25E-09	1.13E-06	3.20E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.88E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-06	1.47E-07	--	NCOPC	2.88E-05	5.41E-07
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.85E-04	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.18E-04	NC	--	NCOPC	4.97E-05	NC	--	NCOPC	5.03E-05	NC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.74E-05	NC	5.12E-05	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	2.16E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.15E-07	NC	4.19E-05	NC	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.59E-05	NC	--	NCOPC	--	NCOPC
	Total:		**3.05E-06**		**2.00E-06**		**5.67E-07**		**2.15E-07**		**1.78E-08**		**1.81E-07**		**4.14E-05**		**5.15E-06**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	3.13E-02	3.13E-02	2.24E+01
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	3.13E-02	3.13E-02	3.65E-02
Benzene	1.00E+00	1	8.57E-03	3.13E-02	3.13E-02	3.65E+00
Chlorobenzene	1.00E+00	1	1.70E-02	3.13E-02	3.13E-02	1.84E+00
Chloroform	1.00E+00	1	1.43E-02	3.13E-02	3.13E-02	2.19E+00
Dichloromethane	1.00E+00	1	8.60E-01	3.13E-02	3.13E-02	3.64E-02
Ethylbenzene	1.00E+00	1	2.86E-01	3.13E-02	3.13E-02	1.09E-01
Tetrachloroethene	1.00E+00	1	1.70E-01	3.13E-02	3.13E-02	1.84E-01
Toluene	1.00E+00	1	1.14E-01	3.13E-02	3.13E-02	2.75E-01
Trichloroethylene	1.00E+00	1	1.00E-02	3.13E-02	3.13E-02	3.13E+00
Xylenes, Total	1.00E+00	1	2.86E-02	3.13E-02	3.13E-02	1.10E+00
SVOCs (b)						
1,2-Dichlorobenzene	1.00E+00	1	5.70E-02	3.13E-02	3.13E-02	5.49E-01
1,3-Dichlorobenzene	1.00E+00	1	2.29E-01	3.13E-02	3.13E-02	1.37E-01
1,4-Dichlorobenzene	1.00E+00	1	2.29E-01	3.13E-02	3.13E-02	1.37E-01
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	1	8.57E-04	3.13E-02	3.13E-02	3.65E+01
2-Nitroaniline	1.00E+00	1	5.71E-05	3.13E-02	3.13E-02	5.48E+02
4-Nitroaniline	1.00E+00	1	1.14E-03	3.13E-02	3.13E-02	2.75E+01
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
bis(2-Chloroethyl)ether	1.00E+00	NA	NA	NA	NA	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Hexachlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Naphthalene	1.00E+00	1	8.57E-04	3.13E-02	3.13E-02	3.65E+01
Nitrobenzene	1.00E+00	1	5.70E-04	3.13E-02	3.13E-02	5.49E+01
Pesticides (b)						
4,4'-DDE	1.00E+00	NA	NA	NA	NA	NC
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
Aldrin	1.00E+00	NA	NA	NA	NA	NC
alpha-BHC	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
delta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Heptachlor Epoxide	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
MCPA	1.00E+00	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Barium	1.00E+00	1	1.40E-04	3.13E-02	3.13E-02	2.24E+02
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	3.13E-02	3.13E-02	1.09E+03
Copper	1.00E+00	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	1.43E-05	3.13E-02	3.13E-02	2.19E+03
Mercury	1.00E+00	1	8.57E-05	3.13E-02	3.13E-02	3.65E+02
Nickel	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL HAZARD QUOTIENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-04	NC	--	NCOPC
1,2-Dichloroethane	2.24E+01	--	NCOPC	--	NCOPC	--	NCOPC	6.80E-04	1.52E-02	--	NCOPC	--	NCOPC	1.40E-03	3.13E-02	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.90E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	3.65E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.90E-02	3.62E-03
Benzene	3.65E+00	8.60E-01	3.14E+00	1.20E-01	4.38E-01	1.90E-03	6.94E-03	2.80E-03	1.02E-02	--	NCOPC	5.20E-04	1.90E-03	2.40E-03	8.77E-03	1.60E-03	5.84E-03
Chlorobenzene	1.84E+00	5.40E-01	9.95E-01	3.40E-01	6.26E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-02	2.58E-02	2.90E-02	5.34E-02
Chloroform	2.19E+00	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-04	4.16E-04	--	NCOPC
Dichloromethane	3.64E-02	--	NCOPC	2.00E-01	7.28E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.30E-03	1.57E-04
Ethylbenzene	1.09E-01	2.30E+00	2.52E-01	6.20E-01	6.79E-02	6.40E-02	7.01E-03	6.30E-03	6.90E-04	--	NCOPC	2.90E-02	3.17E-03	3.10E-04	3.39E-05	2.10E-02	2.30E-03
Tetrachloroethene	1.84E-01	--	NCOPC	1.20E-02	2.21E-03	2.80E-02	5.16E-03	8.80E-03	1.62E-03	--	NCOPC	--	NCOPC	1.40E-02	2.58E-03	1.10E-03	2.03E-04
Toluene	2.75E-01	4.90E-01	1.35E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	5.77E-02	1.00E-02	2.75E-03	1.90E-01	5.22E-02
Trichloroethylene	3.13E+00	--	NCOPC	--	NCOPC	1.60E-03	5.01E-03	3.20E-04	1.00E-03	--	NCOPC	8.10E-05	2.54E-04	2.30E-01	7.20E-01	2.50E-02	7.83E-02
Xylenes, Total	1.10E+00	1.30E+01	1.42E+01	3.60E+00	3.95E+00	3.50E-01	3.84E-01	5.30E-02	5.81E-02	--	NCOPC	2.30E-01	2.52E-01	2.10E-03	2.30E-03	1.70E-01	1.86E-01
SVOCs (b)																	
1,2-Dichlorobenzene	5.49E-01	--	NCOPC	3.12E-05	1.71E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	1.37E-01	--	NCOPC	7.20E-07	9.86E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.20E-07	9.86E-08
1,4-Dichlorobenzene	1.37E-01	2.82E-06	3.86E-07	7.20E-06	9.86E-07	4.02E-06	5.51E-07	--	NCOPC	--	NCOPC	--	NCOPC	3.85E-07	5.28E-08	1.20E-05	1.64E-06
2,4,6-Trichlorophenol	NC	4.14E-07	NC	3.66E-06	NC	--	NCOPC	5.86E-07	NC	--	NCOPC	--	NCOPC	1.02E-05	NC	4.92E-07	NC
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.11E-06	NC	--	NCOPC	--	NCOPC	5.08E-05	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.71E-06	NC	--	NCOPC
2-Methylnaphthalene	3.65E+01	--	NCOPC	1.20E-05	4.38E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	5.48E+02	1.50E-07	8.22E-05	3.72E-06	2.04E-03	--	NCOPC	3.71E-07	2.03E-04	--	NCOPC	--	NCOPC	1.69E-07	9.24E-05	2.76E-07	1.51E-04
4-Nitroaniline	2.75E+01	--	NCOPC	6.00E-05	1.65E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-07	1.37E-05	3.42E-06	9.39E-05
Benzo(a)anthracene	NC	7.20E-07	NC	2.16E-06	NC	--	NCOPC	9.66E-08	NC	6.42E-08	NC	6.18E-08	NC	--	NCOPC	4.80E-07	NC
Benzo(a)pyrene	NC	4.26E-07	NC	6.60E-07	NC	4.02E-08	NC	1.00E-07	NC	7.44E-08	NC	6.84E-08	NC	--	NCOPC	3.24E-07	NC
Benzo(b)fluoranthene	NC	4.74E-07	NC	7.20E-07	NC	--	NCOPC	9.06E-08	NC	9.60E-08	NC	7.08E-08	NC	--	NCOPC	3.96E-07	NC
bis(2-Chloroethyl)ether	NC	--	NCOPC	1.26E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-06	NC
Dibenzo(a,h)anthracene	NC	1.80E-07	NC	2.76E-07	NC	--	NCOPC	1.69E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.08E-07	NC
Hexachlorobenzene	NC	--	NCOPC	2.70E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	3.65E+01	--	NCOPC	2.46E-06	8.99E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.76E-06	6.44E-05	2.88E-06	1.05E-04
Nitrobenzene	5.49E+01	--	NCOPC	6.60E-07	3.63E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.70E-07	4.78E-05	--	NCOPC
Pesticides (b)																	
4,4'-DDE	NC	--	NCOPC	1.98E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	NC	--	NCOPC	3.48E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	9.60E-07	NC
Aldrin	NC	4.32E-08	NC	2.70E-07	NC	--	NCOPC	--	NCOPC	2.04E-09	NC	4.07E-09	NC	--	NCOPC	1.14E-08	NC
alpha-BHC	NC	--	NCOPC	9.00E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	NC	--	NCOPC	1.26E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.52E-08	NC	1.56E-06	NC
delta-BHC	NC	1.71E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	NC	2.28E-07	NC	3.00E-06	NC	1.70E-08	NC	3.50E-08	NC	8.82E-09	NC	3.02E-08	NC	7.32E-08	NC	2.28E-08	NC
gamma-BHC (Lindane)	NC	1.73E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.50E-07	NC
Heptachlor	NC	1.67E-07	NC	5.94E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.67E-08	NC	9.00E-08	NC
Heptachlor Epoxide	NC	2.82E-08	NC	1.62E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	6.18E-09	NC	--	NCOPC	--	NCOPC
Herbicides (b)																	
MCPA	NC	--	NCOPC	--	NCOPC	3.16E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.71E-06	NC	--	NCOPC
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.78E-06	NC	3.91E-07	NC	4.64E-06	NC	--	NCOPC	2.64E-05	NC

TABLE
POTENTIAL HAZARD QUOTIENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - RME

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m^3)	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
PCBs (b)																	
Total PCBs	NC	1.79E-05	NC	1.82E-04	NC	1.01E-06	NC	3.24E-06	NC	2.61E-07	NC	1.14E-06	NC	5.33E-06	NC	6.05E-05	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	1.82E-09	NC	2.98E-08	NC	2.65E-11	NC	6.66E-10	NC	2.27E-10	NC	2.71E-10	NC	1.07E-10	NC	1.55E-09	NC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.96E-07	NC	--	NCOPC	1.12E-06	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	2.22E-06	NC	1.01E-06	NC	9.24E-07	NC	1.33E-06	NC	1.03E-06	NC	4.39E-07	NC	--	NCOPC
Barium	2.24E+02	--	NCOPC	--	NCOPC	--	NCOPC	1.82E-04	4.07E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	5.16E-06	NC	7.98E-07	NC	1.13E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	1.09E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-06	8.54E-03	--	NCOPC	2.88E-05	3.15E-02
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.85E-04	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.18E-04	NC	--	NCOPC	4.97E-05	NC	--	NCOPC	5.03E-05	NC
Manganese	2.19E+03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.74E-05	1.70E-01	5.12E-05	1.12E-01	--	NCOPC	--	NCOPC
Mercury	3.65E+02	--	NCOPC	2.16E-05	7.89E-03	--	NCOPC	--	NCOPC	--	NCOPC	2.15E-07	7.85E-05	4.19E-05	1.53E-02	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.59E-05	NC	--	NCOPC	--	NCOPC
	Total HI:		**1.88E+01**		**5.10E+00**		**4.08E-01**		**1.28E-01**		**1.70E-01**		**4.36E-01**		**8.10E-01**		**4.14E-01**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER-RME INCIDENTAL INGESTION AND DERMAL CONTACT SHALLOW GROUNDWATER AND LEACHATE		Assumed Value	Units	Calculated Value
Water Ingestion Rate	RME Construction/Utility Worker	0.005	(l/day)	
Skin Exposed	RME Construction/Utility Worker	3339	(cm^2)	
Body Weight	RME Construction/Utility Worker	70	(kg)	
Exposure Time (dermal route only)	RME Construction/Utility Worker	1	(hr/day)	
Exposure Frequency	RME Construction/Utility Worker	10	(days)/365 (days) =	2.74E-02
Exposure Duration (cancer)	RME Construction/Utility Worker	1	(yrs)/ 70(yrs) =	1.43E-02
Exposure Duration (noncancer)	RME Construction/Utility Worker	1	(yrs)/ 1(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Construction/Utility Worker Daily Dose-Ing. (mg/kg-day)	*Lifetime* Average (mg/kg-day)	ADDder RME Construction/Utility Worker Daily Dose-Der. (mg/kg-day)	*Lifetime* Average (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
VOCs												
1,2-Dichloroethane	1.00E+00	1	1	5.30E-03	9.10E-02	2.80E-08	2.80E-08	9.89E-08	9.89E-08	2.54E-09	9.00E-09	1.15E-08
1,2-Dichloroethene (total)	1.00E+00	NA	NA	1.00E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	1.10E-03	NA	NA	NA	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	2.77E-03	NA	NA	NA	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	5.69E-04	NA	NA	NA	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	2.13	2.10E-02	1.50E-02	2.80E-08	2.80E-08	8.35E-07	8.35E-07	4.19E-10	1.25E-08	1.29E-08
Chlorobenzene	1.00E+00	NA	NA	4.10E-02	NA	NA	NA	NA	NA	NA	NA	NC
Chloroform	1.00E+00	NA	NA	8.90E-03	NA	NA	NA	NA	NA	NA	NA	NC
Chloromethane	1.00E+00	1	1	4.20E-03	1.30E-02	2.80E-08	2.80E-08	7.84E-08	7.84E-08	3.63E-10	1.02E-09	1.38E-09
Dichloromethane	1.00E+00	1	1.6	4.50E-03	7.50E-03	2.80E-08	2.80E-08	1.34E-07	1.34E-07	2.10E-10	1.01E-09	1.22E-09
Tetrachloroethene	1.00E+00	1	1	4.80E-02	5.40E-01	2.80E-08	2.80E-08	8.96E-07	8.96E-07	1.51E-08	4.84E-07	4.99E-07
Toluene	1.00E+00	NA	NA	4.50E-02	NA	NA	NA	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	1	1.60E-02	4.00E-01	2.80E-08	2.80E-08	2.99E-07	2.99E-07	1.12E-08	1.19E-07	1.31E-07
SVOCs												
2,4,6-Trichlorophenol	1.00E+00	1	1	5.00E-02	1.10E-02	2.80E-08	2.80E-08	9.33E-07	9.33E-07	3.08E-10	1.03E-08	1.06E-08
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
2,4-Dimethylphenol	1.00E+00	NA	NA	1.50E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	1.10E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	5.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
3-Methylphenol/4-Methylphenol	1.00E+00	NA	NA	1.00E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.66E-03	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)pyrene	1.00E+00	1	1	1.20E+00	7.30E+00	2.80E-08	2.80E-08	2.24E-05	2.24E-05	2.04E-07	1.64E-04	1.64E-04
Benzo(b)fluoranthene	1.00E+00	1	1	1.20E+00	7.30E-01	2.80E-08	2.80E-08	2.24E-05	2.24E-05	2.04E-08	1.64E-05	1.64E-05
Benzo(g,h,i)perylene	1.00E+00	NA	NA	5.34E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(k)fluoranthene	1.00E+00	1	1	1.20E+00	7.30E-02	2.80E-09	2.80E-09	2.24E-05	2.24E-05	2.04E-09	1.64E-06	1.64E-06
Dibenzo(a,h)anthracene	1.00E+00	1	1	2.70E+00	7.30E+00	2.80E-08	2.80E-08	5.04E-05	5.04E-05	2.04E-07	3.68E-04	3.68E-04
Indeno(1,2,3-cd)pyrene	1.00E+00	1	1	1.90E+00	7.30E-01	2.80E-08	2.80E-08	3.55E-05	3.55E-05	2.04E-08	2.59E-05	2.59E-05
Naphthalene	1.00E+00	NA	NA	6.90E-02	NA	NA	NA	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	6.96E-03	NA	NA	NA	NA	NA	NA	NA	NC
Phenol	1.00E+00	NA	NA	5.50E-03	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides												
4,4'-DDT	1.00E+00	1	1	4.30E-01	3.40E-01	2.80E-08	2.80E-08	8.03E-06	8.03E-06	9.51E-09	2.73E-06	2.74E-06
beta-BHC	1.00E+00	1	1	1.60E-02	1.80E+00	2.80E-08	2.80E-08	2.99E-07	2.99E-07	5.03E-08	5.38E-07	5.88E-07
Dieldrin	1.00E+00	1	1	1.60E-02	1.60E+01	2.80E-08	2.80E-08	2.99E-07	2.99E-07	4.47E-07	4.78E-06	5.23E-06
Endrin Ketone	1.00E+00	NA	NA	1.60E-02	NA	NA	NA	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	1	1	1.40E-02	1.30E+00	2.80E-08	2.80E-08	2.61E-07	2.61E-07	3.63E-08	3.40E-07	3.76E-07
Heptachlor	1.00E+00	1	1	1.10E-02	4.50E+00	2.80E-08	2.80E-08	2.05E-07	2.05E-07	1.26E-07	9.24E-07	1.05E-06

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	ADDing RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Herbicides												
2,4,5-T	1.00E+00	NA	NA	1.40E-04	NA	NA	NA	NA	NA	NA	NA	NC
2,4-D	1.00E+00	NA	NA	8.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	1	1	6.50E-01	1.20E-01	2.80E-08	2.80E-08	1.21E-05	1.21E-05	3.35E-09	1.46E-08	1.46E-08
PCBs												
Total PCBs	1.00E+00	1	1.1	7.10E-01	2.00E+00	2.80E-08	2.80E-08	1.46E-05	1.46E-05	5.59E-08	2.92E-05	2.92E-05
Dioxin												
2,3,7,8-TCDD-TEQ	1.00E+00	1	1.8	1.40E+00	1.50E+05	2.80E-08	2.80E-08	4.70E-05	4.70E-05	4.19E-03	7.06E+00	7.06E+00
Metals												
Antimony	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1	1.60E-04	1.50E+00	2.80E-08	2.80E-08	2.99E-09	2.99E-09	4.19E-08	4.48E-09	4.64E-08
Beryllium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	6.67E-04	NA	NA	NA	NA	NA	NA	NA	NC
Cobalt	1.00E+00	NA	NA	4.00E-04	NA	NA	NA	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	1.67E-03	NA	NA	NA	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	5.45E-05	NA	NA	NA	NA	NA	NA	NA	NC
Thallium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Vanadium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Zinc	1.00E+00	NA	NA	6.00E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK - RME
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

	Reference	Shallow		Leachate					
	Risk	O - AA-O-1-16		O		Q		R	
Constituent	(per mg/L)	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk
VOCs									
1,2-Dichloroethane	1.15E-08	--	NCOPC	--	NCOPC	2.15E+00	2.48E-08	5.00E+01	5.77E-07
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	7.90E+00	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	2.10E-01	NC	7.50E-01	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	1.40E+00	NC	3.20E+01	NC
Benzene	1.29E-08	--	NCOPC	9.20E-01	1.19E-08	4.25E-01	5.50E-09	6.80E+00	8.80E-08
Chlorobenzene	NC	--	NCOPC	1.70E+00	NC	1.15E+00	NC	1.30E+00	NC
Chloroform	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E+00	NC
Chloromethane	1.38E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.22E-09	--	NCOPC	--	NCOPC	4.70E-02	5.72E-11	1.90E+00	2.31E-09
Tetrachloroethene	4.99E-07	--	NCOPC	--	NCOPC	8.25E-02	4.12E-08	3.30E+01	1.65E-05
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.10E+01	NC
Trichloroethylene	1.31E-07	--	NCOPC	--	NCOPC	2.00E-02	2.61E-09	1.50E+02	1.96E-05
SVOCs									
2,4,6-Trichlorophenol	1.06E-08	--	NCOPC	3.80E-01	4.02E-09	1.25E+01	1.32E-07	--	NCOPC
2,4-Dichlorophenol	NC	--	NCOPC	3.20E-01	NC	1.70E+02	NC	--	NCOPC
2,4-Dimethylphenol	NC	--	NCOPC	--	NCOPC	2.40E-01	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	3.30E-01	NC	7.90E+00	NC	1.10E+01	NC
2-Nitroaniline	NC	--	NCOPC	2.60E-01	NC	1.55E+01	NC	--	NCOPC
3-Methylphenol/4-Methylphenol	NC	--	NCOPC	6.40E-01	NC	1.60E+00	NC	4.50E+00	NC
4-Chloroaniline	NC	--	NCOPC	4.20E+00	NC	9.30E+00	NC	4.20E+01	NC
4-Nitroaniline	NC	--	NCOPC	7.00E-01	NC	1.07E+00	NC	1.80E+01	NC
Benzo(a)pyrene	1.64E-04	1.60E-03	2.62E-07	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(b)fluoranthene	1.64E-05	1.10E-03	1.80E-08	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(g,h,i)perylene	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E+00	NC
Benzo(k)fluoranthene	1.64E-06	1.20E-03	1.96E-09	--	NCOPC	--	NCOPC	--	NCOPC
Dibenzo(a,h)anthracene	3.68E-04	2.70E-03	9.94E-07	--	NCOPC	--	NCOPC	--	NCOPC
Indeno(1,2,3-cd)pyrene	2.59E-05	3.00E-03	7.77E-06	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	5.70E-01	NC	1.20E+00	NC	--	NCOPC
Nitrobenzene	NC	--	NCOPC	8.00E-02	NC	1.30E+00	NC	--	NCOPC
Phenol	NC	--	NCOPC	3.80E+00	NC	8.05E+00	NC	1.10E+03	NC
Pesticides									
4,4'-DDT	2.74E-06	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	5.75E-07
beta-BHC	5.88E-07	--	NCOPC	2.50E-03	1.47E-09	1.35E-02	7.94E-09	2.00E-01	1.18E-07
Dieldrin	5.23E-06	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-01	9.93E-07
Endrin Ketone	NC	--	NCOPC	--	NCOPC	3.20E-03	NC	--	NCOPC
gamma-BHC (Lindane)	3.76E-07	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-02	1.05E-08
Heptachlor	1.05E-06	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	2.20E-07

TABLE
POTENTIAL CARCINOGENIC RISK - RME
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

	Reference	Shallow		Leachate					
	Risk	O - AA-O-1-16		O		Q		R	
Constituent	(per mg/L)	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk
Herbicides									
2,4,5-T	NC	--	NCOPC	4.80E-01	NC	--	NCOPC	--	NCOPC
2,4-D	NC	--	NCOPC	9.30E-01	NC	9.65E+01	NC	3.80E+00	NC
Pentachlorophenol	1.46E-06	--	NCOPC	7.80E-01	1.14E-06	4.60E+00	6.71E-06	--	NCOPC
PCBs									
Total PCBs	2.92E-05	--	NCOPC	5.49E-02	1.60E-06	1.04E-03	3.05E-08	3.98E+00	1.16E-04
Dioxin									
2,3,7,8-TCDD-TEQ	7.06E+00	--	NCOPC	6.87E-07	4.85E-06	--	NCOPC	3.14E-06	2.22E-05
Metals									
Antimony	NC	--	NCOPC	--	NCOPC	1.60E-02	NC	--	NCOPC
Arsenic	4.64E-08	7.00E-02	3.25E-09	--	NCOPC	--	NCOPC	--	NCOPC
Beryllium	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.10E-02	NC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-01	NC
Cobalt	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+00	NC
Lead	NC	1.90E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC
Manganese	NC	4.10E+00	NC	1.80E+01	NC	1.80E+00	NC	2.50E+02	NC
Mercury	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-02	NC
Nickel	NC	--	NCOPC	--	NCOPC	3.10E-01	NC	1.80E+00	NC
Thallium	NC	--	NCOPC	3.70E-03	NC	--	NCOPC	1.20E-01	NC
Vanadium	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	NC
Zinc	NC	--	NCOPC	--	NCOPC	7.45E+00	NC	9.90E+01	NC
	Total:		**1.36E-06**		**7.61E-06**		**6.98E-06**		**1.77E-04**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	RME Construction/Utility Worker ADDing (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	RME Construction/Utility Worker ADDder (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
VOCs												
1,2-Dichloroethane	1.00E+00	1	1	5.30E-03	2.00E-02	1.96E-06	1.96E-06	6.93E-06	6.93E-06	9.78E-05	3.46E-04	4.44E-04
1,2-Dichloroethene (total)	1.00E+00	1	1	1.00E-02	2.00E-02	1.96E-06	1.96E-06	1.31E-05	1.31E-05	9.78E-05	6.53E-04	7.51E-04
2-Butanone (MEK)	1.00E+00	1	1	1.10E-03	6.00E-01	1.96E-06	1.96E-06	1.44E-06	1.44E-06	3.26E-06	2.40E-06	5.66E-06
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	1	2.77E-03	8.00E-02	1.96E-06	1.96E-06	3.62E-06	3.62E-06	2.45E-05	4.52E-05	6.97E-05
Acetone	1.00E+00	1	1	5.69E-04	1.00E-01	1.96E-06	1.96E-06	7.44E-07	7.44E-07	1.96E-05	7.44E-06	2.70E-05
Benzene	1.00E+00	1	2.13	2.10E-02	4.00E-03	1.96E-06	1.96E-06	5.85E-05	5.85E-05	4.89E-04	1.46E-02	1.51E-02
Chlorobenzene	1.00E+00	1	1	4.10E-02	2.00E-02	1.96E-06	1.96E-06	5.36E-05	5.36E-05	9.78E-05	2.68E-03	2.78E-03
Chloroform	1.00E+00	1	1	8.80E-03	1.00E-02	1.96E-06	1.96E-06	1.16E-05	1.16E-05	1.96E-04	1.16E-03	1.36E-03
Chloromethane	1.00E+00	NA	NA	4.20E-03	NA	NA	NA	NA	NA	NA	NA	NC
Dichloromethane	1.00E+00	1	1.6	4.50E-03	6.00E-02	1.96E-06	1.96E-06	9.41E-06	9.41E-06	3.26E-05	1.57E-04	1.89E-04
Tetrachloroethene	1.00E+00	1	1	4.80E-02	1.00E-02	1.96E-06	1.96E-06	6.27E-05	6.27E-05	1.96E-04	6.27E-03	6.47E-03
Toluene	1.00E+00	1	1	4.50E-02	2.00E-01	1.96E-06	1.96E-06	5.88E-05	5.88E-05	9.78E-06	2.94E-04	3.04E-04
Trichloroethylene	1.00E+00	1	1	1.60E-02	3.00E-04	1.96E-06	1.96E-06	2.09E-05	2.09E-05	6.52E-03	6.97E-02	7.62E-02
SVOCs												
2,4,6-Trichlorophenol	1.00E+00	1	1	5.00E-02	1.00E-04	1.96E-06	1.96E-06	6.53E-05	6.53E-05	1.96E-02	6.53E-01	6.73E-01
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	1.96E-06	1.96E-06	3.01E-05	3.01E-05	6.52E-04	1.00E-02	1.07E-02
2,4-Dimethylphenol	1.00E+00	1	1	1.50E-02	2.00E-02	1.96E-06	1.96E-06	1.96E-05	1.96E-05	9.78E-05	9.80E-04	1.08E-03
2-Chlorophenol	1.00E+00	1	1	1.10E-02	5.00E-03	1.96E-06	1.96E-06	1.44E-05	1.44E-05	3.91E-04	2.88E-03	3.27E-03
2-Nitroaniline	1.00E+00	NA	NA	5.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
3-Methylphenol/4-Methylphenol	1.00E+00	1	1	1.00E-02	5.00E-02	1.96E-06	1.96E-06	1.31E-05	1.31E-05	3.91E-05	2.61E-04	3.01E-04
4-Chloroaniline	1.00E+00	1	1	6.33E-03	4.00E-03	1.96E-06	1.96E-06	8.27E-06	8.27E-06	4.89E-04	2.07E-03	2.56E-03
4-Nitroaniline	1.00E+00	1	1	2.66E-03	3.00E-03	1.96E-06	1.96E-06	3.47E-06	3.47E-06	6.52E-04	1.16E-03	1.81E-03
Benzo(a)pyrene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(g,h,i)perylene	1.00E+00	1	1	5.34E+00	3.00E-02	1.96E-06	1.96E-06	6.98E-03	6.98E-03	6.52E-05	2.33E-01	2.33E-01
Benzo(k)fluoranthene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	2.70E+00	NA	NA	NA	NA	NA	NA	NA	NC
Indeno(1,2,3-cd)pyrene	1.00E+00	NA	NA	1.90E+00	NA	NA	NA	NA	NA	NA	NA	NC
Naphthalene	1.00E+00	1	1	6.90E-02	2.00E-02	1.96E-06	1.96E-06	9.02E-05	9.02E-05	9.78E-05	4.51E-03	4.61E-03
Nitrobenzene	1.00E+00	1	1	6.96E-03	5.00E-04	1.96E-06	1.96E-06	9.10E-06	9.10E-06	3.91E-03	1.82E-02	2.21E-02
Phenol	1.00E+00	1	1	5.50E-03	3.00E-01	1.96E-06	1.96E-06	7.19E-06	7.19E-06	6.52E-06	2.40E-05	3.05E-05
Pesticides												
4,4'-DDT	1.00E+00	1	1	4.30E-01	5.00E-04	1.96E-06	1.96E-06	5.62E-04	5.62E-04	3.91E-03	1.12E+00	1.13E+00
beta-BHC	1.00E+00	1	1	1.60E-02	3.00E-04	1.96E-06	1.96E-06	2.09E-05	2.09E-05	6.52E-03	6.97E-02	7.62E-02
Dieldrin	1.00E+00	1	1	1.60E-02	5.00E-05	1.96E-06	1.96E-06	2.09E-05	2.09E-05	3.91E-02	4.18E-01	4.57E-01
Endrin Ketone	1.00E+00	1	1	1.60E-02	3.00E-04	1.96E-06	1.96E-06	2.09E-05	2.09E-05	6.52E-03	6.97E-02	7.62E-02
gamma-BHC (Lindane)	1.00E+00	1	1	1.40E-02	3.00E-04	1.96E-06	1.96E-06	1.83E-05	1.83E-05	6.52E-03	6.10E-02	6.75E-02
Heptachlor	1.00E+00	1	1	1.10E-02	5.00E-04	1.96E-06	1.96E-06	1.44E-05	1.44E-05	3.91E-03	2.88E-02	3.27E-02
Herbicides												
2,4,5-T	1.00E+00	1	1	1.40E-04	1.00E-02	1.96E-06	1.96E-06	1.84E-07	1.84E-07	1.96E-04	1.84E-05	2.14E-04
2,4-D	1.00E+00	1	1	8.45E-03	1.00E-02	1.96E-06	1.96E-06	1.10E-05	1.10E-05	1.96E-04	1.10E-03	1.30E-03
Pentachlorophenol	1.00E+00	1	1	6.50E-01	3.00E-02	1.96E-06	1.96E-06	8.49E-04	8.49E-04	6.52E-05	2.83E-02	2.84E-02

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	ADDing RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
PCBs												
Total PCBs	1.00E+00	1	1.1	7.10E-01	2.00E-05	1.96E-06	1.96E-06	1.02E-03	1.02E-03	9.78E-02	5.10E+01	5.11E+01
Dioxin												
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	1.40E+00	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Antimony	1.00E+00	1	6.7	1.60E-04	4.00E-04	1.96E-06	1.96E-06	1.40E-06	1.40E-06	4.89E-03	3.50E-03	8.39E-03
Arsenic	1.00E+00	1	1	1.60E-04	3.00E-04	1.96E-06	1.96E-06	2.09E-07	2.09E-07	6.52E-03	6.97E-04	7.22E-03
Beryllium	1.00E+00	1	100	1.60E-04	2.00E-03	1.96E-06	1.96E-06	2.09E-05	2.09E-05	9.78E-04	1.05E-02	1.14E-02
Chromium	1.00E+00	1	40	6.67E-04	3.00E-03	1.96E-06	1.96E-06	3.49E-05	3.49E-05	6.52E-04	1.16E-02	1.23E-02
Cobalt	1.00E+00	1	1	4.00E-04	2.00E-02	1.96E-06	1.96E-06	5.23E-07	5.23E-07	9.78E-05	2.61E-05	1.24E-04
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.60E-04	2.40E-02	1.96E-06	1.96E-06	2.09E-06	2.09E-06	8.15E-05	8.71E-05	1.69E-04
Mercury	1.00E+00	2	13.7	1.67E-03	3.00E-04	3.91E-06	3.91E-06	2.99E-05	2.99E-05	1.30E-02	9.97E-02	1.13E-01
Nickel	1.00E+00	1	77	5.45E-05	2.00E-02	1.96E-06	1.96E-06	5.48E-06	5.48E-06	9.78E-05	2.74E-04	3.72E-04
Thallium	1.00E+00	1	1	1.60E-04	6.67E-05	1.96E-06	1.96E-06	2.09E-07	2.09E-07	2.93E-02	3.13E-03	3.25E-02
Vanadium	1.00E+00	1	10	1.60E-04	7.00E-03	1.96E-06	1.96E-06	2.09E-06	2.09E-06	2.80E-04	2.99E-04	5.78E-04
Zinc	1.00E+00	1.6	3.03	6.00E-04	3.00E-01	3.13E-06	3.13E-06	2.38E-06	2.38E-06	1.04E-05	7.92E-06	1.84E-05

TABLE
POTENTIAL HAZARD INDEX - RME
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

	Reference	Shallow		Leachate					
	HQ	O - AA-O-1-16		O		Q		R	
Constituent	(per mg/L)	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ
VOCs									
1,2-Dichloroethane	4.44E-04	--	NCOPC	--	NCOPC	2.15E+00	9.55E-04	5.00E+01	2.22E-02
1,2-Dichloroethene (total)	7.51E-04	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	9.77E-03
2-Butanone (MEK)	5.66E-06	--	NCOPC	--	NCOPC	--	NCOPC	7.90E+00	4.47E-05
4-Methyl-2-pentanone (MIBK)	6.97E-05	--	NCOPC	2.10E-01	1.46E-05	7.50E-01	5.23E-05	--	NCOPC
Acetone	2.70E-05	--	NCOPC	--	NCOPC	1.40E+00	3.78E-05	3.20E+01	8.64E-04
Benzene	1.51E-02	--	NCOPC	9.20E-01	1.39E-02	4.25E-01	6.42E-03	6.80E+00	1.03E-01
Chlorobenzene	2.78E-03	--	NCOPC	1.70E+00	4.72E-03	1.15E+00	3.19E-03	1.30E+00	3.61E-03
Chloroform	1.36E-03	--	NCOPC	--	NCOPC	--	NCOPC	2.00E+00	2.72E-03
Chloromethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.69E-04	--	NCOPC	--	NCOPC	4.70E-02	8.90E-06	1.90E+00	3.60E-04
Tetrachloroethene	6.47E-03	--	NCOPC	--	NCOPC	8.25E-02	5.34E-04	3.30E+01	2.13E-01
Toluene	3.04E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.10E+01	6.38E-03
Trichloroethylene	7.62E-02	--	NCOPC	--	NCOPC	2.00E-02	1.52E-03	1.50E+02	1.14E+01
SVOCs									
2,4,6-Trichlorophenol	6.73E-01	--	NCOPC	3.80E-01	2.56E-01	1.25E+01	8.41E+00	--	NCOPC
2,4-Dichlorophenol	1.07E-02	--	NCOPC	3.20E-01	3.41E-03	1.70E+02	1.81E+00	--	NCOPC
2,4-Dimethylphenol	1.08E-03	--	NCOPC	--	NCOPC	2.40E-01	2.59E-04	--	NCOPC
2-Chlorophenol	3.27E-03	--	NCOPC	3.30E-01	1.08E-03	7.90E+00	2.58E-02	1.10E+01	3.59E-02
2-Nitroaniline	NC	--	NCOPC	2.60E-01	NC	1.55E+01	NC	--	NCOPC
3-Methylphenol/4-Methylphenol	3.01E-04	--	NCOPC	6.40E-01	1.92E-04	1.60E+00	4.81E-04	4.50E+00	1.35E-03
4-Chloroaniline	2.56E-03	--	NCOPC	4.20E+00	1.07E-02	9.30E+00	2.38E-02	4.20E+01	1.07E-01
4-Nitroaniline	1.81E-03	--	NCOPC	7.00E-01	1.27E-03	1.07E+00	1.94E-03	1.80E+01	3.26E-02
Benzo(a)pyrene	NC	1.60E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(b)fluoranthene	NC	1.10E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(g,h,i)perylene	2.33E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.40E+00	3.26E-01
Benzo(k)fluoranthene	NC	1.20E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Dibenzo(a,h)anthracene	NC	2.70E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Indeno(1,2,3-cd)pyrene	NC	3.00E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	4.61E-03	--	NCOPC	5.70E-01	2.63E-03	1.20E+00	5.53E-03	--	NCOPC
Nitrobenzene	2.21E-02	--	NCOPC	8.00E-02	1.77E-03	1.30E+00	2.87E-02	--	NCOPC
Phenol	3.05E-05	--	NCOPC	3.80E+00	1.16E-04	8.05E+00	2.45E-04	1.10E+03	3.35E-02
Pesticides									
4,4'-DDT	1.13E+00	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	2.37E-01
beta-BHC	7.62E-02	--	NCOPC	2.50E-03	1.91E-04	1.35E-02	1.03E-03	2.00E-01	1.52E-02
Dieldrin	4.57E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-01	8.69E-02
Endrin Ketone	7.62E-02	--	NCOPC	--	NCOPC	3.20E-03	2.44E-04	--	NCOPC
gamma-BHC (Lindane)	6.75E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-02	1.69E-03
Heptachlor	3.27E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	6.86E-03

TABLE
POTENTIAL HAZARD INDEX - RME
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - RME

	Reference	Shallow		Leachate					
	HQ	O - AA-O-1-16		O		Q		R	
Constituent	(per mg/L)	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ
Herbicides									
2,4,5-T	2.14E-04	--	NCOPC	4.80E-01	1.03E-04	--	NCOPC	--	NCOPC
2,4-D	1.30E-03	--	NCOPC	9.30E-01	1.21E-03	9.65E+01	1.25E-01	3.80E+00	4.94E-03
Pentachlorophenol	2.84E-02	--	NCOPC	7.80E-01	2.21E-02	4.60E+00	1.31E-01	--	NCOPC
PCBs									
Total PCBs	5.11E+01	--	NCOPC	5.49E-02	2.81E+00	1.04E-03	5.34E-02	3.98E+00	2.04E+02
Dioxin									
2,3,7,8-TCDD-TEQ	NC	--	NCOPC	6.87E-07	NC	--	NCOPC	3.14E-06	NC
Metals									
Antimony	8.39E-03	--	NCOPC	--	NCOPC	1.60E-02	1.34E-04	--	NCOPC
Arsenic	7.22E-03	7.00E-02	5.05E-04	--	NCOPC	--	NCOPC	--	NCOPC
Beryllium	1.14E-02	--	NCOPC	--	NCOPC	--	NCOPC	3.10E-02	3.54E-04
Chromium	1.23E-02	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-01	7.36E-03
Cobalt	1.24E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+00	3.22E-04
Lead	NC	1.90E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC
Manganese	1.69E-04	4.10E+00	6.92E-04	1.80E+01	3.04E-03	1.80E+00	3.04E-04	2.50E+02	4.22E-02
Mercury	1.13E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-02	1.47E-03
Nickel	3.72E-04	--	NCOPC	--	NCOPC	3.10E-01	1.15E-04	1.80E+00	6.70E-04
Thallium	3.25E-02	--	NCOPC	3.70E-03	1.20E-04	--	NCOPC	1.20E-01	3.90E-03
Vanadium	5.78E-04	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	2.08E-04
Zinc	1.84E-05	--	NCOPC	--	NCOPC	7.45E+00	1.37E-04	9.90E+01	1.82E-03
	Total HI:		**1.20E-03**		**3.13E+00**		**1.06E+01**		**2.16E+02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - RME INHALATION OF VOCs IN EXCAVATION TRENCH AIR		Assumed Value	Units	Calculated Value
Inhalation Rate	RME Construction/Utility Worker	2.5	(m^3 air/hour)	
Body Weight	RME Construction/Utility Worker	70	(kg)	
Exposure Time	RME Construction/Utility Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	RME Construction/Utility Worker	40	(days)/365 (days) =	1.10E-01
Exposure Duration (cancer)	RME Construction/Utility Worker	1	(yrs)/70(yrs) =	1.43E-02
Exposure Duration (noncancer)	RME Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF VOCs IN
EXCAVATION TRENCH AIR
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh RME Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	4.47E-04	4.47E-04	4.07E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	4.47E-04	4.47E-04	3.44E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	2.95E-04	2.95E-04	2.38E-05
Chloromethane	1.00E+00	1	6.30E-03	4.47E-04	4.47E-04	2.82E-06
Dichloromethane	1.00E+00	1	1.65E-03	4.47E-04	4.47E-04	7.36E-07
Tetrachloroethene	1.00E+00	1	2.10E-02	4.47E-04	4.47E-04	9.39E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	4.47E-04	4.47E-04	1.79E-04

TABLE
POTENTIAL CARCINOGENIC RISK
CONSTRUCTION/UTILITY WORKER - RME
EXCAVATION TRENCH AIR

Constituent	Reference Risk (per mg/m^3)	Shallow O - AA-O-1-16		Leachate O		Leachate Q		Leachate R	
		EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs									
1,2-Dichloroethane	4.07E-05	--	NCOPC	--	NCOPC	5.78E-02	2.35E-06	1.35E+00	5.48E-05
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.86E-01	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E-01	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	4.51E-03	NC	1.61E-02	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	2.98E-02	NC	6.81E-01	NC
Benzene	3.44E-06	--	NCOPC	2.49E-02	8.58E-08	1.15E-02	3.96E-08	1.84E-01	6.34E-07
Chlorobenzene	NC	--	NCOPC	4.24E-02	NC	2.87E-02	NC	3.25E-02	NC
Chloroform	2.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	5.48E-02	1.30E-06
Chloromethane	2.82E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	7.36E-07	--	NCOPC	--	NCOPC	1.42E-03	1.05E-09	5.76E-02	4.24E-08
Tetrachloroethene	9.39E-06	--	NCOPC	--	NCOPC	1.99E-03	1.87E-08	7.95E-01	7.47E-06
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.22E-01	NC
Trichloroethylene	1.79E-04	--	NCOPC	--	NCOPC	5.16E-04	9.24E-08	3.87E+00	6.93E-04
	Total:		**NCOPC**		**8.58E-08**		**2.51E-06**		**7.57E-04**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF VOCs IN
EXCAVATION TRENCH AIR
CONSTRUCTION/UTILITY WORKER - RME

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh RME Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	5.00E-03	3.13E-02	3.13E-02	6.26E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	1.00E+00	3.13E-02	3.13E-02	3.13E-02
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	3.00E+00	3.13E-02	3.13E-02	1.04E-02
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	3.00E-02	3.13E-02	3.13E-02	1.04E+00
Chlorobenzene	1.00E+00	1	6.00E-02	3.13E-02	3.13E-02	5.22E-01
Chloroform	1.00E+00	1	5.00E-02	3.13E-02	3.13E-02	6.26E-01
Chloromethane	1.00E+00	1	9.00E-02	3.13E-02	3.13E-02	3.48E-01
Dichloromethane	1.00E+00	1	3.00E+00	3.13E-02	3.13E-02	1.04E-02
Tetrachloroethene	1.00E+00	1	6.00E-01	3.13E-02	3.13E-02	5.22E-02
Toluene	1.00E+00	1	4.00E-01	3.13E-02	3.13E-02	7.83E-02
Trichloroethylene	1.00E+00	1	4.00E-02	3.13E-02	3.13E-02	7.83E-01

TABLE
POTENTIAL HAZARD QUOTIENT
CONSTRUCTION/UTILITY WORKER - RME
EXCAVATION TRENCH AIR

Constituent	Reference HQ (per mg/m^3)	Shallow		Leachate					
		O - AA-O-1-16		O		Q		R	
		EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs									
1,2-Dichloroethane	6.26E+00	--	NCOPC	--	NCOPC	5.78E-02	3.62E-01	1.35E+00	8.42E+00
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.86E-01	NC
2-Butanone (MEK)	3.13E-02	--	NCOPC	--	NCOPC	--	NCOPC	1.69E-01	5.30E-03
4-Methyl-2-pentanone (MIBK)	1.04E-02	--	NCOPC	4.51E-03	4.70E-05	1.61E-02	1.68E-04	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	2.98E-02	NC	6.81E-01	NC
Benzene	1.04E+00	--	NCOPC	2.49E-02	2.60E-02	1.15E-02	1.20E-02	1.84E-01	1.92E-01
Chlorobenzene	5.22E-01	--	NCOPC	4.24E-02	2.22E-02	2.87E-02	1.50E-02	3.25E-02	1.69E-02
Chloroform	6.26E-01	--	NCOPC	--	NCOPC	--	NCOPC	5.48E-02	3.43E-02
Chloromethane	3.48E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	1.04E-02	--	NCOPC	--	NCOPC	1.42E-03	1.49E-05	5.76E-02	6.01E-04
Tetrachloroethene	5.22E-02	--	NCOPC	--	NCOPC	1.99E-03	1.04E-04	7.95E-01	4.15E-02
Toluene	7.83E-02	--	NCOPC	--	NCOPC	--	NCOPC	5.22E-01	4.08E-02
Trichloroethylene	7.83E-01	--	NCOPC	--	NCOPC	5.16E-04	4.04E-04	3.87E+00	3.03E+00
	Total HI:		**NCOPC**		**4.82E-02**		**3.90E-01**		**1.18E+01**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated	
Receptor:	MLE Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - MLE INCIDENTIAL INGESTION AND DERMAL CONTACT WITH COMBINED SOIL		Assumed Value	Units	Calculated Value
Soil Ingestion Rate	MLE Construction/Utility Worker	64	(mg soil/day)	
Soil on Skin	MLE Construction/Utility Worker	0.19	(mg/cm^2)	
Skin Exposed	MLE Construction/Utility Worker	3339	(cm^2)	
Body Weight	MLE Construction/Utility Worker	70	(kg)	
Exposure Frequency	MLE Construction/Utility Worker	20	(days)/365(days) =	5.48E-02
Exposure Duration (cancer)	MLE Construction/Utility Worker	1	(years)/70(years) =	1.43E-02
Exposure Duration (noncancer)	MLE Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	ADDIng MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
VOCs											
1,1,2-Trichloroethane	1.00E+00	1	0.01	5.70E-02	7.16E-10	7.16E-10	7.09E-11	7.09E-11	4.08E-11	4.04E-12	4.48E-11
1,2-Dichloroethane	1.00E+00	1	0.01	9.10E-02	7.16E-10	7.16E-10	7.09E-11	7.09E-11	6.51E-11	6.46E-12	7.16E-11
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	0.02	1.50E-02	7.16E-10	7.16E-10	1.42E-10	1.42E-10	1.07E-11	2.13E-12	1.29E-11
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chloroform	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dichloromethane	1.00E+00	1	0.016	7.50E-03	7.16E-10	7.16E-10	1.14E-10	1.14E-10	5.37E-12	8.51E-13	6.22E-12
Ethylbenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Tetrachloroethene	1.00E+00	1	0.01	5.40E-01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	3.86E-10	3.83E-11	4.25E-10
Toluene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	0.01	4.00E-01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	2.86E-10	2.84E-11	3.15E-10
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
SVOCs											
1,2-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
1,3-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
1,4-Dichlorobenzene	1.00E+00	1	0.01	2.40E-02	7.16E-10	7.16E-10	7.09E-11	7.09E-11	1.72E-11	1.70E-12	1.89E-11
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.10E-02	7.16E-10	7.16E-10	7.09E-11	7.09E-11	7.87E-12	7.80E-13	8.65E-12
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)anthracene	1.00E+00	0.29	0.02	7.30E-01	2.08E-10	2.08E-10	1.42E-10	1.42E-10	1.52E-10	1.04E-10	2.55E-10
Benzo(a)pyrene	1.00E+00	0.29	0.02	7.30E+00	2.08E-10	2.08E-10	1.42E-10	1.42E-10	1.52E-09	1.04E-09	2.55E-09
Benzo(b)fluoranthene	1.00E+00	0.29	0.02	7.30E-01	2.08E-10	2.08E-10	1.42E-10	1.42E-10	1.52E-10	1.04E-10	2.55E-10
bis(2-Chloroethyl)ether	1.00E+00	1	0.01	1.10E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	7.87E-10	7.80E-11	8.65E-10
bis(2-Ethylhexyl)phthalate	1.00E+00	1	0.004	1.40E-02	7.16E-10	7.16E-10	2.84E-11	2.84E-11	1.00E-11	3.97E-13	1.04E-11
Dibenzo(a,h)anthracene	1.00E+00	0.29	0.02	7.30E+00	2.08E-10	2.08E-10	1.42E-10	1.42E-10	1.52E-09	1.04E-09	2.55E-09
Hexachlorobenzene	1.00E+00	0.83	0.04	1.60E+00	5.94E-10	5.94E-10	2.84E-10	2.84E-10	9.50E-10	4.54E-10	1.40E-09
Naphthalene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides											
4,4'-DDE	1.00E+00	1	0.01	3.40E-01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	2.43E-10	2.41E-11	2.67E-10
4,4'-DDT	1.00E+00	1	0.01	3.40E-01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	2.43E-10	2.41E-11	2.67E-10
Aldrin	1.00E+00	1	0.01	1.70E+01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	1.22E-08	1.21E-09	1.34E-08
alpha-BHC	1.00E+00	1	0.01	6.30E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	4.51E-09	4.47E-10	4.96E-09
beta-BHC	1.00E+00	1	0.01	1.80E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	1.29E-09	1.28E-10	1.42E-09
delta-BHC	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	1	0.01	1.60E+01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	1.15E-08	1.14E-09	1.26E-08
gamma-BHC (Lindane)	1.00E+00	1	0.01	1.30E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	9.30E-10	9.22E-11	1.02E-09
Heptachlor	1.00E+00	1	0.01	4.50E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	3.22E-09	3.19E-10	3.54E-09
Heptachlor Epoxide	1.00E+00	1	0.01	9.10E+00	7.16E-10	7.16E-10	7.09E-11	7.09E-11	6.51E-09	6.46E-10	7.16E-09

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Soil (mg/kg soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	ADDing MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Herbicides											
MCPA	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	1	0.01	1.20E-01	7.16E-10	7.16E-10	7.09E-11	7.09E-11	8.59E-11	8.51E-12	9.44E-11
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E+00	5.94E-10	5.94E-10	2.84E-10	2.84E-10	1.19E-09	5.68E-10	1.76E-09
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	0.4	0.04	1.50E+05	2.86E-10	2.86E-10	2.84E-10	2.84E-10	4.29E-05	4.26E-05	8.55E-05
Metals											
Antimony	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	0.3	0.001	1.50E+00	2.15E-10	2.15E-10	7.09E-12	7.09E-12	3.22E-10	1.06E-11	3.33E-10
Barium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Cadmium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Copper	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/kg)	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
VOCs																	
1,1,2-Trichloroethane	4.48E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E+00	7.57E-11	--	NCOPC
1,2-Dichloroethane	7.16E-11	--	NCOPC	--	NCOPC	--	NCOPC	3.23E-01	2.31E-11	--	NCOPC	--	NCOPC	1.68E+01	1.20E-09	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.18E+00	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+02	NC
Benzene	1.29E-11	9.64E+01	1.24E-09	4.35E+01	5.60E-10	6.62E-01	8.51E-12	6.77E-01	8.71E-12	--	NCOPC	1.34E-01	1.72E-12	2.62E+01	3.37E-10	1.18E+01	1.51E-10
Chlorobenzene	NC	2.20E+02	NC	3.22E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.33E+02	NC	2.65E+02	NC
Chloroform	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.79E+00	NC	--	NCOPC
Dichloromethane	6.22E-12	--	NCOPC	3.67E+01	2.28E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.64E+01	1.02E-10
Ethylbenzene	NC	4.85E+02	NC	5.05E+02	NC	8.69E+00	NC	3.47E+00	NC	--	NCOPC	1.36E+01	NC	9.04E+00	NC	3.01E+02	NC
Tetrachloroethene	4.25E-10	--	NCOPC	3.55E+00	1.51E-09	1.31E+01	5.56E-09	1.95E+00	8.30E-10	--	NCOPC	--	NCOPC	2.25E+02	9.54E-08	1.30E+01	5.51E-09
Toluene	NC	6.95E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.50E+01	NC	1.78E+02	NC	1.35E+03	NC
Trichloroethylene	3.15E-10	--	NCOPC	--	NCOPC	2.01E-01	6.31E-11	1.07E-01	3.36E-11	--	NCOPC	2.18E-02	6.87E-12	2.53E+02	7.98E-08	5.41E+01	1.70E-08
Xylenes, Total	NC	2.46E+03	NC	2.59E+03	NC	4.02E+01	NC	2.55E+01	NC	--	NCOPC	9.53E+01	NC	4.53E+01	NC	1.77E+03	NC
SVOCs																	
1,2-Dichlorobenzene	NC	--	NCOPC	2.47E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	NC	--	NCOPC	5.93E+00	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.39E+00	NC
1,4-Dichlorobenzene	1.89E-11	1.87E+01	3.53E-10	6.37E+01	1.20E-09	2.44E+01	4.61E-10	--	NCOPC	--	NCOPC	--	NCOPC	2.51E+00	4.75E-11	3.90E+01	7.36E-10
2,4,6-Trichlorophenol	6.65E-12	2.58E+00	2.23E-11	2.41E+01	2.08E-10	--	NCOPC	3.90E+00	3.37E-11	--	NCOPC	--	NCOPC	7.34E+01	6.36E-10	3.03E+00	2.63E-11
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.29E+01	NC	--	NCOPC	--	NCOPC	3.27E+02	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.73E+01	NC	--	NCOPC
2-Methylnaphthalene	NC	--	NCOPC	8.27E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	1.13E+00	NC	2.30E+01	NC	--	NCOPC	3.81E+00	NC	--	NCOPC	--	NCOPC	1.52E+00	NC	2.16E+00	NC
4-Nitroaniline	NC	--	NCOPC	3.43E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.12E+00	NC	1.94E+01	NC
Benzo(a)anthracene	2.55E-10	4.61E+00	1.18E-09	1.53E+01	3.91E-09	--	NCOPC	1.23E+00	3.15E-10	6.07E-01	1.55E-10	5.92E-01	1.51E-10	--	NCOPC	2.96E+00	7.55E-10
Benzo(a)pyrene	2.55E-09	2.88E+00	7.35E-09	6.52E+00	1.66E-08	2.63E-01	6.71E-10	1.32E+00	3.36E-09	6.42E-01	1.64E-09	6.83E-01	1.74E-09	--	NCOPC	2.32E+00	5.92E-09
Benzo(b)fluoranthene	2.55E-10	3.17E+00	8.09E-10	6.13E+00	1.56E-09	--	NCOPC	1.18E+00	3.00E-10	7.82E-01	2.00E-10	7.09E-01	1.81E-10	--	NCOPC	2.65E+00	6.75E-10
bis(2-Chloroethyl)ether	6.65E-10	--	NCOPC	1.14E+00	9.88E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	1.04E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.03E+01	5.23E-10
Dibenzo(a,h)anthracene	2.55E-09	8.52E-01	2.17E-09	2.13E+00	5.42E-09	--	NCOPC	2.11E-01	5.39E-10	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	2.53E-09
Hexachlorobenzene	1.40E-09	--	NCOPC	1.94E+00	2.73E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	1.84E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E+01	NC	2.10E+01	NC
Nitrobenzene	NC	--	NCOPC	4.11E+00	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.63E+00	NC	--	NCOPC
Pesticides																	
4,4'-DDE	2.67E-10	--	NCOPC	1.70E+01	4.55E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	2.67E-10	--	NCOPC	2.04E+01	5.47E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.83E+00	7.56E-10
Aldrin	1.34E-08	1.46E-01	1.95E-09	2.20E+00	2.94E-08	--	NCOPC	--	NCOPC	1.89E-02	2.53E-10	3.92E-02	5.24E-10	--	NCOPC	6.05E-02	8.09E-10
alpha-BHC	4.96E-09	--	NCOPC	5.99E-01	2.97E-09	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	1.42E-09	--	NCOPC	7.26E+00	1.03E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.49E-01	4.94E-10	4.38E+00	6.20E-09
delta-BHC	NC	9.17E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	1.26E-08	1.27E+00	1.59E-08	1.95E+01	2.45E-07	1.26E-01	1.58E-09	3.45E-01	4.35E-09	7.01E-02	8.82E-10	1.33E-01	1.67E-09	3.41E-01	4.29E-09	1.13E-01	1.43E-09
gamma-BHC (Lindane)	1.02E-09	5.06E-01	5.18E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.27E+00	1.30E-09
Heptachlor	3.54E-09	7.86E-01	2.78E-09	3.40E+00	1.20E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.86E-01	6.59E-10	2.73E-01	9.65E-10
Heptachlor Epoxide	7.16E-09	1.46E-01	1.05E-09	1.25E+00	8.95E-09	--	NCOPC	--	NCOPC	--	NCOPC	3.76E-02	2.69E-10	--	NCOPC	--	NCOPC
Herbicides																	
MCPA	NC	--	NCOPC	--	NCOPC	2.16E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.67E+01	NC	--	NCOPC
Pentachlorophenol	9.44E-11	--	NCOPC	--	NCOPC	--	NCOPC	6.54E+01	6.17E-09	1.63E+00	1.54E-10	3.57E+01	3.37E-09	--	NCOPC	1.15E+02	1.08E-08
PCBs																	
Total PCBs	1.76E-09	6.97E+01	1.22E-07	1.78E+03	3.13E-06	4.44E+00	7.80E-09	2.93E+01	5.14E-08	2.40E+00	4.21E-09	5.66E+00	9.93E-09	4.12E+01	7.23E-08	1.76E+02	3.09E-07

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE
SAUGET AREA 2 RI/FS

Constituent	Reference Risk (per mg/kg)	O		O North		P		Q North		Q Central		Q South.		R		S	
		EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
Dioxin																	
2,3,7,8-TCDD-TEQ	8.55E-05	6.41E-03	5.48E-07	3.25E-01	2.78E-05	2.83E-04	2.42E-08	5.24E-03	4.48E-07	2.42E-03	2.07E-07	2.15E-03	1.84E-07	1.31E-03	1.12E-07	4.67E-03	3.99E-07
Metals																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	7.77E+00	NC	--	NCOPC	1.15E+01	NC	--	NCOPC	--	NCOPC
Arsenic	3.33E-10	--	NCOPC	2.00E+01	6.65E-09	1.29E+01	4.29E-09	1.18E+01	3.92E-09	1.47E+01	4.90E-09	1.31E+01	4.37E-09	6.12E+00	2.04E-09	--	NCOPC
Barium	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.38E+03	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	3.93E+01	NC	1.07E+01	NC	1.23E+01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.82E+01	NC	--	NCOPC	1.79E+02	NC
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.29E+03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.96E+03	NC	--	NCOPC	8.28E+02	NC	--	NCOPC	8.38E+02	NC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.42E+02	NC	7.01E+02	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	1.65E+02	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.58E+00	NC	2.51E+02	NC	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.14E+02	NC	--	NCOPC	--	NCOPC
	Total:		**7.06E-07**		**3.13E-05**		**4.47E-08**		**6.19E-07**		**2.20E-07**		**2.06E-07**		**3.70E-07**		**7.64E-07**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
VOCs											
1,1,2-Trichloroethane	1.00E+00	1	0.01	4.00E-03	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.25E-05	1.24E-06	1.38E-05
1,2-Dichloroethane	1.00E+00	1	0.01	2.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	2.50E-06	2.48E-07	2.75E-06
1,2-Dichloroethene (total)	1.00E+00	1	0.01	2.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	2.50E-06	2.48E-07	2.75E-06
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	0.01	8.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	6.26E-07	6.21E-08	6.88E-07
Benzene	1.00E+00	1	0.02	4.00E-03	5.01E-08	5.01E-08	9.93E-09	9.93E-09	1.25E-05	2.48E-06	1.50E-05
Chlorobenzene	1.00E+00	1	0.01	2.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	2.50E-06	2.48E-07	2.75E-06
Chloroform	1.00E+00	1	0.01	1.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.01E-06	4.97E-07	5.51E-06
Dichloromethane	1.00E+00	1	0.016	6.00E-02	5.01E-08	5.01E-08	7.95E-09	7.95E-09	8.35E-07	1.32E-07	9.87E-07
Ethylbenzene	1.00E+00	1	0.01	1.00E-01	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.01E-07	4.97E-08	5.51E-07
Tetrachloroethene	1.00E+00	1	0.01	1.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.01E-06	4.97E-07	5.51E-06
Toluene	1.00E+00	1	0.01	2.00E-01	5.01E-08	5.01E-08	4.97E-09	4.97E-09	2.50E-07	2.48E-08	2.75E-07
Trichloroethylene	1.00E+00	1	0.01	3.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-04	1.66E-05	1.84E-04
Xylenes, Total	1.00E+00	1	0.011	2.00E-01	5.01E-08	5.01E-08	5.46E-09	5.46E-09	2.50E-07	2.73E-08	2.78E-07
SVOCs											
1,2-Dichlorobenzene	1.00E+00	1	0.01	9.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.57E-07	5.52E-08	6.12E-07
1,3-Dichlorobenzene	1.00E+00	1	0.01	9.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.57E-05	5.52E-06	6.12E-05
1,4-Dichlorobenzene	1.00E+00	1	0.01	3.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-06	1.66E-07	1.84E-06
2,4,6-Trichlorophenol	1.00E+00	1	0.01	1.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.01E-04	4.97E-05	5.51E-04
2,4-Dichlorophenol	1.00E+00	1	0.01	3.00E-03	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-05	1.66E-06	1.84E-05
2-Chlorophenol	1.00E+00	1	0.01	5.00E-03	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-05	9.93E-07	1.10E-05
2-Methylnaphthalene	1.00E+00	0.29	0.1	2.00E-02	1.45E-08	1.45E-08	4.97E-08	4.97E-08	7.26E-07	2.48E-08	3.21E-06
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	1	0.01	3.00E-03	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-05	1.66E-06	1.84E-05
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
bis(2-Chloroethyl)ether	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	1	0.004	2.00E-02	5.01E-08	5.01E-08	1.99E-09	1.99E-09	2.50E-06	9.93E-08	2.60E-06
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Hexachlorobenzene	1.00E+00	0.83	0.04	8.00E-04	4.16E-08	4.16E-08	1.99E-08	1.99E-08	5.20E-05	2.48E-05	7.68E-05
Naphthalene	1.00E+00	0.29	0.1	2.00E-02	1.45E-08	1.45E-08	4.97E-08	4.97E-08	7.26E-07	2.48E-08	3.21E-06
Nitrobenzene	1.00E+00	1	0.01	5.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-04	9.93E-06	1.10E-04
Pesticides											
4,4'-DDE	1.00E+00	1	0.01	5.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-04	9.93E-06	1.10E-04
4,4'-DDT	1.00E+00	1	0.01	5.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-04	9.93E-06	1.10E-04
Aldrin	1.00E+00	1	0.01	3.00E-05	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-03	1.66E-04	1.84E-03
alpha-BHC	1.00E+00	1	0.01	3.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-04	1.66E-05	1.84E-04
beta-BHC	1.00E+00	1	0.01	3.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-04	1.66E-05	1.84E-04
delta-BHC	1.00E+00	1	0.01	3.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-04	1.66E-05	1.84E-04
Dieldrin	1.00E+00	1	0.01	5.00E-05	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-03	9.93E-05	1.10E-03
gamma-BHC (Lindane)	1.00E+00	1	0.01	3.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-04	1.66E-05	1.84E-04
Heptachlor	1.00E+00	1	0.01	5.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-04	9.93E-06	1.10E-04
Heptachlor Epoxide	1.00E+00	1	0.01	1.30E-05	5.01E-08	5.01E-08	4.97E-09	4.97E-09	3.85E-03	3.82E-04	4.24E-03

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration in Soil (mg/kg-soil)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Herbicides											
MCPA	1.00E+00	1	0.01	5.00E-04	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.00E-04	9.93E-06	1.10E-04
MCPP	1.00E+00	1	0.01	1.00E-03	5.01E-08	5.01E-08	4.97E-09	4.97E-09	5.01E-05	4.97E-06	5.51E-05
Pentachlorophenol	1.00E+00	1	0.01	3.00E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	1.67E-06	1.66E-07	1.84E-06
PCBs											
Total PCBs	1.00E+00	0.83	0.04	2.00E-05	4.16E-08	4.16E-08	1.99E-08	1.99E-08	2.08E-03	9.93E-04	3.07E-03
Dioxin											
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Metals											
Antimony	1.00E+00	1	0.007	4.00E-04	5.01E-08	5.01E-08	3.48E-09	3.48E-09	1.25E-04	8.69E-06	1.34E-04
Arsenic	1.00E+00	0.3	0.001	3.00E-04	1.50E-08	1.50E-08	4.97E-10	4.97E-10	5.01E-05	1.66E-06	5.18E-05
Barium	1.00E+00	1	0.001	7.00E-02	5.01E-08	5.01E-08	4.97E-10	4.97E-10	7.16E-07	7.09E-09	7.23E-07
Cadmium	1.00E+00	1	0.04	1.00E-03	5.01E-08	5.01E-08	1.99E-08	1.99E-08	5.01E-05	1.99E-06	7.00E-05
Chromium	1.00E+00	0.3	0	3.00E-03	1.50E-08	1.50E-08	0.00E+00	NA	5.01E-06	NC	5.01E-06
Copper	1.00E+00	1	0.002	3.70E-02	5.01E-08	5.01E-08	9.93E-10	9.93E-10	1.35E-06	2.68E-08	1.38E-06
Lead	1.00E+00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	0.01	2.40E-02	5.01E-08	5.01E-08	4.97E-09	4.97E-09	2.09E-06	2.07E-07	2.29E-06
Mercury	1.00E+00	2	0.007	3.00E-04	1.00E-07	1.00E-07	3.48E-09	3.48E-09	3.34E-04	1.16E-05	3.46E-04
Nickel	1.00E+00	1	0.08	2.00E-02	5.01E-08	5.01E-08	3.97E-08	3.97E-08	2.50E-06	1.99E-08	4.49E-06

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE
SAUGET AREA 2 RI/FS

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HI (per mg/kg)	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
VOCs																	
1,1,2-Trichloroethane	1.38E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E+00	2.33E-05	--	NCOPC
1,2-Dichloroethane	2.75E-06	--	NCOPC	--	NCOPC	--	NCOPC	3.23E-01	8.89E-07	--	NCOPC	--	NCOPC	1.68E+01	4.63E-05	--	NCOPC
1,2-Dichloroethene (total)	2.75E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.18E+00	1.70E-05	--	NCOPC
4-Methyl-2-pentanone (MIBK)	6.88E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.03E+02	7.11E-05
Benzene	1.50E-05	9.64E+01	1.45E-03	4.35E+01	6.53E-04	6.62E-01	9.93E-06	6.77E-01	1.02E-05	--	NCOPC	1.34E-01	2.01E-06	2.62E+01	3.93E-04	1.16E+01	1.77E-04
Chlorobenzene	2.75E-06	2.20E+02	6.06E-04	3.22E+02	8.86E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.33E+02	6.42E-04	2.65E+02	7.30E-04
Chloroform	5.51E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.79E+00	1.54E-05	--	NCOPC
Dichloromethane	9.67E-07	--	NCOPC	3.67E+01	3.55E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.64E+01	1.59E-05
Ethylbenzene	5.51E-07	4.85E+02	2.67E-04	5.05E+02	2.78E-04	8.69E+00	4.79E-06	3.47E+00	1.91E-06	--	NCOPC	1.36E+01	7.47E-06	9.04E+00	4.98E-06	3.01E+02	1.66E-04
Tetrachloroethene	5.51E-06	--	NCOPC	3.55E+00	1.95E-05	1.31E+01	7.21E-05	1.95E+00	1.08E-05	--	NCOPC	--	NCOPC	2.25E+02	1.24E-03	1.30E+01	7.14E-05
Toluene	2.75E-07	6.95E+01	1.91E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.50E+01	1.79E-05	1.78E+02	4.91E-05	1.35E+03	3.71E-04
Trichloroethylene	1.84E-04	--	NCOPC	--	NCOPC	2.01E-01	3.68E-05	1.07E-01	1.96E-05	--	NCOPC	2.18E-02	4.01E-06	2.53E+02	4.65E-02	5.41E+01	9.93E-03
Xylenes, Total	2.78E-07	2.46E+03	6.84E-04	2.59E+03	7.20E-04	4.02E+01	1.12E-05	2.55E+01	7.07E-06	--	NCOPC	9.53E+01	2.65E-05	4.53E+01	1.26E-05	1.77E+03	4.91E-04
SVOCs																	
1,2-Dichlorobenzene	6.12E-07	--	NCOPC	2.47E+02	1.51E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	6.12E-05	--	NCOPC	5.93E+00	3.63E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.39E+00	2.07E-04
1,4-Dichlorobenzene	1.84E-06	1.87E+01	3.44E-05	6.37E+01	1.17E-04	2.44E+01	4.48E-05	--	NCOPC	--	NCOPC	--	NCOPC	2.51E+00	4.62E-06	3.90E+01	7.16E-05
2,4,6-Trichlorophenol	5.51E-04	2.58E+00	1.42E-03	2.41E+01	1.32E-02	--	NCOPC	3.90E+00	2.15E-03	--	NCOPC	--	NCOPC	7.34E+01	4.04E-02	3.03E+00	1.67E-03
2,4-Dichlorophenol	1.84E-05	--	NCOPC	--	NCOPC	--	NCOPC	2.29E+01	4.21E-04	--	NCOPC	--	NCOPC	3.27E+02	6.01E-03	--	NCOPC
2-Chlorophenol	1.10E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.73E+01	4.11E-04	--	NCOPC
2-Methylnaphthalene	3.21E-06	--	NCOPC	8.27E+01	2.66E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	1.13E+00	NC	2.30E+01	NC	--	NCOPC	3.81E+00	NC	--	NCOPC	--	NCOPC	1.52E+00	NC	2.16E+00	NC
4-Nitroaniline	1.84E-05	--	NCOPC	3.43E+02	6.30E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.12E+00	7.55E-05	1.94E+01	3.55E-04
Benzo(a)anthracene	NC	4.61E+00	NC	1.53E+01	NC	--	NCOPC	1.23E+00	NC	6.07E-01	NC	5.92E-01	NC	--	NCOPC	2.96E+00	NC
Benzo(a)pyrene	NC	2.68E+00	NC	6.52E+00	NC	2.63E-01	NC	1.32E+00	NC	6.42E-01	NC	6.83E-01	NC	--	NCOPC	2.32E+00	NC
Benzo(b)fluoranthene	NC	3.17E+00	NC	6.13E+00	NC	--	NCOPC	1.18E+00	NC	7.82E-01	NC	7.09E-01	NC	--	NCOPC	2.65E+00	NC
bis(2-Chloroethyl)ether	NC	--	NCOPC	1.14E+00	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	2.60E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.03E+01	1.31E-04
Dibenzo(a,h)anthracene	NC	8.52E-01	NC	2.13E+00	NC	--	NCOPC	2.11E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	9.93E-01	NC
Hexachlorobenzene	7.68E-05	--	NCOPC	1.94E+00	1.49E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	3.21E-06	--	NCOPC	1.84E+01	5.90E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E+01	3.75E-05	2.10E+01	6.76E-05
Nitrobenzene	1.10E-04	--	NCOPC	4.11E+00	4.52E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	6.63E+00	7.30E-04	--	NCOPC
Pesticides																	
4,4'-DDE	1.10E-04	--	NCOPC	1.70E+01	1.87E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	1.10E-04	--	NCOPC	2.04E+01	2.25E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.83E+00	3.11E-04
Aldrin	1.84E-03	1.46E-01	2.67E-04	2.20E+00	4.04E-03	--	NCOPC	--	NCOPC	1.89E-02	3.47E-05	3.92E-02	7.20E-05	--	NCOPC	6.05E-02	1.11E-04
alpha-BHC	1.84E-04	--	NCOPC	5.99E-01	1.10E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	1.84E-04	--	NCOPC	7.26E+00	1.33E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.49E-01	6.40E-05	4.38E+00	8.03E-04
delta-BHC	1.84E-04	9.17E-01	1.68E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	1.10E-03	1.27E+00	1.39E-03	1.95E+01	2.14E-02	1.26E-01	1.38E-04	3.45E-01	3.80E-04	7.01E-02	7.72E-05	1.33E-01	1.46E-04	3.41E-01	3.75E-04	1.13E-01	1.25E-04
gamma-BHC (Lindane)	1.84E-04	5.06E-01	9.29E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.27E+00	2.34E-04
Heptachlor	1.10E-04	7.86E-01	8.66E-05	3.40E+00	3.74E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.86E-01	2.05E-05	2.73E-01	3.00E-05
Heptachlor Epoxide	4.24E-03	1.46E-01	6.19E-04	1.25E+00	5.30E-03	--	NCOPC	--	NCOPC	--	NCOPC	3.76E-02	1.59E-04	--	NCOPC	--	NCOPC
Herbicides																	
MCPA	1.10E-04	--	NCOPC	--	NCOPC	2.16E+01	2.38E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	5.51E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	4.67E+01	2.57E-03	--	NCOPC
Pentachlorophenol	1.84E-06	--	NCOPC	--	NCOPC	--	NCOPC	6.54E+01	1.20E-04	1.63E+00	2.99E-06	3.57E+01	6.55E-05	--	NCOPC	1.15E+02	2.10E-04
PCBs																	
Total PCBs	3.07E-03	6.97E+01	2.14E-01	1.78E+03	5.48E+00	4.44E+00	1.36E-02	2.93E+01	9.00E-02	2.40E+00	7.36E-03	5.66E+00	1.74E-02	4.12E+01	1.27E-01	1.76E+02	5.40E-01

TABLE
POTENTIAL HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT WITH
COMBINED SOIL
CONSTRUCTION/UTILITY WORKER - MLE
SAUGET AREA 2 RI/FS

Constituent	Reference HI (per mg/kg)	O		O North		P		Q North		Q Central		Q South		R		S	
		EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ	EPC (mg/kg)	HQ
Dioxin																	
2,3,7,8-TCDD-TEQ	NC	6.41E-03	NC	3.25E-01	NC	2.83E-04	NC	5.24E-03	NC	2.42E-03	NC	2.15E-03	NC	1.31E-03	NC	4.67E-03	NC
Metals																	
Antimony	1.34E-04	--	NCOPC	--	NCOPC	--	NCOPC	7.77E+00	1.04E-03	--	NCOPC	1.15E+01	1.54E-03	--	NCOPC	--	NCOPC
Arsenic	5.18E-05	--	NCOPC	2.00E+01	1.04E-03	1.29E+01	6.68E-04	1.18E+01	6.10E-04	1.47E+01	7.62E-04	1.31E+01	6.79E-04	6.12E+00	3.17E-04	--	NCOPC
Barium	7.23E-07	--	NCOPC	--	NCOPC	--	NCOPC	1.38E+03	9.95E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	7.00E-05	--	NCOPC	3.93E+01	2.75E-03	1.07E+01	7.46E-04	1.23E+01	8.58E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	5.01E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.82E+01	4.42E-04	--	NCOPC	1.79E+02	8.98E-04
Copper	1.38E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.29E+03	3.16E-03	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.96E+03	NC	--	NCOPC	8.28E+02	NC	--	NCOPC	8.38E+02	NC
Manganese	2.29E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.42E+02	1.93E-03	7.01E+02	1.61E-03	--	NCOPC	--	NCOPC
Mercury	3.46E-04	--	NCOPC	1.65E+02	5.70E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.58E+00	8.90E-04	2.51E+02	8.66E-02	--	NCOPC
Nickel	4.49E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.14E+02	9.60E-04	--	NCOPC	--	NCOPC
	Total HI:		**2.21E-01**		**5.60E+00**		**1.78E-02**		**9.66E-02**		**1.33E-02**		**2.40E-02**		**3.13E-01**		**6.67E-01**

Notes:
-- Not a constituent of concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - MLE INHALATION OF EXCAVATION AIR FROM SOIL		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Construction/Utility Worker	1.5	(m^3 air/hour)	
Body Weight	MLE Construction/Utility Worker	70	(kg)	
Exposure Time	MLE Construction/Utility Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	MLE Construction/Utility Worker	20	(days)/365 (days) =	5.48E-02
Exposure Duration (cancer)	MLE Construction/Utility Worker	1	(yrs)/70(yrs) =	1.43E-02
Exposure Duration (noncancer)	MLE Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	1	5.60E-02	1.34E-04	1.34E-04	7.51E-06
1,2-Dichloroethane	1.00E+00	1	9.10E-02	1.34E-04	1.34E-04	1.22E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	1.34E-04	1.34E-04	1.03E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	8.86E-05	8.86E-05	7.13E-06
Dichloromethane	1.00E+00	1	1.65E-03	1.34E-04	1.34E-04	2.21E-07
Ethylbenzene	1.00E+00	1	NA	1.34E-04	1.34E-04	NC
Tetrachloroethene	1.00E+00	1	2.10E-02	1.34E-04	1.34E-04	2.82E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	1.34E-04	1.34E-04	5.37E-05
Xylenes, Total	1.00E+00	NA	NA	NA	NA	NC
SVOCs (b)						
1,2-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NC
1,3-Dichlorobenzene	1.00E+00	NA	NA	NA	NA	NC
1,4-Dichlorobenzene	1.00E+00	1	2.20E-02	1.34E-04	1.34E-04	2.95E-06
2,4,6-Trichlorophenol	1.00E+00	1	1.09E-02	1.34E-04	1.34E-04	1.46E-06
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)anthracene	1.00E+00	1	3.10E-01	1.34E-04	1.34E-04	4.16E-05
Benzo(a)pyrene	1.00E+00	1	3.10E+00	1.34E-04	1.34E-04	4.16E-04
Benzo(b)fluoranthene	1.00E+00	1	3.10E-01	1.34E-04	1.34E-04	4.16E-05
bis(2-Chloroethyl)ether	1.00E+00	1	1.16E+00	1.34E-04	1.34E-04	1.55E-04
bis(2-Ethylhexyl)phthalate	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	1	3.10E+00	1.34E-04	1.34E-04	4.16E-04
Hexachlorobenzene	1.00E+00	1	1.61E+00	1.34E-04	1.34E-04	2.16E-04
Naphthalene	1.00E+00	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	NA	NA	NC
Pesticides (b)						
4,4'-DDE	1.00E+00	NA	NA	NA	NA	NC
4,4'-DDT	1.00E+00	1	3.40E-01	1.34E-04	1.34E-04	4.56E-05
Aldrin	1.00E+00	1	1.72E+01	1.34E-04	1.34E-04	2.30E-03
alpha-BHC	1.00E+00	1	6.30E+00	1.34E-04	1.34E-04	8.45E-04
beta-BHC	1.00E+00	1	1.86E+00	1.34E-04	1.34E-04	2.49E-04
delta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	1	1.61E+01	1.34E-04	1.34E-04	2.16E-03
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	1	4.55E+00	1.34E-04	1.34E-04	6.11E-04
Heptachlor Epoxide	1.00E+00	1	9.10E+00	1.34E-04	1.34E-04	1.22E-03
Herbicides (b)						
MCPA	1.00E+00	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	1	2.00E+00	1.34E-04	1.34E-04	2.68E-04
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	0.55	1.50E+05	7.38E-05	7.38E-05	1.11E+01
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1.51E+01	1.34E-04	1.34E-04	2.03E-03
Barium	1.00E+00	NA	NA	NA	NA	NC
Cadmium	1.00E+00	1	6.30E+00	1.34E-04	1.34E-04	8.45E-04
Chromium	1.00E+00	1	4.20E+01	1.34E-04	1.34E-04	5.64E-03
Copper	1.00E+00	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	NA	NA	NC

TABLE
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m³)	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk	EPC (mg/m³)	Risk
VOCs (a)																	
1,1,2-Trichloroethane	7.51E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-04	9.77E-10	--	NCOPC
1,2-Dichloroethane	1.22E-05	--	NCOPC	--	NCOPC	--	NCOPC	2.90E-04	3.54E-09	--	NCOPC	--	NCOPC	7.40E-04	9.04E-09	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-02	NC
Benzene	1.03E-06	1.70E-01	1.76E-07	7.60E-02	7.85E-08	1.10E-03	1.14E-09	1.20E-03	1.24E-09	--	NCOPC	2.30E-04	2.38E-10	1.20E-03	1.24E-09	5.40E-04	5.58E-10
Chlorobenzene	NC	1.60E-01	NC	2.30E-01	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.60E-03	NC	6.40E-03	NC
Chloroform	7.13E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-04	7.84E-10	--	NCOPC
Dichloromethane	2.21E-07	--	NCOPC	8.30E-02	1.83E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-03	2.65E-10
Ethylbenzene	NC	3.90E-01	NC	4.10E-01	NC	7.10E-03	NC	2.80E-03	NC	--	NCOPC	1.10E-02	NC	1.70E-04	NC	5.80E-03	NC
Tetrachloroethene	2.82E-06	--	NCOPC	6.30E-03	1.78E-08	2.30E-02	6.48E-08	3.50E-03	9.86E-09	--	NCOPC	--	NCOPC	7.20E-03	2.03E-08	4.20E-04	1.18E-09
Toluene	NC	8.70E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.10E-02	NC	5.80E-03	NC	4.40E-02	NC
Trichloroethylene	5.37E-05	--	NCOPC	--	NCOPC	3.20E-04	1.72E-08	1.70E-04	9.12E-09	--	NCOPC	3.40E-05	1.82E-09	2.60E-02	1.40E-06	5.60E-03	3.01E-07
Xylenes, Total	NC	2.30E+00	NC	2.40E+00	NC	3.70E-02	NC	2.30E-02	NC	--	NCOPC	8.80E-02	NC	1.10E-03	NC	4.20E-02	NC
SVOCs (b)																	
1,2-Dichlorobenzene	NC	--	NCOPC	1.48E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	NC	--	NCOPC	3.56E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.03E-07	NC
1,4-Dichlorobenzene	2.95E-06	1.12E-06	3.32E-12	3.82E-06	1.13E-11	1.47E-06	4.33E-12	--	NCOPC	--	NCOPC	--	NCOPC	1.51E-07	4.45E-13	2.34E-06	6.91E-12
2,4,6-Trichlorophenol	1.46E-06	1.55E-07	2.25E-13	1.44E-06	2.10E-12	--	NCOPC	2.34E-07	3.40E-13	--	NCOPC	--	NCOPC	4.41E-06	6.42E-12	1.82E-07	2.65E-13
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.38E-06	NC	--	NCOPC	--	NCOPC	1.96E-05	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.24E-06	NC	--	NCOPC
2-Methylnaphthalene	NC	--	NCOPC	4.96E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	NC	6.75E-08	NC	1.38E-06	NC	--	NCOPC	2.28E-07	NC	--	NCOPC	--	NCOPC	9.12E-08	NC	1.29E-07	NC
4-Nitroaniline	NC	--	NCOPC	2.06E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	NC	1.16E-06	NC
Benzo(a)anthracene	4.16E-05	2.77E-07	1.15E-11	9.21E-07	3.83E-11	--	NCOPC	7.40E-08	3.08E-12	3.64E-08	1.52E-12	3.55E-08	1.48E-12	--	NCOPC	1.78E-07	7.39E-12
Benzo(a)pyrene	4.16E-04	1.73E-07	7.20E-11	3.91E-07	1.63E-10	1.58E-08	6.56E-12	7.91E-08	3.29E-11	3.85E-08	1.60E-11	4.10E-08	1.70E-11	--	NCOPC	1.39E-07	5.79E-11
Benzo(b)fluoranthene	4.16E-05	1.90E-07	7.92E-12	3.68E-07	1.53E-11	--	NCOPC	7.07E-08	2.94E-12	4.69E-08	1.95E-12	4.25E-08	1.77E-12	--	NCOPC	1.59E-07	6.61E-12
bis(2-Chloroethyl)ether	1.55E-04	--	NCOPC	6.85E-08	1.06E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	NC
Dibenzo(a,h)anthracene	4.16E-04	5.11E-08	2.13E-11	1.28E-07	5.30E-11	--	NCOPC	1.27E-08	5.27E-12	--	NCOPC	--	NCOPC	--	NCOPC	5.96E-08	2.48E-11
Hexachlorobenzene	2.16E-04	--	NCOPC	1.17E-07	2.52E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	1.10E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.02E-07	NC	1.26E-06	NC
Nitrobenzene	NC	--	NCOPC	2.47E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.98E-07	NC	--	NCOPC
Pesticides (b)																	
4,4'-DDE	NC	--	NCOPC	1.02E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	4.56E-05	--	NCOPC	1.23E-06	5.59E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-07	7.73E-12
Aldrin	2.30E-03	8.74E-09	2.01E-11	1.32E-07	3.04E-10	--	NCOPC	--	NCOPC	1.14E-09	2.61E-12	2.35E-09	5.41E-12	--	NCOPC	3.63E-09	8.35E-12
alpha-BHC	6.45E-04	--	NCOPC	3.59E-08	3.04E-11	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	2.49E-04	--	NCOPC	4.35E-07	1.08E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.09E-08	5.21E-12	2.63E-07	6.54E-11
delta-BHC	NC	5.50E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	2.16E-03	7.60E-08	1.64E-10	1.17E-06	2.52E-09	7.53E-09	1.63E-11	2.07E-08	4.48E-11	4.21E-09	9.09E-12	7.98E-09	1.72E-11	2.04E-08	4.42E-11	6.80E-09	1.47E-11
gamma-BHC (Lindane)	NC	3.04E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.64E-08	NC
Heptachlor	6.11E-04	4.72E-08	2.88E-11	2.04E-07	1.25E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	6.82E-12	1.64E-08	9.98E-12
Heptachlor Epoxide	1.22E-03	8.77E-09	1.07E-11	7.50E-08	9.16E-11	--	NCOPC	--	NCOPC	--	NCOPC	2.26E-09	2.76E-12	--	NCOPC	--	NCOPC
Herbicides (b)																	
MCPA	NC	--	NCOPC	--	NCOPC	1.30E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-06	NC	--	NCOPC
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.92E-06	NC	9.76E-08	NC	2.14E-06	NC	--	NCOPC	6.88E-06	NC

TABLE
CARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	Risk (per mg/m^3)	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
PCBs (b)																	
Total PCBs	2.68E-04	4.18E-06	1.12E-09	1.07E-04	2.87E-08	2.67E-07	7.15E-11	1.76E-06	4.72E-10	1.44E-07	3.86E-11	3.39E-07	9.11E-11	2.47E-06	6.63E-10	1.05E-05	2.83E-09
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	1.11E+01	3.85E-10	4.26E-09	1.95E-08	2.16E-07	1.70E-11	1.88E-10	3.14E-10	3.48E-09	1.45E-10	1.61E-09	1.29E-10	1.43E-09	7.89E-11	8.73E-10	2.80E-10	3.10E-09
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	4.66E-07	NC	--	NCOPC	6.89E-07	NC	--	NCOPC	--	NCOPC
Arsenic	2.03E-03	--	NCOPC	1.20E-06	2.43E-09	7.75E-07	1.57E-09	7.07E-07	1.43E-09	8.83E-07	1.79E-09	7.88E-07	1.60E-09	3.67E-07	7.44E-10	--	NCOPC
Barium	NC	--	NCOPC	--	NCOPC	--	NCOPC	8.26E-05	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	8.45E-04	--	NCOPC	2.36E-06	2.00E-09	6.40E-07	5.41E-10	7.36E-07	6.22E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	5.64E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.29E-06	2.98E-08	--	NCOPC	1.08E-05	6.06E-08
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.37E-04	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-04	NC	--	NCOPC	4.97E-05	NC	--	NCOPC	5.03E-05	NC
Manganese	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.05E-05	NC	4.21E-05	NC	--	NCOPC	--	NCOPC
Mercury	NC	--	NCOPC	9.90E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.55E-07	NC	1.50E-05	NC	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.28E-05	NC	--	NCOPC	--	NCOPC
	Total:		1.81E-07		3.67E-07		8.55E-08		2.99E-08		3.47E-09		3.51E-08		1.43E-06		3.69E-07

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - N dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
MLE - Most Likely Exposure.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-inh (mg/kg-day)	Hazard Index - Inhalation
VOCs (a)						
1,1,2-Trichloroethane	1.00E+00	NA	NA	NA	NA	NC
1,2-Dichloroethane	1.00E+00	1	1.40E-03	9.39E-03	9.39E-03	6.71E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	8.57E-01	9.39E-03	9.39E-03	1.10E-02
Benzene	1.00E+00	1	8.57E-03	9.39E-03	9.39E-03	1.10E+00
Chlorobenzene	1.00E+00	1	1.70E-02	9.39E-03	9.39E-03	5.53E-01
Chloroform	1.00E+00	1	1.43E-02	9.39E-03	9.39E-03	6.57E-01
Dichloromethane	1.00E+00	1	8.60E-01	9.39E-03	9.39E-03	1.09E-02
Ethylbenzene	1.00E+00	1	2.86E-01	9.39E-03	9.39E-03	3.28E-02
Tetrachloroethene	1.00E+00	1	1.70E-01	9.39E-03	9.39E-03	5.53E-02
Toluene	1.00E+00	1	1.14E-01	9.39E-03	9.39E-03	8.24E-02
Trichloroethylene	1.00E+00	1	1.00E-02	9.39E-03	9.39E-03	9.39E-01
Xylenes, Total	1.00E+00	1	2.86E-02	9.39E-03	9.39E-03	3.29E-01
SVOCs (b)						
1,2-Dichlorobenzene	1.00E+00	1	5.70E-02	9.39E-03	9.39E-03	1.65E-01
1,3-Dichlorobenzene	1.00E+00	1	2.29E-01	9.39E-03	9.39E-03	4.11E-02
1,4-Dichlorobenzene	1.00E+00	1	2.29E-01	9.39E-03	9.39E-03	4.11E-02
2,4,6-Trichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2,4-Dichlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	NA	NA	NC
2-Methylnaphthalene	1.00E+00	1	8.57E-04	9.39E-03	9.39E-03	1.10E+01
2-Nitroaniline	1.00E+00	1	5.71E-05	9.39E-03	9.39E-03	1.64E+02
4-Nitroaniline	1.00E+00	1	1.14E-03	9.39E-03	9.39E-03	8.24E+00
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NA	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	NA	NA	NC
bis(2-Chloroethyl)ether	1.00E+00	NA	NA	NA	NA	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NA	NC
Hexachlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Naphthalene	1.00E+00	1	8.57E-04	9.39E-03	9.39E-03	1.10E+01
Nitrobenzene	1.00E+00	1	5.70E-04	9.39E-03	9.39E-03	1.65E+01
Pesticides (b)						
4,4'-DDE	1.00E+00	NA	NA	NA	NA	NC
4,4'-DDT	1.00E+00	NA	NA	NA	NA	NC
Aldrin	1.00E+00	NA	NA	NA	NA	NC
alpha-BHC	1.00E+00	NA	NA	NA	NA	NC
beta-BHC	1.00E+00	NA	NA	NA	NA	NC
delta-BHC	1.00E+00	NA	NA	NA	NA	NC
Dieldrin	1.00E+00	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	NA	NA	NA	NA	NC
Heptachlor	1.00E+00	NA	NA	NA	NA	NC
Heptachlor Epoxide	1.00E+00	NA	NA	NA	NA	NC
Herbicides (b)						
MCPA	1.00E+00	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	NA	NA	NA	NA	NC
PCBs (b)						
Total PCBs	1.00E+00	NA	NA	NA	NA	NC
Dioxin (b)						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NA	NC
Metals (b)						
Antimony	1.00E+00	NA	NA	NA	NA	NC
Arsenic	1.00E+00	NA	NA	NA	NA	NC
Barium	1.00E+00	1	1.40E-04	9.39E-03	9.39E-03	6.71E+01
Cadmium	1.00E+00	NA	NA	NA	NA	NC
Chromium	1.00E+00	1	2.86E-05	9.39E-03	9.39E-03	3.28E+02
Copper	1.00E+00	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	1.43E-05	9.39E-03	9.39E-03	6.58E+02
Mercury	1.00E+00	1	8.57E-05	9.39E-03	9.39E-03	1.10E+02
Nickel	1.00E+00	NA	NA	NA	NA	NC

TABLE
POTENTIAL HAZARD QUOTIENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

	Reference	O		O North		P		Q North		Q Central		Q South		R		S	
Constituent	HQ (per mg/m³)	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ	EPC (mg/m³)	HQ
VOCs (a)																	
1,1,2-Trichloroethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-04	NC	--	NCOPC
1,2-Dichloroethane	6.71E+00	--	NCOPC	--	NCOPC	--	NCOPC	2.90E-04	1.95E-03	--	NCOPC	--	NCOPC	7.40E-04	4.97E-03	--	NCOPC
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.70E-04	NC	--	NCOPC
4-Methyl-2-pentanone (MIBK)	1.10E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-02	2.74E-04
Benzene	1.10E+00	1.70E-01	1.86E-01	7.60E-02	8.33E-02	1.10E-03	1.21E-03	1.20E-03	1.32E-03	--	NCOPC	2.30E-04	2.52E-04	1.20E-03	1.32E-03	5.40E-04	5.92E-04
Chlorobenzene	5.53E-01	1.60E-01	8.84E-02	2.30E-01	1.27E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.60E-03	3.09E-03	6.40E-03	3.54E-03
Chloroform	6.57E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.10E-04	7.23E-05	--	NCOPC
Dichloromethane	1.09E-02	--	NCOPC	8.30E-02	9.07E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.20E-03	1.31E-05
Ethylbenzene	3.28E-02	3.90E-01	1.28E-02	4.10E-01	1.35E-02	7.10E-03	2.33E-04	2.80E-03	9.20E-05	--	NCOPC	1.10E-02	3.61E-04	1.70E-04	5.58E-06	5.80E-03	1.90E-04
Tetrachloroethene	5.53E-02	--	NCOPC	6.30E-03	3.48E-04	2.30E-02	1.27E-03	3.50E-03	1.93E-04	--	NCOPC	--	NCOPC	7.20E-03	3.98E-04	4.20E-04	2.32E-05
Toluene	8.24E-02	8.70E-02	7.17E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	8.10E-02	6.67E-03	5.80E-03	4.78E-04	4.40E-02	3.63E-03
Trichloroethylene	9.39E-01	--	NCOPC	--	NCOPC	3.20E-04	3.01E-04	1.70E-04	1.60E-04	--	NCOPC	3.40E-05	3.19E-05	2.60E-02	2.44E-02	5.60E-03	5.26E-03
Xylenes, Total	3.29E-01	2.30E+00	7.56E-01	2.40E+00	7.89E-01	3.70E-02	1.22E-02	2.30E-02	7.56E-03	--	NCOPC	8.80E-02	2.89E-02	1.10E-03	3.62E-04	4.20E-02	1.38E-02
SVOCs (b)																	
1,2-Dichlorobenzene	1.65E-01	--	NCOPC	1.48E-05	2.44E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
1,3-Dichlorobenzene	4.11E-02	--	NCOPC	3.56E-07	1.46E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.03E-07	8.35E-09
1,4-Dichlorobenzene	4.11E-02	1.12E-06	4.62E-08	3.82E-06	1.57E-07	1.47E-06	6.02E-08	--	NCOPC	--	NCOPC	--	NCOPC	1.51E-07	6.20E-09	2.34E-06	9.62E-08
2,4,6-Trichlorophenol	NC	1.55E-07	NC	1.44E-06	NC	--	NCOPC	2.34E-07	NC	--	NCOPC	--	NCOPC	4.41E-06	NC	1.82E-07	NC
2,4-Dichlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.38E-06	NC	--	NCOPC	--	NCOPC	1.96E-05	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.24E-06	NC	--	NCOPC
2-Methylnaphthalene	1.10E+01	--	NCOPC	4.96E-06	5.44E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
2-Nitroaniline	1.64E+02	6.75E-08	1.11E-05	1.38E-06	2.27E-04	--	NCOPC	2.28E-07	3.75E-05	--	NCOPC	--	NCOPC	9.12E-08	1.50E-05	1.29E-07	2.13E-05
4-Nitroaniline	8.24E+00	--	NCOPC	2.06E-05	1.70E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.47E-07	2.03E-06	1.16E-06	9.57E-06
Benzo(a)anthracene	NC	2.77E-07	NC	9.21E-07	NC	--	NCOPC	7.40E-08	NC	3.34E-08	NC	3.55E-08	NC	--	NCOPC	1.78E-07	NC
Benzo(a)pyrene	NC	1.73E-07	NC	3.91E-07	NC	1.58E-08	NC	7.91E-08	NC	3.35E-08	NC	4.10E-08	NC	--	NCOPC	1.39E-07	NC
Benzo(b)fluoranthene	NC	1.90E-07	NC	3.68E-07	NC	--	NCOPC	7.07E-08	NC	4.39E-08	NC	4.25E-08	NC	--	NCOPC	1.59E-07	NC
bis(2-Chloroethyl)ether	NC	--	NCOPC	6.85E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
bis(2-Ethylhexyl)phthalate	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.02E-06	NC
Dibenzo(a,h)anthracene	NC	5.11E-08	NC	1.28E-07	NC	--	NCOPC	1.27E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.96E-08	NC
Hexachlorobenzene	NC	--	NCOPC	1.17E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	1.10E+01	--	NCOPC	1.10E-06	1.21E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.02E-07	7.69E-06	1.26E-06	1.38E-05
Nitrobenzene	1.65E+01	--	NCOPC	2.47E-07	4.06E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	3.98E-07	6.56E-06	--	NCOPC
Pesticides (b)																	
4,4'-DDE	NC	--	NCOPC	1.02E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
4,4'-DDT	NC	--	NCOPC	1.23E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-07	NC
Aldrin	NC	8.74E-09	NC	1.32E-07	NC	--	NCOPC	--	NCOPC	1.14E-09	NC	2.35E-09	NC	--	NCOPC	3.63E-09	NC
alpha-BHC	NC	--	NCOPC	3.59E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
beta-BHC	NC	--	NCOPC	4.35E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.09E-08	NC	2.63E-07	NC
delta-BHC	NC	5.50E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dieldrin	NC	7.60E-08	NC	1.17E-06	NC	7.53E-09	NC	2.07E-08	NC	4.21E-09	NC	7.96E-09	NC	2.04E-08	NC	6.80E-09	NC
gamma-BHC (Lindane)	NC	3.04E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	7.64E-08	NC
Heptachlor	NC	4.72E-08	NC	2.04E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.12E-08	NC	1.64E-08	NC
Heptachlor Epoxide	NC	8.77E-09	NC	7.50E-08	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.26E-09	NC	--	NCOPC	--	NCOPC
Herbicides (b)																	
MCPA	NC	--	NCOPC	--	NCOPC	1.30E-06	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
MCPP	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-06	NC	--	NCOPC
Pentachlorophenol	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.92E-08	NC	9.76E-08	NC	2.14E-06	NC	--	NCOPC	6.88E-06	NC

TABLE
POTENTIAL HAZARD QUOTIENT
INHALATION OF
EXCAVATION AIR FROM SOIL
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Reference HQ (per mg/m³)	O EPC (mg/m³)	O HQ	O North EPC (mg/m³)	O North HQ	P EPC (mg/m³)	P HQ	Q North EPC (mg/m³)	Q North HQ	Q Central EPC (mg/m³)	Q Central HQ	Q South EPC (mg/m³)	Q South HQ	R EPC (mg/m³)	R HQ	S EPC (mg/m³)	S HQ
PCBs (b)																	
Total PCBs	NC	4.18E-06	NC	1.07E-04	NC	2.67E-07	NC	1.76E-06	NC	1.44E-07	NC	3.39E-07	NC	2.47E-06	NC	1.05E-05	NC
Dioxin (b)																	
2,3,7,8-TCDD-TEQ	NC	3.85E-10	NC	1.95E-08	NC	1.70E-11	NC	3.14E-10	NC	1.45E-10	NC	1.29E-10	NC	7.89E-11	NC	2.80E-10	NC
Metals (b)																	
Antimony	NC	--	NCOPC	--	NCOPC	--	NCOPC	4.66E-07	NC	--	NCOPC	6.89E-07	NC	--	NCOPC	--	NCOPC
Arsenic	NC	--	NCOPC	1.20E-06	NC	7.75E-07	NC	7.07E-07	NC	8.83E-07	NC	7.88E-07	NC	3.67E-07	NC	--	NCOPC
Barium	6.71E+01	--	NCOPC	--	NCOPC	--	NCOPC	8.26E-05	5.54E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Cadmium	NC	--	NCOPC	2.36E-06	NC	6.40E-07	NC	7.36E-07	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Chromium	3.28E+02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.29E-06	1.74E-03	--	NCOPC	1.08E-05	3.53E-03
Copper	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.37E-04	NC	--	NCOPC	--	NCOPC	--	NCOPC
Lead	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.17E-04	NC	--	NCOPC	4.97E-05	NC	--	NCOPC	5.03E-05	NC
Manganese	6.58E+02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.05E-05	3.32E-02	4.21E-05	2.77E-02	--	NCOPC	--	NCOPC
Mercury	1.10E+02	--	NCOPC	9.90E-06	1.08E-03	--	NCOPC	--	NCOPC	--	NCOPC	1.55E-07	1.69E-05	1.50E-05	1.65E-03	--	NCOPC
Nickel	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.26E-05	NC	--	NCOPC	--	NCOPC
	Total HI:		**1.05E+00**		**1.02E+00**		**1.52E-02**		**1.68E-02**		**3.32E-02**		**6.57E-02**		**3.68E-02**		**3.09E-02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
MLE - Most Likely Exposure.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER-MLE INCIDENTAL INGESTION AND DERMAL CONTACT SHALLOW GROUNDWATER AND LEACHATE		Assumed Value	Units	Calculated Value
Water Ingestion Rate	MLE Construction/Utility Worker	0.005	(l/day)	
Skin Exposed	MLE Construction/Utility Worker	3339	(cm^2)	
Body Weight	MLE Construction/Utility Worker	70	(kg)	
Exposure Time (dermal route only)	MLE Construction/Utility Worker	1	(hr/day)	
Exposure Frequency	MLE Construction/Utility Worker	5	(days)/365 (days) =	1.37E-02
Exposure Duration (cancer)	MLE Construction/Utility Worker	1	(yrs)/ 70(yrs) =	1.43E-02
Exposure Duration (noncancer)	MLE Construction/Utility Worker	1	(yrs)/ 1(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
VOCs												
1,2-Dichloroethane	1.00E+00	1	1	5.30E-03	9.10E-02	1.40E-08	1.40E-08	4.95E-08	4.95E-08	1.27E-09	4.50E-09	5.77E-09
1,2-Dichloroethene (total)	1.00E+00	NA	NA	1.00E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	1.10E-03	NA	NA	NA	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	2.77E-03	NA	NA	NA	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	5.69E-04	NA	NA	NA	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	2.13	2.10E-02	1.50E-02	1.40E-08	1.40E-08	4.18E-07	4.18E-07	2.10E-10	8.26E-09	8.47E-09
Chlorobenzene	1.00E+00	NA	NA	4.10E-02	NA	NA	NA	NA	NA	NA	NA	NC
Chloroform	1.00E+00	NA	NA	8.90E-03	NA	NA	NA	NA	NA	NA	NA	NC
Chloromethane	1.00E+00	1	1	4.20E-03	1.30E-02	1.40E-08	1.40E-08	3.92E-08	3.92E-08	1.82E-10	5.10E-10	6.91E-10
Dichloromethane	1.00E+00	1	1.6	4.50E-03	7.50E-03	1.40E-08	1.40E-08	6.72E-08	6.72E-08	1.05E-10	5.04E-10	6.09E-10
Tetrachloroethene	1.00E+00	1	1	4.80E-02	5.40E-01	1.40E-08	1.40E-08	4.48E-07	4.48E-07	7.55E-09	2.42E-07	2.50E-07
Toluene	1.00E+00	NA	NA	4.50E-02	NA	NA	NA	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	1	1.60E-02	4.00E-01	1.40E-08	1.40E-08	1.49E-07	1.49E-07	5.59E-09	5.97E-08	6.53E-08
SVOCs												
2,4,6-Trichlorophenol	1.00E+00	1	1	5.00E-02	1.10E-02	1.40E-08	1.40E-08	4.67E-07	4.67E-07	1.54E-10	5.13E-09	5.29E-09
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
2,4-Dimethylphenol	1.00E+00	NA	NA	1.50E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Chlorophenol	1.00E+00	NA	NA	1.10E-02	NA	NA	NA	NA	NA	NA	NA	NC
2-Nitroaniline	1.00E+00	NA	NA	5.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
3-Methylphenol/4-Methylphenol	1.00E+00	NA	NA	1.00E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
4-Nitroaniline	1.00E+00	NA	NA	2.66E-03	2.10E-02	NA	NA	NA	NA	NC	NC	NC
Benzo(a)pyrene	1.00E+00	1	1	1.20E+00	7.30E+00	1.40E-08	1.40E-08	1.12E-05	1.12E-05	1.02E-07	8.18E-05	8.19E-05
Benzo(b)fluoranthene	1.00E+00	1	1	1.20E+00	7.30E-01	1.40E-08	1.40E-08	1.12E-05	1.12E-05	1.02E-08	8.18E-06	8.19E-06
Benzo(g,h,i)perylene	1.00E+00	NA	NA	5.34E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(k)fluoranthene	1.00E+00	1	1	1.20E+00	7.30E-02	1.40E-08	1.40E-08	1.12E-05	1.12E-05	1.02E-09	8.18E-07	8.19E-07
Dibenzo(a,h)anthracene	1.00E+00	1	1	2.70E+00	7.30E+00	1.40E-08	1.40E-08	2.52E-05	2.52E-05	1.02E-07	1.84E-04	1.84E-04
Indeno(1,2,3-cd)pyrene	1.00E+00	1	1	1.90E+00	7.30E-01	1.40E-08	1.40E-08	1.77E-05	1.77E-05	1.02E-08	1.29E-05	1.30E-05
Naphthalene	1.00E+00	NA	NA	6.90E-02	NA	NA	NA	NA	NA	NA	NA	NC
Nitrobenzene	1.00E+00	NA	NA	6.96E-03	NA	NA	NA	NA	NA	NA	NA	NC
Phenol	1.00E+00	NA	NA	5.50E-03	NA	NA	NA	NA	NA	NA	NA	NC
Pesticides												
4,4'-DDT	1.00E+00	1	1	4.30E-01	3.40E-01	1.40E-08	1.40E-08	4.01E-06	4.01E-06	4.75E-09	1.36E-06	1.37E-06
beta-BHC	1.00E+00	1	1	1.60E-02	1.80E+00	1.40E-08	1.40E-08	1.49E-07	1.49E-07	2.52E-08	2.69E-07	2.94E-07
Dieldrin	1.00E+00	1	1	1.60E-02	1.60E+01	1.40E-08	1.40E-08	1.49E-07	1.49E-07	2.24E-07	2.39E-06	2.61E-06
Endrin Ketone	1.00E+00	NA	NA	1.60E-02	NA	NA	NA	NA	NA	NA	NA	NC
gamma-BHC (Lindane)	1.00E+00	1	1	1.40E-02	1.30E+00	1.40E-08	1.40E-08	1.31E-07	1.31E-07	1.82E-08	1.70E-07	1.88E-07
Heptachlor	1.00E+00	1	1	1.10E-02	4.50E+00	1.40E-08	1.40E-08	1.03E-07	1.03E-07	6.29E-08	4.62E-07	5.25E-07
Herbicides												
2,4,5-T	1.00E+00	NA	NA	1.40E-04	NA	NA	NA	NA	NA	NA	NA	NC
2,4-D	1.00E+00	NA	NA	8.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
Pentachlorophenol	1.00E+00	1	1	6.50E-01	1.20E-01	1.40E-08	1.40E-08	6.07E-06	6.07E-06	1.68E-09	7.28E-07	7.30E-07
PCBs												
Total PCBs	1.00E+00	1	1.1	7.10E-01	2.00E+00	1.40E-08	1.40E-08	7.29E-06	7.29E-06	2.80E-08	1.46E-05	1.46E-05

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Dioxin												
2,3,7,8-TCDD-TEQ	1.00E+00	1	1.8	1.40E+00	1.50E+05	1.40E-08	1.40E-08	2.35E-05	2.35E-05	2.10E-03	3.53E+00	3.53E+00
Metals												
Antimony	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Arsenic	1.00E+00	1	1	1.60E-04	1.50E+00	1.40E-08	1.40E-08	1.49E-09	1.49E-09	2.10E-08	2.24E-09	2.32E-08
Beryllium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Chromium	1.00E+00	NA	NA	6.67E-04	NA	NA	NA	NA	NA	NA	NA	NC
Cobalt	1.00E+00	NA	NA	4.00E-04	NA	NA	NA	NA	NA	NA	NA	NC
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Mercury	1.00E+00	NA	NA	1.67E-03	NA	NA	NA	NA	NA	NA	NA	NC
Nickel	1.00E+00	NA	NA	5.45E-05	NA	NA	NA	NA	NA	NA	NA	NC
Thallium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Vanadium	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC
Zinc	1.00E+00	NA	NA	6.00E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Reference Risk (per mg/L)	Shallow		Leachate					
		O - AA-O-1-16		O		Q		R	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk
VOCs									
1,2-Dichloroethane	5.77E-09	--	NCOPC	--	NCOPC	2.15E+00	1.24E-08	5.00E+01	2.89E-07
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	7.90E+00	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	2.10E-01	NC	7.50E-01	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	1.40E+00	NC	3.20E+01	NC
Benzene	6.47E-09	--	NCOPC	9.20E-01	5.95E-09	4.25E-01	2.75E-09	6.80E+00	4.40E-08
Chlorobenzene	NC	--	NCOPC	1.70E+00	NC	1.15E+00	NC	1.30E+00	NC
Chloroform	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.00E+00	NC
Chloromethane	6.91E-10	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	6.09E-10	--	NCOPC	--	NCOPC	4.70E-02	2.86E-11	1.90E+00	1.16E-09
Tetrachloroethene	2.50E-07	--	NCOPC	--	NCOPC	8.25E-02	2.06E-08	3.30E+01	8.23E-06
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.10E+01	NC
Trichloroethylene	6.53E-08	--	NCOPC	--	NCOPC	2.00E-02	1.31E-09	1.50E+02	9.80E-06
SVOCs									
2,4,6-Trichlorophenol	5.29E-09	--	NCOPC	3.80E-01	2.01E-09	1.25E+01	6.61E-08	--	NCOPC
2,4-Dichlorophenol	NC	--	NCOPC	3.20E-01	NC	1.70E+02	NC	--	NCOPC
2,4-Dimethylphenol	NC	--	NCOPC	--	NCOPC	2.40E-01	NC	--	NCOPC
2-Chlorophenol	NC	--	NCOPC	3.30E-01	NC	7.90E+00	NC	1.10E+01	NC
2-Nitroaniline	NC	--	NCOPC	2.60E-01	NC	1.55E+01	NC	--	NCOPC
3-Methylphenol/4-Methylphenol	NC	--	NCOPC	6.40E-01	NC	1.60E+00	NC	4.50E+00	NC
4-Chloroaniline	NC	--	NCOPC	4.20E+00	NC	9.30E+00	NC	4.20E+01	NC
4-Nitroaniline	NC	--	NCOPC	7.00E-01	NC	1.07E+00	NC	1.60E+01	NC
Benzo(a)pyrene	8.19E-05	1.60E-03	1.31E-07	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(b)fluoranthene	8.19E-06	1.10E-03	9.01E-09	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(g,h,i)perylene	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E+00	NC
Benzo(k)fluoranthene	8.19E-07	1.20E-03	9.82E-10	--	NCOPC	--	NCOPC	--	NCOPC
Dibenzo(a,h)anthracene	1.84E-04	2.70E-03	4.97E-07	--	NCOPC	--	NCOPC	--	NCOPC
Indeno(1,2,3-cd)pyrene	1.30E-05	3.00E-03	3.89E-08	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	NC	--	NCOPC	5.70E-01	NC	1.20E+00	NC	--	NCOPC
Nitrobenzene	NC	--	NCOPC	8.00E-02	NC	1.30E+00	NC	--	NCOPC
Phenol	NC	--	NCOPC	3.80E+00	NC	8.05E+00	NC	1.10E+03	NC
Pesticides									
4,4'-DDT	1.37E-06	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	2.88E-07
beta-BHC	2.94E-07	--	NCOPC	2.50E-03	7.35E-10	1.35E-02	3.97E-09	2.00E-01	5.88E-08
Dieldrin	2.61E-06	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-01	4.97E-07
Endrin Ketone	NC	--	NCOPC	--	NCOPC	3.20E-03	NC	--	NCOPC
gamma-BHC (Lindane)	1.88E-07	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-02	5.27E-09
Heptachlor	5.25E-07	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	1.10E-07

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Reference Risk (per mg/L)	Shallow O - AA-O-1-16		Leachate O		Leachate Q		Leachate R	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk	EPC (mg/L)	Risk
Herbicides									
2,4,5-T	NC	--	NCOPC	4.80E-01	NC	--	NCOPC	--	NCOPC
2,4-D	NC	--	NCOPC	9.30E-01	NC	9.65E+01	NC	3.80E+00	NC
Pentachlorophenol	7.30E-07	--	NCOPC	7.80E-01	5.69E-07	4.60E+00	3.36E-06	--	NCOPC
PCBs									
Total PCBs	1.46E-05	--	NCOPC	5.49E-02	8.02E-07	1.04E-03	1.52E-08	3.98E+00	5.82E-05
Dioxin									
2,3,7,8-TCDD-TEQ	3.53E+00	--	NCOPC	6.87E-07	2.43E-06	--	NCOPC	3.14E-06	1.11E-05
Metals									
Antimony	NC	--	NCOPC	--	NCOPC	1.60E-02	NC	--	NCOPC
Arsenic	2.32E-08	7.00E-02	1.62E-09	--	NCOPC	--	NCOPC	--	NCOPC
Beryllium	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.10E-02	NC
Chromium	NC	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-01	NC
Cobalt	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+00	NC
Lead	NC	1.90E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC
Manganese	NC	4.10E+00	NC	1.80E+01	NC	1.80E+00	NC	2.50E+02	NC
Mercury	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-02	NC
Nickel	NC	--	NCOPC	--	NCOPC	3.10E-01	NC	1.80E+00	NC
Thallium	NC	--	NCOPC	3.70E-03	NC	--	NCOPC	1.20E-01	NC
Vanadium	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	NC
Zinc	NC	--	NCOPC	--	NCOPC	7.45E+00	NC	9.90E+01	NC
	Total:		6.79E-07		3.81E-06		3.48E-06		8.86E-05

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	ADDing MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
VOCs												
1,2-Dichloroethane	1.00E+00	1	1	5.30E-03	2.00E-02	9.78E-07	9.78E-07	3.46E-06	3.46E-06	4.89E-05	1.73E-04	2.22E-04
1,2-Dichloroethene (total)	1.00E+00	1	1	1.00E-02	2.00E-02	9.78E-07	9.78E-07	6.53E-06	6.53E-06	4.89E-05	3.27E-04	3.76E-04
2-Butanone (MEK)	1.00E+00	1	1	1.10E-03	6.00E-01	9.78E-07	9.78E-07	7.19E-07	7.19E-07	1.63E-06	1.20E-06	2.83E-06
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	1	2.77E-03	8.00E-02	9.78E-07	9.78E-07	1.81E-06	1.81E-06	1.22E-05	2.26E-05	3.49E-05
Acetone	1.00E+00	1	1	5.69E-04	1.00E-01	9.78E-07	9.78E-07	3.72E-07	3.72E-07	9.78E-06	3.72E-06	1.35E-05
Benzene	1.00E+00	1	2.13	2.10E-02	4.00E-03	9.78E-07	9.78E-07	2.92E-05	2.92E-05	2.45E-04	7.31E-03	7.55E-03
Chlorobenzene	1.00E+00	1	1	4.10E-02	2.00E-02	9.78E-07	9.78E-07	2.68E-05	2.68E-05	4.89E-05	1.34E-03	1.39E-03
Chloroform	1.00E+00	1	1	6.90E-03	1.00E-02	9.78E-07	9.78E-07	5.62E-06	5.62E-06	9.78E-05	5.62E-04	6.79E-04
Chloromethane	1.00E+00	NA	NA	4.20E-03	NA	NA	NA	NA	NA	NA	NA	NC
Dichloromethane	1.00E+00	1	1.6	4.50E-03	6.00E-02	9.78E-07	9.78E-07	4.70E-06	4.70E-06	1.63E-05	7.84E-05	9.47E-05
Tetrachloroethene	1.00E+00	1	1	4.80E-02	1.00E-02	9.78E-07	9.78E-07	3.14E-05	3.14E-05	9.78E-05	3.14E-03	3.23E-03
Toluene	1.00E+00	1	1	4.50E-02	2.00E-01	9.78E-07	9.78E-07	2.94E-05	2.94E-05	4.89E-06	1.47E-04	1.52E-04
Trichloroethylene	1.00E+00	1	1	1.60E-02	3.00E-04	9.78E-07	9.78E-07	1.05E-05	1.05E-05	3.26E-03	3.46E-02	3.81E-02
SVOCs												
2,4,6-Trichlorophenol	1.00E+00	1	1	5.00E-02	1.00E-04	9.78E-07	9.78E-07	3.27E-05	3.27E-05	9.78E-03	3.27E-01	3.38E-01
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	9.78E-07	9.78E-07	1.50E-05	1.50E-05	3.26E-04	5.01E-03	5.34E-03
2,4-Dimethylphenol	1.00E+00	1	1	1.50E-02	2.00E-02	9.78E-07	9.78E-07	9.80E-06	9.80E-06	4.89E-05	4.90E-04	5.39E-04
2-Chlorophenol	1.00E+00	1	1	1.10E-02	5.00E-03	9.78E-07	9.78E-07	7.19E-06	7.19E-06	1.96E-04	1.44E-03	1.63E-03
2-Nitroaniline	1.00E+00	NA	NA	5.45E-03	NA	NA	NA	NA	NA	NA	NA	NC
3-Methylphenol/4-Methylphenol	1.00E+00	1	1	1.00E-02	5.00E-02	9.78E-07	9.78E-07	6.53E-06	6.53E-06	1.96E-05	1.31E-04	1.50E-04
4-Chloroaniline	1.00E+00	1	1	6.33E-03	4.00E-03	9.78E-07	9.78E-07	4.13E-06	4.13E-06	2.45E-04	1.03E-03	1.28E-03
4-Nitroaniline	1.00E+00	1	1	2.66E-03	3.00E-03	9.78E-07	9.78E-07	1.74E-06	1.74E-06	3.26E-04	5.79E-04	9.05E-04
Benzo(a)pyrene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(b)fluoranthene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Benzo(g,h,i)perylene	1.00E+00	1	1	5.34E+00	3.00E-02	9.78E-07	9.78E-07	3.49E-03	3.49E-03	3.26E-05	1.16E-01	1.16E-01
Benzo(k)fluoranthene	1.00E+00	NA	NA	1.20E+00	NA	NA	NA	NA	NA	NA	NA	NC
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	2.70E+00	NA	NA	NA	NA	NA	NA	NA	NC
Indeno(1,2,3-cd)pyrene	1.00E+00	NA	NA	1.90E+00	NA	NA	NA	NA	NA	NA	NA	NC
Naphthalene	1.00E+00	1	1	6.90E-02	2.00E-02	9.78E-07	9.78E-07	4.51E-05	4.51E-05	4.89E-05	2.25E-03	2.30E-03
Nitrobenzene	1.00E+00	1	1	6.98E-03	5.00E-04	9.78E-07	9.78E-07	4.55E-06	4.55E-06	1.96E-03	9.10E-03	1.11E-02
Phenol	1.00E+00	1	1	5.50E-03	3.00E-01	9.78E-07	9.78E-07	3.59E-06	3.59E-06	3.26E-06	1.20E-05	1.52E-05
Pesticides												
4,4'-DDT	1.00E+00	1	1	4.30E-01	5.00E-04	9.78E-07	9.78E-07	2.81E-04	2.81E-04	1.96E-03	5.62E-01	5.64E-01
beta-BHC	1.00E+00	1	1	1.60E-02	3.00E-04	9.78E-07	9.78E-07	1.05E-05	1.05E-05	3.26E-03	3.46E-02	3.81E-02
Dieldrin	1.00E+00	1	1	1.60E-02	5.00E-05	9.78E-07	9.78E-07	1.05E-05	1.05E-05	1.96E-02	2.09E-01	2.29E-01
Endrin Ketone	1.00E+00	1	1	1.60E-02	3.00E-04	9.78E-07	9.78E-07	1.05E-05	1.05E-05	3.26E-03	3.46E-02	3.81E-02
gamma-BHC (Lindane)	1.00E+00	1	1	1.40E-02	3.00E-04	9.78E-07	9.78E-07	9.15E-06	9.15E-06	3.26E-03	3.05E-02	3.38E-02
Heptachlor	1.00E+00	1	1	1.10E-02	5.00E-04	9.78E-07	9.78E-07	7.19E-06	7.19E-06	1.96E-03	1.44E-02	1.63E-02
Herbicides												
2,4,5-T	1.00E+00	1	1	1.40E-04	1.00E-02	9.78E-07	9.78E-07	9.18E-08	9.18E-08	9.78E-05	9.18E-06	1.07E-04
2,4-D	1.00E+00	1	1	6.45E-03	1.00E-02	9.78E-07	9.78E-07	5.52E-06	5.52E-06	9.78E-05	5.52E-04	6.50E-04
Pentachlorophenol	1.00E+00	1	1	6.50E-01	3.00E-02	9.78E-07	9.78E-07	4.25E-04	4.25E-04	3.26E-05	1.42E-02	1.42E-02

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	MLE Construction/Utility Worker ADDing (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	MLE Construction/Utility Worker ADDder (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
PCBs												
Total PCBs	1.00E+00	1	1.1	7.10E-01	2.00E-05	9.78E-07	9.78E-07	5.10E-04	5.10E-04	4.89E-02	2.55E+01	2.56E+01
Dioxin												
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	1.40E+00	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Antimony	1.00E+00	1	6.7	1.60E-04	4.00E-04	9.78E-07	9.78E-07	7.00E-07	7.00E-07	2.45E-03	1.75E-03	4.20E-03
Arsenic	1.00E+00	1	1	1.60E-04	3.00E-04	9.78E-07	9.78E-07	1.05E-07	1.05E-07	3.26E-03	3.48E-04	3.61E-03
Beryllium	1.00E+00	1	100	1.60E-04	2.00E-03	9.78E-07	9.78E-07	1.05E-05	1.05E-05	4.89E-04	5.23E-03	5.72E-03
Chromium	1.00E+00	1	40	6.67E-04	3.00E-03	9.78E-07	9.78E-07	1.74E-05	1.74E-05	3.26E-04	5.81E-03	6.14E-03
Cobalt	1.00E+00	1	1	4.00E-04	2.00E-02	9.78E-07	9.78E-07	2.61E-07	2.61E-07	4.89E-05	1.31E-05	6.20E-05
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.60E-04	2.40E-02	9.78E-07	9.78E-07	1.05E-06	1.05E-06	4.08E-05	4.36E-05	8.43E-05
Mercury	1.00E+00	2	13.7	1.67E-03	3.00E-04	1.96E-06	1.96E-06	1.49E-05	1.49E-05	6.52E-03	4.98E-02	5.64E-02
Nickel	1.00E+00	1	77	5.45E-05	2.00E-02	9.78E-07	9.78E-07	2.74E-06	2.74E-06	4.89E-05	1.37E-04	1.86E-04
Thallium	1.00E+00	1	1	1.60E-04	6.67E-05	9.78E-07	9.78E-07	1.05E-07	1.05E-07	1.47E-02	1.57E-03	1.62E-02
Vanadium	1.00E+00	1	10	1.60E-04	7.00E-03	9.78E-07	9.78E-07	1.05E-06	1.05E-06	1.40E-04	1.49E-04	2.89E-04
Zinc	1.00E+00	1.6	3.03	6.00E-04	3.00E-01	1.57E-06	1.57E-06	1.19E-06	1.19E-06	5.22E-06	3.96E-06	9.18E-06

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

	Reference	Shallow		Leachate					
	HQ	O - AA-O-1-16		O		Q		R	
Constituent	(per mg/L)	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ
VOCs									
1,2-Dichloroethane	2.22E-04	--	NCOPC	--	NCOPC	2.15E+00	4.77E-04	5.00E+01	1.11E-02
1,2-Dichloroethene (total)	3.76E-04	--	NCOPC	--	NCOPC	--	NCOPC	1.30E+01	4.88E-03
2-Butanone (MEK)	2.83E-06	--	NCOPC	--	NCOPC	--	NCOPC	7.90E+00	2.23E-05
4-Methyl-2-pentanone (MIBK)	3.49E-05	--	NCOPC	2.10E-01	7.32E-06	7.50E-01	2.61E-05	--	NCOPC
Acetone	1.35E-05	--	NCOPC	--	NCOPC	1.40E+00	1.89E-05	3.20E+01	4.32E-04
Benzene	7.55E-03	--	NCOPC	9.20E-01	6.95E-03	4.25E-01	3.21E-03	6.80E+00	5.14E-02
Chlorobenzene	1.39E-03	--	NCOPC	1.70E+00	2.36E-03	1.15E+00	1.60E-03	1.30E+00	1.80E-03
Chloroform	6.79E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.00E+00	1.36E-03
Chloromethane	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	9.47E-05	--	NCOPC	--	NCOPC	4.70E-02	4.45E-06	1.90E+00	1.80E-04
Tetrachloroethene	3.23E-03	--	NCOPC	--	NCOPC	8.25E-02	2.67E-04	3.30E+01	1.07E-01
Toluene	1.52E-04	--	NCOPC	--	NCOPC	--	NCOPC	2.10E+01	3.19E-03
Trichloroethylene	3.81E-02	--	NCOPC	--	NCOPC	2.00E-02	7.62E-04	1.50E+02	5.72E+00
SVOCs									
2,4,6-Trichlorophenol	3.36E-01	--	NCOPC	3.80E-01	1.28E-01	1.25E+01	4.21E+00	--	NCOPC
2,4-Dichlorophenol	5.34E-03	--	NCOPC	3.20E-01	1.71E-03	1.70E+02	9.07E-01	--	NCOPC
2,4-Dimethylphenol	5.39E-04	--	NCOPC	--	NCOPC	2.40E-01	1.29E-04	--	NCOPC
2-Chlorophenol	1.63E-03	--	NCOPC	3.30E-01	5.39E-04	7.90E+00	1.29E-02	1.10E+01	1.80E-02
2-Nitroaniline	NC	--	NCOPC	2.60E-01	NC	1.55E+01	NC	--	NCOPC
3-Methylphenol/4-Methylphenol	1.50E-04	--	NCOPC	6.40E-01	9.62E-05	1.60E+00	2.40E-04	4.50E+00	6.76E-04
4-Chloroaniline	1.28E-03	--	NCOPC	4.20E+00	5.37E-03	9.30E+00	1.19E-02	4.20E+01	5.37E-02
4-Nitroaniline	9.05E-04	--	NCOPC	7.00E-01	6.33E-04	1.07E+00	9.68E-04	1.80E+01	1.63E-02
Benzo(a)pyrene	NC	1.60E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(b)fluoranthene	NC	1.10E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Benzo(g,h,i)perylene	1.16E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.40E+00	1.63E-01
Benzo(k)fluoranthene	NC	1.20E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Dibenzo(a,h)anthracene	NC	2.70E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Indeno(1,2,3-cd)pyrene	NC	3.00E-03	NC	--	NCOPC	--	NCOPC	--	NCOPC
Naphthalene	2.30E-03	--	NCOPC	5.70E-01	1.31E-03	1.20E+00	2.76E-03	--	NCOPC
Nitrobenzene	1.11E-02	--	NCOPC	8.00E-02	8.84E-04	1.30E+00	1.44E-02	--	NCOPC
Phenol	1.52E-05	--	NCOPC	3.60E+00	5.79E-05	8.05E+00	1.23E-04	1.10E+03	1.68E-02
Pesticides									
4,4'-DDT	5.64E-01	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	1.18E-01
beta-BHC	3.81E-02	--	NCOPC	2.50E-03	9.53E-05	1.35E-02	5.14E-04	2.00E-01	7.62E-03
Dieldrin	2.29E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.90E-01	4.34E-02
Endrin Ketone	3.81E-02	--	NCOPC	--	NCOPC	3.20E-03	1.22E-04	--	NCOPC
gamma-BHC (Lindane)	3.38E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.80E-02	9.45E-04
Heptachlor	1.63E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.10E-01	3.43E-03

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT
SHALLOW GROUNDWATER AND LEACHATE
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Reference HQ (per mg/L)	Shallow		Leachate					
		O - AA-O-1-16		O		Q		R	
		EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ	EPC (mg/L)	HQ
Herbicides									
2,4,5-T	1.07E-04	--	NCOPC	4.80E-01	5.14E-05	--	NCOPC	--	NCOPC
2,4-D	6.50E-04	--	NCOPC	9.30E-01	6.04E-04	9.65E+01	6.27E-02	3.80E+00	2.47E-03
Pentachlorophenol	1.42E-02	--	NCOPC	7.80E-01	1.11E-02	4.60E+00	6.53E-02	--	NCOPC
PCBs									
Total PCBs	2.56E+01	--	NCOPC	5.49E-02	1.40E+00	1.04E-03	2.67E-02	3.98E+00	1.02E+02
Dioxin									
2,3,7,8-TCDD-TEQ	NC	--	NCOPC	6.87E-07	NC	--	NCOPC	3.14E-06	NC
Metals									
Antimony	4.20E-03	--	NCOPC	--	NCOPC	1.60E-02	6.72E-05	--	NCOPC
Arsenic	3.61E-03	7.00E-02	2.53E-04	--	NCOPC	--	NCOPC	--	NCOPC
Beryllium	5.72E-03	--	NCOPC	--	NCOPC	--	NCOPC	3.10E-02	1.77E-04
Chromium	6.14E-03	--	NCOPC	--	NCOPC	--	NCOPC	6.00E-01	3.68E-03
Cobalt	6.20E-05	--	NCOPC	--	NCOPC	--	NCOPC	2.60E+00	1.61E-04
Lead	NC	1.90E-02	NC	--	NCOPC	--	NCOPC	--	NCOPC
Manganese	8.43E-05	4.10E+00	3.46E-04	1.80E+01	1.52E-03	1.80E+00	1.52E-04	2.50E+02	2.11E-02
Mercury	5.64E-02	--	NCOPC	--	NCOPC	--	NCOPC	1.30E-02	7.33E-04
Nickel	1.86E-04	--	NCOPC	--	NCOPC	3.10E-01	5.77E-05	1.80E+00	3.35E-04
Thallium	1.62E-02	--	NCOPC	3.70E-03	6.01E-05	--	NCOPC	1.20E-01	1.95E-03
Vanadium	2.89E-04	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	1.04E-04
Zinc	9.18E-06	--	NCOPC	--	NCOPC	7.45E+00	6.84E-05	9.90E+01	9.09E-04
	Total HI:		**5.98E-04**		**1.56E+00**		**5.32E+00**		**1.08E+02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Construction/Utility Worker

ASSUMPTIONS FOR CONSTRUCTION/UTILITY WORKER - MLE INHALATION OF VOCs IN EXCAVATION TRENCH AIR		Assumed Value	Units	Calculated Value
Inhalation Rate	MLE Construction/Utility Worker	1.5	(m^3 air/hour)	
Body Weight	MLE Construction/Utility Worker	70	(kg)	
Exposure Time	MLE Construction/Utility Worker	8	(hrs/day) =	8.00E+00
Exposure Frequency	MLE Construction/Utility Worker	20	(days)/365 (days) =	5.48E-02
Exposure Duration (cancer)	MLE Construction/Utility Worker	1	(yrs)/70(yrs) =	1.43E-02
Exposure Duration (noncancer)	MLE Construction/Utility Worker	1	(yrs)/1(yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INHALATION OF VOCs IN
EXCAVATION TRENCH AIR
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDinh MLE Construction/Utility Worker (mg/kg-day)	Lifetime Average Daily Dose - Inh. (mg/kg-day)	Excess Lifetime Cancer Risk - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	9.10E-02	1.34E-04	1.34E-04	1.22E-05
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	NA	NA	NA	NA	NC
4-Methyl-2-pentanone (MIBK)	1.00E+00	NA	NA	NA	NA	NC
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	7.70E-03	1.34E-04	1.34E-04	1.03E-06
Chlorobenzene	1.00E+00	NA	NA	NA	NA	NC
Chloroform	1.00E+00	0.66	8.05E-02	8.86E-05	8.86E-05	7.13E-06
Chloromethane	1.00E+00	1	6.30E-03	1.34E-04	1.34E-04	8.45E-07
Dichloromethane	1.00E+00	1	1.65E-03	1.34E-04	1.34E-04	2.21E-07
Tetrachloroethene	1.00E+00	1	2.10E-02	1.34E-04	1.34E-04	2.82E-06
Toluene	1.00E+00	NA	NA	NA	NA	NC
Trichloroethylene	1.00E+00	1	4.00E-01	1.34E-04	1.34E-04	5.37E-05

TABLE
POTENTIAL CARCINOGENIC RISK
CONSTRUCTION/UTILITY WORKER - MLE
EXCAVATION TRENCH AIR

Constituent	Reference Risk (per mg/m^3)	Shallow		Leachate					
		O - AA-O-1-16		O		Q		R	
		EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk	EPC (mg/m^3)	Risk
VOCs									
1,2-Dichloroethane	1.22E-05	--	NCOPC	--	NCOPC	5.78E-02	7.06E-07	1.35E+00	1.64E-05
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.86E-01	NC
2-Butanone (MEK)	NC	--	NCOPC	--	NCOPC	--	NCOPC	1.69E-01	NC
4-Methyl-2-pentanone (MIBK)	NC	--	NCOPC	4.51E-03	NC	1.61E-02	NC	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	2.98E-02	NC	6.81E-01	NC
Benzene	1.03E-06	--	NCOPC	2.49E-02	2.57E-08	1.15E-02	1.19E-08	1.84E-01	1.90E-07
Chlorobenzene	NC	--	NCOPC	4.24E-02	NC	2.37E-02	NC	3.25E-02	NC
Chloroform	7.13E-06	--	NCOPC	--	NCOPC	--	NCOPC	5.48E-02	3.91E-07
Chloromethane	8.45E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	2.21E-07	--	NCOPC	--	NCOPC	1.42E-03	3.15E-10	5.76E-02	1.27E-08
Tetrachloroethene	2.82E-06	--	NCOPC	--	NCOPC	1.99E-03	5.60E-09	7.95E-01	2.24E-06
Toluene	NC	--	NCOPC	--	NCOPC	--	NCOPC	5.22E-01	NC
Trichloroethylene	5.37E-05	--	NCOPC	--	NCOPC	5.16E-04	2.77E-06	3.87E+00	2.08E-04
	Total:		NCOPC		2.57E-08		7.52E-07		2.27E-04

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INHALATION OF VOCs IN
EXCAVATION TRENCH AIR
CONSTRUCTION/UTILITY WORKER - MLE

Constituent	Unit Concentration In Air (mg/m^3 air)	Inhalation Absorption Adjustment Factor	Inhalation Reference Dose (mg/kg-day)	ADDinh MLE Construction/Utility Worker (mg/kg-day)	Chronic Average Daily Dose-Inh (mg/kg-day)	Hazard Index - Inhalation
VOCs						
1,2-Dichloroethane	1.00E+00	1	5.00E-03	9.39E-03	9.39E-03	1.88E+00
1,2-Dichloroethene (total)	1.00E+00	NA	NA	NA	NA	NC
2-Butanone (MEK)	1.00E+00	1	1.00E+00	9.39E-03	9.39E-03	9.39E-03
4-Methyl-2-pentanone (MIBK)	1.00E+00	1	3.00E+00	9.39E-03	9.39E-03	3.13E-03
Acetone	1.00E+00	NA	NA	NA	NA	NC
Benzene	1.00E+00	1	3.00E-02	9.39E-03	9.39E-03	3.13E-01
Chlorobenzene	1.00E+00	1	6.00E-02	9.39E-03	9.39E-03	1.57E-01
Chloroform	1.00E+00	1	5.00E-02	9.39E-03	9.39E-03	1.88E-01
Chloromethane	1.00E+00	1	9.00E-02	9.39E-03	9.39E-03	1.04E-01
Dichloromethane	1.00E+00	1	3.00E+00	9.39E-03	9.39E-03	3.13E-03
Tetrachloroethene	1.00E+00	1	6.00E-01	9.39E-03	9.39E-03	1.57E-02
Toluene	1.00E+00	1	4.00E-01	9.39E-03	9.39E-03	2.35E-02
Trichloroethylene	1.00E+00	1	4.00E-02	9.39E-03	9.39E-03	2.35E-01

TABLE
POTENTIAL HAZARD QUOTIENT
CONSTRUCTION/UTILITY WORKER - MLE
EXCAVATION TRENCH AIR

Constituent	Reference HQ (per mg/m^3)	Shallow		Leachate					
		O - AA-O-1-16		O		Q		R	
		EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ	EPC (mg/m^3)	HQ
VOCs									
1,2-Dichloroethane	1.88E+00	--	NCOPC	--	NCOPC	5.78E-02	1.09E-01	1.35E+00	2.53E+00
1,2-Dichloroethene (total)	NC	--	NCOPC	--	NCOPC	--	NCOPC	3.86E-01	NC
2-Butanone (MEK)	9.39E-03	--	NCOPC	--	NCOPC	--	NCOPC	1.69E-01	1.59E-03
4-Methyl-2-pentanone (MIBK)	3.13E-03	--	NCOPC	4.51E-03	1.41E-05	1.61E-02	5.04E-05	--	NCOPC
Acetone	NC	--	NCOPC	--	NCOPC	2.98E-02	NC	6.81E-01	NC
Benzene	3.13E-01	--	NCOPC	2.49E-02	7.80E-03	1.15E-02	3.60E-03	1.84E-01	5.77E-02
Chlorobenzene	1.57E-01	--	NCOPC	4.24E-02	6.65E-03	2.87E-02	4.50E-03	3.25E-02	5.08E-03
Chloroform	1.88E-01	--	NCOPC	--	NCOPC	--	NCOPC	5.48E-02	1.03E-02
Chloromethane	1.04E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC
Dichloromethane	3.13E-03	--	NCOPC	--	NCOPC	1.42E-03	4.46E-06	5.76E-02	1.80E-04
Tetrachloroethene	1.57E-02	--	NCOPC	--	NCOPC	1.99E-03	3.11E-05	7.95E-01	1.25E-02
Toluene	2.35E-02	--	NCOPC	--	NCOPC	--	NCOPC	5.22E-01	1.23E-02
Trichloroethylene	2.35E-01	--	NCOPC	--	NCOPC	5.16E-04	1.21E-04	3.87E+00	9.09E-01
Total HI:			**NCOPC**		**1.45E-02**		**1.17E-01**		**3.64E+00**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
VOCs - Volatile Organic Compounds.

Recreational Fisher

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated	
Receptor:	RME Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER - RME INCIDENTIAL INGESTION AND DERMAL CONTACT SEDIMENT		Assumed Value	Units	Calculated Value
Sediment Ingestion Rate	RME Recreational Fisher	100	(mg soil/day)	
Sediment on Skin	RME Recreational Fisher	1	(mg/cm^2)	
Skin Exposed	RME Recreational Fisher	6934	(cm^2)	
Body Weight	RME Recreational Fisher	70	(kg)	
Exposure Frequency	RME Recreational Fisher	22	(days)/365(days) =	6.03E-02
Exposure Duration (cancer)	RME Recreational Fisher	30	(years)/70(years) =	4.29E-01
Exposure Duration (noncancer)	RME Recreational Fisher	30	(yrs)/30(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
RECREATIONAL FISHER - RME

Constituant	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Metals											
Arsenic	3.41E+00	0.3	0.001	1.50E+00	3.78E-08	3.76E-08	8.73E-09	8.73E-09	5.66E-08	1.31E-08	6.97E-08
								Total:	5.66E-08	1.31E-08	6.97E-08

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
RECREATIONAL FISHER - RME

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Metals											
Arsenic	3.41E+00	0.3	0.001	3.00E-04	8.81E-08	8.81E-08	2.04E-08	2.04E-08	2.94E-04	6.79E-05	3.62E-04
								Total:	2.94E-04	6.79E-05	3.62E-04

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER - RME INCIDENTAL INGESTION AND DERMAL CONTACT OF SURFACE WATER		Assumed Value	Units	Calculated Value
Water Ingestion Rate	RME Recreational Fisher	0.01	(l/day)	
Skin Exposed	RME Recreational Fisher	6934	(cm^2)	
Body Weight	RME Recreational Fisher	70	(kg)	
Exposure Time (dermal route only)	RME Recreational Fisher	1	(hr/day)	
Exposure Frequency	RME Recreational Fisher	22	(days)/365 (days) =	6.03E-02
Exposure Duration (cancer)	RME Recreational Fisher	30	(yrs)/ 70(yrs) =	4.29E-01
Exposure Duration (noncancer)	RME Recreational Fisher	30	(yrs)/ 30(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
RECREATIONAL FISHER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs												
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
Herbicides												
MCPA	1.00E+00	NA	NA	2.31E-02	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	1.56E-02	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
RECREATIONAL FISHER - RME

Constituent	Reference Risk (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk
SVOCs					
2,4-Dichlorophenol	NC	--	NCOPC	8.95E-03	NC
4-Chloroaniline	NC	--	NCOPC	1.90E-02	NC
Herbicides					
MCPA	NC	--	NCOPC	3.10E-02	NC
MCPP	NC	--	NCOPC	5.30E-02	NC
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	NC	4.60E-01	NC	--	NCOPC
	Total:		**NC**		**NC**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
RECREATIONAL FISHER - RME

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	ADDing RME Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder RME Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs												
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	8.61E-06	8.61E-06	1.37E-04	1.37E-04	2.87E-03	4.58E-02	4.86E-02
4-Chloroaniline	1.00E+00	1	1	8.33E-03	4.00E-03	8.61E-06	8.61E-06	3.78E-05	3.78E-05	2.15E-03	9.44E-03	1.16E-02
Herbicides												
MCPA	1.00E+00	1	1	2.31E-02	5.00E-04	8.61E-06	8.61E-06	1.38E-04	1.38E-04	1.72E-02	2.76E-01	2.93E-01
MCPP	1.00E+00	1	1	1.56E-02	1.00E-03	8.61E-06	8.61E-06	9.31E-05	9.31E-05	8.61E-03	9.31E-02	1.02E-01
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.60E-04	2.40E-02	8.61E-06	8.61E-06	9.55E-06	9.55E-06	3.59E-04	3.98E-04	7.57E-04

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT OF
SURFACE WATER
RECREATIONAL FISHER - RME

Constituent	Reference HQ (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	HQ	EPC (mg/L)	HQ
SVOCs					
2,4-Dichlorophenol	4.86E-02	--	NCOPC	8.95E-03	4.35E-04
4-Chloroaniline	1.16E-02	--	NCOPC	1.90E-02	2.21E-04
Herbicides					
MCPA	2.93E-01	--	NCOPC	3.10E-02	9.09E-03
MCPP	1.02E-01	--	NCOPC	5.30E-02	5.39E-03
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	7.57E-04	4.60E-01	3.48E-04	--	NCOPC
	Total HI:		**3.48E-04**		**1.51E-02**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
RME

Receptors Evaluated:	
Receptor:	RME Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER - RME INGESTION OF FISH		Assumed Value	Units	Calculated Value
Fish Ingestion Rate	RME Recreational Fisher	0.008	(kg fish/day)	
Body Weight	RME Recreational Fisher	70	(kg)	
Exposure Frequency	RME Recreational Fisher	365	(days)/ 365 (days) =	1.00E+00
Exposure Duration (cancer)	RME Recreational Fisher	30	(yrs)/ 70 (yrs) =	4.29E-01
Exposure Duration (noncancer)	RME Recreational Fisher	30	(yrs)/ 30 (yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INGESTION OF FISH
RECREATIONAL FISHER - RME

Constituent	Fish Fillet Concentration (mg/kg)	Oral - Diet Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose (mg/kg-day)	Excess Lifetime Cancer Risk
SVOCs						
Benzo(a)anthracene	1.00E+00	1	7.30E-01	4.90E-05	4.90E-05	3.58E-05
Benzo(a)pyrene	1.00E+00	1	7.30E+00	4.90E-05	4.90E-05	3.58E-04
bis(2-Ethylhexyl)phthalate	1.00E+00	1	1.40E-02	4.90E-05	4.90E-05	6.86E-07
Dibenzo(a,h)anthracene	1.00E+00	1	7.30E+00	4.90E-05	4.90E-05	3.58E-04
Pesticides						
4,4'-DDE	1.00E+00	1	3.40E-01	4.90E-05	4.90E-05	1.67E-05
4,4'-DDT	1.00E+00	1	3.40E-01	4.90E-05	4.90E-05	1.67E-05
alpha-Chlordane	1.00E+00	1	3.50E-01	4.90E-05	4.90E-05	1.71E-05
beta-BHC	1.00E+00	1	1.80E+00	4.90E-05	4.90E-05	8.82E-05
Dieldrin	1.00E+00	1	1.60E+01	4.90E-05	4.90E-05	7.84E-04
PCBs						
Total PCBs	1.00E+00	1	2.00E+00	4.90E-05	4.90E-05	9.80E-05
Dioxin						
2,3,7,8-TCDD-TEQ	1.00E+00	1	1.50E+05	4.90E-05	4.90E-05	7.35E+00
Metals						
Arsenic	1.00E+00	1	1.50E+00	4.90E-05	4.90E-05	7.35E-05
Mercury	1.00E+00	NA	NA	NA	NC	NC

TABLE
POTENTIAL CARCINOGENIC RISK
SAUGET AREA 2 RI/FS
RECREATIONAL FISHER - RME
INGESTION OF FISH

Constituent	Reference Risk (per mg/kg)	DDA Buffalo Fillet EPC (mg/kg)	DDA Buffalo Fillet Risk	PDA Buffalo Fillet EPC (mg/kg)	PDA Buffalo Fillet Risk	UDA Buffalo Fillet EPC (mg/kg)	UDA Buffalo Fillet Risk	Pond (Site Q) Black Bullhead Fillet EPC (mg/kg)	Pond (Site Q) Black Bullhead Fillet Risk	Pond (Site Q) Carp Fillet EPC (mg/kg)	Pond (Site Q) Carp Fillet Risk
SVOCs											
Benzo(a)anthracene	3.58E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	5.01E-06
Benzo(a)pyrene	3.58E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E-01	6.44E-05
bis(2-Ethylhexyl)phthalate	6.86E-07	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-01	3.43E-07
Dibenzo(a,h)anthracene	3.58E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	5.01E-05
Pesticides											
4,4'-DDE	1.67E-05	--	NCOPC	--	NCOPC	1.70E-02	2.83E-07	--	NCOPC	--	NCOPC
4,4'-DDT	1.67E-05	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	6.00E-06	3.30E-01	5.50E-06
alpha-Chlordane	1.71E-05	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-02	1.71E-07	1.60E-02	2.74E-07
beta-BHC	8.82E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-02	1.50E-06
Dieldrin	7.84E-04	--	NCOPC	--	NCOPC	8.10E-03	6.35E-06	1.00E-01	7.84E-05	1.90E-01	1.49E-04
PCBs											
Total PCBs	9.80E-05	--	NCOPC	--	NCOPC	--	NCOPC	3.87E+00	3.79E-04	1.00E+01	9.80E-04
Dioxin											
2,3,7,8-TCDD-TEQ	7.35E+00	7.39E-07	5.43E-06	6.25E-07	4.59E-06	4.57E-06	3.36E-05	3.84E-06	2.82E-05	1.84E-05	1.35E-04
Metals											
Arsenic	7.35E-05	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-01	5.73E-05	8.20E-01	6.02E-05
Mercury	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-01	NC	7.10E-02	NC
	Total:		**5.43E-06**		**4.59E-06**		**4.02E-05**		**5.49E-04**		**1.45E-03**

Notes:
-- Not a constituent of potential concern in this area/medium.
DDA - Downstream Discharge Area (Mississippi River).
EPC - Exposure Point Concentration.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
PDA - Plume Discharge Area (Mississippi River).
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
UDA - Upstream Discharge Area (Mississippi River).

SAUGET AREA 2 RI/FS
POTENTIAL HAZARD INDEX
INGESTION OF FISH
RECREATIONAL FISHER - RME

Constituent	Fish Fillet Concentration (mg/kg)	Oral - Diet Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing RME Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose (mg/kg-day)	Excess Lifetime Hazard Index
SVOCs						
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NC	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NC	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	1	2.00E-02	1.14E-04	1.14E-04	5.71E-03
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NC	NC
Pesticides						
4,4'-DDE	1.00E+00	1	5.00E-04	1.14E-04	1.14E-04	2.29E-01
4,4'-DDT	1.00E+00	1	5.00E-04	1.14E-04	1.14E-04	2.29E-01
alpha-Chlordane	1.00E+00	1	5.00E-04	1.14E-04	1.14E-04	2.29E-01
beta-BHC	1.00E+00	1	3.00E-04	1.14E-04	1.14E-04	3.81E-01
Dieldrin	1.00E+00	1	5.00E-05	1.14E-04	1.14E-04	2.29E+00
PCBs						
Total PCBs	1.00E+00	1	2.00E-05	1.14E-04	1.14E-04	5.71E+00
Dioxin						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NC	NC
Metals						
Arsenic	1.00E+00	1	3.00E-04	1.14E-04	1.14E-04	3.81E-01
Mercury	1.00E+00	2	3.00E-04	2.29E-04	2.29E-04	7.62E-01

TABLE
POTENTIAL HAZARD INDEX
SAUGET AREA 2 RI/FS
RECREATIONAL FISHER - RME
INGESTION OF FISH

Constituent	Reference HQ (per mg/kg)	DDA Buffalo Fillet EPC (mg/kg)	DDA Buffalo Fillet HQ	PDA Buffalo Fillet EPC (mg/kg)	PDA Buffalo Fillet HQ	UDA Buffalo Fillet EPC (mg/kg)	UDA Buffalo Fillet HQ	Pond (Site Q) Black Bullhead Fillet EPC (mg/kg)	Pond (Site Q) Black Bullhead Fillet HQ	Pond (Site Q) Carp Fillet EPC (mg/kg)	Pond (Site Q) Carp Fillet HQ
SVOCs											
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E-01	NC
bis(2-Ethylhexyl)phthalate	5.71E-03	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-01	2.86E-03
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	NC
Pesticides											
4,4'-DDE	2.29E-01	--	NCOPC	--	NCOPC	1.70E-02	3.89E-03	--	NCOPC	--	NCOPC
4,4'-DDT	2.29E-01	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	8.23E-02	3.30E-01	7.54E-02
alpha-Chlordane	2.29E-01	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-02	2.29E-03	1.60E-02	3.66E-03
beta-BHC	3.81E-01	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-02	6.48E-03
Dieldrin	2.29E+00	--	NCOPC	--	NCOPC	8.10E-03	1.85E-02	1.00E-01	2.29E-01	1.90E-01	4.34E-01
PCBs											
Total PCBs	5.71E+00	--	NCOPC	--	NCOPC	--	NCOPC	3.87E+00	2.21E+01	1.00E+01	5.71E+01
Dioxin											
2,3,7,8-TCDD-TEQ	NC	7.39E-07	NC	6.25E-07	NC	4.57E-06	NC	3.84E-06	NC	1.84E-05	NC
Metals											
Arsenic	3.81E-01	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-01	2.97E-01	8.20E-01	3.12E-01
Mercury	7.62E-01	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-01	1.90E-01	7.10E-02	5.41E-02
	Total HI:		**NC**		**NC**		**2.24E-02**		**2.29E+01**		**5.80E+01**

Notes:
-- Not a constituent of potential concern in this area/medium.
DDA - Downstream Discharge Area (Mississippi River).
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
PDA - Plume Discharge Area (Mississippi River).
RME - Reasonable Maximum Exposure.
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
UDA - Upstream Discharge Area (Mississippi River).

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated	
Receptor:	MLE Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER - MLE INCIDENTIAL INGESTION AND DERMAL CONTACT SEDIMENT		Assumed Value	Units	Calculated Value
Sediment Ingestion Rate	MLE Recreational Fisher	50	(mg soil/day)	
Sediment on Skin	MLE Recreational Fisher	1	(mg/cm^2)	
Skin Exposed	MLE Recreational Fisher	6934	(cm^2)	
Body Weight	MLE Recreational Fisher	70	(kg)	
Exposure Frequency	MLE Recreational Fisher	3	(days)/365(days) =	8.22E-03
Exposure Duration (cancer)	MLE Recreational Fisher	9	(years)/70(years) =	1.29E-01
Exposure Duration (noncancer)	MLE Recreational Fisher	9	(yrs)/9(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor		1.00E-06	(kg/mg)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
RECREATIONAL FISHER - MLE

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
Metals											
Arsenic	2.90E+00	0.3	0.001	1.50E+00	6.58E-10	6.58E-10	3.04E-10	3.04E-10	9.87E-10	4.56E-10	1.44E-09
								Total:	9.87E-10	4.56E-10	1.44E-09

SAUGET AREA 2 RI/FS
NONCARCINOGENIC HAZARD INDEX
INCIDENTIAL INGESTION AND DERMAL CONTACT
SEDIMENT
RECREATIONAL FISHER - MLE

Constituent	Concentration In Sediment (mg/kg)	Oral - Soil Absorption Adjustment Factor	Dermal - Soil Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
Metals											
Arsenic	2.90E+00	0.3	0.001	3.00E-04	5.12E-09	5.12E-09	2.36E-09	2.36E-09	1.71E-05	7.88E-06	2.49E-05
								Total:	1.71E-05	7.88E-06	2.49E-05

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER - MLE INCIDENTAL INGESTION AND DERMAL CONTACT SURFACE WATER		Assumed Value	Units	Calculated Value
Water Ingestion Rate	MLE Recreational Fisher	0.005	(l/day)	
Skin Exposed	MLE Recreational Fisher	6934	(cm^2)	
Body Weight	MLE Recreational Fisher	70	(kg)	
Exposure Time (dermal route only)	MLE Recreational Fisher	1	(hr/day)	
Exposure Frequency	MLE Recreational Fisher	3	(days)/365 (days) =	8.22E-03
Exposure Duration (cancer)	MLE Recreational Fisher	9	(yrs)/ 70(yrs) =	1.29E-01
Exposure Duration (noncancer)	MLE Recreational Fisher	9	(yrs)/ 9(yrs) =	1.00E+00
Lifetime		70	(years)	
Unit Conversion Factor (dermal route only)		0.001	(l/cm^3)	

SAUGET AREA 2 RI/FS
CARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
RECREATIONAL FISHER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose-Der. (mg/kg-day)	Excess Lifetime Cancer Risk - Ingestion	Excess Lifetime Cancer Risk - Dermal Contact	Total Excess Lifetime Cancer Risk
SVOCs												
2,4-Dichlorophenol	1.00E+00	NA	NA	2.30E-02	NA	NA	NA	NA	NA	NA	NA	NC
4-Chloroaniline	1.00E+00	NA	NA	6.33E-03	NA	NA	NA	NA	NA	NA	NA	NC
Herbicides												
MCPA	1.00E+00	NA	NA	2.31E-02	NA	NA	NA	NA	NA	NA	NA	NC
MCPP	1.00E+00	NA	NA	1.56E-02	NA	NA	NA	NA	NA	NA	NA	NC
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	NA	NA	1.60E-04	NA	NA	NA	NA	NA	NA	NA	NC

TABLE
POTENTIAL CARCINOGENIC RISK
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
RECREATIONAL FISHER - MLE

Constituent	Reference Risk (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	Risk	EPC (mg/L)	Risk
SVOCs					
2,4-Dichlorophenol	NC	--	NCOPC	6.01E-03	NC
4-Chloroaniline	NC	--	NCOPC	1.22E-02	NC
Herbicides					
MCPA	NC	--	NCOPC	3.10E-02	NC
MCPP	NC	--	NCOPC	5.30E-02	NC
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	NC	4.60E-01	NC	--	NCOPC
	Total:		**NC**		**NC**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
NONCARCINOGENIC ASSESSMENT
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
RECREATIONAL FISHER - MLE

Constituent	Unit Concentration In Groundwater (mg/l)	Oral - Water Absorption Adjustment Factor	Dermal - Water Absorption Adjustment Factor	Dermal Permeability Constant (cm/hr)	Oral Reference Dose (mg/kg-day)	ADDing MLE Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Ing. (mg/kg-day)	ADDder MLE Recreational Fisher (mg/kg-day)	Chronic Average Daily Dose-Der. (mg/kg-day)	Hazard Index - Ingestion	Hazard Index - Dermal Contact	Total Hazard Index
SVOCs												
2,4-Dichlorophenol	1.00E+00	1	1	2.30E-02	3.00E-03	5.87E-07	5.87E-07	1.87E-05	1.87E-05	1.96E-04	6.24E-03	6.44E-03
4-Chloroaniline	1.00E+00	1	1	6.33E-03	4.00E-03	5.87E-07	5.87E-07	5.15E-06	5.15E-06	1.47E-04	1.29E-03	1.43E-03
Herbicides												
MCPA	1.00E+00	1	1	2.31E-02	5.00E-04	5.87E-07	5.87E-07	1.88E-05	1.88E-05	1.17E-03	3.76E-02	3.88E-02
MCPP	1.00E+00	1	1	1.56E-02	1.00E-03	5.87E-07	5.87E-07	1.27E-05	1.27E-05	5.87E-04	1.27E-02	1.33E-02
Metals												
Lead	1.00E+00	NA	NA	(j)	NA	NA	NA	NA	NA	NA	NA	NC
Manganese	1.00E+00	1	10	1.50E-04	2.40E-02	5.87E-07	5.87E-07	1.30E-06	1.30E-06	2.45E-05	5.43E-05	7.87E-05

TABLE
POTENTIAL HAZARD INDEX
INCIDENTAL INGESTION AND DERMAL CONTACT
SURFACE WATER
RECREATIONAL FISHER - MLE

Constituent	Reference HQ (per mg/L)	Pond (Site Q)		River	
		EPC (mg/L)	HQ	EPC (mg/L)	HQ
SVOCs					
2,4-Dichlorophenol	6.44E-03	--	NCOPC	6.01E-03	3.87E-05
4-Chloroaniline	1.43E-03	--	NCOPC	1.22E-02	1.75E-05
Herbicides					
MCPA	3.88E-02	--	NCOPC	3.10E-02	1.20E-03
MCPP	1.33E-02	--	NCOPC	5.30E-02	7.04E-04
Metals					
Lead	NC	1.40E-02	NC	--	NCOPC
Manganese	7.87E-05	4.60E-01	3.62E-05	--	NCOPC
	Total HI:		**3.62E-05**		**1.96E-03**

Notes:
-- Not a constituent of potential concern in this area/medium.
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
SVOCs - Semi Volatile Organic Compounds.

SAUGET AREA 2 RI/FS
MLE

Receptors Evaluated:	
Receptor:	MLE Recreational Fisher

ASSUMPTIONS FOR RECREATIONAL FISHER -MLE INGESTION OF FISH		Assumed Value	Units	Calculated Value
Fish Ingestion Rate	MLE Recreational Fisher	0.001	(kg fish/day)	
Body Weight	MLE Recreational Fisher	70	(kg)	
Exposure Frequency	MLE Recreational Fisher	365	(days)/ 365 (days) =	1.00E+00
Exposure Duration (cancer)	MLE Recreational Fisher	9	(yrs)/ 70 (yrs) =	1.29E-01
Exposure Duration (noncancer)	MLE Recreational Fisher	9	(yrs)/ 9 (yrs) =	1.00E+00
Lifetime		70	(years)	

SAUGET AREA 2 RI/FS
POTENTIAL CARCINOGENIC RISK
INGESTION OF FISH
RECREATIONAL FISHER -MLE

Constituent	Fish Fillet Concentration (mg/kg)	Oral - Diet Absorption Adjustment Factor	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	ADDing MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose (mg/kg-day)	Excess Lifetime Cancer Risk
SVOCs						
Benzo(a)anthracene	1.00E+00	1	7.30E-01	1.84E-06	1.84E-06	1.34E-06
Benzo(a)pyrene	1.00E+00	1	7.30E+00	1.84E-06	1.84E-06	1.34E-05
bis(2-Ethylhexyl)phthalate	1.00E+00	1	1.40E-02	1.84E-06	1.84E-06	2.57E-08
Dibenzo(a,h)anthracene	1.00E+00	1	7.30E+00	1.84E-06	1.84E-06	1.34E-05
Pesticides						
4,4'-DDE	1.00E+00	1	3.40E-01	1.84E-06	1.84E-06	6.24E-07
4,4'-DDT	1.00E+00	1	3.40E-01	1.84E-06	1.84E-06	6.24E-07
alpha-Chlordane	1.00E+00	1	3.50E-01	1.84E-06	1.84E-06	6.43E-07
beta-BHC	1.00E+00	1	1.80E+00	1.84E-06	1.84E-06	3.31E-06
Dieldrin	1.00E+00	1	1.60E+01	1.84E-06	1.84E-06	2.94E-05
PCBs						
Total PCBs	1.00E+00	1	2.00E+00	1.84E-06	1.84E-06	3.67E-06
Dioxin						
2,3,7,8-TCDD-TEQ	1.00E+00	1	1.50E+05	1.84E-06	1.84E-06	2.76E-01
Metals						
Arsenic	1.00E+00	1	1.50E+00	1.84E-06	1.84E-06	2.76E-06
Mercury	1.00E+00	NA	NA	NA	NC	NC

TABLE
POTENTIAL CARCINOGENIC RISK
SAUGET AREA 2 RI/FS
RECREATIONAL FISHER -MLE
INGESTION OF FISH

Constituent	Reference Risk (per mg/kg)	DDA Buffalo Fillet		PDA Buffalo Fillet		UDA Buffalo Fillet		Pond (Site Q) Black Bullhead Fillet		Pond (Site Q) Carp Fillet	
		EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk	EPC (mg/kg)	Risk
SVOCs											
Benzo(a)anthracene	1.34E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	1.88E-07
Benzo(a)pyrene	1.34E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E-01	2.41E-06
bis(2-Ethylhexyl)phthalate	2.57E-08	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-01	1.29E-08
Dibenzo(a,h)anthracene	1.34E-05	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	1.88E-06
Pesticides											
4,4'-DDE	6.24E-07	--	NCOPC	--	NCOPC	1.70E-02	1.06E-08	--	NCOPC	--	NCOPC
4,4'-DDT	6.24E-07	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	2.25E-07	3.30E-01	2.06E-07
alpha-Chlordane	6.43E-07	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-02	6.43E-09	1.60E-02	1.03E-08
beta-BHC	3.31E-06	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-02	5.62E-08
Dieldrin	2.94E-05	--	NCOPC	--	NCOPC	8.10E-03	2.38E-07	1.00E-01	2.94E-06	1.90E-01	5.58E-06
PCBs											
Total PCBs	3.67E-06	--	NCOPC	--	NCOPC	--	NCOPC	3.87E+00	1.42E-05	1.00E+01	3.67E-05
Dioxin											
2,3,7,8-TCDD-TEQ	2.76E-01	7.39E-07	2.04E-07	5.25E-07	1.45E-07	4.57E-06	1.26E-06	3.84E-06	1.06E-06	1.84E-05	5.07E-06
Metals											
Arsenic	2.76E-06	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-01	2.15E-06	8.20E-01	2.26E-06
Mercury	NC	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-01	NC	7.10E-02	NC
	Total:		**2.04E-07**		**1.45E-07**		**1.51E-06**		**2.06E-05**		**5.44E-05**

Notes:
-- Not a constituent of potential concern in this area/medium.
DDA - Downstream Discharge Area (Mississippi River).
EPC - Exposure Point Concentration.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
PDA - Plume Discharge Area (Mississippi River).
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
UDA - Upstream Discharge Area (Mississippi River).

SAUGET AREA 2 RI/FS
POTENTIAL HAZARD INDEX
INGESTION OF FISH
RECREATIONAL FISHER -MLE

Constituent	Fish Fillet Concentration (mg/kg)	Oral - Diet Absorption Adjustment Factor	Oral Reference Dose (mg/kg-day)	ADDing MLE Recreational Fisher (mg/kg-day)	Lifetime Average Daily Dose (mg/kg-day)	Excess Lifetime Hazard Index
SVOCs						
Benzo(a)anthracene	1.00E+00	NA	NA	NA	NC	NC
Benzo(a)pyrene	1.00E+00	NA	NA	NA	NC	NC
bis(2-Ethylhexyl)phthalate	1.00E+00	1	2.00E-02	1.43E-05	1.43E-05	7.14E-04
Dibenzo(a,h)anthracene	1.00E+00	NA	NA	NA	NC	NC
Pesticides						
4,4'-DDE	1.00E+00	1	5.00E-04	1.43E-05	1.43E-05	2.86E-02
4,4'-DDT	1.00E+00	1	5.00E-04	1.43E-05	1.43E-05	2.86E-02
alpha-Chlordane	1.00E+00	1	5.00E-04	1.43E-05	1.43E-05	2.86E-02
beta-BHC	1.00E+00	1	3.00E-04	1.43E-05	1.43E-05	4.76E-02
Dieldrin	1.00E+00	1	5.00E-05	1.43E-05	1.43E-05	2.86E-01
PCBs						
Total PCBs	1.00E+00	1	2.00E-05	1.43E-05	1.43E-05	7.14E-01
Dioxin						
2,3,7,8-TCDD-TEQ	1.00E+00	NA	NA	NA	NC	NC
Metals						
Arsenic	1.00E+00	1	3.00E-04	1.43E-05	1.43E-05	4.76E-02
Mercury	1.00E+00	2	3.00E-04	2.86E-05	2.86E-05	9.52E-02

TABLE
POTENTIAL HAZARD INDEX
SAUGET AREA 2 RI/FS
RECREATIONAL FISHER -MLE
INGESTION OF FISH

Constituent	Reference HQ (per mg/kg)	DDA Buffalo Fillet EPC (mg/kg)	DDA Buffalo Fillet HQ	PDA Buffalo Fillet EPC (mg/kg)	PDA Buffalo Fillet HQ	UDA Buffalo Fillet EPC (mg/kg)	UDA Buffalo Fillet HQ	Pond (Site Q) Black Bullhead Fillet EPC (mg/kg)	Pond (Site Q) Black Bullhead Fillet HQ	Pond (Site Q) Carp Fillet EPC (mg/kg)	Pond (Site Q) Carp Fillet HQ
SVOCs											
Benzo(a)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	NC
Benzo(a)pyrene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.80E-01	NC
bis(2-Ethylhexyl)phthalate	7.14E-04	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	5.00E-01	3.57E-04
Dibenzo(a,h)anthracene	NC	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.40E-01	NC
Pesticides											
4,4'-DDE	2.86E-02	--	NCOPC	--	NCOPC	1.70E-02	4.86E-04	--	NCOPC	--	NCOPC
4,4'-DDT	2.86E-02	--	NCOPC	--	NCOPC	--	NCOPC	3.60E-01	1.03E-02	3.30E-01	9.43E-03
alpha-Chlordane	2.86E-02	--	NCOPC	--	NCOPC	--	NCOPC	1.00E-02	2.86E-04	1.60E-02	4.57E-04
beta-BHC	4.76E-02	--	NCOPC	--	NCOPC	--	NCOPC	--	NCOPC	1.70E-02	8.10E-04
Dieldrin	2.86E-01	--	NCOPC	--	NCOPC	8.10E-03	2.31E-03	1.00E-01	2.86E-02	1.90E-01	5.43E-02
PCBs											
Total PCBs	7.14E-01	--	NCOPC	--	NCOPC	--	NCOPC	3.87E+00	2.76E+00	1.00E+01	7.14E+00
Dioxin											
2,3,7,8-TCDD-TEQ	NC	7.39E-07	NC	5.25E-07	NC	4.57E-06	NC	3.84E-06	NC	1.84E-05	NC
Metals											
Arsenic	4.76E-02	--	NCOPC	--	NCOPC	--	NCOPC	7.80E-01	3.71E-02	8.20E-01	3.90E-02
Mercury	9.52E-02	--	NCOPC	--	NCOPC	--	NCOPC	2.50E-01	2.38E-02	7.10E-02	6.76E-03
	Total HI:		**NC**		**NC**		**2.80E-03**		**2.86E+00**		**7.25E+00**

Notes:
-- Not a constituent of potential concern in this area/medium.
DDA - Downstream Discharge Area (Mississippi River).
EPC - Exposure Point Concentration.
HI - Hazard Index.
HQ - Hazard Quotient.
MLE - Most Likely Exposure.
NC - No dose-response value.
NCOPC - Not calculated because not a constituent of potential concern in this area/medium.
PCBs - Polychlorinated Biphenyls.
PDA - Plume Discharge Area (Mississippi River).
SVOCs - Semi Volatile Organic Compounds.
TCDD - TEQ - Tetrachlorodibenzo-p-dioxin Toxic Equivalents Concentration.
UDA - Upstream Discharge Area (Mississippi River).

APPENDIX N

TOXIC ENDPOINT ANALYSIS

APPENDIX N
TOXIC ENDPOINT ANALYSIS

This appendix presents the toxic endpoint analysis for the evaluation of noncarcinogenic total hazard indices for receptors whose total site hazard index exceeded the target value of 1.

In the report, a hazard quotient (HQ) is calculated for each constituent of potential concern (COPC) for each receptor at each exposure point. When the HQ is less than one, the reference dose (RfD) has not been exceeded, and no adverse noncarcinogenic health effects are expected. Notice that this is not a calculation of risk, per se. That is, the hazard quotient does not predict the probability of health effect. It simply indicates whether an exposure estimate is above or below a dose assumed to be unlikely to produce an effect. However, because the RfD has the connotation of being "acceptable" (i.e., unlikely to result in effects) risk management decisions may be made based on whether the HQ is above or below one. A total receptor-specific Hazard Index (HI) is calculated for each exposure pathway by summing the HQ for each individual constituent for that receptor. This approach accounts for the possibility that the toxicity of all COPCs are additive and should be regarded only as a screening assessment because additive toxicity may not be correct. Again, if the total HI is below one, a remedial response would not normally be required. If the HI is greater than one, further evaluation to identify COPCs that may be additive (or otherwise interactive) in their toxicity should be conducted before making decisions. Such an evaluation is termed a toxic endpoint analysis. Toxicologically, only the HQs of chemicals having similar toxic endpoints can be added together to provide an HI for a given effect.

The toxic endpoints based on oral and inhalation exposures to COPCs are presented in Table N-1. The toxic endpoint information in this table was identified either from the Integrated Risk Information System (IRIS), the Health Effects Assessment Summary Tables (HEAST) or the National Center for Environmental Assessment (NCEA) using the information on the dose-response tables (Table 4-1 for oral endpoints and Table 4-2 for inhalation endpoints) presented in Section 4.0 of the text. A single COPC can have more than one toxic endpoint. For example, the HQ for ethylbenzene is appropriately additive with other COPCs that have "liver effects" identified as a toxic endpoint. However, because the toxic endpoint for ethylbenzene is identified as liver and kidney toxicity, the HQ for ethylbenzene is also added with the HQ for other COPCs exhibiting kidney effects.

The following table lists the table number of the target endpoint analysis performed for each receptor scenario identified as having total HI greater than 1. Target endpoint

analyses were performed for both reasonable maximum exposure (RME) and most likely exposure (MLE) scenarios where both had a total HI greater than 1.

Table	Site	Receptor	Scenario
N-2	O	Outdoor industrial worker	RME
N-3	O	Construction/utility worker	RME
N-4	O	Construction/utility worker	MLE
N-5	O North	Outdoor industrial worker	RME
N-6	O North	Outdoor industrial worker	MLE
N-7	O North	Construction/utility worker	RME
N-8	O North	Construction/utility worker	MLE
N-9	O North	Trespassing teenager	RME
N-10	O North	Trespassing teenager	MLE
N-11	R	Outdoor industrial worker	RME
N-12	R	Construction/utility worker	RME
N-13	R	Construction/utility worker	MLE
N-14	S	Outdoor industrial worker	RME
N-15	S	Outdoor industrial worker	MLE
N-16	S	Construction/utility worker	RME
N-17	S	Trespassing teenager	RME
N-18	Q Pond (Carp)	Recreational fisher	RME
N-19	Q Pond (Carp)	Recreational fisher	MLE
N-20	Q Pond (Black Bullhead)	Recreational fisher	RME
N-21	Q Pond (Black Bullhead)	Recreational fisher	MLE
N-22	Q North	Construction/utility worker	RME
N-23	Q North	Construction/utility worker	MLE

The results are discussed in the text in Section 6.0.

TABLE N-1
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight		Develop. Effects		Blood Effects		Liver Effects		Kidney Effects		Neuro. Effects		GI Effects		Reproductive Effects		Vascular Effects		Dec. Longevity		Nasal Effects		Immune Effects		Spleen Effects		Skin Effects		Eye Effects		Thyroid Effects		Adrenal Effects		Skeletal Effects		Respitory Effects		None Reported		No D/R Available	
Constituent	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh
VOCs																																						
1,1,2-Trichloroethane					X																																	X
1,2-Dichloroethane								X	X	X				X												X												
1,2-Dichloroethene (total)					X																																	X
2-Butanone (MEK)			X	X																																		
4-Methyl-2-pentanone (MIBK)				X			X		X		X																					X						
Acetone							X		X																													X
Benzene																							X	X														
Chlorobenzene							X	X																														
Chloroform					X		X	X		X		X																										
Chloromethane												X																									X	
Dichloromethane							X	X																														
Ethylbenzene				X			X		X																													
Tetrachloroethene	X						X	X		X																												
Toluene							X		X			X																										
Trichloroethylene							X					X																										
Xylenes, Total	X											X							X																		
SVOCs																																						
1,2-Dichlorobenzene		X																																		X		
1,3-Dichlorobenzene					X			X																					X									
1,4-Dichlorobenzene			X				X	X																														
2,4,6-Trichlorophenol															X																							X
2,4-Dichlorophenol																							X															X
2,4-Dimethylphenol					X						X																											X
2-Chlorophenol															X																							X
2-Methylnaphthalene	X																				X																	
2-Nitroaniline						X																															X	
3-Methylphenol/4-Methylphenol	X										X																											X
4-Chloroaniline																										X												X
4-Nitroaniline					X	X																																
Benzo(a)anthracene																																					X	X
Benzo(a)pyrene																																					X	X
Benzo(b)fluoranthene																																					X	X
Benzo(g,h,i)perylene									X																													X
Benzo(k)fluoranthene																																					X	X
bis(2-Chloroethyl)ether																																					X	X
bis(2-Ethylhexyl)phthalate							X																															X
Dibenzo(a,h)anthracene																																					X	X
Hexachlorobenzene							X																															X
Indeno(1,2,3-cd)pyrene																																					X	X
Naphthalene	X																				X																	
Nitrobenzene					X	X	X	X	X	X																					X	X						
Phenol	X																																					X

TABLE N-1
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Dec. Body Weight		Develop. Effects		Blood Effects		Liver Effects		Kidney Effects		Neuro. Effects		GI Effects		Reproductive Effects		Vascular Effects		Dec. Longevity		Nasal Effects		Immune Effects		Spleen Effects		Skin Effects		Eye Effects		Thyroid Effects		Adrenal Effects		Skeletal Effects		Respitory Effects		None Reported		No D/R Available	
	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh	Ing	Inh
Pesticides																																						
4,4'-DDE							X																															X
4,4'-DDT							X																															X
Aldrin							X																															X
alpha-BHC							X		X																													X
alpha-Chlordane							X	X																														
beta-BHC							X		X																													X
delta-BHC							X		X																													X
Dieldrin							X																															X
Endrin Ketone							X				X																											X
gamma-BHC (Lindane)							X		X																													X
Heptachlor							X																															X
Heptachlor epoxide							X																															X
Herbicides																																						
2,4,5-T									X																													X
2,4-D					X		X		X																													X
MCPA							X		X																													X
MCPP									X																													X
Pentachlorophenol							X		X																													X
PCBs																																						
Total PCBs																							X			X	X											X
Dioxin																																						
2,3,7,8-TCDD-TEQ																																					X	X
Metals																																						
Antimony					X														X																			X
Arsenic																	X									X												X
Barium				X					X																													
Beryllium													X																						X			
Cadmium									X																													X
Chromium																																			X	X		
Cobalt					X																														X			
Copper													X																									X
Lead																																					X	X
Manganese											X	X																										
Mercury												X											X															
Nickel	X																																					X
Thallium					X																																	X
Vanadium																																					X	X
Zinc					X																																	X

Notes:
Dec. - Decreased
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion
Inh - Inhalation.
Neuro. - Neurological
X - This endpoint was identified for this exposure route for this constituent.

TABLE N-2
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - RME SCENARIO - SITE O
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Neuro. Effects			Immune Effects			Skin Effects			Eye Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
Benzene											3.89E-01	3.89E-01						
Chlorobenzene					2.91E-01	2.91E-01												
Ethylbenzene		6.32E-02	6.32E-02															
Toluene								2.25E-02	2.25E-02									
Xylenes, Total								**3.23E+00**	**3.23E+00**									
Pesticides																		
Dieldrin				1.36E-03		1.36E-03												
PCBs																		
Total PCBs										1.77E-01		1.77E-01	1.77E-01		1.77E-01	1.77E-01		1.77E-01
		6.32E-02	6.32E-02	1.36E-03	2.91E-01	2.93E-01		**3.25E+00**	**3.25E+00**	1.77E-01	3.89E-01	5.66E-01	1.77E-01		1.77E-01	1.77E-01		1.77E-01

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-3
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - RME SCENARIO - SITE O
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
Benzene																		
Chlorobenzene										6.33E-03	9.95E-01	**1.00E+00**						
Ethylbenzene					2.52E-01	2.52E-01				4.66E-03		4.66E-03	4.66E-03		4.66E-03			
Toluene										3.25E-04		3.25E-04	3.25E-04		3.25E-04		1.35E-01	1.35E-01
Xylenes, Total	1.17E-02		1.17E-02														**1.42E+01**	**1.42E+01**
SVOCs																		
1,4-Dichlorobenzene				2.61E-04		2.61E-04				2.61E-04	3.86E-07	2.61E-04						
2,4,6-Trichlorophenol																		
2-Nitroaniline								8.22E-05	8.22E-05									
Pesticides																		
Aldrin										4.00E-03		4.00E-03						
delta-BHC										1.58E-03		1.58E-03	1.58E-03		1.58E-03			
Dieldrin										1.27E-02		1.27E-02						
gamma-BHC (Lindane)										1.60E-03		1.60E-03	1.60E-03		1.60E-03			
Heptachlor										9.26E-04		9.26E-04						
Heptachlor epoxide										6.02E-03		6.02E-03						
PCBs																		
Total PCBs																		
Metals																		
Arsenic																		
Manganese																6.92E-04		6.92E-04
	1.17E-02		1.17E-02	2.61E-04	2.52E-01	2.52E-01		8.22E-05	8.22E-05	3.83E-02	9.95E-01	**1.03E+00**	8.17E-03		8.17E-03	6.92E-04	**1.44E+01**	**1.44E+01**

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-3
TOXIC ENDPOINTS FOR POTENTIAL NONC
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Reproductive Effects			Vascular Effects			Dec. Longevity			Immune Effects			Skin Effects			Eye Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
Benzene										2.21E-02	**3.14E+00**	**3.16E+00**						
Chlorobenzene																		
Ethylbenzene																		
Toluene																		
Xylenes, Total							1.17E-02		1.17E-02									
SVOCs																		
1,4-Dichlorobenzene																		
2,4,6-Trichlorophenol	1.15E-02		1.15E-02															
2-Nitroaniline																		
Pesticides																		
Aldrin																		
delta-BHC																		
Dieldrin																		
gamma-BHC (Lindane)																		
Heptachlor																		
Heptachlor epoxide																		
PCBs																		
Total PCBs										**2.53E+00**		**2.53E+00**	**2.53E+00**		**2.53E+00**	**2.53E+00**		**2.53E+00**
Metals																		
Arsenic				5.05E-04		5.05E-04							5.05E-04		5.05E-04			
Manganese																		
	1.15E-02		1.15E-02	5.05E-04		5.05E-04	1.17E-02		1.17E-02	**2.55E+00**	**3.14E+00**	**5.69E+00**	**2.53E+00**		**2.53E+00**	**2.53E+00**		**2.53E+00**

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the targ

TABLE N-4
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - MLE SCENARIO - SITE O
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects			Reproductive Effects			Vascular Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																								
Benzene																								
Chlorobenzene										6.06E-04	8.84E-02	8.90E-02												
Ethylbenzene					1.28E-02	1.28E-02				2.67E-04		2.67E-04	2.67E-04		2.67E-04									
Toluene										1.91E-05		1.91E-05	1.91E-05		1.91E-05		7.17E-03	7.17E-03						
Xylenes, Total	6.84E-04		6.84E-04														7.56E-01	7.56E-01						
SVOCs																								
1,4-Dichlorobenzene				3.44E-05		3.44E-05				3.44E-05	4.62E-08	3.44E-05												
2,4,6-Trichlorophenol																			1.42E-03		1.42E-03			
2-Nitroaniline								1.11E-05	1.11E-05															
Pesticides																								
Aldrin										2.67E-04		2.67E-04												
delta-BHC										1.68E-04		1.68E-04	1.68E-04		1.68E-04									
Dieldrin										1.39E-03		1.39E-03												
gamma-BHC (Lindane)										9.29E-05		9.29E-05	9.29E-05		9.29E-05									
Heptachlor										8.66E-05		8.66E-05												
Heptachlor epoxide										6.19E-04		6.19E-04												
PCBs																								
Total PCBs																								
Metals																								
Arsenic																						2.53E-04		2.53E-04
Manganese																3.46E-04		3.46E-04						
Total	6.84E-04		6.84E-04	3.44E-05	1.28E-02	1.28E-02		1.11E-05	1.11E-05	3.56E-03	8.84E-02	9.20E-02	5.47E-04		5.47E-04	3.46E-04	7.63E-01	7.64E-01	1.42E-03		1.42E-03	2.53E-04		2.53E-04

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect Not Additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-4
TOXIC ENDPOINTS FOR POTENTIAL NONC
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Dec. Longevity			Immune Effects			Skin Effects			Eye Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs												
Benzene				1.45E-03	1.86E-01	1.88E-01						
Chlorobenzene												
Ethylbenzene												
Toluene												
Xylenes, Total	6.84E-04		6.84E-04									
SVOCs												
1,4-Dichlorobenzene												
2,4,6-Trichlorophenol												
2-Nitroaniline												
Pesticides												
Aldrin												
delta-BHC												
Dieldrin												
gamma-BHC (Lindane)												
Heptachlor												
Heptachlor epoxide												
PCBs												
Total PCBs				2.14E-01		2.14E-01	2.14E-01		2.14E-01	2.14E-01		2.14E-01
Metals												
Arsenic							2.53E-04		2.53E-04			
Manganese												
Total	6.84E-04		6.84E-04	2.16E-01	1.86E-01	4.02E-01	2.15E-01		2.15E-01	2.14E-01		2.14E-01

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect Not Additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the tar

TABLE N-5
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - RME SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Kidney Effects			Neuro. Effects			Immune Effects			Skin Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
4-Methyl-2-pentanone (MIBK)		4.11E-06	4.11E-06															
Benzene														7.43E-02	7.43E-02			
Chlorobenzene					2.58E-01	2.58E-01												
Dichloromethane					9.19E-04	9.19E-04												
Ethylbenzene		2.40E-02	2.40E-02															
Tetrachloroethene					3.64E-04	3.64E-04		3.64E-04	3.64E-04									
Xylenes, Total											1.23E+00	1.23E+00						
PCBs																		
Total PCBs													1.16E+01		1.16E+01	1.16E+01		1.16E+01
Metals																		
Mercury											4.33E-05	4.33E-05	1.07E-01		1.07E-01			
		2.40E-02	2.40E-02		2.60E-01	2.60E-01		3.64E-04	3.64E-04		1.23E+00	1.23E+00	1.18E+01	7.43E-02	1.18E+01	1.16E+01		1.16E+01

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-5
TOXIC ENDPOINTS FOR POTENTIAL I
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Eye Effects			Skeletal Effects		
	Ing	Inh	Total	Ing	Inh	Total
VOCs						
4-Methyl-2-pentanone (MIBK)					4.11E-06	4.11E-06
Benzene						
Chlorobenzene						
Dichloromethane						
Ethylbenzene						
Tetrachloroethene						
Xylenes, Total						
PCBs						
Total PCBs	**1.16E+01**		**1.16E+01**			
Metals						
Mercury						
	1.16E+01		**1.16E+01**		4.11E-06	4.11E-06

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-6
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - MLE SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Kidney Effects			Neuro. Effects			Immune Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs															
4-Methyl-2-pentanone (MIBK)		2.57E-06	2.57E-06												
Benzene														2.91E-02	2.91E-02
Chlorobenzene					1.09E-01	1.09E-01									
Dichloromethane					2.42E-04	2.42E-04									
Ethylbenzene		9.98E-03	9.98E-03												
Tetrachloroethene					1.19E-04	1.19E-04		1.19E-04	1.19E-04						
Xylenes, Total											5.21E-01	5.21E-01			
PCBs															
Total PCBs													**7.27E+00**		**7.27E+00**
Metals															
Mercury											2.71E-05	2.71E-05	6.45E-02		6.45E-02
		9.99E-03	9.99E-03		1.09E-01	1.09E-01		1.19E-04	1.19E-04		5.21E-01	5.21E-01	**7.33E+00**	2.91E-02	**7.36E+00**

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-6
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Skin Effects			Eye Effects			Skeletal Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs									
4-Methyl-2-pentanone (MIBK)								2.57E-06	2.57E-06
Benzene									
Chlorobenzene									
Dichloromethane									
Ethylbenzene									
Tetrachloroethene									
Xylenes, Total									
PCBs									
Total PCBs	**7.27E+00**		**7.27E+00**	**7.27E+00**		**7.27E+00**			
Metals									
Mercury									
	7.27E+00		**7.27E+00**	**7.27E+00**		**7.27E+00**		2.57E-06	2.57E-06

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-7
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - RME SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
4-Methyl-2-pentanone (MIBK)					4.70E-05	4.70E-05				1.46E-05		1.46E-05	1.46E-05		1.46E-05	1.46E-05		1.46E-05
Benzene																		
Chlorobenzene										8.72E-03	6.48E-01	6.57E-01						
Dichloromethane										2.50E-04	7.28E-03	7.53E-03						
Ethylbenzene					6.79E-02	6.79E-02				1.27E-03		1.27E-03	1.27E-03		1.27E-03			
Tetrachloroethene	1.13E-04		1.13E-04							1.13E-04	2.21E-03	2.32E-03		2.21E-03	2.21E-03			
Xylenes, Total	3.27E-03		3.27E-03														3.95E+00	3.95E+00
SVOCs																		
1,2-Dichlorobenzene		1.71E-05	1.71E-05															
1,3-Dichlorobenzene							2.22E-03		2.22E-03		9.86E-08	9.86E-08						
1,4-Dichlorobenzene				6.66E-04		6.66E-04				6.66E-04	9.86E-07	6.67E-04						
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Methylnaphthalene	1.45E-03		1.45E-03															
2-Nitroaniline								2.04E-03	2.04E-03									
3-Methylphenol/4-Methylphenol	1.92E-04		1.92E-04													1.92E-04		1.92E-04
4-Chloroaniline																		
4-Nitroaniline							5.68E-02	1.65E-03	5.84E-02									
Hexachlorobenzene										9.54E-04		9.54E-04						
Naphthalene	2.92E-03		2.92E-03															
Nitrobenzene							5.43E-03	3.63E-05	5.47E-03	5.43E-03	3.63E-05	5.47E-03	5.43E-03	3.63E-05	5.47E-03			
Phenol	1.16E-04		1.16E-04															
Pesticides																		
4,4'-DDE										1.10E-02		1.10E-02						
4,4'-DDT										1.93E-02		1.93E-02						
Aldrin										2.50E-02		2.50E-02						
alpha-BHC										8.32E-04		8.32E-04	8.32E-04		8.32E-04			
beta-BHC													1.18E-02		1.18E-02			
Dieldrin										1.66E-01		1.66E-01						
Heptachlor										3.30E-03		3.30E-03						
Heptachlor epoxide										3.46E-02		3.46E-02						
Herbicides																		
2,4,5-T													1.03E-04		1.03E-04			
2,4-D							1.21E-03		1.21E-03	1.21E-03		1.21E-03	1.21E-03		1.21E-03			
Pentachlorophenol										2.21E-02		2.21E-02	2.21E-02		2.21E-02			
PCBs																		
Total PCBs																		
Metals																		
Arsenic																		
Cadmium													1.69E-02		1.69E-02			
Manganese																3.04E-03		3.04E-03
Mercury																	7.89E-03	7.89E-03
Thallium							1.20E-04		1.20E-04									
Total	8.06E-03	1.71E-05	8.07E-03	6.66E-04	6.79E-02	6.86E-02	6.57E-02	3.72E-03	6.95E-02	3.01E-01	6.58E-01	9.59E-01	5.97E-02	2.25E-03	6.20E-02	3.24E-03	3.95E+00	3.96E+00

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-7
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Reproductive Effects			Vascular Effects			Dec. Longevity			Nasal Effects			Immuno Effects			Spleen Effects			Skin Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																					
4-Methyl-2-pentanone (MIBK)																					
Benzene													1.69E-02	4.64E-01	4.81E-01						
Chlorobenzene																					
Dichloromethane																					
Ethylbenzene																					
Tetrachloroethene																					
Xylenes, Total							3.27E-03		3.27E-03												
SVOCs																					
1,2-Dichlorobenzene																					
1,3-Dichlorobenzene																					
1,4-Dichlorobenzene																					
2,4,6-Trichlorophenol	3.57E-01		3.57E-01																		
2,4-Dichlorophenol													3.41E-03		3.41E-03						
2-Chlorophenol	1.08E-03		1.08E-03																		
2-Methylnaphthalene											4.38E-04	4.38E-04									
2-Nitroaniline																					
3-Methylphenol/4-Methylphenol																					
4-Chloroaniline																1.07E-02		1.07E-02			
4-Nitroaniline																					
Hexachlorobenzene																					
Naphthalene											8.99E-05	8.99E-05									
Nitrobenzene																					
Phenol																					
Pesticides																					
4,4'-DDE																					
4,4'-DDT																					
Aldrin																					
alpha-BHC																					
beta-BHC																					
Dieldrin																					
Heptachlor																					
Heptachlor epoxide																					
Herbicides																					
2,4,5-T																					
2,4-D																					
Pentachlorophenol																					
PCBs																					
Total PCBs													**2.85E+01**		**2.85E+01**				**2.85E+01**		**2.85E+01**
Metals																					
Arsenic				5.92E-03		5.92E-03													5.92E-03		5.92E-03
Cadmium																					
Manganese																					
Mercury													3.84E-01		3.84E-01						
Thallium																					
Total	3.58E-01		3.58E-01	5.92E-03		5.92E-03	3.27E-03		3.27E-03		5.28E-04	5.28E-04	**2.89E+01**	4.64E-01	**2.94E+01**	1.07E-02		1.07E-02	**2.85E+01**		**2.85E+01**

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-7
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Eye Effects			Thyroid Effects			Adrenal Effects			Skeletal Effects			None Reported		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
4-Methyl-2-pentanone (MIBK)											4.70E-05	4.70E-05			
Benzene															
Chlorobenzene															
Dichloromethane															
Ethylbenzene															
Tetrachloroethene															
Xylenes, Total															
SVOCs															
1,2-Dichlorobenzene													9.62E-04		9.62E-04
1,3-Dichlorobenzene				2.22E-03		2.22E-03									
1,4-Dichlorobenzene															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2-Chlorophenol															
2-Methylnaphthalene															
2-Nitroaniline															
3-Methylphenol/4-Methylphenol															
4-Chloroaniline															
4-Nitroaniline															
Hexachlorobenzene															
Naphthalene															
Nitrobenzene							5.43E-03	3.63E-05	5.47E-03						
Phenol															
Pesticides															
4,4'-DDE															
4,4'-DDT															
Aldrin															
alpha-BHC															
beta-BHC															
Dieldrin															
Heptachlor															
Heptachlor epoxide															
Herbicides															
2,4,5-T															
2,4-D															
Pentachlorophenol															
PCBs															
Total PCBs	**2.85E+01**		**2.85E+01**												
Metals															
Arsenic															
Cadmium															
Manganese															
Mercury															
Thallium															
Total	**2.85E+01**		**2.85E+01**	2.22E-03		2.22E-03	5.43E-03	3.63E-05	5.47E-03		4.70E-05	4.70E-05	**NA**		**NA**

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-8
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - MLE SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
4-Methyl-2-pentanone (MIBK)					1.41E-05	1.41E-05				7.32E-06		7.32E-06	7.32E-06		7.32E-06	7.32E-06		7.32E-06
Benzene																		
Chlorobenzene										3.25E-03	1.34E-01	1.37E-01						
Dichloromethane										3.55E-05	9.07E-04	9.42E-04						
Ethylbenzene					1.35E-02	1.35E-02				2.78E-04		2.78E-04	2.78E-04		2.78E-04			
Tetrachloroethene	1.95E-05		1.95E-05							1.95E-05	3.48E-04	3.68E-04		3.48E-04	3.48E-04			
Xylenes, Total	7.20E-04		7.20E-04														7.89E-01	7.89E-01
SVOCs																		
1,2-Dichlorobenzene		2.44E-06	2.44E-06															
1,3-Dichlorobenzene							3.63E-04		3.63E-04		1.46E-08	1.46E-08						
1,4-Dichlorobenzene				1.17E-04		1.17E-04				1.17E-04	1.57E-07	1.17E-04						
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Methylnaphthalene	2.66E-04		2.66E-04															
2-Nitroaniline								2.27E-04	2.27E-04									
3-Methylphenol/4-Methylphenol	9.62E-05		9.62E-05													9.62E-05		9.62E-05
4-Chloroaniline																		
4-Nitroaniline							6.93E-03	1.70E-04	7.10E-03									
Hexachlorobenzene										1.49E-04		1.49E-04						
Naphthalene	1.37E-03		1.37E-03															
Nitrobenzene							1.34E-03	4.06E-06	1.34E-03	1.34E-03	4.06E-06	1.34E-03	1.34E-03	4.06E-06	1.34E-03			
Phenol	5.79E-05		5.79E-05															
Pesticides																		
4,4'-DDE										1.87E-03		1.87E-03						
4,4'-DDT										2.25E-03		2.25E-03						
Aldrin										4.04E-03		4.04E-03						
alpha-BHC										1.10E-04		1.10E-04	1.10E-04		1.10E-04			
beta-BHC													1.43E-03		1.43E-03			
Dieldrin										2.14E-02		2.14E-02						
Heptachlor										3.74E-04		3.74E-04						
Heptachlor epoxide										5.30E-03		5.30E-03						
Herbicides																		
2,4,5-T													5.14E-05		5.14E-05			
2,4-D							6.04E-04		6.04E-04	6.04E-04		6.04E-04	6.04E-04		6.04E-04			
Pentachlorophenol										1.11E-02		1.11E-02	1.11E-02		1.11E-02			
PCBs																		
Total PCBs																		
Metals																		
Arsenic																		
Cadmium													2.75E-03		2.75E-03			
Manganese																1.52E-03		1.52E-03
Mercury																	1.08E-03	1.08E-03
Thallium							6.01E-05		6.01E-05									
Total	2.53E-03	2.44E-06	2.53E-03	1.17E-04	1.35E-02	1.36E-02	9.30E-03	4.00E-04	9.70E-03	5.22E-02	1.35E-01	1.87E-01	1.76E-02	3.52E-04	1.80E-02	1.62E-03	7.90E-01	7.92E-01

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-8
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Reproductive Effects			Vascular Effects			Dec. Longevity			Nasal Effects			Immuno Effects			Spleen Effects			Skin Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																					
4-Methyl-2-pentanone (MIBK)																					
Benzene													7.60E-03	9.11E-02	9.87E-02						
Chlorobenzene																					
Dichloromethane																					
Ethylbenzene																					
Tetrachloroethene																					
Xylenes, Total							7.20E-04		7.20E-04												
SVOCs																					
1,2-Dichlorobenzene																					
1,3-Dichlorobenzene																					
1,4-Dichlorobenzene																					
2,4,6-Trichlorophenol	1.41E-01		1.41E-01																		
2,4-Dichlorophenol													1.71E-03		1.71E-03						
2-Chlorophenol	5.39E-04		5.39E-04																		
2-Methylnaphthalene											5.44E-05	5.44E-05									
2-Nitroaniline																					
3-Methylphenol/4-Methylphenol																					
4-Chloroaniline																5.37E-03		5.37E-03			
4-Nitroaniline																					
Hexachlorobenzene																					
Naphthalene											1.21E-05	1.21E-05									
Nitrobenzene																					
Phenol																					
Pesticides																					
4,4'-DDE																					
4,4'-DDT																					
Aldrin																					
alpha-BHC																					
beta-BHC																					
Dieldrin																					
Heptachlor																					
Heptachlor epoxide																					
Herbicides																					
2,4,5-T																					
2,4-D																					
Pentachlorophenol																					
PCBs																					
Total PCBs													**6.89E+00**		**6.89E+00**				**6.89E+00**		**6.89E+00**
Metals																					
Arsenic				1.04E-03		1.04E-03													1.04E-03		1.04E-03
Cadmium																					
Manganese																					
Mercury													5.70E-02		5.70E-02						
Thallium																					
Total	1.42E-01		1.42E-01	1.04E-03		1.04E-03	7.20E-04		7.20E-04		6.65E-05	6.65E-05	6.95E+00	9.11E-02	7.04E+00	5.37E-03		5.37E-03	6.89E+00		6.89E+00

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-8
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Eye Effects			Thyroid Effects			Adrenal Effects			Skeletal Effects			None Reported		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
4-Methyl-2-pentanone (MIBK)											1.41E-05	1.41E-05			
Benzene															
Chlorobenzene															
Dichloromethane															
Ethylbenzene															
Tetrachloroethene															
Xylenes, Total															
SVOCs															
1,2-Dichlorobenzene													1.51E-04		1.51E-04
1,3-Dichlorobenzene				3.63E-04		3.63E-04									
1,4-Dichlorobenzene															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2-Chlorophenol															
2-Methylnaphthalene															
2-Nitroaniline															
3-Methylphenol/4-Methylphenol															
4-Chloroaniline															
4-Nitroaniline															
Hexachlorobenzene															
Naphthalene															
Nitrobenzene							1.34E-03	4.06E-06	1.34E-03						
Phenol															
Pesticides															
4,4'-DDE															
4,4'-DDT															
Aldrin															
alpha-BHC															
beta-BHC															
Dieldrin															
Heptachlor															
Heptachlor epoxide															
Herbicides															
2,4,5-T															
2,4-D															
Pentachlorophenol															
PCBs															
Total PCBs	6.89E+00		6.89E+00												
Metals															
Arsenic															
Cadmium															
Manganese															
Mercury															
Thallium															
Total	6.89E+00		6.89E+00	3.63E-04		3.63E-04	1.34E-03	4.06E-06	1.34E-03		1.41E-05	1.41E-05	NA		NA

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-9
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - TRESPASSING TEENAGER - RME SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Kidney Effects			Neuro. Effects			Immune Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs															
4-Methyl-2-pentanone (MIBK)		1.57E-07	1.57E-07												
Benzene														2.84E-03	2.84E-03
Chlorobenzene					9.87E-03	9.87E-03									
Dichloromethane					3.51E-05	3.51E-05									
Ethylbenzene		9.16E-04	9.16E-04												
Tetrachloroethene					1.39E-05	1.39E-05		1.39E-05	1.39E-05						
Xylenes, Total											4.71E-02	4.71E-02			
PCBs															
Total PCBs													**4.86E+00**		**4.86E+00**
Metals															
Mercury											1.65E-06	1.65E-06	4.37E-02		4.37E-02
		9.16E-04	9.16E-04		9.92E-03	9.92E-03		1.39E-05	1.39E-05		4.71E-02	4.71E-02	**4.90E+00**	2.84E-03	**4.91E+00**

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-9
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Skin Effects			Eye Effects			Skeletal Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs									
4-Methyl-2-pentanone (MIBK)								1.57E-07	1.57E-07
Benzene									
Chlorobenzene									
Dichloromethane									
Ethylbenzene									
Tetrachloroethene									
Xylenes, Total									
PCBs									
Total PCBs	**4.86E+00**		**4.86E+00**	**4.86E+00**		**4.86E+00**			
Metals									
Mercury									
	4.86E+00		**4.86E+00**	**4.86E+00**		**4.86E+00**		1.57E-07	1.57E-07

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-10
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - TRESPASSING TEENAGER - MLE SCENARIO - SITE O NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Kidney Effects			Neuro. Effects			Immune Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs															
4-Methyl-2-pentanone (MIBK)		6.54E-08	6.54E-08												
Benzene														7.41E-04	7.41E-04
Chlorobenzene					2.77E-03	2.77E-03									
Dichloromethane					6.17E-06	6.17E-06									
Ethylbenzene		2.54E-04	2.54E-04												
Tetrachloroethene					3.03E-06	3.03E-06		3.03E-06	3.03E-06						
Xylenes, Total											1.33E-02	1.33E-02			
PCBs															
Total PCBs													**1.32E+00**		**1.32E+00**
Metals															
Mercury											6.89E-07	6.89E-07	1.10E-02		1.10E-02
		2.54E-04	2.54E-04		2.78E-03	2.78E-03		3.03E-06	3.03E-06		1.33E-02	1.33E-02	**1.33E+00**	7.41E-04	**1.33E+00**

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-10
TOXIC ENDPOINTS FOR POTENTIAL N
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Skin Effects			Eye Effects			Skeletal Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs									
4-Methyl-2-pentanone (MIBK)								6.54E-08	6.54E-08
Benzene									
Chlorobenzene									
Dichloromethane									
Ethylbenzene									
Tetrachloroethene									
Xylenes, Total									
PCBs									
Total PCBs	**1.32E+00**		**1.32E+00**	**1.32E+00**		**1.32E+00**			
Metals									
Mercury									
	1.32E+00		**1.32E+00**	**1.32E+00**		**1.32E+00**		6.54E-08	6.54E-08

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-11
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - RME SCENARIO - SITE R
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Liver Effects			Kidney Effects			Neuro. Effects			GI Effects			Immune Effects			Skin Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																					
1,2-Dichloroethane					1.56E-01	1.56E-01		1.56E-01	1.56E-01					1.56E-01	1.56E-01					1.56E-01	1.56E-01
2-Butanone (MEK)		2.43E-05	2.43E-05																		
Benzene																	1.17E-02	1.17E-02			
Chlorobenzene					1.61E-02	1.61E-02															
Chloroform					1.19E-03	1.19E-03		1.19E-03	1.19E-03		1.19E-03	1.19E-03									
Chloromethane											6.29E-08	6.29E-08									
Dichloromethane					1.22E-05	1.22E-05															
Ethylbenzene		2.06E-05	2.06E-05																		
Tetrachloroethene					4.76E-03	4.76E-03		4.76E-03	4.76E-03												
Toluene											3.26E-03	3.26E-03									
Trichloroethylene											9.14E-01	9.14E-01									
Xylenes, Total											1.40E-04	1.40E-04									
		4.50E-05	4.50E-05		1.78E-01	1.78E-01		1.62E-01	1.62E-01		9.18E-01	9.18E-01		1.56E-01	1.56E-01		1.17E-02	1.17E-02		1.56E-01	1.56E-01

Notes:
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
RME - Reasonable Maximum Exposure.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-12
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - RME SCENARIO - SITE R
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane							1.32E-04		1.32E-04									
1,2-Dichloroethane											8.46E+00	8.46E+00	2.25E-02	8.46E+00	8.48E+00			
1,2-Dichloroethene (total)							9.88E-03		9.88E-03									
2-Butanone (MEK)				4.47E-05	5.30E-03	5.35E-03												
Acetone										8.64E-04		8.64E-04	8.64E-04		8.64E-04			
Benzene																		
Chlorobenzene										6.51E-03	4.27E-02	5.12E-02						
Chloroform							2.80E-03		2.80E-03	2.80E-03	3.48E-02	3.76E-02		3.48E-02	3.48E-02		3.48E-02	3.48E-02
Dichloromethane										3.60E-04	6.01E-04	9.61E-04						
Ethylbenzene					3.39E-05	3.39E-05				2.70E-05		2.70E-05	2.70E-05		2.70E-05			
Tetrachloroethene	2.21E-01		2.21E-01							2.21E-01	4.41E-02	2.65E-01		4.41E-02	4.41E-02			
Toluene										6.64E-03		6.64E-03	6.64E-03		6.64E-03		4.36E-02	4.36E-02
Trichloroethylene										**1.27E+01**		**1.27E+01**					**3.75E+00**	**3.75E+00**
Xylenes, Total	7.44E-05		7.44E-05														2.30E-03	2.30E-03
SVOCs																		
1,4-Dichlorobenzene				3.56E-05		3.56E-05				3.56E-05	5.28E-08	3.57E-05						
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Nitroaniline								9.24E-05	9.24E-05									
3-Methylphenol/4-Methylphenol	1.35E-03		1.35E-03													1.35E-03		1.35E-03
4-Chloroaniline																		
4-Nitroaniline							3.30E-02	1.37E-05	3.30E-02									
Benzo(g,h,i)perylene													3.26E-01		3.26E-01			
Naphthalene	2.13E-04		2.13E-04															
Nitrobenzene							4.83E-03	4.78E-05	4.88E-03	4.83E-03	4.78E-05	4.88E-03	4.83E-03	4.78E-05	4.88E-03			
Phenol	3.35E-02		3.35E-02															
Pesticides																		
4,4'-DDT										2.37E-01		2.37E-01						
beta-BHC										1.57E-02		1.57E-02	1.57E-02		1.57E-02			
Dieldrin										9.10E-02		9.10E-02						
gamma-BHC (Lindane)										1.89E-03		1.89E-03	1.89E-03		1.89E-03			
Heptachlor										7.01E-03		7.01E-03						
Herbicides																		
2,4-D							4.94E-03		4.94E-03	4.94E-03		4.94E-03	4.94E-03		4.94E-03			
MCPP													1.03E-02		1.03E-02			
PCBs																		
Total PCBs																		
Metals																		
Arsenic																		
Beryllium																		
Chromium																		
Cobalt							3.22E-04		3.22E-04									
Manganese																4.22E-02		4.22E-02
Mercury																	1.53E-02	1.53E-02
Nickel	6.70E-04		6.70E-04															
Thallium							3.90E-03		3.90E-03									
Vanadium																		
Zinc							1.82E-03		1.82E-03									
Total	2.57E-01		2.57E-01	8.03E-05	5.34E-03	5.42E-03	6.17E-02	1.54E-04	6.18E-02	**1.33E+01**	**8.58E+00**	**2.18E+01**	3.93E-01	8.53E+00	8.93E+00	4.35E-02	3.85E+00	3.89E+00

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-12
TOXIC ENDPOINTS FOR POTEN
HUMAN HEALTH RISK ASSESSM
SAUGET AREA 2 RI/FS

Constituent	GI Effects			Reproductive Effects			Vascular Effects			Dec. Longevity			Nasal Effects			Immune Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane																		
1,2-Dichloroethane		**8.46E+00**	**8.46E+00**															
1,2-Dichloroethene (total)																		
2-Butanone (MEK)																		
Acetone																		
Benzene																1.05E-01	2.01E-01	3.06E-01
Chlorobenzene																		
Chloroform																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Toluene																		
Trichloroethylene																		
Xylenes, Total										7.44E-05		7.44E-05						
SVOCs																		
1,4-Dichlorobenzene																		
2,4,6-Trichlorophenol				2.83E-01		2.83E-01												
2,4-Dichlorophenol																4.70E-02		4.70E-02
2-Chlorophenol				3.91E-02		3.91E-02												
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol																		
4-Chloroaniline																		
4-Nitroaniline																		
Benzo(g,h,i)perylene																		
Naphthalene														6.44E-05	6.44E-05			
Nitrobenzene																		
Phenol																		
Pesticides																		
4,4'-DDT																		
beta-BHC																		
Dieldrin																		
gamma-BHC (Lindane)																		
Heptachlor																		
Herbicides																		
2,4-D																		
MCPP																		
PCBs																		
Total PCBs																**2.04E+02**		**2.04E+02**
Metals																		
Arsenic							1.17E-03		1.17E-03									
Beryllium	3.54E-04		3.54E-04															
Chromium																		
Cobalt																		
Manganese																		
Mercury																7.47E-01		7.47E-01
Nickel																		
Thallium																		
Vanadium																		
Zinc																		
Total	3.54E-04	**8.46E+00**	**8.46E+00**	3.22E-01		3.22E-01	1.17E-03		1.17E-03	7.44E-05		7.44E-05		6.44E-05	6.44E-05	**2.05E+02**	2.01E-01	**2.05E+02**

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Expo
SVOCs - Semivolatile Organic Cor
VOCs - Volatile Organic Compoun
Bold values indicate an exceedenc

TABLE N-12
TOXIC ENDPOINTS FOR POTEN
HUMAN HEALTH RISK ASSESSI
SAUGET AREA 2 RI/FS

	Spleen Effects			Skin Effects			Eye Effects			Adrenal Effects			Respiratory Effects			None Reported		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane																		
1,2-Dichloroethane					8.46E+00	8.46E+00												
1,2-Dichloroethene (total)																		
2-Butanone (MEK)																		
Acetone																		
Benzene																		
Chlorobenzene																		
Chloroform																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Toluene																		
Trichloroethylene																		
Xylenes, Total																		
SVOCs																		
1,4-Dichlorobenzene																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol																		
4-Chloroaniline	1.07E-01		1.07E-01															
4-Nitroaniline																		
Benzo(g,h,i)perylene																		
Naphthalene																		
Nitrobenzene										4.83E-03	4.78E-05	4.88E-03						
Phenol																		
Pesticides																		
4,4'-DDT																		
beta-BHC																		
Dieldrin																		
gamma-BHC (Lindane)																		
Heptachlor																		
Herbicides																		
2,4-D																		
MCPP																		
PCBs																		
Total PCBs				2.04E+02		2.04E+02	2.04E+02		2.04E+02									
Metals																		
Arsenic				1.17E-03		1.17E-03												
Beryllium													3.54E-04		3.54E-04			
Chromium																7.36E-03		7.36E-03
Cobalt																		
Manganese																		
Mercury																		
Nickel																		
Thallium																		
Vanadium																2.08E-04		2.08E-04
Zinc																		
Total	1.07E-01		1.07E-01	2.04E+02	8.46E+00	2.13E+02	2.04E+02		2.04E+02	4.83E-03	4.78E-05	4.88E-03	3.54E-04		3.54E-04	NA		NA

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exp
SVOCs - Semivolatile Organic Cor
VOCs - Volatile Organic Compoun
Bold values indicate an exceedenc

TAABLE N-13
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - MLE SCENARIO - SITE R
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane							2.33E-05		2.33E-05									
1,2-Dichloroethane											2.53E+00	2.53E+00	1.12E-02	2.53E+00	2.54E+00			
1,2-Dichloroethene (total)							4.90E-03		4.90E-03									
2-Butanone (MEK)				2.23E-05	1.59E-03	1.61E-03												
Acetone										4.32E-04		4.32E-04	4.32E-04		4.32E-04			
Benzene																		
Chlorobenzene										2.45E-03	8.18E-03	1.06E-02						
Chloroform							1.37E-03		1.37E-03	1.37E-03	1.04E-02	1.17E-02		1.04E-02	1.04E-02		1.04E-02	1.04E-02
Dichloromethane										1.80E-04	1.80E-04	3.60E-04						
Ethylbenzene					5.58E-06	5.58E-06				4.98E-06		4.98E-06	4.98E-06		4.98E-06			
Tetrachloroethene	1.08E-01		1.08E-01							1.08E-01	1.28E-02	1.21E-01		1.28E-02	1.28E-02			
Toluene										3.24E-03		3.24E-03	3.24E-03		3.24E-03		1.27E-02	1.27E-02
Trichloroethylene										**5.76E+00**		**5.76E+00**					9.34E-01	9.34E-01
Xylenes, Total	1.26E-05		1.26E-05														3.62E-04	3.62E-04
SVOCs																		
1,4-Dichlorobenzene				4.62E-06		4.62E-06				4.62E-06	6.20E-09	4.62E-06						
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Nitroaniline								1.50E-05	1.50E-05									
3-Methylphenol/4-Methylphenol	6.76E-04		6.76E-04													6.76E-04		6.76E-04
4-Chloroaniline																		
4-Nitroaniline							1.64E-02	2.03E-06	1.64E-02									
Benzo(g,h,i)perylene													1.63E-01		1.63E-01			
Naphthalene	3.75E-05		3.75E-05															
Nitrobenzene							7.30E-04	6.56E-06	7.37E-04	7.30E-04	6.56E-06	7.37E-04	7.30E-04	6.56E-06	7.37E-04			
Phenol	1.68E-02		1.68E-02															
Pesticides																		
4,4'-DDT										1.18E-01		1.18E-01						
beta-BHC										7.69E-03		7.69E-03	7.69E-03		7.69E-03			
Dieldrin										4.38E-02		4.38E-02						
gamma-BHC (Lindane)										9.45E-04		9.45E-04	9.45E-04		9.45E-04			
Heptachlor										3.45E-03		3.45E-03						
Herbicides																		
2,4-D							2.47E-03		2.47E-03	2.47E-03		2.47E-03	2.47E-03		2.47E-03			
MCPP													2.57E-03		2.57E-03			
PCBs																		
Total PCBs																		
Metals																		
Arsenic																		
Beryllium																		
Chromium																		
Cobalt							1.61E-04		1.61E-04									
Manganese																2.11E-02		2.11E-02
Mercury																	1.65E-03	1.65E-03
Nickel	3.35E-04		3.35E-04															
Thallium							1.95E-03		1.95E-03									
Vanadium																		
Zinc							9.09E-04		9.09E-04									
Total	1.26E-01		1.26E-01	2.70E-05	1.60E-03	1.62E-03	2.89E-02	2.36E-05	2.89E-02	**6.06E+00**	**2.56E+00**	**8.62E+00**	1.92E-01	**2.56E+00**	**2.75E+00**	2.18E-02	9.59E-01	9.81E-01

Notes:
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Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
MLE - Most Likely Exposure.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TAABLE N-13
TOXIC ENDPOINTS FOR POTENTIAL NONC
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	GI Effects			Reproductive Effects			Vascular Effects			Dec. Longevity			Nasal Effects			Immune Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane																		
1,2-Dichloroethane		2.53E+00	2.53E+00															
1,2-Dichloroethene (total)																		
2-Butanone (MEK)																		
Acetone																		
Benzene																5.17E-02	5.90E-02	1.11E-01
Chlorobenzene																		
Chloroform																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Toluene																		
Trichloroethylene																		
Xylenes, Total										1.26E-05		1.26E-05						
SVOCs																		
1,4-Dichlorobenzene																		
2,4,6-Trichlorophenol				4.04E-02		4.04E-02												
2,4-Dichlorophenol																6.01E-03		6.01E-03
2-Chlorophenol				1.84E-02		1.84E-02												
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol																		
4-Chloroaniline																		
4-Nitroaniline																		
Benzo(g,h,i)perylene																		
Naphthalene														7.69E-06	7.69E-06			
Nitrobenzene																		
Phenol																		
Pesticides																		
4,4'-DDT																		
beta-BHC																		
Dieldrin																		
gamma-BHC (Lindane)																		
Heptachlor																		
Herbicides																		
2,4-D																		
MCPP																		
PCBs																		
Total PCBs																1.02E+02		1.02E+02
Metals																		
Arsenic							3.17E-04		3.17E-04									
Beryllium	1.77E-04		1.77E-04															
Chromium																		
Cobalt																		
Manganese																		
Mercury																8.73E-02		8.73E-02
Nickel																		
Thallium																		
Vanadium																		
Zinc																		
Total	1.77E-04	2.53E+00	2.53E+00	5.88E-02		5.88E-02	3.17E-04		3.17E-04	1.26E-05		1.26E-05		7.69E-06	7.69E-06	1.02E+02	5.90E-02	1.02E+02

Notes:
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Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
MLE - Most Likely Exposure.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the targ

TAABLE N-13
TOXIC ENDPOINTS FOR POTENTIAL NONC
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Spleen Effects			Skin Effects			Eye Effects			Adrenal Effects			Respiratory Effects			None Reported		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,1,2-Trichloroethane																		
1,2-Dichloroethane					2.53E+00	2.53E+00												
1,2-Dichloroethene (total)																		
2-Butanone (MEK)																		
Acetone																		
Benzene																		
Chlorobenzene																		
Chloroform																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Toluene																		
Trichloroethylene																		
Xylenes, Total																		
SVOCs																		
1,4-Dichlorobenzene																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2-Chlorophenol																		
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol																		
4-Chloroaniline	5.37E-02		5.37E-02															
4-Nitroaniline																		
Benzo(g,h,i)perylene																		
Naphthalene																		
Nitrobenzene										7.30E-04	6.56E-06	7.37E-04						
Phenol																		
Pesticides																		
4,4'-DDT																		
beta-BHC																		
Dieldrin																		
gamma-BHC (Lindane)																		
Heptachlor																		
Herbicides																		
2,4-D																		
MCPP																		
PCBs																		
Total PCBs				1.02E+02		1.02E+02	1.02E+02		1.02E+02									
Metals																		
Arsenic				3.17E-04		3.17E-04												
Beryllium													1.77E-04		1.77E-04			
Chromium																3.68E-03		3.68E-03
Cobalt																		
Manganese																		
Mercury																		
Nickel																		
Thallium																		
Vanadium																1.04E-04		1.04E-04
Zinc																		
Total	5.37E-02		5.37E-02	1.02E+02	2.53E+00	1.04E+02	1.02E+02		1.02E+02	7.30E-04	6.56E-06	7.37E-04	1.77E-04		1.77E-04	NA		NA

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
MLE - Most Likely Exposure.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedance of the targ

TABLE N-14
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - RME SCENARIO - SITE S
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects			Reproductive Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
4-Methyl-2-pentanone (MIBK)		2.22E-03	2.22E-03															
Benzene																		
Chlorobenzene								3.25E-02	3.25E-02									
Dichloromethane								9.52E-05	9.52E-05									
Ethylbenzene		1.40E-03	1.40E-03															
Tetrachloroethene								1.18E-04	1.18E-04		1.18E-04	1.18E-04						
Toluene														3.26E-02	3.26E-02			
Trichloroethylene														4.76E-02	4.76E-02			
Xylenes, Total														1.17E-01	1.17E-01			
SVOCs																		
2,4,6-Trichlorophenol																3.09E-02		3.09E-02
2-Nitroaniline					1.04E-05	1.04E-05												
4-Nitroaniline				7.16E-03	6.49E-06	7.17E-03												
Pesticides																		
4,4'-DDT							1.21E-02		1.21E-02									
beta-BHC							3.27E-02		3.27E-02	3.27E-02		3.27E-02						
gamma-BHC (Lindane)							*9.42E-03*		*9.42E-03*	*9.42E-03*		*9.42E-03*						
Heptachlor							1.13E-03		1.13E-03									
Herbicides																		
Pentachlorophenol							5.53E-03		5.53E-03	5.53E-03		5.53E-03						
PCBs																		
Total PCBs																		
		3.62E-03	3.62E-03	7.16E-03	1.69E-05	7.18E-03	6.08E-02	3.27E-02	9.35E-02	4.76E-02	1.18E-04	4.77E-02		1.97E-01	1.97E-01	3.09E-02		3.09E-02

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-14
TOXIC ENDPOINTS FOR POTENTIAL I
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Immune Effects			Skin Effects			Eye Effects			Skeletal Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs												
4-Methyl-2-pentanone (MIBK)											2.22E-03	2.22E-03
Benzene		3.55E-03	3.55E-03									
Chlorobenzene												
Dichloromethane												
Ethylbenzene												
Tetrachloroethene												
Toluene												
Trichloroethylene												
Xylenes, Total												
SVOCs												
2,4,6-Trichlorophenol												
2-Nitroaniline												
4-Nitroaniline												
Pesticides												
4,4'-DDT												
beta-BHC												
gamma-BHC (Lindane)												
Heptachlor												
Herbicides												
Pentachlorophenol												
PCBs												
Total PCBs	**1.66E+01**		**1.66E+01**	**1.66E+01**		**1.66E+01**	**1.66E+01**		**1.66E+01**			
	1.66E+01	3.55E-03	**1.66E+01**	**1.66E+01**		**1.66E+01**	**1.66E+01**		**1.66E+01**		2.22E-03	2.22E-03

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compoun
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-15
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - OUTDOOR INDUSTRIAL WORKER - MLE SCENARIO - SITE S
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects			Reproductive Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
4-Methyl-2-pentanone (MIBK)		3.54E-04	3.54E-04															
Benzene																		
Chlorobenzene								4.55E-03	4.55E-03									
Dichloromethane								1.73E-05	1.73E-05									
Ethylbenzene		2.50E-04	2.50E-04															
Tetrachloroethene								2.94E-05	2.94E-05		2.94E-05	2.94E-05						
Toluene														4.54E-03	4.54E-03			
Trichloroethylene														6.54E-03	6.54E-03			
Xylenes, Total														1.75E-02	1.75E-02			
SVOCs																		
2,4,6-Trichlorophenol																9.56E-03		9.56E-03
2-Nitroaniline					3.94E-06	3.94E-06												
4-Nitroaniline				2.20E-03	2.06E-06	2.20E-03												
Pesticides																		
4,4'-DDT							3.65E-03		3.65E-03									
beta-BHC							9.88E-03		9.88E-03	9.88E-03		9.88E-03						
gamma-BHC (Lindane)							2.85E-03		2.85E-03	2.85E-03		2.85E-03						
Heptachlor							3.42E-04		3.42E-04									
Herbicides																		
Pentachlorophenol							1.67E-03		1.67E-03	1.67E-03		1.67E-03						
PCBs																		
Total PCBs																		
		6.04E-04	6.04E-04	2.20E-03	6.00E-06	2.21E-03	1.84E-02	4.60E-03	2.30E-02	1.44E-02	2.94E-05	1.44E-02		2.86E-02	2.86E-02	9.56E-03		9.56E-03

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-15
TOXIC ENDPOINTS FOR POTENTIAL I
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Immune Effects			Skin Effects			Eye Effects			Skeletal Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs												
4-Methyl-2-pentanone (MIBK)											3.54E-04	3.54E-04
Benzene		7.63E-04	7.63E-04									
Chlorobenzene												
Dichloromethane												
Ethylbenzene												
Tetrachloroethene												
Toluene												
Trichloroethylene												
Xylenes, Total												
SVOCs												
2,4,6-Trichlorophenol												
2-Nitroaniline												
4-Nitroaniline												
Pesticides												
4,4'-DDT												
beta-BHC												
gamma-BHC (Lindane)												
Heptachlor												
Herbicides												
Pentachlorophenol												
PCBs												
Total PCBs	**5.17E+00**		**5.17E+00**	**5.17E+00**		**5.17E+00**	**5.17E+00**		**5.17E+00**			
	5.17E+00	**7.63E-04**	**5.17E+00**	**5.17E+00**		**5.17E+00**	**5.17E+00**		**5.17E+00**		**3.54E-04**	**3.54E-04**

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compoun
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-16
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - RME SCENARIO - SITE S
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
4-Methyl-2-pentanone (MIBK)					3.62E-03	3.62E-03				8.32E-04		8.32E-04	8.32E-04		8.32E-04	8.32E-04		8.32E-04
Benzene																		
Chlorobenzene										9.99E-03	5.34E-02	6.34E-02						
Dichloromethane										1.64E-04	1.57E-04	3.20E-04						
Ethylbenzene					2.30E-03	2.30E-03				1.83E-03		1.83E-03	1.83E-03		1.83E-03			
Tetrachloroethene	5.49E-04		5.49E-04							5.49E-04	2.03E-04	7.52E-04		2.03E-04	2.03E-04			
Toluene										4.99E-03		4.99E-03	4.99E-03		4.99E-03		5.22E-02	5.22E-02
Trichloroethylene										1.33E-01		1.33E-01					7.83E-02	7.83E-02
Xylenes, Total	6.11E-03		6.11E-03														1.86E-01	1.86E-01
SVOCs																		
1,3-Dichlorobenzene							2.22E-03		2.22E-03		9.86E-08	9.86E-08						
1,4-Dichlorobenzene				1.11E-03		1.11E-03				1.11E-03	1.64E-06	1.11E-03						
2,4,6-Trichlorophenol																		
2-Nitroaniline								1.51E-04	1.51E-04									
4-Nitroaniline							3.16E-03	9.39E-05	3.26E-03									
bis(2-Ethylhexyl)phthalate										1.04E-03		1.04E-03						
Naphthalene	3.47E-04		3.47E-04															
Pesticides																		
4,4'-DDT										5.33E-03		5.33E-03						
Aldrin										1.05E-03		1.05E-03						
beta-BHC										1.44E-02		1.44E-02	1.44E-02		1.44E-02			
Dieldrin										1.27E-03		1.27E-03						
gamma-BHC (Lindane)										4.16E-03		4.16E-03	4.16E-03		4.16E-03			
Heptachlor										4.99E-04		4.99E-04						
Herbicides																		
Pentachlorophenol										2.44E-03		2.44E-03	2.44E-03		2.44E-03			
PCBs																		
Total PCBs																		
Metals																		
Chromium																		
	7.01E-03		7.01E-03	1.11E-03	5.92E-03	7.03E-03	5.38E-03	2.45E-04	5.63E-03	1.83E-01	5.38E-02	2.37E-01	2.87E-02	2.03E-04	2.89E-02	8.32E-04	3.17E-01	3.18E-01

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-16
TOXIC ENDPOINTS FOR POTENTIAL N(
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Reproductive Effects			Dec. Longevity			Nasal Effects			Immune Effects			Skin Effects			Eye Effects			Thyroid Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																					
4-Methyl-2-pentanone (MIBK)																					
Benzene										1.54E-03	5.84E-03	7.39E-03									
Chlorobenzene																					
Dichloromethane																					
Ethylbenzene																					
Tetrachloroethene																					
Toluene																					
Trichloroethylene																					
Xylenes, Total				6.11E-03		6.11E-03															
SVOCs																					
1,3-Dichlorobenzene																			2.22E-03		2.22E-03
1,4-Dichlorobenzene																					
2,4,6-Trichlorophenol	1.37E-02		1.37E-02																		
2-Nitroaniline																					
4-Nitroaniline																					
bis(2-Ethylhexyl)phthalate																					
Naphthalene								1.05E-04	1.05E-04												
Pesticides																					
4,4'-DDT																					
Aldrin																					
beta-BHC																					
Dieldrin																					
gamma-BHC (Lindane)																					
Heptachlor																					
Herbicides																					
Pentachlorophenol																					
PCBs																					
Total PCBs										8.56E+00		8.56E+00	8.56E+00		8.56E+00	8.56E+00		8.56E+00			
Metals																					
Chromium																					
	1.37E-02		1.37E-02	6.11E-03		6.11E-03		1.05E-04	1.05E-04	8.56E+00	5.84E-03	8.56E+00	8.56E+00		8.56E+00	8.56E+00		8.56E+00	2.22E-03		2.22E-03

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-16
TOXIC ENDPOINTS FOR POTENTIAL NC
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Skeletal Effects			Respiratory Effects			None Reported		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs									
4-Methyl-2-pentanone (MIBK)		3.62E-03	3.62E-03						
Benzene									
Chlorobenzene									
Dichloromethane									
Ethylbenzene									
Tetrachloroethene									
Toluene									
Trichloroethylene									
Xylenes, Total									
SVOCs									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
2,4,6-Trichlorophenol									
2-Nitroaniline									
4-Nitroaniline									
bis(2-Ethylhexyl)phthalate									
Naphthalene									
Pesticides									
4,4'-DDT									
Aldrin									
beta-BHC									
Dieldrin									
gamma-BHC (Lindane)									
Heptachlor									
Herbicides									
Pentachlorophenol									
PCBs									
Total PCBs									
Metals									
Chromium					3.15E-02	3.15E-02	7.51E-03		7.51E-03
		3.62E-03	3.62E-03		3.15E-02	3.15E-02	NA		NA

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compound
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the

TABLE N-17
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - TRESPASSING TEENAGER - RME SCENARIO - SITE S
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Develop. Effects			Blood Effects			Liver Effects			Kidney Effects			Neuro. Effects			Reproductive Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
VOCs																		
4-Methyl-2-pentanone (MIBK)		8.49E-05	8.49E-05															
Benzene																		
Chlorobenzene								1.24E-03	1.24E-03									
Dichloromethane								3.64E-06	3.64E-06									
Ethylbenzene		5.34E-05	5.34E-05															
Tetrachloroethene								4.49E-06	4.49E-06		4.49E-06	4.49E-06						
Toluene														1.24E-03	1.24E-03			
Trichloroethylene														1.82E-03	1.82E-03			
Xylenes, Total														4.46E-03	4.46E-03			
SVOCs																		
2,4,6-Trichlorophenol																1.27E-02		1.27E-02
2-Nitroaniline					3.99E-07	3.99E-07												
4-Nitroaniline				2.93E-03	2.48E-07	2.93E-03												
Pesticides																		
4,4'-DDT							4.94E-03		4.94E-03									
beta-BHC							1.34E-02		1.34E-02	1.34E-02		1.34E-02						
gamma-BHC (Lindane)							3.86E-03		3.86E-03	3.86E-03		3.86E-03						
Heptachlor							4.63E-04		4.63E-04									
Herbicides																		
Pentachlorophenol							2.26E-03		2.26E-03	2.26E-03		2.26E-03						
PCBs																		
Total PCBs																		
		1.38E-04	1.38E-04	2.93E-03	6.47E-07	2.93E-03	2.49E-02	1.25E-03	2.62E-02	1.95E-02	4.49E-06	1.95E-02		7.52E-03	7.52E-03	1.27E-02		1.27E-02

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-17
TOXIC ENDPOINTS FOR POTENTIAL I
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Immune Effects			Skin Effects			Eye Effects			Skeletal Effects		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs												
4-Methyl-2-pentanone (MIBK)											8.49E-05	8.49E-05
Benzene		1.36E-04	1.36E-04									
Chlorobenzene												
Dichloromethane												
Ethylbenzene												
Tetrachloroethene												
Toluene												
Trichloroethylene												
Xylenes, Total												
SVOCs												
2,4,6-Trichlorophenol												
2-Nitroaniline												
4-Nitroaniline												
Pesticides												
4,4'-DDT												
beta-BHC												
gamma-BHC (Lindane)												
Heptachlor												
Herbicides												
Pentachlorophenol												
PCBs												
Total PCBs	**6.91E+00**		**6.91E+00**	**6.91E+00**		**6.91E+00**	**6.91E+00**		**6.91E+00**			
	6.91E+00	1.36E-04	**6.91E+00**	**6.91E+00**		**6.91E+00**	**6.91E+00**		**6.91E+00**		8.49E-05	8.49E-05

Notes:
Develop. - Developmental.
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compoun
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of th

TABLE N-18
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - RECREATIONAL FISHER - CARP FILLET - RME SCENARIO - SITE Q POND
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Liver Effects			Kidney Effects			Neuro. Effects			Vascular Effects			Immune Effects			Skin Effects			Eye Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
SVOCs																					
bis(2-Ethylhexyl)phthalate	2.86E-03		2.86E-03																		
Pesticides																					
4,4'-DDT	7.54E-02		7.54E-02																		
alpha-Chlordane	3.66E-03		3.66E-03																		
beta-BHC	6.48E-03		6.48E-03	6.48E-03		6.48E-03															
Dieldrin	4.34E-01		4.34E-01																		
PCBs																					
Total PCBs													5.71E+01		5.71E+01	5.71E+01		5.71E+01	5.71E+01		5.71E+01
Metals																					
Arsenic										3.12E-01		3.12E-01				3.12E-01		3.12E-01			
Manganese							3.48E-04		3.48E-04												
Mercury													5.41E-02		5.41E-02						
	5.23E-01		5.23E-01	6.48E-03		6.48E-03	3.48E-04		3.48E-04	3.12E-01		3.12E-01	5.72E+01		5.72E+01	5.75E+01		5.75E+01	5.71E+01		5.71E+01

Notes:
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-19
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - RECREATIONAL FISHER - CARP FILLET - MLE SCENARIO - SITE Q POND
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Liver Effects			Kidney Effects			Neuro. Effects			Vascular Effects			Immune Effects			Skin Effects			Eye Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
SVOCs																					
bis(2-Ethylhexyl)phthalate	3.57E-04		3.57E-04																		
Pesticides																					
4,4'-DDT	9.43E-03		9.43E-03																		
alpha-Chlordane	4.57E-04		4.57E-04																		
beta-BHC	8.10E-04		8.10E-04	8.10E-04		8.10E-04															
Dieldrin	5.43E-02		5.43E-02																		
PCBs																					
Total PCBs													7.14E+00		7.14E+00	7.14E+00		7.14E+00	7.14E+00		7.14E+00
Metals																					
Arsenic										3.90E-02		3.90E-02				3.90E-02		3.90E-02			
Manganese							3.62E-05		3.62E-05												
Mercury													6.76E-03		6.76E-03						
	6.53E-02		6.53E-02	8.10E-04		8.10E-04	3.62E-05		3.62E-05	3.90E-02		3.90E-02	7.15E+00		7.15E+00	7.18E+00		7.18E+00	7.14E+00		7.14E+00

Notes:
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-20
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - RECREATIONAL FISHER -BLACK BULLHEAD FILLET - RME SCENARIO - SITE Q POND
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Liver Effects			Neuro. Effects			Vascular Effects			Immune Effects			Skin Effects			Eye Effects		
Constituent	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**	**Ing**	**Inh**	**Total**
Pesticides																		
4,4'-DDT	8.23E-02		8.23E-02															
alpha-Chlordane	2.29E-03		2.29E-03															
Dieldrin	2.29E-01		2.29E-01															
PCBs																		
Total PCBs										**2.21E+01**		**2.21E+01**	**2.21E+01**		**2.21E+01**	**2.21E+01**		**2.21E+01**
Metals																		
Arsenic							2.97E-01		2.97E-01				2.97E-01		2.97E-01			
Manganese				3.48E-04		3.48E-04												
Mercury										1.90E-01		1.90E-01						
	3.13E-01		3.13E-01	3.48E-04		3.48E-04	2.97E-01		2.97E-01	**2.23E+01**		**2.23E+01**	**2.24E+01**		**2.24E+01**	**2.21E+01**		**2.21E+01**

Notes:
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-21
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - RECREATIONAL FISHER -BLACK BULLHEAD FILLET - MLE SCENARIO - SITE Q POND
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Liver Effects			Neuro. Effects			Vascular Effects			Immune Effects			Skin Effects			Eye Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
Pesticides																		
4,4'-DDT	1.03E-02		1.03E-02															
alpha-Chlordane	2.86E-04		2.86E-04															
Dieldrin	2.86E-02		2.86E-02															
PCBs																		
Total PCBs										**2.76E+00**		**2.76E+00**	**2.76E+00**		**2.76E+00**	**2.76E+00**		**2.76E+00**
Metals																		
Arsenic							3.71E-02		3.71E-02				3.71E-02		3.71E-02			
Manganese				3.62E-05		3.62E-05												
Mercury										2.38E-02		2.38E-02						
	3.91E-02		3.91E-02	3.62E-05		3.62E-05	3.71E-02		3.71E-02	**2.79E+00**		**2.79E+00**	**2.80E+00**		**2.80E+00**	**2.76E+00**		**2.76E+00**

Notes:
D/R - Dose-Response.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-22
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - RME SCENARIO - SITE Q NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
1,2-Dichloroethane											3.77E-01	3.77E-01	9.61E-04	3.77E-01	3.78E-01
4-Methyl-2-pentanone (MIBK)					1.68E-04	1.68E-04				5.23E-05		5.23E-05	5.23E-05		5.23E-05
Acetone										3.78E-05		3.78E-05	3.78E-05		3.78E-05
Benzene															
Chlorobenzene										3.19E-03	1.50E-02	1.82E-02			
Dichloromethane										8.90E-06	1.49E-05	2.38E-05			
Ethylbenzene					6.90E-04	6.90E-04				1.30E-05		1.30E-05	1.30E-05		1.30E-05
Tetrachloroethene	6.15E-04		6.15E-04							6.15E-04	1.72E-03	2.34E-03		1.72E-03	1.72E-03
Trichloroethylene										1.64E-03		1.64E-03			
Xylenes, Total	4.85E-05		4.85E-05												
SVOCs															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol							2.59E-04		2.59E-04						
2-Chlorophenol															
2-Nitroaniline								2.03E-04	2.03E-04						
3-Methylphenol/4-Methylphenol	4.81E-04		4.81E-04												
4-Chloroaniline															
4-Nitroaniline							1.94E-03		1.94E-03						
Naphthalene	5.53E-03		5.53E-03												
Nitrobenzene							2.87E-02		2.87E-02	2.87E-02		2.87E-02	2.87E-02		2.87E-02
Phenol	2.45E-04		2.45E-04												
Pesticides															
beta-BHC										1.03E-03		1.03E-03	1.03E-03		1.03E-03
Dieldrin										1.94E-03		1.94E-03			
Endrin Ketone										2.44E-04		2.44E-04			
Herbicides															
2,4-D							1.25E-01		1.25E-01	1.25E-01		1.25E-01	1.25E-01		1.25E-01
Pentachlorophenol										1.31E-01		1.31E-01	1.31E-01		1.31E-01
PCBs															
Total PCBs															
Metals															
Antimony							6.92E-03		6.92E-03						
Arsenic															
Barium					4.07E-02	4.07E-02							6.82E-03		6.82E-03
Cadmium													3.71E-03		3.71E-03
Manganese															
Nickel	1.15E-04		1.15E-04												
Zinc							1.37E-04		1.37E-04						
Total	7.03E-03		7.03E-03		4.15E-02	4.15E-02	1.63E-01	2.03E-04	1.64E-01	2.94E-01	3.94E-01	6.89E-01	2.98E-01	3.79E-01	6.77E-01

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-22
TOXIC ENDPOINTS FOR POTENTIAL NOI
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Neuro. Effects			GI Effects			Reproductive Effects			Vascular Effects			Dec. Longevity			Immune Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,2-Dichloroethane					3.77E-01	3.77E-01												
4-Methyl-2-pentanone (MIBK)	5.23E-05		5.23E-05															
Acetone																		
Benzene																6.49E-03	2.22E-02	2.87E-02
Chlorobenzene																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Trichloroethylene		1.41E-03	1.41E-03															
Xylenes, Total		5.81E-02	5.81E-02										4.85E-05		4.85E-05			
SVOCs																		
2,4,6-Trichlorophenol							8.43E+00		8.43E+00									
2,4-Dichlorophenol																1.82E+00		1.82E+00
2,4-Dimethylphenol	2.59E-04		2.59E-04															
2-Chlorophenol							2.58E-02		2.58E-02									
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol	4.81E-04		4.81E-04															
4-Chloroaniline																		
4-Nitroaniline																		
Naphthalene																		
Nitrobenzene																		
Phenol																		
Pesticides																		
beta-BHC																		
Dieldrin																		
Endrin Ketone	2.44E-04		2.44E-04															
Herbicides																		
2,4-D																		
Pentachlorophenol																		
PCBs																		
Total PCBs																5.11E-01		5.11E-01
Metals																		
Antimony													6.92E-03		6.92E-03			
Arsenic										2.46E-03		2.46E-03						
Barium																		
Cadmium																		
Manganese	3.04E-04		3.04E-04															
Nickel																		
Zinc																		
Total	1.34E-03	5.95E-02	6.08E-02		3.77E-01	3.77E-01	8.45E+00		8.45E+00	2.46E-03		2.46E-03	6.97E-03		6.97E-03	2.33E+00	2.22E-02	2.36E+00

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the t

TABLE N-22
TOXIC ENDPOINTS FOR POTENTIAL NON
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Spleen Effects			Skin Effects			Eye Effects			Adrenal Effects			Skeletal Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
1,2-Dichloroethane					3.77E-01	3.77E-01									
4-Methyl-2-pentanone (MIBK)														1.68E-04	1.68E-04
Acetone															
Benzene															
Chlorobenzene															
Dichloromethane															
Ethylbenzene															
Tetrachloroethene															
Trichloroethylene															
Xylenes, Total															
SVOCs															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol															
2-Chlorophenol															
2-Nitroaniline															
3-Methylphenol/4-Methylphenol															
4-Chloroaniline	2.38E-02		2.38E-02												
4-Nitroaniline															
Naphthalene															
Nitrobenzene										2.87E-02		2.87E-02			
Phenol															
Pesticides															
beta-BHC															
Dieldrin															
Endrin Ketone															
Herbicides															
2,4-D															
Pentachlorophenol															
PCBs															
Total PCBs				5.11E-01		5.11E-01	5.11E-01		5.11E-01						
Metals															
Antimony															
Arsenic				2.46E-03		2.46E-03									
Barium															
Cadmium															
Manganese															
Nickel															
Zinc															
Total	2.38E-02		2.38E-02	5.14E-01	3.77E-01	8.91E-01	5.11E-01		5.11E-01	2.87E-02		2.87E-02		1.68E-04	1.68E-04

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
NA - Effect not additive.
Neuro. - Neurological.
PCBs - Polychlorinated Biphenyls.
RME - Reasonable Maximum Exposure.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the t

TABLE N-23
TOXIC ENDPOINTS FOR POTENTIAL NONCARCINOGENIC EFFECTS - CONSTRUCTION/UTILITY WORKER - MLE SCENARIO - SITE Q NORTH
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Dec. Body Weight			Develop. Effects			Blood Effects			Liver Effects			Kidney Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
1,2-Dichloroethane											1.11E-01	1.11E-01	4.78E-04	1.11E-01	1.11E-01
4-Methyl-2-pentanone (MIBK)					5.04E-05	5.04E-05				2.61E-05		2.61E-05	2.61E-05		2.61E-05
Acetone										1.89E-05		1.89E-05	1.89E-05		1.89E-05
Benzene															
Chlorobenzene										1.60E-03	4.50E-03	6.09E-03			
Dichloromethane										4.45E-06	4.46E-06	8.91E-06			
Ethylbenzene					9.20E-05	9.20E-05				1.91E-06		1.91E-06	1.91E-06		1.91E-06
Tetrachloroethene	2.78E-04		2.78E-04							2.78E-04	2.25E-04	5.02E-04		2.25E-04	2.25E-04
Trichloroethylene										7.82E-04		7.82E-04			
Xylenes, Total	7.07E-06		7.07E-06												
SVOCs															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol							1.29E-04		1.29E-04						
2-Chlorophenol															
2-Nitroaniline								3.75E-05	3.75E-05						
3-Methylphenol/4-Methylphenol	2.40E-04		2.40E-04												
4-Chloroaniline															
4-Nitroaniline							9.68E-04		9.68E-04						
Naphthalene	2.76E-03		2.76E-03												
Nitrobenzene							1.44E-02		1.44E-02	1.44E-02		1.44E-02	1.44E-02		1.44E-02
Phenol	1.23E-04		1.23E-04												
Pesticides															
beta-BHC										5.14E-04		5.14E-04	5.14E-04		5.14E-04
Dieldrin										3.80E-04		3.80E-04			
Endrin Ketone										1.22E-04		1.22E-04			
Herbicides															
2,4-D							6.27E-02		6.27E-02	6.27E-02		6.27E-02	6.27E-02		6.27E-02
Pentachlorophenol										6.54E-02		6.54E-02	6.54E-02		6.54E-02
PCBs															
Total PCBs															
Metals															
Antimony							1.11E-03		1.11E-03						
Arsenic															
Barium					5.54E-03	5.54E-03							9.95E-04		9.95E-04
Cadmium													8.58E-04		8.58E-04
Manganese															
Nickel	5.77E-05		5.77E-05												
Zinc							6.84E-05		6.84E-05						
Total	3.47E-03		3.47E-03		5.69E-03	5.69E-03	7.94E-02	3.75E-05	7.94E-02	1.46E-01	1.15E-01	2.62E-01	1.45E-01	1.11E-01	2.56E-01

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the target hazard index of 1, or values that significantly contribute to an exceedence.

TABLE N-23
TOXIC ENDPOINTS FOR POTENTIAL NON
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

Constituent	Neuro. Effects			GI Effects			Reproductive Effects			Vascular Effects			Dec. Longevity		
	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs															
1,2-Dichloroethane					1.11E-01	1.11E-01									
4-Methyl-2-pentanone (MIBK)	2.61E-05		2.61E-05												
Acetone															
Benzene															
Chlorobenzene															
Dichloromethane															
Ethylbenzene															
Tetrachloroethene															
Trichloroethylene		2.81E-04	2.81E-04												
Xylenes, Total		7.56E-03	7.56E-03										7.07E-06		7.07E-06
SVOCs															
2,4,6-Trichlorophenol							4.21E+00		4.21E+00						
2,4-Dichlorophenol															
2,4-Dimethylphenol	1.29E-04		1.29E-04												
2-Chlorophenol							1.29E-02		1.29E-02						
2-Nitroaniline															
3-Methylphenol/4-Methylphenol	2.40E-04		2.40E-04												
4-Chloroaniline															
4-Nitroaniline															
Naphthalene															
Nitrobenzene															
Phenol															
Pesticides															
beta-BHC															
Dieldrin															
Endrin Ketone	1.22E-04		1.22E-04												
Herbicides															
2,4-D															
Pentachlorophenol															
PCBs															
Total PCBs															
Metals															
Antimony													1.11E-03		1.11E-03
Arsenic										6.10E-04		6.10E-04			
Barium															
Cadmium															
Manganese	1.52E-04		1.52E-04												
Nickel															
Zinc															
Total	6.70E-04	7.84E-03	8.51E-03		1.11E-01	1.11E-01	4.22E+00		4.22E+00	6.10E-04		6.10E-04	1.12E-03		1.12E-03

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the tar

TABLE N-23
TOXIC ENDPOINTS FOR POTENTIAL NON-
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS

	Immune Effects			Spleen Effects			Skin Effects			Eye Effects			Adrenal Effects			Skelatal Effects		
Constituent	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total	Ing	Inh	Total
VOCs																		
1,2-Dichloroethane								1.11E-01	1.11E-01									
4-Methyl-2-pentanone (MIBK)																	5.04E-05	5.04E-05
Acetone																		
Benzene	3.22E-03	4.92E-03	8.14E-03															
Chlorobenzene																		
Dichloromethane																		
Ethylbenzene																		
Tetrachloroethene																		
Trichloroethylene																		
Xylenes, Total																		
SVOCs																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol	9.07E-01		9.07E-01															
2,4-Dimethylphenol																		
2-Chlorophenol																		
2-Nitroaniline																		
3-Methylphenol/4-Methylphenol																		
4-Chloroaniline				1.19E-02		1.19E-02												
4-Nitroaniline																		
Naphthalene																		
Nitrobenzene													1.44E-02		1.44E-02			
Phenol																		
Pesticides																		
beta-BHC																		
Dieldrin																		
Endrin Ketone																		
Herbicides																		
2,4-D																		
Pentachlorophenol																		
PCBs																		
Total PCBs	1.17E-01		1.17E-01				1.17E-01		1.17E-01	1.17E-01		1.17E-01						
Metals																		
Antimony																		
Arsenic							6.10E-04		6.10E-04									
Barium																		
Cadmium																		
Manganese																		
Nickel																		
Zinc																		
Total	1.03E+00	4.92E-03	1.03E+00	1.19E-02		1.19E-02	1.17E-01	1.11E-01	2.28E-01	1.17E-01		1.17E-01	1.44E-02		1.44E-02		5.04E-05	5.04E-05

Notes:
Dec. - Decreased.
Develop. - Developmental.
D/R - Dose-Response.
GI - Gastrointestinal.
Ing - Ingestion.
Inh - Inhalation.
MLE - Most Likely Exposure.
NA - Effect not additive.
Neuro. - Neurological
PCBs - Polychlorinated Biphenyls.
SVOCs - Semivolatile Organic Compounds.
VOCs - Volatile Organic Compounds.
Bold values indicate an exceedence of the ta

APPENDIX O

ASSESSMENT OF POTENTIAL LEAD EXPOSURES

APPENDIX O

ASSESSMENT OF POTENTIAL LEAD EXPOSURES

This appendix presents the risk assessment for lead. Section O.1 presents the hazard identification for lead; Section O.2 discusses the exposure assessment for lead; Section O.3 presents the dose-response assessment for lead; Section O.4 presents the model for assessing potential exposure to lead in soil; Section O.5 presents the model for assessing potential exposure to lead in water. Section O.6 presents the risk characterization for lead; and Section O.7 presents the conclusions. References sited in this appendix are presented in Section 8 of the main text of this report.

O.1 Hazard Identification

Lead was identified as constituent of potential concern (COPC) in combined soils (Sites O North, Q South, and S), shallow groundwater (Site O), and in the Site Q South Pond surface water in Section 3.2 of the main text of this report.

O.2 Exposure Assessment

Section 5.1.2 of the main text of this report selects the receptors and media to be evaluated in the risk assessment. A construction/utility worker is assumed to be exposed to both combined soil and shallow groundwater. A trespassing teenager and a recreational fisher are assumed to be exposed to surface water in the Site Q Pond, which is located in Site Q South. Therefore, incidental ingestion of soil in Sites Q North, Q South, and S and shallow groundwater in Site O associated with potential construction and/or utility repair were evaluated in the lead risk assessment for the construction/utility worker. Incidental ingestion of surface water in the Site Q Pond was evaluated in the lead risk assessment for the recreational fisher and trespassing teenager.

Following the models available for lead evaluation, potential exposure to lead in soil, groundwater, and surface water via dermal contact was not evaluated in this risk assessment. Construction/utility worker direct contact with groundwater may occur during soil excavation. The trespassing teenager and the recreational fisher are assumed to contact surface water. This potential exposure pathway is not expected to contribute significantly to the future construction worker, because of the limited body surface area in contact with groundwater (i.e., hands and forearms), and the short duration of contact. In addition, the potential absorbed dermal dose from lead in groundwater and surface water is expected to be negligible due to the low skin permeability constant of lead constituents in water ($K_p = 4 \times 10^{-6}$ cm/hr). USEPA (1992b) states that constituents with Kps less than 0.1 cm/hr are probably not important to consider for the dermal exposure pathway.

Exposure assumptions derived for the Reasonable Maximum Exposure Scenario (RME) in Section 5 of the main text of this report were used to evaluate each receptor's potential exposure to lead.

O.3 Dose Response Assessment

For many constituents associated with known or potential noncarcinogenic health effects, it has been demonstrated that there is a threshold for these effects. It is conventionally assumed for all such constituents that there is a dose below which no adverse effect occurs or, conversely, above which an adverse effect may be seen. For constituents with known or suspected carcinogenic effects, the underlying default assumption for regulatory risk assessment is that there is no threshold for effects. Thus, every dose, no matter how small, is assumed to pose some finite level of risk.

Because of the uncertainties in the dose-response relationship between exposure to lead and biological effects, it is unclear whether the noncarcinogenic effects of lead exhibit a threshold response. Therefore, a reference dose (RfD) for lead is not available. Although USEPA has classified lead as a B2 (probable human) carcinogen, no cancer slope factor (CSF) has been developed. Therefore, potential exposures to lead cannot be evaluated using the traditional methods of risk assessment.

The Technical Review Workgroup (TRW), convened by USEPA to evaluate the risk assessment of lead, assumes that there is a baseline blood lead concentration in the adult population of the United States. The TRW selected baseline blood lead concentration represents the best estimate of a reasonable central tendency value for women of child-bearing age without previous excessive occupational exposures (USEPA, 1996d). The TRW has developed potential baseline blood lead levels which are dependent on race. The recommended range is 1.7- 2.2 ug/dL. The conservative estimate of a baseline blood lead concentration of 2.2 ug/dL has been employed in this risk assessment. This is the value selected by TRW in the version of the adult lead model model obtained from the USEPA web-site.

It is assumed that there is a relationship between uptake of lead into the body and blood lead levels. A numerical value, called a biokinetic slope factor (BKSF), was assigned to represent the relationship between uptake of lead into the body and blood levels. The TRW recommended BKSF of 0.4 ug Pb/dL blood per ug Pb absorbed/day (USEPA, 1996d) is utilized in this risk assessment.

The absorption fraction (AF) is the fraction of lead in soil ingested daily that is absorbed from the gastrointestinal tract. The TRW (USEPA, 1996d) recommended value of 0.12 for absorption from soil has been employed in this risk assessment. This value is based on the assumption that the absorption factor for soluble lead is 0.2, and that the relative bioavailability of lead in soil compared to soluble lead is 0.6. The air lead absorption factor for lead of 0.32 recommended by Bowers et al., (1994), was utilized in this risk assessment. The TRW assumption that the absorption factor for soluble lead in water is 0.2 (USEPA, 1996d), was utilized in this risk assessment.

O.4 Estimating Potential Exposure from Lead in Soil

Lead is identified as a COPC in soil for the construction/utility worker. Soil lead exposures are estimated using the USEPA (1996d) Adult Lead Model. The model assumes that there is a baseline blood lead level in the adult population of the United States. It is assumed that there is a relationship between uptake of lead into the body and blood lead levels. The BKSF was assigned to represent the relationship between uptake of lead into the body and blood levels. The model predicts the geometric mean blood lead level of adult workers potentially exposed to soil at the site, and also predicts the 95th percentile blood lead concentrations among fetuses of adult workers. The model was developed using a sensitive adult receptor, which is a woman of childbearing age. The target blood lead level of concern is 10 ug/dL.

The following equation was used to predict the average expected blood lead level for a hypothetical future worker:

$$PbB_{adult} = \frac{PbS \times BKSF \times IR_{S,D} \times AF_{S,D} \times EF_{S,D}}{AT_{S,D}} + PbB_0$$

The 95th percentile blood lead concentration among fetuses of adult workers is then predicted by:

$$PbB_{fetal,0.95} = PbB_{adult} \times \left(GSD_i^{1.645} \times R\right)$$

where:

PbB_{adult}	=	Geometric mean of adult blood lead concentration (ug/dL)
PbS	=	Soil lead concentration (mg/kg)
BKSF	=	Biokinetic Slope Factor [(ug/dL) per (ug/day)]
$IR_{S,D}$	=	Soil ingestion rate (including soil-derived indoor dust) (g/day)
$AF_{S,D}$	=	Absorption fraction (same for soil and dust) (dimensionless)
$EF_{S,D}$	=	Exposure frequency (same for soil and dust) (days/year)
$AT_{S,D}$	=	Averaging time (same for soil and dust) (days/year)
PbB_0	=	Baseline blood lead concentration (ug/dL)
$PbB_{fetal,0.95}$	=	95th percentile blood lead concentration among fetuses of adult workers (ug/dL)
R	=	Fetal/maternal blood lead ratio (dimensionless)
GSD_i	=	Geometric standard deviation of blood lead concentration (dimensionless)

PbS, IR, EF, and AT were derived in Section 5 of the main text of this report. BKSF and PbB_0 were described in Section O.3 of this appendix. The remaining parameters are discussed below.

The Fetal/Maternal blood lead concentration ratio (R) is 0.9, and is the recommended value of the TRW (USEPA, 1996d).

The TRW (USEPA, 1996d) recommends values for the individual blood lead concentration geometric standard deviation (GSD_i) ranging from 1.8 to 2.3. The use of higher values is recommended for heterogeneous populations. Therefore, the higher default value of 2.3 presented in the version of the model obtained from the USEPA web-site has been used in this risk assessment.

The adult lead model guidance (USEPA, 1996d) does not recommend using the adult lead model for scenarios with exposure frequencies less than 1 day per week. The elimination half-time of lead in the blood of adults is approximately 30 days, and short exposure frequencies are expected to produce oscillations in blood lead concentrations associated with absorption and clearance of lead from the blood between each exposure event. Therefore, the lead model was not conducted for the MLE scenario due to the low (20 days/year) exposure frequency.

O.5 Estimating Potential Exposure from Lead in Groundwater and Surface Water

Lead is identified as a COPC in the shallow groundwater in Site O and in the Site Q Pond surface water. The USEPA Adult Lead Model (1996d) does not evaluate potential exposures to lead in water. However, a model for evaluating adult exposure to elevated levels of lead in multiple environmental media (air, soil, and water) is available from peer reviewed literature (Bowers et al., 1994). The model of Bowers et al., (1994) is based upon a biokinetic slope factor approach conceptually similar to that upon which the USEPA (1996) model is based. Therefore, the Bowers Model (Bowers et al., 1994) is used to evaluate potential exposures to lead in surface water.

Lead was identified as a COPC in shallow groundwater in Site O, but not in soils in Site O. As a conservative measure, potential construction worker exposures to lead in soil and excavation air were evaluated in addition to exposure to lead in shallow groundwater. Lead was identified as a COPC in surface water in the Site Q Pond. As a conservative measure, potential trespassing teenager and recreational fisher exposures to lead in sediment were evaluated in addition to exposure to lead in surface water. Excavation air exposure is not applicable to these receptors.

The adult lead exposure model of Bowers et al. (1994) also assumes that there is a baseline blood lead level in the adult population of the United States. It is assumed that the baseline blood lead level reflects typical exposure arising primarily due to lead in the diet. The model also incorporates ingestion and absorption rates specific to each potential exposure pathway. It is assumed that there is a relationship between uptake of lead into the body and blood lead levels. The BKSF represents the relationship between uptake of lead into the body and blood levels.

The following equation was used to predict the average expected blood lead level for a hypothetical construction worker:

$$PbB(ug/dl) = PbB_{baseline}(ug/dl) + BKSF\frac{(ug/dl)}{ug/day} * [Uptake_{air}(ug/day) + Uptake_{soil}(ug/day) + Uptake_{water}(ug/day)]$$

BKSF and $PbB_{baseline}$ were discussed in Section O.3 of this appendix. The equations used to calculate uptake from air, soil and water are presented below:

- $$Uptake_{air}(ug/day) = \frac{AF_a(unitless) * IR_a(m^3/day) * C_a(ug/m^3) * EF(days)}{AT(days)}$$

- $$Uptake_{soil}(ug/day) = \frac{AF_s(unitless) * IR_s(g/day) * C_s(ug/g) * EF(days)}{AT(days)}$$

- $$Uptake_{water}(ug/day) = \frac{AF_w(unitless) * IR_w(L/day) * C_w(ug/L) * EF(days)}{AT(days)}$$

Where:

AF_a	=	Air Absorption Factor (unitless)
AF_s	=	Soil Absorption Factor (unitless)
AF_w	=	Water Absorption Factor (unitless)
IR_a	=	Air Inhalation Rate (m^3/day)
IR_s	=	Soil Ingestion Rate (g/day)
IR_w	=	Water Ingestion Rate (L/day)
C_a	=	Air Concentration (ug/m^3)
C_s	=	Soil Concentration (ug/day)
C_w	=	Water Concentration (ug/L)
EF	=	Exposure Frequency (days/year
AT	=	Averaging Time (days per year) (same as Exposure Frequency)

Ingestion rates, exposure frequencies, and media concentrations were discussed in Section 5 of the main text of this report. Absorption factors were discussed in Section O.3 of this appendix.

O.6 Risk Characterization

The risk characterization for lead consists of comparing the predicted blood lead levels from the models discussed above to the target blood lead concentration of 10 ug/dl.

Table O-1 presents predicted blood lead levels for the construction/utility worker potential exposure to lead in combined soils in Q (North), Q (South), and Site S. Predicted geometric mean blood lead levels for adult workers are not significantly elevated above baseline (2.2 ug/dl) and are well below the target blood lead level of 10 ug/dl for all three areas. Predicted 95th percentile blood lead levels among fetuses of adult workers are equal to or below the target blood lead level of 10 ug/dl for all three areas. The calculated probability that fetal blood lead levels exceed the target blood lead level of 10 ug/dl is 5% for Q (North), and 2.7% for Q (South) and Site S.

Table O-2 presents the predicted blood lead concentration for the construction worker potential exposure to lead in shallow groundwater, soil, and excavation air in Site O. As indicated in the table, the predicted blood lead level is not significantly elevated above baseline (2.2 ug/dl) and is well below the target blood lead level of 10 ug/dl.

Table O-3 presents the predicted blood lead concentration for the trespassing teenager potential exposure to lead in surface water and sediment in the Site Q Pond. As indicated in the table, the predicted blood lead level is not significantly elevated above baseline (2.2 ug/dl) and is well below the target blood lead level of 10 ug/dl.

Table O-4 presents the predicted blood lead concentration for the recreational fisher potential exposure to lead in surface water and sediment in the Site Q Pond. As indicated in the table, the predicted blood lead level is not significantly elevated above baseline (2.2 ug/dl) and is well below the target blood lead level of 10 ug/dl.

O.7 Conclusions

Based on the evaluation presented above for lead, predicted blood levels are not expected to rise significantly above baseline for a construction/utility worker, trespassing teenager, or a recreational fisher exposed to lead at Sauget Area 2. Therefore, no further action is required for lead at Sauget Area 2.

TABLE O-1
CALCULATION OF BLOOD LEAD CONCENTRATIONS - COMBINED SOIL - CONSTRUCTION WORKER REASONABLE MAXIMUM EXPOSURI
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS
SAUGET, ILLINOIS

Exposure Variable	Description of Exposure Variable	Units	Site		
			Q North	Q South	S
PbS	Combined Soil lead concentration (average)	ug/g or ppm	1956.80	827.85	838.00
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.3	2.3	2.3
PbB_0	Baseline PbB	ug/dL	1.8	1.8	1.8
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.1	0.1	0.1
$AF_{S,D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12
$EF_{S,D}$	Exposure frequency (same for soil and dust)	days/yr	40	40	40
$AT_{S,D}$	Averaging time (same for soil and dust)	days/yr	365	365	365
PbB_{adult} (a)	**PbB of adult worker, geometric mean**	**ug/dL**	**2.8**	**2.2**	**2.2**
*** $PbB_{fetal, 0.95}$ (a)**	**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**10.0**	**7.9**	**7.9**
PbB_t	**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**5.0%**	**2.7%**	**2.7%**

Notes:
(a) - Equation 1, based on Eq. 1, 2 in USEPA (1996).

$$PbB_{adult} = (PbS * BKSF * IR_{S+D} * AF_{S,D} * EF_S / AT_{S,D}) + PbB_0$$

$$PbB_{fetal, 0.95} = PbB_{adult} * (GSD_i^{1.645} * R)$$

Source: USEPA, 1996. *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil.* Version date 8/14/01.

TABLE O-2
EVALUATION OF CONSTRUCTION WORKER EXPOSURE - REASONABLE MAXIMUM EXPOSURE TO LEAD IN SHALLOW GROUNDWATER (LOCATION AA-O-1)
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS
SAUGET, ILLINIOS

Parameter	Reasonable Maximum Exposure Construction Worker
Baseline Blood Lead Concentration (ug/dL)	2.2
Biokinetic Slope Factor (ug/dL per ug/day)	0.4
Inhalation - Excavation Air (based on Site O average soil concentration)	
Air Absorption Factor (unitless)	0.32
Air Inhalation Rate (m^3/day)	20
Air Concentration (ug/m^3)	0.000936
Uptake air (ug/day)	0.0007
Ingestion - Groundwater (AA-O-16)	
Water Absorption Factor (unitless)	0.2
Water Ingestion Rate (L/day)	0.005
Water Concentration (ug/L)	19
Uptake water (ug/day)	0.002
Ingestion Soil (average Site O Concentration)	
Soil Absorption Factor (unitless)	0.12
Soil Ingestion Rate (g/day)	0.1
Soil Concentration (ug/g)	15.6
Uptake soil (ug/day)	0.021
Calculated Blood Lead Concentration (ug/dl)	**2.21**

Notes:
Target Blood Lead Level as Defined by OSHA for Adult Workers:
a) Blood lead level of workers (male and female) intending to have children should remain below 30 ug/dL.
b) OSHA allows 40 ug/dL as a "permissible" blood lead level in lead-exposed workers, below which no further medical monitoring or workplace intervention is required.
The Centers for Disease Control has selected 10 ug/dl as the "level of concern" for young children. Bowers et al. (1994) suggest that while the CDC criteria for children were not developed for adults they may be useful as a screening technique for adults.
USEPA (1996d) also recommends10 ug/dl as the target blood lead level.

TABLE O-3
EVALUATION OF RECREATIONAL FISHER EXPOSURE
TO LEAD IN SURFACE WATER (SITE Q POND)
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS
SAUGET, ILLINIOS

Parameter	Reasonable Maximum Exposure Recreational Fisher
Baseline Blood Lead Concentration (ug/dL)	2.2
Biokinetic Slope Factor (ug/dL per ug/day)	0.4
Inhalation (Not Applicable)	
Ingestion - Pond Surface Water	
Water Absorption Factor (unitless)	0.2
Water Ingestion Rate (L/day)	0.01
Water Concentration (ug/L)	14
Uptake water (ug/day)	0.003
Ingestion Soil (Average sediment concentration)	
Soil Absorption Factor (unitless)	0.12
Soil Ingestion Rate (g/day)	0.1
Soil Concentration (ug/g)	48
Uptake soil (ug/day)	0.063
Calculated Blood Lead Concentration (ug/dl)	**2.23**

Notes:
Target Blood Lead Level as Defined by OSHA for Adult Workers:
a) Blood lead level of workers (male and female) intending to have children should remain below 30 ug/dL.
b) OSHA allows 40 ug/dL as a "permissible" blood lead level in lead-exposed workers, below which no further medical monitoring or workplace intervention is required.
The Centers for Disease Control has selected 10 ug/dl as the "level of concern" for young children. Bowers et al. (1994) suggest that while the CDC criteria for children were not developed for adults they may be useful as a screening technique for adults.
USEPA (1996d) also recommends10 ug/dl as the target blood lead level.

TABLE O-4
EVALUATION OF TRESPASSING TEENAGER EXPOSURE
TO LEAD IN SURFACE WATER (SITE Q POND)
HUMAN HEALTH RISK ASSESSMENT
SAUGET AREA 2 RI/FS
SAUGET, ILLINIOS

Parameter	Reasonable Maximum Exposure Trespassing Teenager
Baseline Blood Lead Concentration (ug/dL)	2.2
Biokinetic Slope Factor (ug/dL per ug/day)	0.4
Inhalation (Not Applicable)	
Ingestion - Pond Surface Water	
Water Absorption Factor (unitless)	0.2
Water Ingestion Rate (L/day)	0.005
Water Concentration (ug/L)	14
Uptake water (ug/day)	0.002
Ingestion Soil (Average sediment concentration)	
Soil Absorption Factor (unitless)	0.12
Soil Ingestion Rate (g/day)	0.1
Soil Concentration (ug/g)	48
Uptake soil (ug/day)	0.063
Calculated Blood Lead Concentration (ug/dl)	**2.23**

Notes:
Target Blood Lead Level as Defined by OSHA for Adult Workers:
a) Blood lead level of workers (male and female) intending to have children should remain below 30 ug/dL.
b) OSHA allows 40 ug/dL as a "permissible" blood lead level in lead-exposed workers, below which no further medical monitoring or workplace intervention is required.
The Centers for Disease Control has selected 10 ug/dl as the "level of concern" for young children. Bowers et al. (1994) suggest that while the CDC criteria for children were not developed for adults they may be useful as a screening technique for adults.
USEPA (1996d) also recommends10 ug/dl as the target blood lead level.

APPENDIX P

GROUNDWATER ORDINANCES

ORDINANCE NO. 99-5

AN ORDINANCE PROHIBITING THE USE OF GROUNDWATER AS A POTABLE WATER SUPPLY BY THE INSTALLATION OR USE OF POTABLE WATER SUPPLY WELLS OR BY ANY OTHER METHOD

WHEREAS, certain properties in the Village of Sauget, Illinois, have been used over a period of time for commercial/industrial purposes; and

WHEREAS, because of said use, concentrations of certain chemical constituents in the groundwater beneath the Village may exceed Class I groundwater quality standards for potable resource groundwater, as set forth in 35 Illinois Administrative Code Part 620, or Tier 1 residential remediation objectives, as set forth in 35 Ill. Adm. Code Part 742; and

WHEREAS, the Village of Sauget desires to limit potential threats to human health from groundwater contamination while facilitating the redevelopment and productive use of properties that are the source of said chemical constituents;

NOW, THEREFORE, BE IT ORDAINED BY THE VILLAGE COUNCIL IN THE VILLAGE OF SAUGET, ILLINOIS:

Section One: Use of groundwater as a potable water supply prohibited.

The use or attempted use of groundwater from within the corporate limits of the Village as a potable water supply by the installation or drilling of wells or by any other method is hereby prohibited.

Section Two: Penalties

Any person violating the provisions of this ordinance shall be subject to a fine of up to $ 100.00 for each violation.

Section Three: Definitions.

"Person" is any individual, partnership, co-partnership, firm, company, limited liability company, corporation, association, joint stock company, trust, estate, political subdivision, or any other legal entity, or their representatives, agents or assigns.

"Potable water" is any water used for human or domestic consumption, including, but not limited to, water used for drinking, bathing, swimming, washing dishes, or preparing foods.