APPENDIX A

Comparison Values

ATSDR comparison values (CVs) are media-specific concentrations that are considered to be safe under default conditions of exposure. They are used as screening values in selecting site-specific chemicals for further evaluation of their public health implications. Generally, a chemical is selected for further public health evaluation because its maximum concentration in air, water, or soil at the site exceeds at least one of ATSDR's CVs. Supplementing this conservative approach is ATSDR guidance that requires environmental health scientists to exercise professional judgment when selecting chemicals for further public health evaluation, evaluating exposure pathways, and determining the public health implications of site-specific exposures (ATSDR 1992). ATSDR may also select detected chemical substances for further public health evaluation and discussion because ATSDR has no CVs for certain specified chemicals or because the community has expressed special concern about the substance, whether it exceeds CVs or not.

It cannot be emphasized strongly enough that CVs are not thresholds of toxicity. While concentrations at or below the relevant CV are generally considered to be safe, it does not automatically follow that any environmental concentration that exceeds a CV would be expected to produce adverse health effects. In fact, the whole purpose behind highly conservative, health-based standards and guidelines is to enable health professionals to recognize and resolve potential public health problems before they become actual health hazards. For that reason, ATSDR's CVs are typically designed to be 1 to 3 orders of magnitude lower (i.e., 10 to 1,000 times lower) than the corresponding no-effect levels or lowest-effect levels on which they are based. The probability that adverse health outcomes will actually occur depends not on environmental concentrations alone, but on several additional factors, including site-specific conditions of exposure, and individual lifestyle and genetic factors that affect the route, magnitude, and duration of actual exposures, and the individual physiological response to those exposures.

Listed below are the abbreviations for selected CVs and units of measure used within this document. Following this list of abbreviations are more complete descriptions of the various comparison values used within this document, as well as a brief discussion on one of ATSDR's most conservative CVs.

CREG	=	cancer risk evaluation guide
EMEG	=	environmental media evaluation guide
LTHA	=	drinking water lifetime health advisory
MCL	=	maximum contaminant level
MCLA	=	maximum contaminant level action
MRL	=	minimal risk level
RBC	=	risk-based concentration
RfD	=	reference dose
RMEG	=	reference dose media evaluation guide

Units of Measure

ppm	=	parts per million, e.g., mg/L (water), mg/kg (soil)
ppb	=	parts per billion, e.g., µg/L (water), µg/kg (soil)
kg	=	kilogram (1,000 grams)
mg	=	milligram (0.001 gram)
µg	=	microgram (0.000001 gram)
L	=	liter (1,000 milliliters or 1.057 quarts of liquid, or 0.001 m^3 of air)
m^3	=	cubic meter (a volume of air equal to 1,000 liters)

Cancer Risk Evaluation Guides (CREGs) are derived by ATSDR. They are estimated chemical concentrations theoretically expected to cause no more than one excess case of cancer in a million people exposed over a lifetime. CREGs are derived from EPA's cancer slope factors and therefore reflect estimates of risk based on the assumption of zero threshold and lifetime exposure. Such estimates are necessarily hypothetical. As stated in EPA's 1986 Guidelines for Carcinogenic Risk Assessment, "the true value of the risk is unknown and may be as low as zero." (EPA 1986)

Minimal Risk Levels (MRLs) are ATSDR estimates of daily human exposures to a chemical that are unlikely to be associated with any appreciable risk of deleterious noncancer effects over a specified duration of exposure. MRLs are calculated using data from human and animal studies and are reported for acute (≤14 days), intermediate (15–364 days), and chronic (≥365 days) exposures. MRLs for oral exposure (i.e., ingestion) are doses and are typically expressed in mg/kg/day. Inhalation MRLs are concentrations and are typically expressed in either parts per billion (ppb) or $\mu g/m^3$. The latter are identical to ATSDR's EMEGs for airborne contaminants. ATSDR's MRLs are published in ATSDR Toxicological Profiles for specific chemicals.

Environmental Media Evaluation Guides (EMEGs) are media-specific concentrations that are calculated from ATSDR's Minimal Risk Levels by factoring in default body weights and ingestion rates. Different EMEGs are calculated for adults and children, as well as for acute (≤14 days), intermediate (15–364 days), and chronic (≥365 days) exposures.

EPA Reference Dose (RfD) is an estimate of the daily exposure to a contaminant unlikely to cause any noncarcinogenic adverse health effects over a lifetime of chronic exposure. Like the ATSDR MRL, the EPA RfD is a dose and is typically expressed in mg/kg/day.

Reference Dose Media Evaluation Guide (RMEG) is the concentration of a contaminant in air, water, or soil that ATSDR derives from EPA's RfD for that contaminant by factoring in default values for body weight and the media-specific intake rate. Like ATSDR EMEGs, RMEGs are calculated for both adults and children.

Risk-Based Concentrations (RBCs) are media-specific values derived by the Region III Office of the US Environmental Protection Agency from EPA RfDs, RfCs, or cancer slope factors, by factoring in default values for body weight, exposure duration, and ingestion/inhalation rates. These values represent levels of chemicals in air, water, soil, and fish that are considered safe over a lifetime of exposure. RBCs for noncarcinogens and carcinogens are analogous to ATSDR EMEGs and CREGs, respectively.

Lifetime Health Advisories (LTHAs) are calculated from the DWEL (Drinking Water Equivalent Level) and represent the concentration of a substance in drinking water estimated to have negligible deleterious effects in humans over a lifetime of 70 years, assuming 2 L/day water consumption for a 70-kg adult, and taking into account other sources of exposure. In the absence of chemical-specific data, LTHAs for noncarcinogenic organic and inorganic compounds are 20% and 10%, respectively, of the corresponding DWELs. LTHAs are not derived for compounds that are potentially carcinogenic for humans.

Maximum Contaminant Levels (MCLs) are drinking water standards established by the EPA. They represent levels of substances in drinking water that EPA deems protective of public health over a lifetime (70 years) at an adult exposure rate of 2 liters of water per day. They differ from other protective comparison values in that they (1) reflect consideration of both carcinogenic and noncarcinogenic effects, (2) take into account the availability and economics of water treatment technology, and (3) are legally enforceable.

Maximum Contaminant Level Action (MCLA) are **action** levels **for drinking water** set by EPA under Superfund. When the relevant action level is exceeded, a regulatory response is triggered.

When screening individual chemical substances, ATSDR staff compare the highest single concentration of a chemical detected at the site with the appropriate comparison value available for the most sensitive of the potentially exposed individuals (usually children). Typically the cancer risk evaluation guide (CREG) or chronic environmental media evaluation guide (cEMEG) is used. This worst-case approach introduces a high degree of conservatism into the analysis and often results in the selection of many chemical substances for further public health evaluation that will not, upon closer scrutiny, be judged to pose any hazard to human health. However, in the interest of public health, it is more prudent to use an environmental screen that identifies many chemicals for further evaluation that may be determined later to be harmless, as opposed to one that may overlook even a single potential hazard to public health. The reader should keep in mind the conservativeness of this approach when interpreting ATSDR's analysis of the potential health implications of site-specific exposures.

References

Agency for Toxic Substances and Disease Registry. 1992. Public health assessment guidance manual. Atlanta: US Department of Health and Human Services.

US Environmental Protection Agency. Guidelines for carcinogenic risk assessment. September 24, 1986. Federal Register 51(185): 33992–34003.

APPENDIX B

TABLES

TABLE 1

Concentrations of Volatile Organic Compounds (VOCs) in Soil Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppm)											EPA -- III RBCs for Industrial Activities (ppm)	SOIL COMPARISON VALUES (ppm)		FURTHER PUBLIC HEALTH EVALUATION REQUIRED
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate					
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%				
acetone	0.0265 -- 0.33	16	0.0715	0.0694	<0.013 -- <100	77	63	0.044	0.05	16/93	17.20	920,000	100,000	iEMEG (child)	No
benzene	0.0015 -- 6	8	0.0099	0.0055	<0.001 -- <0.05	90	29	0.0011	0.00065	8/98	8.16	4,100	200	RMEG (child)	No
bromodichloromethane	--				<0.001 -- <1	93				0/93	0.00	20,000	2,000	aEMEG (child)	No
bromoform (tribromomethane)	--				<0.002 -- <2	93				0/93	0.00	20,000	10,000	iEMEG (child)	No
bromomethane	0.0097 -- 0.0097	1	0.0097	0.0097	<0.002 -- <2	92	3	0.0014	0.001	1/93	1.08	1,400	200	iEMEG (child)	No
2-butanone	0.0102 -- 0.036	6	0.02	0.02	<0.01 -- <100	87	66	0.0066	0.0065	6/93	6.45	610,000	30,000	RMEG (child)	No
carbon disulfide	0.002 -- 0.028	21	0.007	0.0077	<0.002 -- <2	72	40	0.0021	0.0025	21/93	22.58	100,000	500	aEMEG (child)	No
carbon tetrachloride	--				<0.002 -- <2	93				0/93	0.00	720	1,000	iEMEG (child)	No
chlorobenzene	--				<0.002 -- <2	93				0/93	0.00	20,000	20,000	iEMEG (child)	No
chlorodibromomethane	--				<0.002 -- <2	93				0/93	0.00	20,000	5,000	aEMEG (child)	No
chloroethane	--				<0.002 -- <4	93				0/93	0.00	410,000	31,000	RBC (child)	No
chloroform	--				<0.002 -- <2	93				0/93	0.00	10,000	5,000	iEMEG (child)	No
chloromethane (methyl chloride)	--				<0.002 -- <2	93				0/93	0.00				No
cumene (isopropylbenzene)	--				<0.002 -- <0.0028	8				0/8	0.00	100,000	5,000	RMEG (child)	No
1,2-dibromoethane (ethylene dibromide)	--				<0.002 -- <0.0028	8				0/8	0.00				No
1,1-dichloroethane	--				<0.002 -- <2	93				0/93	0.00	100,000	7,800	RBC (child)	No
1,2-dichloroethane	--				<0.002 -- <2	97				0/97	0.00	31,000	10,000	iEMEG (child)	No
1,1-dichloroethene	--				<0.002 -- <2	93				0/93	0.00	51,000	500	cEMEG (child)	No
cis 1,2-dichloroethene	0.0071 -- 0.065	2	0.0215	0.0361	<0.002 -- <2	91	3	0.0015	0.001	2/93	2.15	10,000	20,000	iEMEG (child)	No
trans 1,2-dichloroethene	0.002 -- 0.002	1	0.002	0.002	<0.002 -- <2	92	43	0.001	0.0010075	1/93	1.08	20,000	10,000	iEMEG (child)	No
1,2-dichloropropane	--				<0.002 -- <2	93				0/93	0.00		4,000	iEMEG (child)	No
cis 1,3-dichloropropene	--				<0.002 -- <2	93				0/93	0.00				No
trans 1,3-dichloropropene	--				<0.002 -- <2	93				0/93	0.00				No
ethylbenzene	0.002 -- 120	3	0.1841	0.026	<0.002 -- <0.1	95	46	0.0018	0.001125	3/98	3.06	100,000	5,000	cEMEG (child)	No
2-hexanone (methyl n-butyl ketone) (MBK)	0.0121 -- 0.0121	1	0.0121	0.0121	<0.01 -- <10	92	16	0.0053	0.005	1/93	1.08	82,000	3,100	RBC (child)	No
methylene chloride (dichloromethane)	0.0017 -- 0.02	9	0.0119	0.015	<0.01 -- <10	29	29	0.0066	0.005	9/38	23.68	61,000	10,000	aEMEG (child)	No
4-methyl-2-pentanone (MIBK)	0.00708 -- 0.0247	10	0.0148	0.0158	<0.005 -- <10	83	64	0.0051	0.005	10/93	10.75	2,800 (PRG)	790	PRG (child)	No
methyl tert-butyl ether (MTBE)	--				<0.002 -- <2	97				0/97	0.00		20,000	iEMEG (child)	No
naphthalene	--				<0.0051 -- <0.0053	2				0/2	0.00	20,000	30,000	iEMEG (child)	No
styrene	--				<0.002 -- <2	66				0/66	0.00	200,000	10,000	iEMEG (child)	No
1,1,2,2-tetrachloroethane	--				<0.002 -- <2	93				0/93	0.00	61,000	30,000	iEMEG (child)	No
tetrachloroethene (PCE)	--				<0.001 -- <1	93				0/93	0.00	10,000	3,000	aEMEG (child)	No
toluene	0.0016 -- 230	7	0.022	0.0035	<0.001 -- <0.1	90	67	0.0015	0.001	7/97	7.22	200,000	1,000	iEMEG (child)	No
1,1,1-trichloroethane	0.0021 -- 0.01	6	0.005	0.0055	<0.002 -- <2	88	43	0.0015	0.00125	6/94	6.38	290,000	22,000	RBC (child)	No
1,1,2-trichloroethane	--				<0.002 -- <2	93				0/93	0.00	4,100	2,000	iEMEG (child)	No
trichloroethene (TCE)	--				<0.001 -- <1	93				0/93	0.00	310	10,000	aEMEG (child)	No
trichlorofluoromethane (Freon 11)	0.0019 -- 0.081	5	0.0085	0.0073	<0.001 -- <2	88	62	0.0014	0.001	5/93	5.38	310,000	20,000	RMEG (child)	No
vinyl acetate	0.0036 -- 0.017	3	0.007	0.0056	<0.002 -- <0.1	53	26	0.0017	0.0025	3/56	5.36	1,000,000	78,000	RBC (child)	No
vinyl chloride	--				<0.002 -- <2	93				0/93	0.00	3,100	200	RMEG (child)	No
p,m-xylene	0.0044 -- 0.01	2	1.611	295	<0.004 -- <0.2	68	18	0.0029	0.002	2/70	2.86	200,000	30,000	iEMEG (child)	No
o-xylene	260 -- 260	1	260	260	<0.002 -- <0.1	69	0	0.0014	0.001	1/70	1.43	200,000	16,000	RBC (child)	No

Notes:

A substance is selected for further public health evaluation if its maximum detected level in soil exceeds its respective soil comparison value. Moreover, a substance may also be selected for further public health evaluation if detected and no available non-cancer soil comparison value exists for the substance. Note, shading indicates that the substance was selected for further public health evaluation.

EMEG = Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)

PRG = Preliminary Remediation Goal (Note, PRG values derived from equations documented in following reference: EPA Region IX Preliminary Remediation Goals. United States Environmental Protection Agency, Region 9 Office: 75 Hawthorne St., San Francisco, Calif., 94105 (Send PRG-related comments and questions to smucker.stan@epa.gov). Available on EPA Region IX's Internet website, http://www.epa.gov/region09/waste/sfund/prg/index.htm, **Background Information - [PDF]***)*

RBC = Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm, **Background Information - [PDF].***) On another note, the RBC values for 2-Hexanone has been withdrawn from the September 2003 RBC Table until new recommended values are available. For the purpose of this health consultation, however, detected concentrations of 2-Hexanone were compared to the previous RBC values before their withdrawal.*

RMEG = Reference Dose Media Evaluation Guide

ppm = parts per million

Limits > Min. Detect = Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.

Adjusted Mean = Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).

Adjusted Median = Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).

TABLE 2

Concentrations of Semivolatile Organic Compounds (SVOCs) in Soil Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppm)											EPA -- III RBCs for Industrial Activities (ppm)	SOIL COMPARISON VALUES (ppm)		FURTHER PUBLIC HEALTH EVALUATION REQUIRED
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate					
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%				
acenaphthene	0.76 -- 220	5	7.545	4.3	<0.1 -- <2	105	17	0.1277	0.065	5/110	4.55	120,000	30,000	iEMEG (child)	No
acenaphthylene	0.52 -- 8.1	7	1.962	2.6	<0.1 -- <20	103	18	0.1273	0.065	7/110	6.36				**Yes**
aniline	--				<0.1 -- <20	110				0/110	0.00	7,200	550	RBC (child)	No
anthracene	0.24 -- 130	10	3.548	3.5	<0.1 -- <2	107	36	0.1376	0.065	10/117	8.55	310,000	500,000	iEMEG (child)	No
benzoic acid	--				<0.5 -- <98	110				0/110	0.00	4,100,000	200,000	RMEG (child)	No
benzidine	--				<0.1 -- <1.6	3				0/3	0.00	3,100	200	RMEG (child)	No
benzo(a)anthracene	0.13 -- 55	27	1.311	1.5	<0.1 -- <2	90	30	0.1780	0.065	27/117	23.08				**Yes**
benzo(a)pyrene	0.11 -- 46	26	1.099	1.15	<0.1 -- <20	91	47	0.1766	0.065	26/117	22.22				**Yes**
benzo(b)fluoranthene	0.12 -- 57	36	0.9124	0.695	<0.1 -- <20	81	43	0.2022	0.14	36/117	30.77				**Yes**
benzo(g,h,i)perylene	0.1 -- 30	23	0.8011	0.8	<0.1 -- <20	94	49	0.1573	0.065	23/117	19.66				**Yes**
benzo(k)fluoranthene	0.13 -- 25	17	0.9100	0.86	<0.1 -- <20	93	36	0.1555	0.065	17/110	15.45				**Yes**
benzyl alcohol	0.87 -- 0.87	1	0.87	0.87	<0.1 -- <20	109	21	0.1035	0.065	1/110	0.91	310,000	23,000	RBC (child)	No
bis(2-chloroethoxy)methane	--				<0.1 -- <20	110				0/110	0.00				No
bis(2-chloroethyl)ether	--				<0.1 -- <20	110				0/110	0.00				No
bis(2-chloroisopropyl)ether	--				<0.1 -- <20	110				0/110	0.00	41,000	2,000	RMEG (child)	No
bis(2-ethylhexyl)phthalate	1.7 -- 12	4	3.284	2.45	<0.33 -- <64	106	21	0.4049	0.21	4/110	3.64	20,000	5,000	iEMEG (child)	No
4-bromophenyl phenyl ether	--				<0.1 -- <20	110				0/110	0.00				No
butyl benzyl phthalate	--				<0.014 -- <20	110				0/110	0.00	200,000	10,000	RMEG (child)	No
4-chloroaniline	--				<0.014 -- <20	110				0/110	0.00	4,100	200	RMEG (child)	No
4-chloro-3-methylphenol	--				<0.014 -- <20	110				0/110	0.00				No
2-chloronaphthalene	--				<0.014 -- <20	110				0/110	0.00	82,000	4,000	RMEG (child)	No
2-chlorophenol	--				<0.014 -- <20	110				0/110	0.00	5,100	300	RMEG (child)	No
4-chlorophenyl phenyl ether	--				<0.014 -- <20	110				0/110	0.00				No
chrysene	0.1 -- 52	32	0.9322	0.79	<0.014 -- <2	85	44	0.1828	0.11	32/117	27.35				**Yes**
dibenzo(a,h)anthracene	0.1 -- 6.6	4	1.642	2.2	<0.014 -- <20	106	40	0.1192	0.065	4/110	3.64				**Yes**
dibenzofuran	1.1 -- 110	5	6.576	3.4	<0.014 -- <2	105	4	0.1253	0.065	5/110	4.55	2,000	160	RBC (child)	No
1,2-dichlorobenzene	--				<0.014 -- <20	110				0/110	0.00	92,000	5,000	RMEG (child)	No
1,3-dichlorobenzene	--				<0.014 -- <20	110				0/110	0.00	31,000	2,300	RBC (child)	No
1,4-dichlorobenzene	--				<0.014 -- <20	110				0/110	0.00	31,000	20,000	iEMEG (child)	No
3,3'-dichlorobenzidine	5 -- 5	1	5	5	<0.5 -- <98	109	7	0.5637	0.32	1/110	0.91				**Yes**
2,4-dichlorophenol	--				<0.014 -- <20	110				0/110	0.00	3,100	200	iEMEG (child)	No
diethyl phthalate	--				<0.014 -- <20	110				0/110	0.00	820,000	300,000	iEMEG (child)	No
2,4-dimethylphenol	--				<0.014 -- <20	110				0/110	0.00	20,000	1,000	RMEG (child)	No
dimethyl phthalate	--				<0.014 -- <20	110				0/110	0.00	10,000,000	780,000	RBC (child)	No
di-N-butyl phthalate	0.64 -- 0.64	1	0.64	0.64	<0.33 -- <64	109	44	0.1972	0.21	1/110	0.91	100,000	30,000	aEMEG (child)	No
4,6-dinitro-2-methylphenol	--				<0.5 -- <98	110				0/110	0.00	100	200	iEMEG (child)	No
2,4-dinitrophenol	--				<0.5 -- <98	110				0/110	0.00	2,000	500	aEMEG (child)	No
2,4-dinitrotoluene	--				<0.014 -- <20	110				0/110	0.00	2,000	3,000	aEMEG (child)	No
2,6-dinitrotoluene	--				<0.014 -- <20	110				0/110	0.00	1,000	200	iEMEG (child)	No
di-N-octyl phthalate	--				<0.014 -- <20	110				0/110	0.00	41,000	20,000	iEMEG (child)	No
fluoranthene	0.11 -- 190	42	1.482	1.3	<0.014 -- <2	68	30	0.2545	0.195	42/110	38.18	41,000	20,000	iEMEG (child)	No
fluorene	0.65 -- 170	8	4.623	2.55	<0.014 -- <2	110	16	0.131	0.065	8/118	6.78	41,000	20,000	iEMEG (child)	No
hexachlorobenzene	--				<0.014 -- <20	110				0/110	0.00	820	5	iEMEG (child)	No
hexachlorobutadiene	--				<0.014 -- <20	110				0/110	0.00	200	10	iEMEG (child)	No
hexachlorocyclopentadiene	--				<0.014 -- <20	110				0/110	0.00	6,100	5,000	iEMEG (child)	No
hexachloroethane	--				<0.014 -- <20	110				0/110	0.00	1,000	500	iEMEG (child)	No
indeno(1,2,3-cd)pyrene	0.1 -- 31	23	0.8351	0.79	<0.014 -- <20	87	43	0.1632	0.065	23/110	20.91				**Yes**
isophorone	--				<0.014 -- <20	110				0/110	0.00	200,000	200,000	iEMEG (child)	No
2-methylnaphthalene	0.16 -- 110	5	7.284	13	<0.014 -- <2	105	40	0.1293	0.065	5/110	4.55	20,000	3,000	cEMEG (child)	No
2-methylphenol (o-cresol)	--				<0.014 -- <20	110				0/110	0.00	51,000	3,000	aEMEG (child)	No
4-methylphenol (p-cresol)	--				<0.014 -- <1.6	26				0/26	0.00	5,100	3,000	aEMEG (child)	No
3,4-dimethylphenol	2.6 -- 2.6	1	2.6	2.6	<0.1 -- <20	83	1	0.1257	0.065	1/84	1.19	1,000	50	RMEG (child)	No

TABLE 2 (continued)

Concentrations of Semivolatile Organic Compounds (SVOCs) in Soil Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppm)											EPA -- III RBCs for Industrial Activities (ppm)	SOIL COMPARISON VALUES (ppm)		FURTHER PUBLIC HEALTH EVALUATION REQUIRED
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate					
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%				
naphthalene	0.11 -- 77	7	5.321	12	<0.014 -- <2	111	58	0.1325	0.065	7/118	5.93	41,000	30,000	iEMEG (child)	No
2-nitroaniline	--				<0.5 -- <98	110				0/110	0.00	3,100	230	RBC (child)	No
3-nitroaniline	--				<0.5 -- <98	110				0/110	0.00	310	23	RBC (child)	No
4-nitroaniline	--				<0.5 -- <98	110				0/110	0.00	3,100	230	RBC (child)	No
nitrobenzene	--				<0.1 -- <20	110				0/110	0.00	510	30	RMEG (child)	No
2-nitrophenol	--				<0.1 -- <20	110				0/110	0.00				No
4-nitrophenol	--				<0.16 -- <98	110				0/110	0.00				No
n-nitroso-di-n-propylamine	--				<0.1 -- <20	110				0/110	0.00		5,000	aEMEG (child)	No
n-nitrosodiphenylamine	--				<0.1 -- <20	110				0/110	0.00				No
pentachlorophenol	--				<0.5 -- <98	110				0/110	0.00	31,000	50	iEMEG (child)	No
phenanthrene	0.11 -- 430	29	1.77	1.3	<0.1 -- <2	89	44	0.198	0.065	29/118	24.58				**Yes**
phenol	--				<0.1 -- <20	110				0/110	0.00	310,000	20,000	RMEG (child)	No
pyrene	0.11 -- 120	40	1.461	1.2	<0.1 -- <2	77	37	0.2307	0.15	40/117	34.19	31,000	2,000	RMEG (child)	No
1,2,4-trichlorobenzene	--				<0.1 -- <20	110				0/110	0.00	10,000	500	RMEG (child)	No
2,4,5-trichlorophenol	--				<0.5 -- <98	110				0/110	0.00	100,000	5,000	RMEG (child)	No
2,4,6-trichlorophenol	--				<0.1 -- <20	110				0/110	0.00				No

Notes:

A substance is selected for further public health evaluation if its maximum detected level in soil exceeds its respective soil comparison value. Moreover, a substance may also be selected for further public health evaluation if detected and no available non-cancer soil comparison value exists for the substance. Note, shading indicates that the substance was selected for further public health evaluation.

EMEG = Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)

PRG = Preliminary Remediation Goal (Note, PRG values derived from equations documented in following reference: EPA Region IX Preliminary Remediation Goals. United States Environmental Protection Agency, Region 9 Office: 75 Hawthorne St., San Francisco, Calif., 94105 (Send PRG-related comments and questions to smucker.stan@epa.gov). Available on EPA Region IX's Internet website, http://www.epa.gov/region09/waste/sfund/prg/index.htm, **Background Information - [PDF]***)*

RBC = Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm, **Background Information - [PDF]***)*

RMEG = Reference Dose Media Evaluation Guide

ppm = parts per million

Limits > Min. Detect = Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.

Adjusted Mean = Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).

Adjusted Median = Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).

TABLE 3

Concentrations of Polychlorinated Biphenyls (PCBs) in Soil Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppm)											EPA -- III RBCs for Industrial Activities (ppm)	SOIL COMPARISON VALUES (ppm)		FURTHER PUBLIC HEALTH EVALUATION REQUIRED
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate					
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%				
PCB-1016	--				<0.025 -- <0.63	53				0/53	0.00	72	4	RMEG (child)	No
PCB-1221	--				<0.025 -- <0.63	53				0/53	0.00				No
PCB-1232	--				<0.025 -- <0.63	53				0/53	0.00				No
PCB-1242	--				<0.025 -- <0.63	53				0/53	0.00				No
PCB-1248	--				<0.025 -- <0.63	53				0/53	0.00				No
PCB-1254	0.63 -- 0.63	1	0.63	0.63	<0.025 -- <0.63	52	0	0.0241	0.025	1/53	1.89	20	2	iEMEG (child)	No
PCB-1260	0.59 -- 0.59	1	0.59	0.59	<0.025 -- <0.63	52	2	0.0241	0.025	1/53	1.89				**Yes**

Notes:

A substance is selected for further public health evaluation if its maximum detected level in soil exceeds its respective soil comparison value. Moreover, a substance may also be selected for further public health evaluation if detected and no available non-cancer soil comparison value exists for the substance. Note, shading indicates that the substance was selected for further public health evaluation.

EMEG = *Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)*

PRG = *Preliminary Remediation Goal (Note, PRG values derived from equations documented in following reference: EPA Region IX Preliminary Remediation Goals. United States Environmental Protection Agency, Region 9 Office: 75 Hawthorne St., San Francisco, Calif., 94105 (Send PRG-related comments and questions to smucker.stan@epa.gov). Available on EPA Region IX's Internet website, http://www.epa.gov/region09/waste/sfund/prg/index.htm,* **Background Information - [PDF]***)*

RBC = *Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm,* **Background Information - [PDF]***)*

RMEG = *Reference Dose Media Evaluation Guide*

ppm = *parts per million*

Limits > Min. Detect = *Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.*

Adjusted Mean = *Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).*

Adjusted Median = *Computation of the median where non-detects are reduced by half and included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).*

TABLE 4

Concentrations of Metals in Soil Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppm)											EPA -- III RBCs for Industrial Activities (ppm)	SOIL COMPARISON VALUES (ppm)		BACKGROUND SOIL CONCENTRATIONS FOR METALS IN THE EASTERN UNITED STATES	FURTHER PUBLIC HEALTH EVALUATION REQUIRED
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate						
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%					
antimony	5.1 -- 14	19	7.838	7.6	<5 -- <25	118	17	3.029	2.5	19/137	13.87	410	20	RMEG (child)	<1 -- 8.8	No
arsenic[1]	1.6 -- 230	96	10.821	11	<1.5 -- <25	46	12	4.947	5	96/142	67.61	310	300	aEMEG (child)	<0.1 -- 73	No
beryllium	0.22 -- 6.9	135	1.01	0.95	<0.2 -- <0.2	5	0	0.9303	0.935	135/140	96.43	2,000	100	cEMEG (child)	<1 -- 7	No
cadmium	0.21 -- 19	69	0.9106	0.69	<0.2 -- <1	68	14	0.328	0.24	69/137	50.36	510	10	cEMEG (child)		**Yes**
chromium (total)[2]	2.4 -- 520	137	18.266	18	--	0	0	18.266	18	137/137	100.00	1,500,000	80,000	RMEG (child)		No
copper	1.8 -- 2,600	137	37.433	38	--	0	0	37.433	38	137/137	100.00	41,000	2,000	iEMEG (child)	<1 -- 700	**Yes**
cyanide (reactive)	0.019 -- 0.225	11	0.1193	0.167	<0.13 -- <3.5	59	59	0.0715	0.065	11/70	15.71	20,000	1,000	RMEG (child)		No
cyanide (total)	0.272 -- 2.99	10	0.773	0.7935	<0.25 -- <0.25	15	0	0.2591	0.125	10/25	40.00	20,000	1,000	RMEG (child)		No
lead[3]	5 -- 2,900	146	69.938	67.5	<5 -- <6.4	4	1	64.098	59.5	146/150	97.33	750 (PRG)	400	PRG (child)	<10 -- 300	**Yes**
mercury	0.1 -- 1.53	41	0.2181	0.177	<0.01 -- <0.146	96	16	0.0788	0.05	41/137	29.93	310 (PRG)	23	PRG (child)	0.01 -- 3.4	No
nickel	2.5 -- 260	100	14.002	14	<2.5 -- <3.3	37	5	7.357	10	100/137	72.99	20,000	1,000	RMEG (child)	<5 -- 700	No
selenium	2.5 -- 42	53	7.132	6.4	<2.5 -- <12	85	19	2.714	1.6	53/138	38.41	5,100	300	cEMEG (child)	<0.1 -- 3.9	No
silver	0.5 -- 3.3	6	1.063	0.93	<0.5 -- <2.5	131	35	0.3255	0.25	6/137	4.38	5,100	300	RMEG (child)		No
thallium	0.138 -- 28	23	0.3984	0.292	<0.1 -- <78	107	101	0.1237	0.1	23/130	17.69	72	5.5	RBC (child)		**Yes**
zinc	4 -- 3,850	135	139.429	100	<1 -- <1	2	0	128.426	100	135/137	98.54	310,000	20,000	iEMEG (child)	<5 -- 2,900	No

Notes: *A substance is selected for further public health evaluation if its maximum detected level in soil exceeds its respective soil comparison value. Moreover, a substance may also be selected for further public health evaluation if detected and no available non-cancer soil comparison value exists for the substance. Note, shading indicates that the substance was selected for further public health evaluation.*

EMEG = Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)

PRG = Preliminary Remediation Goal (Note, PRG values derived from equations documented in following reference: EPA Region IX Preliminary Remediation Goals. United States Environmental Protection Agency, Region 9 Office: 75 Hawthorne St., San Francisco, Calif., 94105 (Send PRG-related comments and questions to smucker.stan@epa.gov). Available on EPA Region IX's Internet website, http://www.epa.gov/region09/waste/sfund/prg/index.htm, **Background Information - [PDF]***)*

RBC = Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm, **Background Information - [PDF]***)*

RMEG = Reference Dose Media Evaluation Guide

ppm = parts per million

Limits > Min. Detect = Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.

Adjusted Mean = Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).

Adjusted Median = Computation of the median where non-detects are reduced by half and included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).

[1]Although arsenic did not meet ATSDR's selective screen to be selected for further public health evaluation, it was still selected for such an evaluation because some of the arsenic levels detected in the soil at the Reading Gray Iron site exceeded the PaDEP's arsenic standard for non-residential direct contact with soil (53 milligrams per kilogram).

[2]All chemical detects of chromium are considered to chromium III (i.e., chromium trivalent), predominant chemical series, instead of chromium VI (i.e., chromium hexavalent); therefore, the comparison values are reflective of chromium III.

[3]The listed lead comparison value for residential exposures is based on EPA's Integrated Exposure Uptake Biokinetic (IEUBK) model, whereas the lead comparison value for exposures in an industrial setting is based on an EPA Adult Lead Model. Both models are pharmacokinetic models.

TABLE 5

Concentrations of Volatile Organic Compounds (VOCs) in Groundwater Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppb)											EPA MCL (ppb)	WATER COMPARISON VALUES (ppb)	
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate				
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%			
acetone	--				<50 -- <50	21				0/21	0.00		9,000	RMEG (child)
benzene	8.8 -- 8.8	1	8.8	8.8	<1 -- <1	20	0	0.5732	0.5	1/21	4.76	5	0.6	CREG
bromodichloromethane	--				<1 -- <1	21				0/21	0.00	80	0.6	CREG
bromoform (tribromomethane)	--				<2 -- <2	21				0/21	0.00	80	4	CREG
bromomethane	--				<2 -- <2	21				0/21	0.00		10	RMEG (child)
2-butanone (MEK)	--				<10 -- <50	21				0/21	0.00		6,000	RMEG (child)
carbon disulfide	--				<2 -- <2	21				0/21	0.00		100	aEMEG (child)
carbon tetrachloride	--				<2 -- <2	21				0/21	0.00	5	0.3	CREG
chlorobenzene	62 -- 62	1	62	62	<2 -- <2	20	0	1.217	1	1/21	4.76	100	200	RMEG (child)
chlorodibromomethane	--				<2 -- <2	21				0/21	0.00	80	0.4	CREG
chloroethane	--				<2 -- <2	21				0/21	0.00		3.6	RBC (carcinogenic)
chloroform	--				<2 -- <2	21				0/21	0.00	80	100	cEMEG (child)
chloromethane (methyl chloride)	--				<2 -- <10	21				0/21	0.00		2.1	RBC (carcinogenic)
1,1-dichloroethane	--				<2 -- <2	21				0/21	0.00		800	RBC (adult)
1,2-dichloroethane	--				<2 -- <2	21				0/21	0.00	5	0.4	CREG
1,1-dichloroethene	--				<2 -- <2	21				0/21	0.00	7	90	cEMEG (child)
cis 1,2-dichloroethene	7.9 -- 7.9	1	7.9	7.9	<2 -- <2	20	0	1.103	1	1/21	4.76	70	61	RBC (adult)
trans 1,2-dichloroethene	--				<1 -- <2	21				0/21	0.00	100	200	RMEG (child)
1,2-dichloropropane	--				<2 -- <2	21				0/21	0.00	5	0.16	RBC (carcinogenic)
cis 1,3-dichloropropene	--				<2 -- <2	21				0/21	0.00			
trans 1,3-dichloropropene	--				<2 -- <2	21				0/21	0.00			
ethylbenzene	--				<2 -- <2	21				0/21	0.00	700	1,000	RMEG (child)
2-hexanone (MBK)	--				<10 -- <10	21				0/21	0.00		1,500	RBC (adult)
methylene chloride (dichloromethane)	--				<2 -- <5	21				0/21	0.00	5	5	CREG
4-methyl-2-pentanone (MIBK)	--				<10 -- <10	21				0/21	0.00		6,300	RBC (adult)
MTBE	--				<2 -- <2	21				0/21	0.00		2.6	RBC (carcinogenic)
styrene	--				<2 -- <2	21				0/21	0.00	100	2,000	RMEG (child)
1,1,2,2-tetrachloroethane	--				<1 -- <2	21				0/21	0.00		0.2	CREG
tetrachloroethene (PCE)	26 -- 28	2	26.981	27	<1 -- <1	19	0	0.731	0.5	2/21	9.52	5	0.1	RBC (carcinogenic)
toluene	--				<2 -- <2	21				0/21	0.00	1,000	200	iEMEG (child)
1,1,1-trichloroethane	--				<2 -- <2	21				0/21	0.00	200	200	LTHA
1,1,2-trichloroethane	--				<2 -- <2	21				0/21	0.00	5	0.6	CREG
trichloroethene (TCE)	1.4 -- 2.6	3	1.799	1.6	<1 -- <1	18	0	0.6004	0.5	3/21	14.29	5	0.026	RBC (carcinogenic)
trichlorofluoromethane	--				<2 -- <2	21				0/21	0.00		3,000	RMEG (child)
vinyl chloride	3.4 -- 3.4	1	3.4	3.4	<2 -- <2	20	0	1.06	1	1/21	4.76	2	0.03	CREG
p,m-xylenes	--				<4 -- <4	21				0/21	0.00		6,000	iEMEG (child)
o-xylene	--				<2 -- <2	21				0/21	0.00			

Notes:

Shading indicates that the substance exceeded drinking water comparison values; however, the substance was not selected for further public health evaluation because residents in the residential neighborhood adjacent to the Reading Gray Iron site do not use the area groundwater as a drinking water source.

CREG = *Cancer Risk Evaluation Guide*

EMEG = *Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)*

LTHA = *Drinking Water Lifetime Health Advisory*

MCL = *Maximum Contaminant Level*

RBC = *Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm,* **Background Information - [PDF]**)

RMEG = *Reference Dose Media Evaluation Guide*

ppb = *parts per billion*

Limits > Min. Detect = *Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.*

Adjusted Mean = *Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).*

Adjusted Median = *Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).*

TABLE 6

Concentrations of Semivolatile Organic Compounds (SVOCs) in Groundwater Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppb)											EPA MCL (ppb)	WATER COMPARISON VALUES (ppb)	
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate				
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%			
acenaphthene	--				<2 -- <2	19				0/19	0.00		600	RMEG (child)
acenaphthylene	--				<2 -- <2	19				0/19	0.00			
aniline	--				<2 -- <2	19				0/19	0.00		6	CREG
anthracene	--				<2 -- <2	19				0/19	0.00		3,000	RMEG (child)
benzidine	--				<50 -- <50	19				0/19	0.00		0.0002	CREG
benzoic acid	--				<10 -- <10	19				0/19	0.00		40,000	RMEG (child)
benzo(a)anthracene	--				<2 -- <2	19				0/19	0.00		0.092	RBC (carcinogenic)
benzo(a)pyrene	--				<0.61 -- <0.61	19				0/19	0.00	0.2	0.005	CREG
benzo(b)fluoranthene	--				<1.2 -- <1.2	19				0/19	0.00		0.092	RBC (carcinogenic)
benzo(g,h,i)perylene	--				<0.57 -- <0.57	19				0/19	0.00			
benzo(k)fluoranthene	--				<0.65 -- <0.65	19				0/19	0.00		0.92	RBC (carcinogenic)
benzyl alcohol	--				<2 -- <2	19				0/19	0.00		11,000	RBC (adult)
bis(2-chloroethoxy)methane	--				<2 -- <2	19				0/19	0.00			
bis(2-chloroethyl)ether	--				<0.55 -- <0.55	19				0/19	0.00		0.03	CREG
bis(2-chloroisopropyl)ether	--				<2 -- <2	19				0/19	0.00		0.26	RBC (carcinogenic)
bis(2-ethylhexyl)phthalate	62 -- 62	1	62	62	<6 -- <6	18	0	3.518	3	1/19	5.26	6	3	CREG
4-bromophenyl phenyl ether	--				<2 -- <2	19				0/19	0.00			
butyl benzyl phthalate	--				<2 -- <2	19				0/19	0.00		2,000	RMEG (child)
4-chloroaniline	--				<2 -- <2	19				0/19	0.00		40	RMEG (child)
4-chloro-3-methylphenol	--				<2 -- <2	19				0/19	0.00			
2-chloronaphthalene	--				<2 -- <2	19				0/19	0.00		800	RMEG (child)
2-chlorophenol	--				<2 -- <2	19				0/19	0.00		50	RMEG (child)
4-chlorophenyl phenyl ether	--				<2 -- <2	19				0/19	0.00			
chrysene	--				<1.8 -- <1.8	19				0/19	0.00		9.2	RBC (carcinogenic)
dibenzo(a,h)anthracene	--				<0.56 -- <0.56	19				0/19	0.00		0.0092	RBC (carcinogenic)
dibenzofuran	--				<2 -- <2	19				0/19	0.00		12	RBC (adult)
1,2-dichlorobenzene	2.4 -- 2.4	1	2.4	2.4	<2 -- <2	18	0	1.047	1	1/19	5.26	600	900	RMEG (child)
1,3-dichlorobenzene	3.9 -- 3.9	1	3.9	3.9	<2 -- <2	18	0	1.074	1	1/19	5.26		600	LTHA
1,4-dichlorobenzene	4.2 -- 4.2	1	4.2	4.2	<2 -- <2	18	0	1.078	1	1/19	5.26	75	0.47	RBC (carcinogenic)
3,3'-dichlorobenzidine	--				<5.8 -- <5.8	19				0/19	0.00		0.08	CREG
2,4-dichlorophenol	--				<2 -- <2	19				0/19	0.00		30	iEMEG (child)
diethyl phthalate	--				<2 -- <2	19				0/19	0.00		8,000	RMEG (child)
2,4-dimethylphenol	--				<2 -- <2	19				0/19	0.00		200	RMEG (child)
dimethyl phthalate	--				<2 -- <2	19				0/19	0.00		370,000	RBC (adult)
di-N-butyl phthalate	--				<10 -- <10	19				0/19	0.00		1,000	RMEG (child)
4,6-dinitro-2-methylphenol	--				<10 -- <10	19				0/19	0.00		3.7	RBC (child)
2,4-dinitrophenol	--				<10 -- <10	19				0/19	0.00		20	RMEG (child)
2,4-dinitrotoluene	--				<2 -- <2	19				0/19	0.00		20	cEMEG (child)
2,6-dinitrotoluene	--				<2 -- <2	19				0/19	0.00		40	iEMEG (child)
di-N-octyl phthalate	--				<2 -- <2	19				0/19	0.00		1,500	RBC (adult)
fluoranthene	--				<2 -- <2	19				0/19	0.00		400	RMEG (child)
fluorene	--				<2 -- <2	19				0/19	0.00		400	RMEG (child)
hexachlorobenzene	--				<1 -- <1	19				0/19	0.00	1	0.02	CREG
hexachlorobutadiene	--				<1 -- <1	19				0/19	0.00		0.4	CREG
hexachlorocyclopentadiene	--				<2 -- <2	19				0/19	0.00	50	60	RMEG (child)

TABLE 6 (continued)

Concentrations of Semivolatile Organic Compounds (SVOCs) in Groundwater Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppb)											EPA MCL (ppb)	WATER COMPARISON VALUES (ppb)	
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate				
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%			
hexachloroethane	--				<1 -- <1	19				0/19	0.00		3	CREG
indeno(1,2,3-cd)pyrene	--				<2 -- <2	19				0/19	0.00		0.092	RBC (carcinogenic)
isophorone	--				<2 -- <2	19				0/19	0.00		40	CREG
2-methylnaphthalene	--				<2 -- <2	19				0/19	0.00		500	cEMEG (child)
2-methylphenol	--				<2 -- <2	19				0/19	0.00		500	RMEG (child)
4-methylphenol	--				<2 -- <2	19				0/19	0.00		180	RBC (adult)
naphthalene	--				<2 -- <2	19				0/19	0.00		200	RMEG (child)
2-nitroaniline	--				<5.8 -- <5.8	19				0/19	0.00		110	RBC (adult)
3-nitroaniline	--				<5.8 -- <5.8	19				0/19	0.00		3.3	RBC (carcinogenic)
4-nitroaniline	--				<5.8 -- <5.8	19				0/19	0.00		3.3	RBC (carcinogenic)
nitrobenzene	--				<2 -- <2	19				0/19	0.00		5	RMEG (child)
2-nitrophenol	--				<2 -- <2	19				0/19	0.00			
4-nitrophenol	--				<10 -- <10	19				0/19	0.00		60	LTHA
n-nitroso-di-n-propylamine	--				<1.3 -- <1.3	19				0/19	0.00		0.005	CREG
n-nitrosodiphenylamine	--				<1 -- <1	19				0/19	0.00		7	CREG
pentachlorophenol	--				<2.8 -- <2.8	19				0/19	0.00	1	0.3	CREG
phenanthrene	--				<2 -- <2	19				0/19	0.00			
phenol	--				<2 -- <2	19				0/19	0.00		3,000	RMEG (child)
pyrene	--				<2 -- <2	19				0/19	0.00		300	RMEG (child)
1,2,4-trichlorobenzene	--				<2 -- <2	19				0/19	0.00	70	100	RMEG (child)
2,4,5-trichlorophenol	--				<10 -- <10	19				0/19	0.00		1,000	RMEG (child)
2,4,6-trichlorophenol	--				<2 -- <2	19				0/19	0.00		3	CREG

Notes:

Shading indicates that the substance exceeded drinking water comparison values; however, the substance was not selected for further public health evaluation because residents in the residential neighborhood adjacent to the Reading Gray Iron site do not use the area groundwater as a drinking water source.

CREG = Cancer Risk Evaluation Guide

EMEG = Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)

LTHA = Drinking Water Lifetime Health Advisory

MCL = Maximum Contaminant Level

RBC = Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm, ***Background Information - [PDF]****)*

RMEG = Reference Dose Media Evaluation Guide

ppb = parts per billion

Limits > Min. Detect = Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.

Adjusted Mean = Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).

Adjusted Median = Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).

TABLE 7

Concentrations of Polychlorinated Biphenyls (PCBs) in Groundwater Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppb)											EPA MCL (ppb)	WATER COMPARISON VALUES (ppb)	
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate				
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%			
PCB-1016	--				<0.4 -- <1	20				0/20	0.00		0.7	RMEG (child)
PCB-1221	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)
PCB-1232	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)
PCB-1242	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)
PCB-1248	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)
PCB-1254	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)
PCB-1260	--				<0.4 -- <1	20				0/20	0.00		0.033	RBC (carcinogenic)

Notes:

Shading indicates that the substance exceeded drinking water comparison values; however, the substance was not selected for further public health evaluation because residents in the residential neighborhood adjacent to the Reading Gray Iron site do not use the area groundwater as a drinking water source.

MCL = *Maximum Contaminant Level*

RBC = *Risk Based Concentration (Note, RBC values derived from equations documented in following reference: EPA Region III Risk-Based Concentration Table. United States Environmental Protection Agency, Region III, 841 Chestnut Street, Philadelphia, PA, 19107. Available on EPA Region III's Internet website, http://www.epa.gov/reg3hwmd/risk/riskmenu.htm,* ***Background Information - [PDF]****)*

RMEG = *Reference Dose Media Evaluation Guide*

ppb = *parts per billion*

Limits > Min. Detect = *Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.*

Adjusted Mean = *Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).*

Adjusted Median = *Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).*

TABLE 8

Concentrations of Metals in Groundwater Samples

CHEMICAL SUBSTANCE	CHEMICAL CONCENTRATIONS (ppb)											EPA MCL (ppb)	WATER COMPARISON VALUES (ppb)	
	Detection Summary				Detection Limit Summary			Adjusted Mean (NDs Incl.)	Adjusted Median (NDs Incl.)	Detection Rate				
	Range	Detects	Mean	Median	Range	Non-Detects	Limits > Min. Detect			Count	%			
antimony	31.6 -- 31.6	1	31.6	31.6	<5 -- <5	19	0	2.838	2.5	1/20	5.00	6	4	RMEG (child)
arsenic	--				<5 -- <30	20				0/20	0.00	10	0.02	CREG
beryllium	--				<4 -- <4	20				0/20	0.00	4	20	cEMEG (child)
cadmium	--				<4 -- <4	20				0/20	0.00	5	2	cEMEG (child)
chromium (total)	39 -- 39	1	39	39	<20 -- <50	19	3	10.704	10	1/20	5.00	100	100	LTHA
copper[2]	34 -- 34	1	34	34	<10 -- <50	19	3	5.503	5	1/20	5.00	1,300 (MCLA)	200	aEMEG (child)
cyanide (free)	--				<10 -- <10	10				0/10	0.00	200	200	RMEG (child)
cyanide (total)	10 -- 296	4	34.949	27	<10 -- <11	6	1	10.987	5.25	4/10	40.00	200	200	RMEG (child)
lead[2]	5.9 -- 23	2	11.649	14.45	<5 -- <5	18	0	2.916	2.5	2/20	10.00	15 (MCLA)		
mercury	--				<1 -- <1	20				0/20	0.00	2	2	LTHA
nickel	--				<50 -- <50	20				0/20	0.00		200	RMEG (child)
selenium	--				<50 -- <50	20				0/20	0.00	50	50	cEMEG (child)
silver[1]	--				<10 -- <20	20				0/20	0.00	100	50	RMEG (child)
thallium	--				<2 -- <2	20				0/20	0.00	2	0.5	LTHA
zinc[1]	21 -- 39	4	27.477	26.5	<20 -- <50	16	3	12.24	10	4/20	20.00	5,000	3,000	cEMEG (child)

Notes:

Shading indicates that the substance exceeded drinking water comparison values; however, the substance was not selected for further public health evaluation because residents in the residential neighborhood adjacent to the Reading Gray Iron site do not use the area groundwater as a drinking water source.

CREG = Cancer Risk Evaluation Guide

EMEG = Environmental Media Evaluation Guide (prefixes: a = acute, c = chronic, and i = intermediate)

LTHA = Drinking Water Lifetime Health Advisory

MCL = Maximum Contaminant Level

RMEG = Reference Dose Media Evaluation Guide

ppb = parts per billion

Limits > Min. Detect = Number of non-detects where the reported quantifiable detection limits exceed the lowest or minimum level detected in the samples analyzed for the specified chemical.

Adjusted Mean = Computation of the mean where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and added into overall sum).

Adjusted Median = Computation of the median where non-detects are included in the calculations (i.e., reported quantifiable detection limits for non-detects are reduced by half and included in the ascending sort of data).

[1]Listed value in "EPA MCL" column is a secondary drinking water regulation (SDWR) for drinking water as set by EPA. SDWRs are unenforceable federal guidelines regarding taste, odor, color, and other non-aesthetic effects of drinking water. EPA recommends them to States as reasonable goals, but federal law does not require water supply systems to comply with them. States may, however, adopt their own enforceable regulations governing these concerns.

[2]Listed value in "EPA MCL" column is a Maximum Contaminant Level Action (MCLA) for drinking water as set by EPA under Superfund. If the relevant action level is exceeded, a regulatory response is triggered.

TABLE 9

Waste Characterization Results - Reading Gray Iron Site

Chemical Substance	MAXIMUM TOXICITY CHARACTERISTICS (mg/L)	RGI-BS-01 06/27/2001	RGI-WS-02 06/27/2001	RGI-WP-03 06/27/2001	RGI-WM-04 06/27/2001	RGI-BSP-05 06/27/2001
TCLP Metals by EPA 1311/6000/7000 Series Methods						
arsenic	5	<0.06	<0.06	<0.06	<0.06	<0.06
barium	100	**0.2**	**0.0**	**0.051**	**0.5**	**0.12**
cadmium	1	<0.008	<0.008	<0.008	<0.008	<0.008
chromium	5	<0.04	<0.04	<0.04	<0.04	<0.04
lead	5	<0.02	**0.28**	<0.02	<0.02	<0.02
selenium	1	<0.1	<0.1	<0.1	<0.1	<0.1
silver	5	<0.02	<0.02	<0.02	<0.02	<0.02
mercury	0.2	<0.001	<0.001	<0.001	<0.001	<0.001
TCLP Volatile Organic Compounds by EPA Method 1311/8260B						
benzene	0.5	<0.4	<0.4	<0.4	<0.4	<0.4
carbon tetrachloride	0.5	<0.4	<0.4	<0.4	<0.4	<0.4
chlorobenzene	100	<0.4	<0.4	<0.4	<0.4	<0.4
chloroform	6	<0.4	<0.4	<0.4	<0.4	<0.4
1,2-dichloroethane	0.5	<0.4	<0.4	<0.4	<0.4	<0.4
1,1-dichloroethylene	0.7	<0.4	<0.4	<0.4	<0.4	<0.4
methyl ethyl ketone	200	<1	<1	<1	<1	<1
tetrachloroethylene	0.7	<0.4	<0.4	<0.4	<0.4	<0.4
trichloroethylene	0.5	<0.4	<0.4	<0.4	<0.4	<0.4
vinyl chloride	0.2	<0.4	<0.4	<0.4	<0.4	<0.4
TCLP Semivolatiles by EPA Method 1311/8270C						
o-cresol	200	<20	<20	<20	<20	<20
m,p-cresols	200	<20	<20	<20	<20	<20
cresol	200	<20	<20	<20	<20	<20
1,4-dichlorobenzene	7.5	<0.75	<0.75	<0.75	<0.75	<0.75
2,4-dinitrotoluene	0.13	<0.02	<0.02	<0.02	<0.02	<0.02
hexachlorobenzene	0.13	<0.02	<0.02	<0.02	<0.02	<0.02
hexachlorobutadiene	0.5	<0.05	<0.05	<0.05	<0.05	<0.05
hexachloroethane	3	<0.3	<0.3	<0.3	<0.3	<0.3
nitrobenzene	2	<0.2	<0.2	<0.2	<0.2	<0.2
pentachlorophenol	100	<10	<10	<10	<10	<10
pyridine	5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	400	<40	<40	<40	<40	<40
2,4,6-trichlorophenol	2	<0.2	<0.2	<0.2	<0.2	<0.2
General Chemistry						
flashpoint (in degrees F)	200	>200	>200	>200	>200	>200
TRPH (mg/kg dry)	NA	**134**	ND	**47.9**	**34**	139
reactive cyanide	non-reactive	<2.5	<2.5	<2.5	<2.5	<2.5
reactive sulfide	non-reactive	<5	<5	<5	<5	<5
TCLP Polychlorinated Biphenyls (PCBs) by EPA 1311/8082						
PCB-1016	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1221	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1232	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1242	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1248	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1254	NA	<0.02	<0.02	<0.02	<0.02	<0.02
PCB-1260	NA	<0.02	<0.02	<0.02	<0.02	<0.02
Dry Weight Determination						
percentage (%)	NA	99.2	86.7	97.9	91.8	90

* From 40 CFR Part 261 Identification and Listing of Hazardous Waste (Subpart C - Characteristics of Hazardous Waste)
NA - Not applicable; not listed in 40 CFR Part 261.
ND - Not detected
TRPH - Total Recoverable Petroleum Hydrocarbons

TABLE 10

Results of ACM Sampling - Reading Gray Iron Site

Sample I.D.	Material	Description	Friable (Yes or No)	ACM Content
RGI-01	Wood Insulation	Grey/Tan Homogenous	N	NAD
RGI-02	Roof	Black Homogenous	N	NAD
RGI-03	Roof Material	Green/Black Homogenous, Shingle	N	NAD
RGI-04	Roof Material	Black, Homogenous Paper	N	NAD
RGI-05	Roof Material	Black Homogenous Tar/Paper	N	NAD
RGI-06	Roof Material	Black Homogenous Tar	N	**7% chrysotile**
RGI-07	Roof Material	Tar Paper	N	NA/PS
RGI-08	Roof Material	Tar Paper	N	NA/PS
RGI-09	Transite	Grey Homogenous Transite	N	**22% chrysotile**
RGI-10	Transite	Transite	N	NA/PS
RGI-11	Roof Material	Tar Paper	N	NA/PS
RGI-12	Paper Board	Brown, Homogenous	N	NAD
RGI-13	Roof Material	Paper	N	NA/PS
RGI-14	Roof Material	Paper	N	NA/PS
RGI-15	Transite	Transite	N	NA/PS
RGI-16	Transite	Transite	N	NA/PS
RGI-17	Roof Material	Tar Paper	N	NA/PS
RGI-18	Transite	Transite	N	NA/PS
RGI-19	Transite	Transite	N	NA/PS
RGI-20	Roof Material	Paper	N	NA/PS

NAD = No asbestos detected
NA/PS = Not Analyzed/Postitive Stop (after first positive result, laboratory stopped analyzing samples of the same material)

TABLE D-1

Exposure Factor Defaults
Due to Ingestion and Dermal Exposures

Exposure Factor		[1]Child	[2]Adult	Occupational Worker
EF		122	-----	250
ED		6	-----	25
B		0.5	-----	0.5
IRS		200	-----	100
SA		2,800	-----	3,300
AF		0.2	-----	0.2
[3]ABS	VOCs	-----	-----	-----
	SVOCs	0.1	-----	0.1
	Inorganics	-----	-----	-----
BW		30	-----	70
AT		ED*365	-----	ED*365

[1]Assume that children frequently trespass at the site, at least ⅓ of the year, due to the site's proximity within an urban residential neighborhood (Exposure Factors Handbook, Volume III-Activity Factors, August 1997, EPA/600/P-95-002Fa).

[2]Assume that there is limited trespass, which probably will not lead to significant exposures due to soil ingestion and dermal contact.

[3]The default or recommended dermal absorption fraction (ABS) from soil for SVOCs is 0.1; however, the recommended ABS for VOCs and inorganics are chemical-specific, depending upon the chemical, the chemical type, and soil charateristics (RAGS, Part E (Draft - Public Comment), September 2001, EPA/540/R-99-005).

TABLE D-2

Exposure Factor Defaults
Due to Inhalation Exposure

Exposure Factor		[1]Child	[2]Child	[2]Adult	Occupational Worker
EF		122	350	350	250
ED		6	6	30	25
B		0.5	0.5	0.5	0.5
IRA		10	10	20	20
ABS	IF	1	1	1	1
	FRL	0.125	0.125	0.125	0.125
	FS	0.625	0.625	0.625	0.625
	GIABS	1	1	1	1
BW		30	10	70	70
AT		ED*365	ED*365	ED*365	ED*365
[3]Q/C		[4]see below	40.27	40.27	[4]see below
V		0.5	0.5	0.5	0.5
U_m		4.3	4.3	4.3	4.3
U_t		1.083	1.083	1.083	1.083
F(x)		1.91	1.91	1.91	1.91

[1]Assume that children frequently trespass at the site, at least ⅓ of the year, due to the site's proximity within an urban residential neighborhood (Exposure Factors Handbook, Volume III-Activity Factors, August 1997, EPA/600/P-95-002Fa).

[2]Assume that there is limited trespass and most inhalation exposures are considered residential and off site.

[3]Value approximated from the following regression model (R^2 = 0.9973), $Q/C(A) = 75.7262/A^{0.1606}$, where A is the extent of areal contamination measured in acres.

[4]Assuming on-site exposures are dependent upon the number of chemical detections (N) and that each chemical detection is represented areally by a 10 ft. x 10 ft. square of earth, then the extent of areal contamination used in the above Q/C model is approximated as A = 100N/43,560.

TABLE D-3

Estimated Combined Average Daily Dose (ADD) for Non-Cancer Effects
From Soil Ingestion and Dermal Exposures to Soil
(Estimated Only for Chemicals Selected for Further Public Health Evaluation)

Chemical Substance	[1]Estimated ADD (Child)			[2]Estimated ADD (Worker)			Oral		
	Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	Health Guideline (mg/kg/day)		Reference
Arsenic	2.78E-04	1.31E-05	1.33E-05	1.35E-04	6.34E-06	6.45E-06	3.00E-04	ATSDR cMRL	Tseng et al., 1968
Cadmium	2.12E-05	1.02E-06	7.71E-07	9.36E-06	4.48E-07	3.40E-07	2.00E-04	ATSDR cMRL	Nogawa et al., 1989
Copper	2.90E-03	4.17E-05	4.23E-05	1.27E-03	1.83E-05	1.86E-05	2.00E-02	ATSDR aMRL	Pizarro et al., 1999
Lead[3]	3.23E-03	7.79E-05	7.52E-05	1.42E-03	3.42E-05	3.30E-05	-------	-------	
Thallium[3]	3.12E-05	4.44E-07	3.25E-07	1.37E-05	1.95E-07	1.43E-07	-------	-------	
Benzo(a)anthracene[PAH]	8.36E-05	1.99E-06	2.28E-06	5.00E-05	1.19E-06	1.36E-06	-------	-------	
Benzo(a)pyrene[PAH]	6.99E-05	1.67E-06	1.75E-06	4.18E-05	9.99E-07	1.05E-06	-------	-------	
Benzo(b)fluoranthene[PAH]	8.66E-05	1.39E-06	1.06E-06	5.18E-05	8.29E-07	6.32E-07	-------	-------	
Benzo(k)fluoranthene[PAH]	3.80E-05	1.38E-06	1.31E-06	2.27E-05	8.27E-07	7.82E-07	-------	-------	
Chrysene[PAH]	7.90E-05	1.42E-06	1.20E-06	4.73E-05	8.47E-07	7.18E-07	-------	-------	
Dibenzo(a,h)anthracene[PAH]	1.00E-05	2.50E-06	3.34E-06	6.00E-06	1.73E-06	2.00E-06	-------	-------	
3,3'-dichlorobenzidine[3]	7.13E-06	-----	-----	4.06E-06	-----	-----	-------	-------	
Indeno(1,2,3-cd)pyrene[PAH]	4.71E-05	1.27E-06	1.20E-06	2.82E-05	7.59E-07	7.18E-07	-------	-------	
PCB-1260[3]	9.15E-07	-----	-----	5.55E-07	-----	-----	-------	-------	
Acenaphthylene[PAH]	1.23E-05	2.98E-06	3.95E-06	7.36E-06	2.09E-06	2.36E-06	-------	-------	
Benzo(g,h,i)perylene[PAH]	4.56E-05	1.22E-06	1.22E-06	2.73E-05	7.28E-07	7.27E-07	-------	-------	
Phenanthrene[PAH]	6.54E-04	2.69E-06	1.98E-06	3.91E-04	1.61E-06	1.18E-06	-------	-------	

[1]Assume that children frequently trespass at the site, at least ⅓ of the year, due to the site's proximity within an urban residential neighborhood (Exposure Factors Handbook, Volume III-Activity Factors, August 1997, EPA/600/P-95-002Fa).

[2]Assume worker also resides in the surrounding community.

[3]Refer to the Public Health Implications section of the health consultation.

PAH: polycyclic aromatic hydrocarbon. All known effect levels for PAHs in any species are greater than 1 mg/kg/day, as cited in the Public Health Implications section of this health consultation (ATSDR 1995).

TABLE D-4

Estimated Average Daily Dose (ADD) for Non-Cancer Effects
From the Inhalation of Soil Particulates Less Than PM_{10}
(Estimated Only for Chemicals Selected for Further Public Health Evaluation)

Chemical Substance	[1]Estimated ADD (Child)			[2]Estimated ADD (Child)			[2]Estimated ADD (Adult)			Estimated ADD (Worker)			Oral		
	[3]Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	[3]Maximum (mg/kg/day)	[4]Mean (mg/kg/day)	[4]Median (mg/kg/day)	[3]Maximum (mg/kg/day)	[4]Mean (mg/kg/day)	[4]Median (mg/kg/day)	Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	Health Guideline (mg/kg/day)		Reference
Arsenic	3.46E-05	5.51E-06	5.59E-06	2.61E-05	1.17E-05	1.19E-05	3.73E-06	1.68E-06	1.69E-06	2.63E-05	3.01E-06	3.06E-06	5.00E-03	ATSDR aMRL	Mizuta et al., 1956
Cadmium	2.86E-06	4.02E-07	3.00E-07	2.15E-06	7.73E-07	5.66E-07	3.07E-07	1.11E-07	8.08E-08	2.18E-06	2.33E-07	1.75E-07	2.00E-04	ATSDR cMRL	Nogawa et al., 1989
Copper	3.44E-04	3.07E-05	3.11E-05	8.96E-05	8.82E-05	8.96E-05	1.28E-05	1.26E-05	1.28E-05	2.88E-04	1.32E-05	1.33E-05	2.00E-02	ATSDR aMRL	Pizarro et al., 1999
Lead[5]	3.99E-04	5.48E-05	5.16E-05	1.67E-04	1.53E-04	1.42E-04	2.39E-05	2.19E-05	2.03E-05	3.24E-04	2.42E-05	2.31E-05	-------	-------	
Thallium[5]	3.70E-06	1.49E-07	1.14E-07	9.31E-07	2.89E-07	2.34E-07	1.33E-07	4.13E-08	3.34E-08	3.10E-06	8.55E-08	6.37E-08	-------	-------	
Benzo(a)anthracene[PAH]	7.63E-06	3.71E-07	3.51E-07	3.45E-06	4.09E-07	1.49E-07	4.93E-07	5.84E-08	2.13E-08	6.17E-06	2.62E-07	2.85E-07	-------	-------	
Benzo(a)pyrene[PAH]	6.33E-06	3.24E-07	2.76E-07	2.64E-06	4.06E-07	1.49E-07	3.78E-07	5.80E-08	2.13E-08	5.15E-06	2.22E-07	2.19E-07	-------	-------	
Benzo(b)fluoranthene[PAH]	7.57E-06	3.09E-07	2.28E-07	2.10E-06	4.65E-07	3.22E-07	3.00E-07	6.64E-08	4.60E-08	6.32E-06	1.99E-07	1.50E-07	-------	-------	
Benzo(k)fluoranthene[PAH]	3.59E-06	2.60E-07	2.03E-07	2.07E-06	3.54E-07	1.48E-07	2.96E-07	5.06E-08	2.11E-08	2.83E-06	1.73E-07	1.55E-07	-------	-------	
Chrysene[PAH]	6.96E-06	2.99E-07	2.30E-07	2.14E-06	4.20E-07	2.53E-07	3.06E-07	6.00E-08	3.61E-08	5.78E-06	1.97E-07	1.62E-07	-------	-------	
Dibenzo(a,h)anthracene[PAH]	1.98E-06	3.18E-07	3.76E-07	5.01E-06	2.71E-07	1.48E-07	7.15E-07	3.88E-08	2.11E-08	9.55E-07	2.37E-07	3.07E-07	-------	-------	
3,3'-dichlorobenzidine[5]	9.18E-07	4.28E-07	2.43E-07	-----	1.28E-06	7.28E-07	-----	1.83E-07	1.04E-07	6.06E-07	1.83E-07	1.04E-07	-------	-------	
Indeno(1,2,3-cd)pyrene[PAH]	4.29E-06	2.58E-07	1.97E-07	1.90E-06	3.71E-07	1.48E-07	2.72E-07	5.31E-08	2.11E-08	3.47E-06	1.68E-07	1.50E-07	-------	-------	
PCB-1260[5]	8.50E-08	1.63E-08	1.69E-08	-----	4.88E-08	5.06E-08	-----	6.97E-09	7.23E-09	6.68E-08	6.97E-09	7.23E-09	-------	-------	
Acenaphthylene[PAH]	2.38E-06	4.00E-07	4.76E-07	5.92E-06	2.90E-07	1.48E-07	8.45E-07	4.14E-08	2.11E-08	1.16E-06	3.06E-07	3.95E-07	-------	-------	
Benzo(g,h,i)perylene[PAH]	4.16E-06	2.48E-07	1.99E-07	1.84E-06	3.58E-07	1.48E-07	2.63E-07	5.11E-08	2.11E-08	3.36E-06	1.62E-07	1.51E-07	-------	-------	
Phenanthrene[PAH]	5.44E-05	4.83E-07	3.12E-07	4.07E-06	4.56E-07	1.50E-07	5.82E-07	6.51E-08	2.14E-08	4.71E-05	3.53E-07	2.51E-07	-------	-------	

[1]Assume that children frequently trespass at the site, at least ⅓ of the year, due to the site's proximity within an urban residential neighborhood (Exposure Factors Handbook, Volume III-Activity Factors, August 1997, EPA/600/P-95-002Fa).

[2]Assume that there is limited trespass and most inhalation exposures are considered residential and off site.

[3]Maximum chemical concentration based on an upper limit average assuming particulates are originating from the sampled portion of the site for the specified chemical.

[4]Assume particulates are originating from the sampled portion of the site for the specified chemical.

[5]Refer to the Public Health Implications section of the health consultation.

PAH: polycyclic aromatic hydrocarbon. All known effect levels for PAHs in any species are greater than 1 mg/kg/day, as cited in the Public Health Implications section of this health consultation (ATSDR 1995).

TABLE D-5

Estimated Combined Average Daily Dose (ADD) for Non-Cancer Effects
From Soil Ingestion, Dermal Exposures to Soil, and Inhalation of Soil Particulates Less Than PM_{10}
(Estimated Only for Chemicals Selected for Further Public Health Evaluation)

Chemical Substance	[1]Estimated ADD (Child)			[2]Estimated ADD (Child)			[2]Estimated ADD (Adult)			Estimated ADD (Worker)			Oral		
	Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	[3]Maximum (mg/kg/day)	[4]Mean (mg/kg/day)	[4]Median (mg/kg/day)	[3]Maximum (mg/kg/day)	[4]Mean (mg/kg/day)	[4]Median (mg/kg/day)	Maximum (mg/kg/day)	Mean (mg/kg/day)	Median (mg/kg/day)	Health Guideline (mg/kg/day)		Reference
Arsenic	3.12E-04	1.86E-05	1.89E-05	2.61E-05	1.17E-05	1.19E-05	3.73E-06	1.68E-06	1.69E-06	1.61E-04	9.35E-06	9.50E-06	5.00E-03	ATSDR aMRL	Mizuta et al., 1956
Cadmium	2.41E-05	1.42E-06	1.07E-06	2.15E-06	7.73E-07	5.66E-07	3.07E-07	1.11E-07	8.08E-08	1.15E-05	6.81E-07	5.15E-07	2.00E-04	ATSDR cMRL	Nogawa et al., 1989
Copper	3.24E-03	7.24E-05	7.35E-05	8.96E-05	8.82E-05	8.96E-05	1.28E-05	1.26E-05	1.28E-05	1.56E-03	3.15E-05	3.19E-05	2.00E-02	ATSDR aMRL	Pizarro et al., 1999
Lead[5]	3.63E-03	1.33E-04	1.27E-04	1.67E-04	1.53E-04	1.42E-04	2.39E-05	2.19E-05	2.03E-05	1.74E-03	5.84E-05	5.61E-05	-------	-------	
Thallium[5]	3.49E-05	5.93E-07	4.39E-07	9.31E-07	2.89E-07	2.34E-07	1.33E-07	4.13E-08	3.34E-08	1.68E-05	2.80E-07	2.07E-07	-------	-------	
Benzo(a)anthracene[PAH]	9.12E-05	2.36E-06	2.63E-06	3.45E-06	4.09E-07	1.49E-07	4.93E-07	5.84E-08	2.13E-08	5.62E-05	1.45E-06	1.65E-06	-------	-------	
Benzo(a)pyrene[PAH]	7.62E-05	1.99E-06	2.02E-06	2.64E-06	4.06E-07	1.49E-07	3.78E-07	5.80E-08	2.13E-08	4.70E-05	1.22E-06	1.26E-06	-------	-------	
Benzo(b)fluoranthene[PAH]	9.42E-05	1.70E-06	1.28E-06	2.10E-06	4.65E-07	3.22E-07	3.00E-07	6.64E-08	4.60E-08	5.81E-05	1.03E-06	7.82E-07	-------	-------	
Benzo(k)fluoranthene[PAH]	4.16E-05	1.64E-06	1.51E-06	2.07E-06	3.54E-07	1.48E-07	2.96E-07	5.06E-08	2.11E-08	2.56E-05	1.00E-06	9.37E-07	-------	-------	
Chrysene[PAH]	8.60E-05	1.72E-06	1.43E-06	2.14E-06	4.20E-07	2.53E-07	3.06E-07	6.00E-08	3.61E-08	5.30E-05	1.04E-06	8.80E-07	-------	-------	
Dibenzo(a,h)anthracene[PAH]	1.20E-05	2.81E-06	3.72E-06	5.01E-06	2.71E-07	1.48E-07	7.15E-07	3.88E-08	2.11E-08	6.95E-06	1.97E-06	2.31E-06	-------	-------	
3,3'-dichlorobenzidine[5]	8.05E-06	4.28E-07	2.43E-07	-----	1.28E-06	7.28E-07	-----	1.83E-07	1.04E-07	4.67E-06	1.83E-07	1.04E-07	-------	-------	
Indeno(1,2,3-cd)pyrene[PAH]	5.14E-05	1.53E-06	1.40E-06	1.90E-06	3.71E-07	1.48E-07	2.72E-07	5.31E-08	2.11E-08	3.17E-05	9.27E-07	8.68E-07	-------	-------	
PCB-1260[5]	1.00E-06	1.63E-08	1.69E-08	-----	4.88E-08	5.06E-08	-----	6.97E-09	7.23E-09	6.22E-07	6.97E-09	7.23E-09	-------	-------	
Acenaphthylene[PAH]	1.47E-05	3.38E-06	4.43E-06	5.92E-06	2.90E-07	1.48E-07	8.45E-07	4.14E-08	2.11E-08	8.53E-06	2.40E-06	2.76E-06	-------	-------	
Benzo(g,h,i)perylene[PAH]	4.97E-05	1.46E-06	1.41E-06	1.84E-06	3.58E-07	1.48E-07	2.63E-07	5.11E-08	2.11E-08	3.06E-05	8.90E-07	8.79E-07	-------	-------	
Phenanthrene[PAH]	7.08E-04	3.17E-06	2.29E-06	4.07E-06	4.56E-07	1.50E-07	5.82E-07	6.51E-08	2.14E-08	4.38E-04	1.96E-06	1.43E-06	-------	-------	

[1]Assume that children frequently trespass at the site, at least ⅓ of the year, due to the site's proximity within an urban residential neighborhood (Exposure Factors Handbook, Volume III-Activity Factors, August 1997, EPA/600/P-95-002Fa).

[2]Assume that there is limited trespass and most inhalation exposures are considered residential and off site.

[3]Maximum chemical concentration based on an upper limit average assuming particulates are originating from the sampled portion of the site for the specified chemical.

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[5]Refer to the Public Health Implications section of the health consultation.

PAH: polycyclic aromatic hydrocarbon. All known effect levels for PAHs in any species are greater than 1 mg/kg/day, as cited in the Public Health Implications section of this health consultation (ATSDR 1995).