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Assessment of Potential Risks to Public Health Posed By the Richmond Avenue Site in Lockport, Niagara County, New York Under A Baseline (No Remedial Action) Scenario

by

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EXECUTIVE SUMMARY

Development of the Richmond Avenue Site by law must be planned, and proceed consistent with the law and supporting regulations, in a manner protecting public health from risks potentially posed by site conditions. This report assesses risks to public health potentially posed by residues of chemical pollutants detected in sampled environmental media at the site. The purpose of this health risk assessment (HRA) is to determine whether site conditions with respect to such contamination potentially pose unacceptable risks to public health, or only acceptable risks and, if unacceptable, to quantify the total cancer and non-cancer risks and fractional contribution of each substance of potential concern to the total. In this manner, examination of the spatial distribution of each contributing pollutant, and its fractional contribution to total risk, can guide project developers toward efficient remediation of potentially unacceptable baseline risks, if such unacceptable risks are revealed. An efficient remediation plan under that scenario, and based upon this HRA, would consist of remediating sectors of the site contributing most to total risks, until total risk is mitigated sufficiently, and worst-case estimates of residual risks are acceptable.

Potential worst case risks were assessed via standard, approved methods. Findings were made regarding environmental sampling data, substances of potential concern, values of substance-specific risk assessment input parameters, values of other risk assessment input parameters, reference individuals of potential concern, and exposure pathways of potential concern. Data provided by Integreyted Consultants were aggregated by type for input to the HRA. A list of 16 substances of potential concern was assembled, including each substance detected in any environmental medium at levels exceeding its regulatory benchmark value. Values of input parameters were selected conservatively. Reference individuals of potential concern included on-site construction workers and commercial employees, and off-site residents. Complete exposure pathways of potential concern included air and soil pathways, but not groundwater pathways, given the depth to groundwater.

Based upon findings made, the following conclusions are drawn. Total potential incremental lifetime cancer risks under the baseline scenario are 2.38 per million for the off-site residential receptors and 47.4 per million for on-site commercial receptors. This latter risk is in the order of 10 times higher than potential risks traditionally deemed to be acceptable. Potential non-cancer risks, quantified via the hazard index (HI), were HI = 0.000035 for off-site residential receptors. This would be deemed acceptable compared with a defined acceptability criterion of unity (HI $\leq$ 1). In contrast, however, HI = 70.1 for on-site commercial receptors. This latter risk is 70 times higher than potential non-cancer risks traditionally deemed to be acceptable.

Fractional contributions of individual substances or families of substances of potential concern to total potential incremental cancer and non-cancer risks also were quantified. **Cancer risk.** A single substance dominates in determining cancer risks to off-site residential receptors. Specifically, 97 percent of total risk is posed by chromium and its compounds. With respect to off-site residential receptors, therefore, site remediation could focus most efficiently upon chromium. With respect to on-site commercial receptors, however, site remediation to mitigate potential cancer risks must focus upon the PAHs, of which benz(a)pyrene accounts for 46 percent of total risk, and the carcinogenic PAHs together account for 88 percent of total potential cancer risk [1.9 times benz(a)pyrene alone, that is, 1.9 benz(a)pyrene equivalents]. Inasmuch as the PAHs typically constitute a co-occurring family of contaminants, site remediation for cancer risks most efficiently could focus upon the PAHs and chromium.

Non-cancer risk. A single substance dominates in determining non-cancer risks to off-site residential receptors: 85 percent of total risk is posed by ethylbenzene. For off-site residential receptors, therefore, site remediation could focus most efficiently upon ethylbenzene. With respect to on-site commercial receptors, however, site remediation to mitigate potential non-cancer risks, therefore, must focus upon lead (Pb) and its compounds, which account for 98 percent of total potential non-cancer risk. Accordingly, site remediation for non-cancer risks most efficiently could focus upon ethylbenzene and lead.

CONTENTS

TABLES

INTRODUCTION

Development of the Richmond Avenue Site by law must be planned, and proceed consistent with the law and supporting regulations, in a manner protecting public health from risks potentially posed by site conditions. This report assesses risks to public health potentially posed by residues of chemical pollutants detected in sampled environmental media at the site. The purpose of this health risk assessment (HRA) is to determine whether site conditions with respect to such contamination potentially pose unacceptable risks to public health, or only acceptable risks and, if unacceptable, to quantify the total cancer and non-cancer risks and fractional contribution of each substance of potential concern to the total. In this manner, examination of the spatial distribution of each contributing pollutant, and its fractional contribution to total risk, can guide project developers toward efficient remediation of potentially unacceptable baseline risks, if such unacceptable risks are revealed. An efficient remediation plan under that scenario, and based upon this HRA, would consist of remediating sectors of the site contributing most to total risks, until total risk is mitigated sufficiently, and worst-case estimates of residual risks are acceptable.

METHODS

Methods utilized to assess potential worst case risks were standard, approved methods consistent with U. S. EPA guidelines (such as 20-30). Methods for risk-based corrective action (RBCA) in particular were implemented via dedicated RBCA software prepared under the aegis of the *American Society for Testing and Materials* (ASTM; 2-4). Input parameters pertaining to substances of potential concern were quantified via accessing toxicological, medical, epidemiological, and other scientific literature and databases (for example, 1, 5-11, 13-19, 31). Site-specific information and input environmental sampling data were provided by Integreyted Consultants (Syracuse, New York; 12).

FINDINGS

Input Environmental Sampling Data

Data provided by Integreyted Consultants were aggregated by type for input to the HRA. Three types of data were available: surface soil data (Table 1), subsurface soil data (Table 2), and *Toxic Characteristic Leachate Procedure* (TCLP) data (Table 3). Tables 1-3 also indicate regulatory benchmark concentration values that constitute thresholds which, if exceeded, would trigger a requirement for further analysis and possibly also remediation.

Identification of Substances of Potential Concern

Environmental data were further analyzed for input to the HRA, and to characterize the extent and degree of site contamination, via an evaluative instrument simpler than the full database (Tables 4, 5). Accordingly, sample variability is quantified with respect to each site contaminant that had been reported to have exceeded its regulatory benchmark concentration. Tables 4 and 5 identify 16 substances of potential concern, including any substance detected in any environmental medium at levels exceeding its respective regulatory benchmark value. Each exceedance is highlighted in Table 1, 2, or 3.

Table 4 characterizes surface soil data, Table 5 subsurface. Although each table reports 10 parameters with respect to each substance, parameters used for further analysis were selected conservatively, thereby to assure a worst-case assessment, that is, one that would overestimate risks relative to most probable (actual) risks, with a high degree of confidence. For this purpose, each substance was quantified by its 95-percent upper-bound confidence limit, defined (and calculated) as an estimated concentration that would exceed the most probable actual concentration with a probability of 19/20 (95 percent). Confidence limits could not be calculated, however, for undetected substances. These substances were assumed to have a maximum concentration of zero.

Table 1. Surface Soil Data [1]

substance(s)	clean-up standard [2]	B-01-1	B-01-2	TB-01-1	TB-01-2	TB-01-3	TB-01-4
	(mg or µg/kg)	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
		site background (SB)					
metals (mg/kg)							
arsenic	7.5 or SB	4.40	3.20	4.10	3.30	8.80	4.90
barium	300 or SB	67.10	64.70	66.90	28.20	73.00	53.60
cadmium	10 or SB	1.09	0.850	2.18	1.35	1.13	0.97
chromium	50 or SB	7.33	6.63	8.05	4.86	5.92	4.73
lead	400**or SB	92.80	24.90	57.80	12.00	452	400.00
mercury	0.10	0.430	0.100	0.058	0.00	3.030	1.670
selenium	2 or SB	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.9 (SB)	0.00	0.00	0.00	0.00	0.00	0.00
pesticides (mg/kg)							
4,4'-DDD	2.90	...	...	...	...	...	...
4,4'-DDE	2.10	...	...	...	...	...	...
4,4'-DDT	2.10	...	...	...	...	...	...
PCBs (mg/kg or µg/wipe)							
Aroclor-1254	1.00	...	...	...	...	...	...
Aroclor-1260	1.00	...	...	...	...	...	...
total PCBs	1.00	...	...	...	...	...	...
semivolatile organics (SemiVols, SVOCs; µg/kg)							
2,4-dinitrotoluene	50,000	...	...	...	...	...	...
2-chlorophenol	800	...	...	...	...	...	...
4-chloro-3-methylphenol	390 (MDL)	...	...	...	...	...	...
4-nitrophenol	390 (MDL)	...	...	...	...	...	...
acenaphthene	50,000	...	...	...	...	...	...
anthracene	50,000	...	...	...	...	...	...
benzo(a)anthracene	390 (MDL)	...	...	...	...	...	...
benzo(a)pyrene	390 (MDL)	...	...	...	...	...	...
benzo(b)fluoranthene	1,100	...	...	...	...	...	...
benzo(g,h,i)perylene	50,000	...	...	...	...	...	...
benzo(k)fluoranthene	1,100	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	50,000	...	...	...	...	...	...
butylbenzyl phthalate	50,000	...	...	...	...	...	...
carbozole	50,000	...	...	...	...	...	...
chrysene	400	...	...	...	...	...	...
dibenzo(a, h)anthracene	140	...	...	...	...	...	...
dibenzofuran	6,200	...	...	...	...	...	...
di-n-butyl phthalate	8,100	...	...	...	...	...	...
fluorene	50,000	...	...	...	...	...	...
fluoranthene	50,000	...	...	...	...	...	...

Table 1. Surface Soil Data [1]

substance(s)	clean-up standard [2]	B-01-1	B-01-2	TB-01-1	TB-01-2	TB-01-3	TB-01-4
	(mg or µg/kg)	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
		site background (SB)					
indeno(1,2,3-cd)pyrene	3,200	...	...	...	...	...	...
N-nitrosodi-N-propylamine	50,000	...	...	...	...	...	...
pentachlorophenol	1,000	...	...	...	...	...	...
phenanthrene	50,000	...	...	...	...	...	...
phenol	390 (MDL)	...	...	...	...	...	...
pyrene	50,000	...	...	...	...	...	...
TICs	NS	...	...	...	...	...	...
total SVOCs	500,000	...	...	...	...	...	...
volatile organics (VOCs; µg/kg)							
1, 2, 3 - trimethyl benzene	NS	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	NS	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	10,000	...	...	...	...	...	...
1,1-dichloroethene	400	...	...	...	...	...	...
1-ethyl-2 methyl benzene	NS	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzene	NS	...	...	...	...	...	...
2 - ethyl - 1, 4 - dimethyl benzene	NS	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - Idene	NS	...	...	...	...	...	...
benzene	60	...	...	...	...	...	...
chlorobenzene	1,700	...	...	...	...	...	...
decahydro -2 - methyl napthalene	NS	...	...	...	...	...	...
ethylbenzene	5,500	...	...	...	...	...	...
isopropylbenzene	5,000	...	...	...	...	...	...
m-, o-, p-xylenes	1,200	...	...	...	...	...	...
methylcyclohexane	NS	...	...	...	...	...	...
methylene chloride	100	...	...	...	...	...	...
toluene	1,500	...	...	...	...	...	...
trichloroethene	700	...	...	...	...	...	...
unknown hydrocarbons	NS	...	...	...	...	...	...
unknowns	NS	...	...	...	...	...	...
total VOCs	10,000	...	...	...	...	...	...

notes:

1. Adapted from data tables provided by Integreyted (Syracuse, New York).
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste standard. Substances in shaded cells selected for further assessment.
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective reported
   R = reject: surrogate recoveries below 10%.
   SB = site background
2. **Metals:** *Recommended Soil Clean-Up Objective* specified by TAGM 4046
   Pesticides: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   SemiVols: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   VOCs: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046

Table 1. Surface Soil Data

substance(s)	TB-01-5	TB-01-6	TB-01-7	TB-01-8	TB-01-9	TB-01-10	TB-01-10
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	2'-4'
metals (mg/kg)							
arsenic	3.70	4.70	8.90	15.00	5.80	3.30	3.30
barium	26.10	136.00	176.00	377	182.00	53.00	53.00
cadmium	1.32	1.40	2.03	6.21	6.79	3.08	3.08
chromium	4.93	12.80	9.42	29.70	35.70	14.30	14.30
lead	25.40	960	1,020	893	3,060	20.60	20.60
mercury	0.079	3.420	2.730	6.310	1.270	0.027B	0.027B
selenium	0.00	0.00	0.00	2WB	0.00	0.00	0.00
silver	0.00	0.00	0.00	3.47	1.49	0.00	0.00
pesticides (mg/kg)							
4,4'-DDD	...	...	...	...	...	...	...
4,4'-DDE	...	...	...	...	...	...	...
4,4'-DDT	...	...	...	...	...	...	...
PCBs (mg/kg or µg/wipe)							
Aroclor-1254	...	...	...	...	...	...	...
Aroclor-1260	...	...	...	...	...	...	...
total PCBs	...	...	...	...	...	...	...
semivolatile organics (SemiVols,							
2,4-dinitrotoluene	...	...	...	...	...	...	...
2-chlorophenol	...	...	...	...	...	...	...
4-chloro-3-methylphenol	...	...	...	...	...	...	...
4-nitrophenol	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	...	...	...
anthracene	...	...	...	...	...	...	...
benzo(a)anthracene	...	...	...	...	...	...	...
benzo(a)pyrene	...	...	...	...	...	...	...
benzo(b)fluoranthene	...	...	...	...	...	...	...
benzo(g,h,i)perylene	...	...	...	...	...	...	...
benzo(k)fluoranthene	...	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...
carbozole	...	...	...	...	...	...	...
chrysene	...	...	...	...	...	...	...
dibenzo(a, h)anthracene	...	...	...	...	...	...	...
dibenzofuran	...	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...
fluorene	...	...	...	...	...	...	...
fluoranthene	...	...	...	...	...	...	...

Table 1. Surface Soil Data

substance(s)	TB-01-5	TB-01-6	TB-01-7	TB-01-8	TB-01-9	TB-01-10	TB-01-10
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	2'-4'
indeno(1,2,3-cd)pyrene	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	...	...	...
pentachlorophenol	...	...	...	...	...	...	...
phenanthrene	...	...	...	...	...	...	...
phenol	...	...	...	...	...	...	...
pyrene	...	...	...	...	...	...	...
TICs	...	...	...	...	...	...	...
total SVOCs	...	...	...	...	...	...	...
volatile organics (VOCs; µg/kg)							
1, 2, 3 - trimethyl benzene	...	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	...	...
1,1-dichloroethene	...	...	...	...	...	...	...
1-ethyl-2 methyl benzene	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzene	...	...	...	...	...	...	...
2 - ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - Idene	...	...	...	...	...	...	...
benzene	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	...	...
decahydro -2 - methyl napthalene	...	...	...	...	...	...	...
ethylbenzene	...	...	...	...	...	...	...
isopropylbenzene	...	...	...	...	...	...	...
m-, o-, p-xylenes	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	...	...
methylene chloride	...	...	...	...	...	...	...
toluene	...	...	...	...	...	...	...
trichloroethene	...	...	...	...	...	...	...
unknown hydrocarbons	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	...	...
total VOCs	...	...	...	...	...	...	...

notes:

1. Adapted from data tables provided by Integr
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste stand
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective reported
   R = reject: surrogate recoveries below 10%.
   SB = site background
2. **Metals:** *Recommended Soil Clean-Up Objective*
   Pesticides: *New York State Clean-Up Objective*
   SemiVols: *New York State Clean-Up Objective*
   VOCs: *New York State Clean-Up Objective* sp

Table 1. Surface Soil Data

substance(s)	TB-01-11	TB-01-12	TB-01-13	TB-01-14	TB-01-15	TB-01-16	TB-01-17
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
metals (mg/kg)							
arsenic	3.00	5.30	15.00	46.00	9.40	5.20	13.00
barium	52.10	68.80	317	92.10	654	175.00	196.00
cadmium	2.03	1.47	3.06	4.42	0.00	2.08	1.82
chromium	12.50	5.75	22.30	6.94	27.50	13.40	50.60
lead	10.90	59.70	753	57.30	4,120	1,240	976
mercury	0.00R	0.105	9.560	0.049B	3.860	2.450	0.462
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.00	1.83	0.00	0.00	0.00	0.00
pesticides (mg/kg)							
4,4'-DDD	...	...	...	...	...	...	...
4,4'-DDE	...	...	...	...	...	...	...
4,4'-DDT	...	...	...	...	...	...	...
PCBs (mg/kg or µg/wipe)							
Aroclor-1254	...	...	...	...	...	...	...
Aroclor-1260	...	...	...	...	...	...	...
total PCBs	...	...	...	...	...	...	...
semivolatile organics (SemiVols,							
2,4-dinitrotoluene	...	...	...	...	...	...	...
2-chlorophenol	...	...	...	...	...	...	...
4-chloro-3-methylphenol	...	...	...	...	...	...	...
4-nitrophenol	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	...	...	...
anthracene	...	...	...	...	...	...	...
benzo(a)anthracene	...	...	...	...	...	...	...
benzo(a)pyrene	...	...	...	...	...	...	...
benzo(b)fluoranthene	...	...	...	...	...	...	...
benzo(g,h,i)perylene	...	...	...	...	...	...	...
benzo(k)fluoranthene	...	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...
carbozole	...	...	...	...	...	...	...
chrysene	...	...	...	...	...	...	...
dibenzo(a, h)anthracene	...	...	...	...	...	...	...
dibenzofuran	...	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...
fluorene	...	...	...	...	...	...	...
fluoranthene	...	...	...	...	...	...	...

Table 1. Surface Soil Data

substance(s)	TB-01-11	TB-01-12	TB-01-13	TB-01-14	TB-01-15	TB-01-16	TB-01-17
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
indeno(1,2,3-cd)pyrene	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	...	...	...
pentachlorophenol	...	...	...	...	...	...	...
phenanthrene	...	...	...	...	...	...	...
phenol	...	...	...	...	...	...	...
pyrene	...	...	...	...	...	...	...
TICs	...	...	...	...	...	...	...
total SVOCs	...	...	...	...	...	...	...
volatile organics (VOCs; µg/kg)							
1, 2, 3 - trimethyl benzene	...	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	...	...
1,1-dichloroethene	...	...	...	...	...	...	...
1-ethyl-2 methyl benzene	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzene	...	...	...	...	...	...	...
2 - ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - Idene	...	...	...	...	...	...	...
benzene	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	...	...
decahydro -2 - methyl napthalene	...	...	...	...	...	...	...
ethylbenzene	...	...	...	...	...	...	...
isopropylbenzene	...	...	...	...	...	...	...
m-, o-, p-xylenes	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	...	...
methylene chloride	...	...	...	...	...	...	...
toluene	...	...	...	...	...	...	...
trichloroethene	...	...	...	...	...	...	...
unknown hydrocarbons	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	...	...
total VOCs	...	...	...	...	...	...	...

notes:

1. Adapted from data tables provided by Integre
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste stand
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective reported
   R = reject: surrogate recoveries below 10%.
   SB = site background
2. **Metals:** *Recommended Soil Clean-Up Objective*
   Pesticides: *New York State Clean-Up Objective*
   SemiVols: *New York State Clean-Up Objective*
   VOCs: *New York State Clean-Up Objective* sp

Table 1. Surface Soil Data

substance(s)	TB-01-18	TB-01-20	TB-01-21	TB-01-22	TB-01-23	TB-01-26	TB-01-27
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
metals (mg/kg)							
arsenic	13.00	45.00	2.10	2.40	3.20	1.20	13.00
barium	419	151.00	70.10	27.20	70.20	22.40	235.00
cadmium	2.83	2.02	1.37	0.67	1.77	1.96	4.60
chromium	12.60	7.97	9.52	67.10	322	6.87	8.86
lead	2,330	49.20	17.40	63.00	134.00	5.00	1,170
mercury	4.410	0.218	0.00	0.065	0.00	0.00	0.298
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pesticides (mg/kg)							
4,4'-DDD	...	...	...	...	...	...	...
4,4'-DDE	...	...	...	...	...	...	...
4,4'-DDT	...	...	...	...	...	...	...
PCBs (mg/kg or µg/wipe)							
Aroclor-1254	...	...	...	...	...	...	...
Aroclor-1260	...	...	...	...	...	...	...
total PCBs	...	...	...	...	...	...	...
semivolatile organics (SemiVols, :							
2,4-dinitrotoluene	...	...	...	...	...	...	...
2-chlorophenol	...	...	...	...	...	...	...
4-chloro-3-methylphenol	...	...	...	...	...	...	...
4-nitrophenol	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	...	...	...
anthracene	...	...	...	...	...	...	...
benzo(a)anthracene	...	...	...	...	...	...	...
benzo(a)pyrene	...	...	...	...	...	...	...
benzo(b)fluoranthene	...	...	...	...	...	...	...
benzo(g,h,i)perylene	...	...	...	...	...	...	...
benzo(k)fluoranthene	...	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...
carbozole	...	...	...	...	...	...	...
chrysene	...	...	...	...	...	...	...
dibenzo(a, h)anthracene	...	...	...	...	...	...	...
dibenzofuran	...	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...
fluorene	...	...	...	...	...	...	...
fluoranthene	...	...	...	...	...	...	...

Table 1. Surface Soil Data

substance(s)	TB-01-18	TB-01-20	TB-01-21	TB-01-22	TB-01-23	TB-01-26	TB-01-27
	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'	0'-2'
indeno(1,2,3-cd)pyrene	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	...	...	...
pentachlorophenol	...	...	...	...	...	...	...
phenanthrene	...	...	...	...	...	...	...
phenol	...	...	...	...	...	...	...
pyrene	...	...	...	...	...	...	...
TICs	...	...	...	...	...	...	...
total SVOCs	...	...	...	...	...	...	...
volatile organics (VOCs; µg/kg)							
1, 2, 3 - trimethyl benzene	...	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	...	...
1,1-dichloroethene	...	...	...	...	...	...	...
1-ethyl-2 methyl benzene	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzene	...	...	...	...	...	...	...
2 - ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - Idene	...	...	...	...	...	...	...
benzene	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	...	...
decahydro -2 - methyl napthalene	...	...	...	...	...	...	...
ethylbenzene	...	...	...	...	...	...	...
isopropylbenzene	...	...	...	...	...	...	...
m-, o-, p-xylenes	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	...	...
methylene chloride	...	...	...	...	...	...	...
toluene	...	...	...	...	...	...	...
trichloroethene	...	...	...	...	...	...	...
unknown hydrocarbons	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	...	...
total VOCs	...	...	...	...	...	...	...

notes:

1. Adapted from data tables provided by Integre
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste stand
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective reported
   R = reject: surrogate recoveries below 10%.
   SB = site background
2. **Metals:** *Recommended Soil Clean-Up Objective*
   Pesticides: *New York State Clean-Up Objective*
   SemiVols: *New York State Clean-Up Objective*
   VOCs: *New York State Clean-Up Objective* sp

Table 1. Surface Soil Data

substance(s)	TB-01-29	B-01-3	S-01-1	S-01-2	S-01-3
	0'-4'	0'-2'	0"-6"	0"-6"	0"-6"
metals (mg/kg)					
arsenic	26.00	4.10	2.90	4.30	3.70
barium	70.30	109.00	59.70	132.00	61.40
cadmium	1.43	1.38	1.57	2.41	0.93
chromium	6.54	8.94	11.60	12.50	4.38
lead	124.00	123.00	79.90	67.00	73.40
mercury	0.210	0.640	0.120	1.320	0.120
selenium	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.846B	0.00	0.992B	0.00
pesticides (mg/kg)					
4,4'-DDD	...	...	0.82	0.00	0.00
4,4'-DDE	...	...	0.19	0.00	0.00
4,4'-DDT	...	...	2.90	0.00	0.00
PCBs (mg/kg or µg/wipe)					
Aroclor-1254	...	...	0.00	0.00	0.00
Aroclor-1260	...	...	0.00	0.00	0.00
total PCBs	...	...	0.00	0.00	0.00
semivolatile organics (SemiVols,					
2,4-dinitrotoluene	...	...	0.00	0.00	0.00
2-chlorophenol	...	...	0.00	0.00	0.00
4-chloro-3-methylphenol	...	...	0.00	0.00	0.00
4-nitrophenol	...	...	0.00	0.00	0.00
acenaphthene	...	...	150J	0.00	0.00
anthracene	...	...	0.00	0.00	0.00
benzo(a)anthracene	...	...	2,100	74J	0.00
benzo(a)pyrene	...	...	1,700	69J	0.00
benzo(b)fluoranthene	...	...	3,100	100J	0.00
benzo(g,h,i)perylene	...	...	660J	0.00	0.00
benzo(k)fluoranthene	...	...	980	0.00	0.00
bis-2-ethylhexyl phthalate	...	...	0.00	0.00	130J
butylbenzyl phthalate	...	...	570J	0.00	50J
carbozole	...	...	390J	0.00	0.00
chrysene	...	...	2,100	82J	0.00
dibenzo(a, h)anthracene	...	...	190J	0.00	0.00
dibenzofuran	...	...	290J	0.00	0.00
di-n-butyl phthalate	...	...	0.00	0.00	67J
fluorene	...	...	610J	0.00	0.00
fluoranthene	...	...	3,700.00	130J	0.00

Table 1. Surface Soil Data

substance(s)	TB-01-29	B-01-3	S-01-1	S-01-2	S-01-3
	0'-4'	0'-2'	0"-6"	0"-6"	0"-6"
indeno(1,2,3-cd)pyrene	...	...	1,100.00	55J	0.00
N-nitrosodi-N-propylamine	...	...	0.00	0.00	0.00
pentachlorophenol	...	...	3,600	0.00	0.00
phenanthrene	...	...	840.00	81J	0.00
phenol	...	...	0.00	0.00	0.00
pyrene	...	...	4,300	130J	0.00
TICs	...	...	4,420	0.00	2,740
total SVOCs	...	...	...	721J	2,987
volatile organics (VOCs; µg/kg)					
1, 2, 3 - trimethyl benzene	...	...	0.00	0.00	0.00
1, 2, 3, 4 - tetramethyl benzene	...	...	0.00	0.00	0.00
1, 2, 4 - trimethylbenzene	...	...	0.00	0.00	0.00
1,1-dichloroethene	...	...	0.00	0.00	0.00
1-ethyl-2 methyl benzene	...	...	0.00	0.00	0.00
1-methyl-3-1(1 methyl ethyl) benzene	...	...	0.00	0.00	0.00
2 - ethyl - 1, 4 - dimethyl benzene	...	...	0.00	0.00	0.00
2, 3 - dihydro - 5- methyl - 1H - Idene	...	...	0.00	0.00	0.00
benzene	...	...	0.00	0.00	0.00
chlorobenzene	...	...	0.00	0.00	0.00
decahydro -2 - methyl napthalene	...	...	0.00	0.00	0.00
ethylbenzene	...	...	0.00	0.00	0.00
isopropylbenzene	...	...	0.00	0.00	0.00
m-, o-, p-xylenes	...	...	0.00	0.00	5J
methylcyclohexane	...	...	0.00	0.00	0.00
methylene chloride	...	...	5JB	7JB	6JB
toluene	...	...	0.00	0.00	8J
trichloroethene	...	...	0.00	0.00	0.00
unknown hydrocarbons	...	...	0.00	0.00	0.00
unknowns	...	...	0.00	0.00	0.00
total VOCs	...	...	5JB	7JB	19JB

notes:

1. Adapted from data tables provided by Integre
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste stand
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective reported
   R = reject: surrogate recoveries below 10%.
   SB = site background
2. **Metals:** *Recommended Soil Clean-Up Objective*
   Pesticides: *New York State Clean-Up Objective*
   SemiVols: *New York State Clean-Up Objective*
   VOCs: *New York State Clean-Up Objective* sp

Table 2. Subsurface Soil Data [1]

substance(s)	clean-up standard [2]	B-01-1	B-01-1	B-01-2	B-01-2	B-01-3	B-01-3	MW-01-1
	(mg/kg)	2'-4'	4'-8'	2'-4'	4'-5'	2'-4'	4'-8'	11'
		site background (SB) samples						
metals (mg/kg)								
arsenic	7.5 or SB	4.80	2.10	4.80	1.90	4.70	4.50	...
barium	300 or SB	126.00	72.60	88.60	47.20	55.2	56.4	...
cadmium	10 or SB	1.85	1.23	1.20	0.64	1.58	1.05	...
chromium	50 or SB	13.50	8.64	8.16	7.48	8.48	6.50	...
lead	400**or SB	171.00	6.30	249.00	25.00	51.20	33.30	...
mercury	0.10	0.610	0.026	0.081	0.061	0.120	0.210	...
selenium	2 or SB	0.00	0.00	0.00	0.00	0.00	0.00	...
silver	0.9 (SB)	1.01B	0.00	0.00	0.00	0.79B	0.913B	...
semivolatile organics (SemiVols, SVOCs; µg/kg)								
		site background (SB) samples						
	clean-up standard [2]	B-01-1	B-01-1	B-01-2	B-01-2	B-01-3	B-01-3	MW-01-1
	(µg/kg)	2'-4'	4'-8'	2'-4'	4'-5'	2'-4'	4'-8'	11'
1, 1'-biphenyl	50,000	...	...	...	...	...	...	...
2,4-dinitrotoluene	50,000	...	...	...	...	...	...	0.00
2-chlorophenol	800	...	...	...	...	...	...	0.00
2-methylnaphthalene	36,400	...	...	...	...	...	...	0.00
4-chloro-3-methylphenol	390 (MDL)	...	...	...	...	...	...	0.00
4-nitrophenol	390 (MDL)	...	...	...	...	...	...	0.00
acenaphthalene	41,000	...	...	...	...	...	...	...
acenaphthene	50,000	...	...	...	...	...	...	0.00
anthracene	50,000	...	...	...	...	...	...	0.00
benzo(a)anthracene	390 (MDL)	...	...	...	...	...	...	0.00
benzo(a)pyrene	390 (MDL)	...	...	...	...	...	...	0.00
benzo(b)fluoranthene	1,100	...	...	...	...	...	...	0.00
benzo(g,h,i)perylene	50,000	...	...	...	...	...	...	0.00
benzo(k)fluoranthene	1,100	...	...	...	...	...	...	0.00
bis-2-ethylhexyl phthalate	50,000	...	...	...	...	...	...	54JBU
butylbenzyl phthalate	50,000	...	...	...	...	...	...	0.00
carbozole	50,000	...	...	...	...	...	...	0.00
chrysene	400	...	...	...	...	...	...	0.00
dibenzo(a, h)anthracene	140	...	...	...	...	...	...	0.00
dibenzofuran	6,200	...	...	...	...	...	...	0.00
di-n-butyl phthalate	8,100	...	...	...	...	...	...	0.00
fluorene	50,000	...	...	...	...	...	...	0.00
fluoranthene	50,000	...	...	...	...	...	...	0.00
indeno(1,2,3-cd)pyrene	3,200	...	...	...	...	...	...	0.00
naphthalene	13,000	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	50,000	...	...	...	...	...	...	0.00
pentachlorophenol	1,000	...	...	...	...	...	...	0.00
phenanthrene	50,000	...	...	...	...	...	...	0.00
phenol	390 (MDL)	...	...	...	...	...	...	0.00
pyrene	50,000	...	...	...	...	...	...	0.00
TICs	NS	...	...	...	...	...	...	0.00
total SVOCs	500,000	...	...	...	...	...	...	0.00

Table 2. Subsurface Soil Data [1]

substance(s)	clean-up standard [2]	B-01-1	B-01-1	B-01-2	B-01-2	B-01-3	B-01-3	MW-01-1
	(mg/kg)	2'-4'	4'-8'	2'-4'	4'-5'	2'-4'	4'-8'	11'
		site background (SB) samples						
volatile organics (VOCs; µg/kg)								
		site background (SB) samples						
	clean-up standard [2]	B-01-1	B-01-1	B-01-2	B-01-2	B-01-3	B-01-3	MW-01-1
	(µg/kg)	2'-4'	4'-8'	2'-4'	4'-5'	2'-4'	4'-8'	11'
1, 1-dichloroethene	400	...	...	...	...	...	...	0.00
1, 2, 3, 4 - tetramethyl benzene	NS	...	...	...	...	...	...	69,000
1, 2, 3, 5 - tetramethyl benzene	NS	...	...	...	...	...	...	...
1, 2, 3-trimethyl benzene	NS	...	...	...	...	...	...	170,000
1, 2, 4 - trimethylbenzene	10,000	...	...	...	...	...	...	70,000
1, 2, 4, 5-tetramethylbenzene	NS	...	...	...	...	...	...	...
1, 3, 5 - trimethylbenzene	NS	...	...	...	...	...	...	...
1-ethyl-2-methyl benzene	NS	...	...	...	...	...	...	86,000
1-ethyl-2, 4-dimethyl benzene	NS	...	...	...	...	...	...	...
1-ethyl-4-(1-methylethyl) benzene	NS	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzen	NS	...	...	...	...	...	...	69,000
2, 3 - dihydro - 5- methyl - 1H - idene	NS	...	...	...	...	...	...	83,000
2-ethyl - 1, 4 - dimethyl benzene	NS	...	...	...	...	...	...	110,000
4-isopropyltoluene	NS	...	...	...	...	...	...	...
benzene	60	...	...	...	...	...	...	0.00
bromomethane	NS	...	...	...	...	...	...	...
chlorobenzene	1,700	...	...	...	...	...	...	0.00
decahydro -2-methylnapthalene	NS	...	...	...	...	...	...	0.00
ethylbenzene	5,500	...	...	...	...	...	...	11,000
isopropylbenzene	5,000	...	...	...	...	...	...	3700J
m, o, p-xylenes	1,200	...	...	...	...	...	...	45,600J
methyl-tert-butyl-ether (MTBE)	NS	...	...	...	...	...	...	...
methylcyclohexane	NS	...	...	...	...	...	...	12,000
methylene chloride	100	...	...	...	...	...	...	2,800JB
n-butylbenzene	NS	...	...	...	...	...	...	...
n-propylbenzene	NS	...	...	...	...	...	...	...
sec-butylbenzene	NS	...	...	...	...	...	...	...
tert-butylbenzene	NS	...	...	...	...	...	...	...
toluene	1,500	...	...	...	...	...	...	0.00
trichloroethene	700	...	...	...	...	...	...	0.00
unknown hydrocarbons	NS	...	...	...	...	...	...	...
unknowns	NS	...	...	...	...	...	...	271,000
total VOCs	10,000	...	...	...	...	...	...	1,003,100

notes:

1. Adapted from data tables provided by Integreyted (Syracuse, New York).
   0 = not detected at laboratory detection limit.
   Bolded values exceed hazardous waste standard. Substances in shaded cells selected for further assessment.
   B = analyte detected in method or trip blank.
   J = usable as estimated value
   R = reject: surrogate recoveries below 10%.
   NA = not analyzed.
   SB = site background
   NS = no soil clean-up objective reported
2. **Metals:** *Recommended Soil Clean-Up Objective* specified by TAGM 4046
   Pesticides: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   SemiVols: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   VOCs: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046

Table 2. Subsurface

substance(s)	HL-1	HL-2	TB-01-1	TB-01-2	TB-01-3	TB-01-4	TB-01-5	TB-01-6
	3'-4'	Composite	2'-4'	2'-4'	2'-4'	2'-4'	2'-4'	2'-4'
metals (mg/kg)								
arsenic	...	...	8.40	5.10	4.60	6.40	4.20	3.30
barium	...	...	10B	17 B	16B	36.50	6.91 B	95.60
cadmium	...	...	1.65	0.798	1.22	1.38	0.81	1.27
chromium	...	...	4.25	4.06	5.02	4.01	4.95	5.74
lead	...	...	35.30	23.90	63.40	244.00	17.40	200.00
mercury	...	...	0.031 B	0.000	1.100	1.700	0.000	1.210
selenium	...	...	0.00	0.00	0.00	0.00	0.00	0.00
silver	...	...	0.726 B	0.00	0.00	0.00	0.00	0.00
semivolatile organics (Sen								
	HL-1	HL-2	TP-01-1	TP-01-2	TP-01-3	TP-01-4	TP-01-5	TP-01-6
	3'-4'	Composite	7'-8'	5'-6'	10'-11'	11'-12'	7'-8'	4'-6'
1, 1'-biphenyl	...	...	0.00R	0.00R	0.00	0.00	380J	0.00
2,4-dinitrotoluene	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
2-chlorophenol	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
2-methylnaphthalene	0.00	0.00	0.00R	0.00R	0.00	58J	1,200J	0.00
4-chloro-3-methylphenol	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
4-nitrophenol	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
acenaphthalene	...	...	...	...	...	...	...	...
acenaphthene	0.00	120J	0.00R	0.00R	0.00	0.00	1,400J	380J
anthracene	0.00	660J	0.00R	0.00R	0.00	0.00	2,200	1000J
benzo(a)anthracene	0.00	1,600	0.00R	0.00R	0.00	0.00	2,700	5,300
benzo(a)pyrene	0.00	1,000	0.00R	0.00R	0.00	0.00	0.00	4,100
benzo(b)fluoranthene	0.00	1,700	0.00R	0.00R	0.00	0.00	1,700	7,300
benzo(g,h,i)perylene	0.00	280J	0.00R	0.00R	0.00	0.00	0.00	1200J
benzo(k)fluoranthene	0.00	520J	0.00R	0.00R	0.00	0.00	990J	2,800
bis-2-ethylhexyl phthalate	66J	0.00	42JR	0.00R	120JB	0.00	0.00	0.00
butylbenzyl phthalate	0.00	0.00	...	...	...	...	...	...
carbozole	0.00	300J	0.00R	0.00R	0.00	0.00	930J	660J
chrysene	0.00	1,500	0.00R	0.00R	0.00	0.00	1,800	5,400
dibenzo(a, h)anthracene	0.00	190	0.00R	0.00R	0.00	0.00	280	510
dibenzofuran	0.00	290J	0.00R	0.00R	0.00	0.00	2,000	220J
di-n-butyl phthalate	0.00	0.00	...	...	...	...	...	...
fluorene	0.00	120J	0.00R	0.00R	0.00	0.00	2,400	340J
fluoranthene	0.00	2,800	0.00R	0.00R	0.00	0.00	4,900	8,900
indeno(1,2,3-cd)pyrene	0.00	750J	0.00R	0.00R	0.00	0.00	0.00	2,000
naphthalene	...	...	0.00R	0.00R	0.00	0.00	1300J	0.00
N-nitrosodi-N-propylamine	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
pentachlorophenol	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
phenanthrene	0.00	3,000	0.00R	0.00R	0.00	0.00	7,100	5,100
phenol	0.00	0.00	0.00R	0.00R	0.00	0.00	0.00	0.00
pyrene	0.00	3,200	0.00R	0.00R	0.00	0.00	760J	9,300
TICs	0.00	3,670	270	0.00R	0.00	17,790	21,680	12,820
total SVOCs	66J	...	312	0.00R	120JB	17848 (58J)	...	...

Table 2. Subsurface

substance(s)	HL-1	HL-2	TB-01-1	TB-01-2	TB-01-3	TB-01-4	TB-01-5	TB-01-6
	3'-4'	Composite	2'-4'	2'-4'	2'-4'	2'-4'	2'-4'	2'-4'
volatile organics (VOCs; µ								
	HL-1	HL-2	TP-01-1	TP-01-2	TP-01-3	TP-01-4	TP-01-5	TP-01-6
	3'-4'	Composite	7'-8'	5'-6'	10'-11'	11'-12'	7'-8'	4'-6'
1, 1-dichloroethene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1, 2, 3, 4 - tetramethyl benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1, 2, 3, 5 - tetramethyl benzene	...	...	0.00	0.00	0.00	20,000	0.00	0.00
1, 2, 3-trimethyl benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1, 2, 4 - trimethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1, 2, 4, 5-tetramethylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	0.00
1, 3, 5 - trimethylbenzene	...	...	...	...	...	...	...	...
1-ethyl-2-methyl benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-ethyl-2, 4-dimethyl benzene	...	...	0.00	0.00	0.00	17,000	0.00	0.00
1-ethyl-4-(1-methylethyl) benzene	...	...	0.00	0.00	0.00	21,000	0.00	0.00
1-methyl-3-1(1 methyl ethyl) benzen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2, 3 - dihydro - 5- methyl - 1H - idene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-ethyl - 1, 4 - dimethyl benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4-isopropyltoluene	...	...	...	...	...	...	...	...
benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bromomethane	...	...	0.00	0.00	0.00	790J	0.00	0.00
chlorobenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
decahydro -2-methylnapthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
isopropylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m, o, p-xylenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
methyl-tert-butyl-ether (MTBE)	...	...	...	...	...	...	...	...
methylcyclohexane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
methylene chloride	0.00	0.00	0.00	0.00	0.00	810JB	0.00	8JB
n-butylbenzene	...	...	...	...	...	...	...	...
n-propylbenzene	...	...	...	...	...	...	...	...
sec-butylbenzene	...	...	...	...	...	...	...	...
tert-butylbenzene	...	...	...	...	...	...	...	...
toluene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
trichloroethene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unknown hydrocarbons	...	...	0.00	0.00	0.00	18,000	0.00	0.00
unknowns	0.00	0.00	0.00	0.00	0.00	74,000	0.00	0.00
total VOCs	0.00	0.00	0.00	0.00	0.00	151,600	0.00	8JB

notes:

1. Adapted from data tables provide
   0 = not detected at laboratory dete
   Bolded values exceed hazardous v
   B = analyte detected in method or
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective re
2. **Metals:** *Recommended Soil Clean-l*
   Pesticides: *New York State Clean-l*
   SemiVols: *New York State Clean-l*
   VOCs: *New York State Clean-Up C*

Table 2. Subsurface

substance(s)	TB-01-6	TB-01-7	TB-01-8	TB-01-9	TB-01-9	TB-01-10	TB-01-10	TB-01-11
	4'-8'	2'-4'	2'-4'	2'-4'	4'-8'	2'-4'	4'-8'	2'-4'
metals (mg/kg)								
arsenic	7.30	8.10	12.00	9.90	6.40	3.00	7.60	2.80
barium	37.60	161	262	195.00	179.00	29.50	46.90	44.10
cadmium	1.65	1.48	9.50	2.82	2.00	2.01	2.28	1.87
chromium	5.75	5.52	15.0	10.20	18.30	11.90	12.50	10.30
lead	114.00	679	162	235.00	186.00	3.90	5.00	4.40
mercury	0.174	3.44	0.522	1.530	0.116	0.00	0.000	0.00R
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.00	1.75	1.13B	0.78B	0.00	0.00	0.00

semivolatile organics (Sen

	TP-01-7	TP-01-8	TP-01-9	TP-01-9	TP-01-9	TP-01-9	TP-01-9	...
	7'-9'	4'-6'	north	east	south	west	bottom	...
1, 1'-biphenyl	0.00	0.00	...	...	...	...	...	...
2,4-dinitrotoluene	0.00	0.00	...	...	...	...	...	...
2-chlorophenol	0.00	0.00	...	...	...	...	...	...
2-methylnaphthalene	0.00	0.00	...	...	...	...	...	...
4-chloro-3-methylphenol	0.00	0.00	...	...	...	...	...	...
4-nitrophenol	0.00	0.00	...	...	...	...	...	...
acenaphthalene	...	...	0.00	0.00	0.00	0.00	0.00	...
acenaphthene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	...
anthracene	0.00	0.00	0.00	0.00	180J	1,100.00	0.00	...
benzo(a)anthracene	0.00	0.00	200J	220J	1,100	2,300	89J	...
benzo(a)pyrene	0.00	0.00	220J	240J	1,300	2,400	100J	...
benzo(b)fluoranthene	0.00	0.00	300	400	2,000	3,700	0	...
benzo(g,h,i)perylene	0.00	0.00	0.00	130J	540	1,100	0.00	...
benzo(k)fluoranthene	0.00	0.00	0.00	0.00	820	1,200	0.00	...
bis-2-ethylhexyl phthalate	0.00	0.00	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...	...
carbozole	0.00	0.00	...	...	...	...	...	...
chrysene	0.00	0.00	210J	260J	1,400	2,300	120J	...
dibenzo(a, h)anthracene	0.00	0.00	0.00	0.00	0.00	230.00	0.00	...
dibenzofuran	0.00	0.00	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...	...
fluorene	0.00	0.00	0.00	0.00	0.00	420	0.00	...
fluoranthene	0.00	0.00	300	350	2,000	4,200	160J	...
indeno(1,2,3-cd)pyrene	0.00	0.00	170J	0.00	590	1,300	0	...
naphthalene	0.00	0.00	0.00	0.00	0.00	850	0.00	...
N-nitrosodi-N-propylamine	0.00	0.00	...	...	...	...	...	...
pentachlorophenol	0.00	0.00	...	...	...	...	...	...
phenanthrene	0.00	0.00	210J	210J	1,400	4,000	99J	...
phenol	0.00	0.00	...	...	...	...	...	...
pyrene	0.00	0.00	340	370	2,400	4,900	180J	...
TICs	0.00	2,310	...	...	...	...	...	...
total SVOCs	0.00	2,310	1,950	2,180	13,730	30,610	748	...

Table 2. Subsurface

substance(s)	TB-01-6	TB-01-7	TB-01-8	TB-01-9	TB-01-9	TB-01-10	TB-01-10	TB-01-11
	4'-8'	2'-4'	2'-4'	2'-4'	4'-8'	2'-4'	4'-8'	2'-4'

volatile organics (VOCs; µ

	TP-01-7	TP-01-8	TP-01-9	TP-01-9	TP-01-9	TP-01-9	TP-01-9	TB-01-7C
	7'-9'	4'-6'	north	east	south	west	bottom	9'-10.5'
1, 1-dichloroethene	0.00	0.00	...	...	...	...	...	0.00
1, 2, 3, 4 - tetramethyl benzene	0.00	0.00	...	...	...	...	...	0.00
1, 2, 3, 5 - tetramethyl benzene	0.00	0.00	...	...	...	...	...	...
1, 2, 3-trimethyl benzene	0.00	0.00	...	...	...	...	...	0.00
1, 2, 4 - trimethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1, 2, 4, 5-tetramethylbenzene	0.00	0.00	...	...	...	...	...	...
1, 3, 5 - trimethylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	...
1-ethyl-2-methyl benzene	0.00	0.00	...	...	...	...	...	0.00
1-ethyl-2, 4-dimethyl benzene	0.00	0.00	...	...	...	...	...	...
1-ethyl-4-(1-methylethyl) benzene	0.00	0.00	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzen	0.00	0.00	...	...	...	...	...	0.00
2, 3 - dihydro - 5- methyl - 1H - idene	0.00	0.00	...	...	...	...	...	0.00
2-ethyl - 1, 4 - dimethyl benzene	0.00	0.00	...	...	...	...	...	0.00
4-isopropyltoluene	...	...	0.00	0.00	0.00	0.00	0.00	...
benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bromomethane	0.00	0.00	...	...	...	...	...	...
chlorobenzene	0.00	0.00	...	...	...	...	...	0.00
decahydro -2-methylnapthalene	0.00	0.00	...	...	...	...	...	0.00
ethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
isopropylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m, o, p-xylenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
methyl-tert-butyl-ether (MTBE)	...	...	0.00	0.00	0.00	0.00	0.00	...
methylcyclohexane	0.00	0.00	...	...	...	...	...	0.00
methylene chloride	0.00	0.00	...	...	...	...	...	9JB
n-butylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	...
n-propylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	...
sec-butylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	...
tert-butylbenzene	...	...	0.00	0.00	0.00	0.00	0.00	...
toluene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
trichloroethene	0.00	0.00	...	...	...	...	...	0.00
unknown hydrocarbons	0.00	0.00	...	...	...	...	...	...
unknowns	0.00	0.00	...	...	...	...	...	0.00
total VOCs	0.00	0.00	NA	NA	NA	NA	NA	9JB

notes:

1. Adapted from data tables provide
   0 = not detected at laboratory dete
   Bolded values exceed hazardous v
   B = analyte detected in method or
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective re
2. **Metals:** *Recommended Soil Clean-L*
   Pesticides: *New York State Clean-l*
   SemiVols: *New York State Clean-l*
   VOCs: *New York State Clean-Up C*

Table 2. Subsurface

substance(s)	TB-01-12	TB-01-13	TB-01-14	TB-01-14	TB-01-15	TB-01-16	TB-01-17	TB-01-18
	2'-4'	2'-4'	2'-4'	4'-7'	2'-4'	2'-4'	2'-4'	2'-4'
metals (mg/kg)								
arsenic	7.50	6.60	5.50	3.50	14.00	5.40	6.40	7.00
barium	1,380	158.00	55.40	64.10	297.00	20.3B	26.40	195.00
cadmium	2.99	4.41	2.12	2.83	2.65	1.37	0.00	1.26
chromium	38.70	16.70	12.80	14.00	19.90	5.05	26.90	8.82
lead	314.00	167.00	25.40	14.90	853	37.50	1,910	619
mercury	1.370	1.370	0.497	0.037B	1.930	0.112	0.000	1.920
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	3.73	0.00	0.00	0.00	1.17B	0.00	0.00	0.00
semivolatile organics (Sen								
	...	...	...	...	TB-01-7C	TB-01-16	...	...
	..	..	..	..	9'-10.5'	12'	..	..
1, 1'-biphenyl	...	...	...	...	...	...	...	...
2,4-dinitrotoluene	...	...	...	...	0.00	0.00	...	...
2-chlorophenol	...	...	...	...	0.00	0.00	...	...
2-methylnaphthalene	...	...	...	...	0.00	870J	...	...
4-chloro-3-methylphenol	...	...	...	...	0.00	0.00	...	...
4-nitrophenol	...	...	...	...	0.00	0.00	...	...
acenaphthalene	...	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	0.00	87J	...	...
anthracene	...	...	...	...	0.00	0.00	...	...
benzo(a)anthracene	...	...	...	...	0.00	0.00	...	...
benzo(a)pyrene	...	...	...	...	0.00	0.00	...	...
benzo(b)fluoranthene	...	...	...	...	0.00	0.00	...	...
benzo(g,h,i)perylene	...	...	...	...	0.00	0.00	...	...
benzo(k)fluoranthene	...	...	...	...	0.00	0.00	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	0.00	0.00	...	...
butylbenzyl phthalate	...	...	...	...	0.00	0.00	...	...
carbozole	...	...	...	...	0.00	0.00	...	...
chrysene	...	...	...	...	0.00	0.00	...	...
dibenzo(a, h)anthracene	...	...	...	...	0.00	0.00	...	...
dibenzofuran	...	...	...	...	0.00	0.00	...	...
di-n-butyl phthalate	...	...	...	...	0.00	0.00	...	...
fluorene	...	...	...	...	0.00	88J	...	...
fluoranthene	...	...	...	...	0.00	0.00	...	...
indeno(1,2,3-cd)pyrene	...	...	...	...	0.00	0.00	...	...
naphthalene	...	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	0.00	0.00	...	...
pentachlorophenol	...	...	...	...	0.00	0.00	...	...
phenanthrene	...	...	...	...	0.00	170J	...	...
phenol	...	...	...	...	0.00	0.00	...	...
pyrene	...	...	...	...	0.00	0.00	...	...
TICs	...	...	...	...	0.00	12,461	...	...
total SVOCs	...	...	...	...	0.00	13,676	...	...

Table 2. Subsurface

substance(s)	TB-01-12	TB-01-13	TB-01-14	TB-01-14	TB-01-15	TB-01-16	TB-01-17	TB-01-18
	2'-4'	2'-4'	2'-4'	4'-7'	2'-4'	2'-4'	2'-4'	2'-4'
volatile organics (VOCs; µ								
	...	...	...	...	TB-01-7C	TB-01-16	...	...
	...	...	...	...	9'-10.5'	12'	...	...
1, 1-dichloroethene	...	...	...	...	...	0.00	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	0.00	...	...
1, 2, 3, 5 - tetramethyl benzene	...	...	...	...	...	...	...	...
1, 2, 3-trimethyl benzene	...	...	...	...	...	0.00	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	0.00	...	...
1, 2, 4, 5-tetramethylbenzene	...	...	...	...	...	...	...	...
1, 3, 5 - trimethylbenzene	...	...	...	...	...	...	...	...
1-ethyl-2-methyl benzene	...	...	...	...	...	0.00	...	...
1-ethyl-2, 4-dimethyl benzene	...	...	...	...	...	...	...	...
1-ethyl-4-(1-methylethyl) benzene	...	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzen	...	...	...	...	...	0.00	...	...
2, 3 - dihydro - 5- methyl - 1H - idene	...	...	...	...	...	1,300	...	...
2-ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	0.00	...	...
4-isopropyltoluene	...	...	...	...	...	...	...	...
benzene	...	...	...	...	...	0.00	...	...
bromomethane	...	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	0.00	...	...
decahydro -2-methylnapthalene	...	...	...	...	...	1,500	...	...
ethylbenzene	...	...	...	...	...	0.00	...	...
isopropylbenzene	...	...	...	...	...	0.00	...	...
m, o, p-xylenes	...	...	...	...	...	0.00	...	...
methyl-tert-butyl-ether (MTBE)	...	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	0.00	...	...
methylene chloride	...	...	...	...	...	0.00	...	...
n-butylbenzene	...	...	...	...	...	...	...	...
n-propylbenzene	...	...	...	...	...	...	...	...
sec-butylbenzene	...	...	...	...	...	...	...	...
tert-butylbenzene	...	...	...	...	...	...	...	...
toluene	...	...	...	...	...	0.00	...	...
trichloroethene	...	...	...	...	...	0.00	...	...
unknown hydrocarbons	...	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	16,200	...	...
total VOCs	...	...	...	...	...	19,000	...	...

notes:

1. Adapted from data tables provide
   0 = not detected at laboratory dete
   Bolded values exceed hazardous v
   B = analyte detected in method or
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective re
2. **Metals:** *Recommended Soil Clean-l*
   Pesticides: *New York State Clean-l*
   SemiVols: *New York State Clean-l*
   VOCs: *New York State Clean-Up C*

Table 2. Subsurface

substance(s)	TB-01-19	TB-01-20	TB-01-21	TB-01-22	TB-01-23	TB-01-24	TB-01-24	TB-01-25
	2'-4'	4'-6.5'	4'-6'	2'-4'	4'-6'	2'-4'	6'-8'	2'-4'
metals (mg/kg)								
arsenic	7.40	5.60	5.30	9.70	4.80	5.10	6.00	3.90
barium	105.00	22.1B	108.00	61.80	9.72B	79.10	111.00	73.70
cadmium	3.96	0.70	3.08	6.25	0.89	1.55	1.65	3.03
chromium	17.30	4,73	12.90	0.00	10.20	7.43	11.00	15.60
lead	24.30	11.00	19.90	65.10	25.50	432	353.00	13.10
mercury	0.067	0.00	0.083	1.290	0.00	0.602	0.885	0.00
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00
semivolatile organics (Sen								
	...	...	...	...	...	...	...	...
	..	..	..	..	..	..	..	..
1, 1'-biphenyl	...	...	...	...	...	...	...	...
2,4-dinitrotoluene	...	...	...	...	...	...	...	...
2-chlorophenol	...	...	...	...	...	...	...	...
2-methylnaphthalene	...	...	...	...	...	...	...	...
4-chloro-3-methylphenol	...	...	...	...	...	...	...	...
4-nitrophenol	...	...	...	...	...	...	...	...
acenaphthalene	...	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	...	...	...	...
anthracene	...	...	...	...	...	...	...	...
benzo(a)anthracene	...	...	...	...	...	...	...	...
benzo(a)pyrene	...	...	...	...	...	...	...	...
benzo(b)fluoranthene	...	...	...	...	...	...	...	...
benzo(g,h,i)perylene	...	...	...	...	...	...	...	...
benzo(k)fluoranthene	...	...	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...	...
carbozole	...	...	...	...	...	...	...	...
chrysene	...	...	...	...	...	...	...	...
dibenzo(a, h)anthracene	...	...	...	...	...	...	...	...
dibenzofuran	...	...	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...	...
fluorene	...	...	...	...	...	...	...	...
fluoranthene	...	...	...	...	...	...	...	...
indeno(1,2,3-cd)pyrene	...	...	...	...	...	...	...	...
naphthalene	...	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	...	...	...	...
pentachlorophenol	...	...	...	...	...	...	...	...
phenanthrene	...	...	...	...	...	...	...	...
phenol	...	...	...	...	...	...	...	...
pyrene	...	...	...	...	...	...	...	...
TICs	...	...	...	...	...	...	...	...
total SVOCs	...	...	...	...	...	...	...	...

Table 2. Subsurface

substance(s)	TB-01-19	TB-01-20	TB-01-21	TB-01-22	TB-01-23	TB-01-24	TB-01-24	TB-01-25
	2'-4'	4'-6.5'	4'-6'	2'-4'	4'-6'	2'-4'	6'-8'	2'-4'
volatile organics (VOCs; µ								
	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...
1, 1-dichloroethene	...	...	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	...	...	...
1, 2, 3, 5 - tetramethyl benzene	...	...	...	...	...	...	...	...
1, 2, 3-trimethyl benzene	...	...	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	...	...	...
1, 2, 4, 5-tetramethylbenzene	...	...	...	...	...	...	...	...
1, 3, 5 - trimethylbenzene	...	...	...	...	...	...	...	...
1-ethyl-2-methyl benzene	...	...	...	...	...	...	...	...
1-ethyl-2, 4-dimethyl benzene	...	...	...	...	...	...	...	...
1-ethyl-4-(1-methylethyl) benzene	...	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzen	...	...	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - idene	...	...	...	...	...	...	...	...
2-ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	...	...	...
4-isopropyltoluene	...	...	...	...	...	...	...	...
benzene	...	...	...	...	...	...	...	...
bromomethane	...	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	...	...	...
decahydro -2-methylnapthalene	...	...	...	...	...	...	...	...
ethylbenzene	...	...	...	...	...	...	...	...
isopropylbenzene	...	...	...	...	...	...	...	...
m, o, p-xylenes	...	...	...	...	...	...	...	...
methyl-tert-butyl-ether (MTBE)	...	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	...	...	...
methylene chloride	...	...	...	...	...	...	...	...
n-butylbenzene	...	...	...	...	...	...	...	...
n-propylbenzene	...	...	...	...	...	...	...	...
sec-butylbenzene	...	...	...	...	...	...	...	...
tert-butylbenzene	...	...	...	...	...	...	...	...
toluene	...	...	...	...	...	...	...	...
trichloroethene	...	...	...	...	...	...	...	...
unknown hydrocarbons	...	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	...	...	...
total VOCs	...	...	...	...	...	...	...	...

notes:

1. Adapted from data tables provide
   0 = not detected at laboratory dete
   Bolded values exceed hazardous v
   B = analyte detected in method or
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective re
2. **Metals:** *Recommended Soil Clean-L*
   Pesticides: *New York State Clean-l*
   SemiVols: *New York State Clean-l*
   VOCs: *New York State Clean-Up C*

Table 2. Subsurface

substance(s)	TB-01-26	TB-01-27	TB-01-28	TB-01-28	TB-01-29	TB-01-30	TB-01-30
	4'-6.5'	4'-5'	2'-4'	6'-7'	4'-8'	2'-4'	4'-6'
metals (mg/kg)							
arsenic	5.90	0.85B	3.40	3.30	62.00	5.70	3.20
barium	18.8B	10.8B	76.90	53.80	351	20.50B	37.10
cadmium	1.12	0.00	1.32	1.32	3.01	0.73	2.31
chromium	5.07	2.52	6.05	4.14	5.74	5.31	4.11
lead	17.30	5.30	107.00	16.00	1,200	15.90	53,7
mercury	0.031B	0.00	0.625	0.024B	0.250	0.088	0.031B
selenium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
silver	0.00	0.00	0.00	0.00	0.00	0.00	0.595B
semivolatile organics (Sen							
	...	...	...	...	...	...	...
	..	..	..	..	..	..	..
1, 1'-biphenyl	...	...	...	...	...	...	...
2,4-dinitrotoluene	...	...	...	...	...	...	...
2-chlorophenol	...	...	...	...	...	...	...
2-methylnaphthalene	...	...	...	...	...	...	...
4-chloro-3-methylphenol	...	...	...	...	...	...	...
4-nitrophenol	...	...	...	...	...	...	...
acenaphthalene	...	...	...	...	...	...	...
acenaphthene	...	...	...	...	...	...	...
anthracene	...	...	...	...	...	...	...
benzo(a)anthracene	...	...	...	...	...	...	...
benzo(a)pyrene	...	...	...	...	...	...	...
benzo(b)fluoranthene	...	...	...	...	...	...	...
benzo(g,h,i)perylene	...	...	...	...	...	...	...
benzo(k)fluoranthene	...	...	...	...	...	...	...
bis-2-ethylhexyl phthalate	...	...	...	...	...	...	...
butylbenzyl phthalate	...	...	...	...	...	...	...
carbozole	...	...	...	...	...	...	...
chrysene	...	...	...	...	...	...	...
dibenzo(a, h)anthracene	...	...	...	...	...	...	...
dibenzofuran	...	...	...	...	...	...	...
di-n-butyl phthalate	...	...	...	...	...	...	...
fluorene	...	...	...	...	...	...	...
fluoranthene	...	...	...	...	...	...	...
indeno(1,2,3-cd)pyrene	...	...	...	...	...	...	...
naphthalene	...	...	...	...	...	...	...
N-nitrosodi-N-propylamine	...	...	...	...	...	...	...
pentachlorophenol	...	...	...	...	...	...	...
phenanthrene	...	...	...	...	...	...	...
phenol	...	...	...	...	...	...	...
pyrene	...	...	...	...	...	...	...
TICs	...	...	...	...	...	...	...
total SVOCs	...	...	...	...	...	...	...

Table 2. Subsurface

substance(s)	TB-01-26	TB-01-27	TB-01-28	TB-01-28	TB-01-29	TB-01-30	TB-01-30
	4'-6.5'	4'-5'	2'-4'	6'-7'	4'-8'	2'-4'	4'-6'
volatile organics (VOCs; µ							
	...	...	...	...	...	...	...
	...	...	...	...	...	...	...
1, 1-dichloroethene	...	...	...	...	...	...	...
1, 2, 3, 4 - tetramethyl benzene	...	...	...	...	...	...	...
1, 2, 3, 5 - tetramethyl benzene	...	...	...	...	...	...	...
1, 2, 3-trimethyl benzene	...	...	...	...	...	...	...
1, 2, 4 - trimethylbenzene	...	...	...	...	...	...	...
1, 2, 4, 5-tetramethylbenzene	...	...	...	...	...	...	...
1, 3, 5 - trimethylbenzene	...	...	...	...	...	...	...
1-ethyl-2-methyl benzene	...	...	...	...	...	...	...
1-ethyl-2, 4-dimethyl benzene	...	...	...	...	...	...	...
1-ethyl-4-(1-methylethyl) benzene	...	...	...	...	...	...	...
1-methyl-3-1(1 methyl ethyl) benzen	...	...	...	...	...	...	...
2, 3 - dihydro - 5- methyl - 1H - iden	...	...	...	...	...	...	...
2-ethyl - 1, 4 - dimethyl benzene	...	...	...	...	...	...	...
4-isopropyltoluene	...	...	...	...	...	...	...
benzene	...	...	...	...	...	...	...
bromomethane	...	...	...	...	...	...	...
chlorobenzene	...	...	...	...	...	...	...
decahydro -2-methylnapthalene	...	...	...	...	...	...	...
ethylbenzene	...	...	...	...	...	...	...
isopropylbenzene	...	...	...	...	...	...	...
m, o, p-xylenes	...	...	...	...	...	...	...
methyl-tert-butyl-ether (MTBE)	...	...	...	...	...	...	...
methylcyclohexane	...	...	...	...	...	...	...
methylene chloride	...	...	...	...	...	...	...
n-butylbenzene	...	...	...	...	...	...	...
n-propylbenzene	...	...	...	...	...	...	...
sec-butylbenzene	...	...	...	...	...	...	...
tert-butylbenzene	...	...	...	...	...	...	...
toluene	...	...	...	...	...	...	...
trichloroethene	...	...	...	...	...	...	...
unknown hydrocarbons	...	...	...	...	...	...	...
unknowns	...	...	...	...	...	...	...
total VOCs	...	...	...	...	...	...	...

notes:

1. Adapted from data tables provide
   0 = not detected at laboratory det
   Bolded values exceed hazardous v
   B = analyte detected in method or
   J = usable as estimated value
   NA = not analyzed.
   NS = no soil clean-up objective re
2. **Metals:** *Recommended Soil Clean-L*
   Pesticides: *New York State Clean-l*
   SemiVols: *New York State Clean-l*
   VOCs: *New York State Clean-Up C*

Table 3. *Toxicity Characteristic Leachate Procedure* (TCLP) Data [1]

substance(s)	haz.ardous waste standard [2]	TB-01-5	TB-01-9	TB-01-9	TB-01-13	TB-01-15	TB-01-15	TB-01-17	TB-01-23	TB-01-30
	(mg/kg)	0'-2'	0'-2'	2'-4'	0'-2'	0'-2'	2'-4'	0'-2'	2'-4'	2'-4'
metals (mg/kg)										
arsenic	5.00	0.00	NA	0.00	NA	NA	0.00	0.00	0.00	0.00
barium	100.00	0.90	NA	1.47	NA	NA	0.72	2.14	0.00	0.34
cadmium	1.00	0.00	NA	0.07	NA	NA	0.00	0.00	0.00	0.00
chromium	5.00	0.00	NA	0.00	NA	NA	0.00	0.00	0.00	0.00
lead	5.00	0.00	**14.4**	0.00	NA	4.57	0.00	2.18	0.00	0.00
mercury	0.20	0.00	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00
selenium	1.00	0.00	NA	0.00	NA	NA	0.00	0.00	0.00	0.00
silver	5.00	0.00	NA	0.00	NA	NA	0.00	0.00	0.00	0.00

notes:

1.. 0 = not detected at laboratory detection limit.
NA = not analyzed.
Bolded values exceed hazardous waste standard. Substances in shaded cells selected for further assessment.

2. *Maximum Concentration of Contamination* as reported in Table 1 of 40 CFR - Chapter I - Part 261.24

Table 4. Surface Soil Data Analysis [1]

substance(s)	CAS no.	clean-up standard [2]	mean site background (SB)	detection limit	sample size (n)	maximum	mean	standard deviation	coefficient of variation	upper 95% confidence limit
...	...	(mg/kg or µg/kg)			...	(mg/kg or µg/kg)			(CV, percent)	(mg or µg/kg)
metals (mg/kg)										
arsenic	7440-38-2	7.5 or SB	3.80	0.55	30	46.0	9.45	11.2	118	13.5
barium	7440-39-3	300 or SB	65.9	0.22	30	654	140	141	100	191
chromium	7440-47-3	50 or SB	6.98	1.09	30	322	25.4	57.8	227	46.1
lead	7439-92-1	400**or SB	58.9	2.39	30	4,120	612	985	161	965
mercury	7439-97-6	0.10	0.27	0.02	26	9.56	1.63	2.35	144	2.53
silver	7440-22-4	0.9 (SB)	0.00	0.76	28	3.47	0.24	0.77	317	0.53
pesticides (mg/kg)										
4,4'-DDT	50-29-3	2.10	...	...	3	2.90	0.97	1.67	173	2.86
semivolatile organics (SemiVols, SVOCs; µg/kg)										
benz(a)anthracene	56-55-3	390 (MDL)	...	390	2	2,100	1,050	1,485	141	3,108
benzo(a)pyrene	50-32-8	390 (MDL)	...	390	2	1,700	850	1,202	141	2,516
benzo(b)fluoranthene	205-99-2	1,100	...	390	2	3,100	1,550	2,192	141	4,588
benzo(k)fluoranthene	207-08-9	1,100	...	390	3	980	327	566	173	967
chrysene	218-01-9	400	...	390	2	2,100	1,050	1,485	141	3,108
dibenzo(a, h)anthracene	53-70-3	140	...		2	0.00	0.00	0.00	...	...
pentachlorophenol	87-86-5	1,000	...	970	3	3,600	1,200	2,078	173	3,552
volatile organics (VOCs; µg/kg)										
1, 2, 4 - trimethylbenzene	95-63-6	10,000	...	...	3	0.00	0.00	0.00	...	...
ethylbenzene	100-41-4	5,500	...	11	3	0.00	0.00	0.00	...	...

1. ND = not detected at laboratory detection limit.
   NA = not analyzed.
   SB = site backgroud
   Bolded values exceed hazardous waste standard.

2. **Metals:** *Recommended Soil Clean-Up Objective* specified by TAGM 4046
   Pesticides: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   SemiVols: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   VOCs: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046

Table 5. Subsurface Soil Data Analysis [1]

substance(s)	CAS no.	clean-up standard [2]	mean site background (SB)	detection limit	sample size (n)	maximum	mean	standard deviation	coefficient of variation	upper 95% confidence limit
...	...	(mg/kg or µg/kg)			...	(mg/kg or µg/kg)			(CV, percent)	(mg or µg/kg)
metals (mg/kg)										
arsenic	7440-38-2	7.5 or SB	3.80	0.55	36	62.0	7.68	9.64	126	10.8
barium	7440-39-3	300 or SB	74.3	0.22	27	1,380	160	259	162	258
chromium	7440-47-3	50 or SB	8.79	1.09	36	38.7	10.2	7.60	74.4	12.7
lead	7439-92-1	400**or SB	89.3	2.39	36	1,910	228	396	173	358
mercury	7439-97-6	0.10	0.18	0.02	31	3.44	0.67	0.83	123	0.97
silver	7440-22-4	0.9 (SB)	0.00	0.76	32	3.73	0.20	0.73	363	0.46
pesticides (mg/kg)										
4,4'-DDT	50-29-3	2.10	...	...	0	...	...	...	...	...
semivolatile organics (SemiVols, SVOCs; µg/kg)										
benz(a)anthracene	56-55-3	390 (MDL)	...	390	13	5,300	1,000	1,619	162	1,880
benzo(a)pyrene	50-32-8	390 (MDL)	...	390	13	4,100	677	1,268	187	1,366
benzo(b)fluoranthene	205-99-2	1,100	...	390	16	7,300	1,069	1,979	185	2,038
benzo(k)fluoranthene	207-08-9	1,100	...	390	14	2,800	344	799	232	763
chrysene	218-01-9	400	...	390	13	5,400	954	1,583	166	1,814
dibenzo(a, h)anthracene	53-70-3	140	...	390	16	510	75.6	150	198	149
pentachlorophenol	87-86-5	1,000	...	970	11	0.00	0.00	0.00	...	...
volatile organics (VOCs; µg/kg)										
1, 2, 4 - trimethylbenzene	95-63-6	10,000	...	...	18	70,000	3,889	16,499	424	11,511
ethylbenzene	100-41-4	5,500	...	11	18	11,000	611	2,593	424	1,809

1. ND = not detected at laboratory detection limit.
   NA = not analyzed.
   SB = site backgroud
   Bolded values exceed hazardous waste standard.

2. **Metals:** *Recommended Soil Clean-Up Objective* specified by TAGM 4046
   Pesticides: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   SemiVols: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046
   VOCs: *New York State Clean-Up Objective* specified by NYS TAGM HWR 94-4046

Substance-Specific Risk Assessment Input Parameters

Values of substance-specific risk assessment input parameters were determined via inspection of relevant technical literature as described in *Methods*. Findings made from this inquiry are set forth in detail in separate Appendices A-K, with each Appendix consisting of a *Toxicological Profile* of one substance or family of substances. Values of substance-specific risk assessment input parameters are summarized in Table 6.

Other Risk Assessment Input Parameters

Findings were made evaluating numerous other risk assessment input parameters that are demanded by the ASTM RBCA software for quantifying exposure of reference individuals to each substance of potential concern, and the pathways and durations of such exposure. Some of these parameters characterized the site environment, such as soil porosity, depth of surface soil sampling, depth to groundwater, direction and velocity of groundwater flow, path length of wind available for lofting surficial particles into the air, and many other parameters. Other parameters quantified reference individuals, for example, with respect to their age, body weight, skin surface area, number of liters of water consumed daily, volume of air breathed daily, and so forth. Conservative values of most if not all of these parameters were suggested as defaults in the RBCA software to assure a worst-case analysis. Values of these input parameters actually selected for use in the HRA are set forth in Appendix L, consisting of the inputs and outputs of the RBCA HRA software.

Reference Individuals of Potential Concern

Reference individuals of potential concern include on-site construction workers and commercial employees, and off-site residents. Off-site residential exposure pathways are complete because residences exist at the property line. On-site residential pathways, however, are incomplete because the site has no residents, and can have no residents because of its commercial zoning status.

Table 6. Values of Substance-Specific Risk Assessment Input Parameters*

substance(s)	CAS no.	molecular weight (MW)	half life, 1st-order decay	solubility in water, 20-25 C	log [Koc] or log [Kd], 20-25 C:	diffusion coefficent		vapor pressure, 20-25 C	Henry's Law constant, 20-25 C	
					Koc	in water	in air			
...	...	(daltons)	(days)	(mg/L)	(1/kg)	(cm2/s)	(cm2/s)	(mm Hg)	(atm M^3/mol)	...
metals										
arsenic	7440-38-2	74.92	...	4.41 e+5	2.07	...	...	0.00 e+0	0.00 e+0	...
barium	7440-39-3	137.3	...	2.50 e+0	1.78	...	...	0.00 e+0	0.00 e+0	...
chromium	7440-47-3	52	...	1.67 e+5	1.55	...	...	0.00 e+0	0.00 e+0	...
lead	7439-92-1	207.19	...	...	...	...	...	0.00 e+0	0.00 e+0	...
mercury	7439-97-6	200.59	...	5.62 e-5	...	...	...	0.00 e+0	0.00 e+0	...
silver	7440-22-4	107.868	...	...	...	...	...	0.00 e+0	0.00 e+0	...
pesticides										
4,4'-DDT	50-29-3	3.54 e+2	...	5.50 e-3	6.91	...	...	1.60 e-7	8.30 e-6	...
semivolatile organics (SemiVols, SVOCs)										
benz(a)anthracene	56-55-3	228.3	1,360	5.70 e-3	6.14	9.00 e-6	5.10 e-2	1.50 e-7	1.38 e-8	...
benzo(a)pyrene	50-32-8	252.3	1,060	1.20 e-3	5.59	5.80 e-6	5.00 e-2	5.68 e-4	1.39 e-9	...
benzo(b)fluoranthene	205-99-2	252	1,220	1.47 e-2	5.74	5.56 e-6	2.26 e-2	6.67 e-7	2.01 e-5	...
benzo(k)fluoranthene	207-08-9	252.3	4,280	4.30 e-3	5.74	5.56 e-6	2.26 e-2	9.59 e-10	1.07 e-8	...
chrysene	218-01-9	228.2	...	1.80 e-3	5.30	6.21 e-6	2.48 e-2	5.76 e-9	1.18 e-8	...
dibenzo(a,h)anthracene	53-70-3	278.4	1,880	5.00 e-4	5.87	5.24 e-6	2.00 e-2	5.20 e-10	3.81 e-7	...
pentachlorophenol	87-86-5	266.34	130	1.40 e+1	5.12	...	...	1.10 e-4	2.45 e-8	...
volatile organics (VOCs)										
1,2,4-trimethylbenzene	95-63-6	120.2	1,000	5.70 e+1	2.82	...	...	2.15 e+0	6.16 e-3	...
ethylbenzene	100-41-4	106.2	228	1.52 e+2	1.98	8.50 e-6	7.60 e-2	1.00 e+1	7.69 e-3	...

substance(s)	relative absorption factor			carc wt of evidence	cancer potency factor			risk reference dose		
	ingestion	inhalation	dermal	...	ingestion	inhalation	dermal	ingestion	inhalation	dermal
...	...	...	...	...	(1/mg/kg d)			(mg/kg d)		
metals										
arsenic	1	1	0	A	1.50 e+0	1.23 e+0	*1.50 e+0*	3.00 e-4	*3.00 e-4*	*3.00 e-4*
barium	1	1	0	D	0.00 e+0	0.00 e+0	0.00 e+0	7.00 e-2	1.00 e-4	*1.00 e-4*
chromium	1	1	0	A	0.00 e+0	4.20 e+1	*4.20 e+1*	5.00 e-3	5.00 e-3	*5.00 e-3*
lead	1	5	0.004	B2	0.00 e+0	0.00 e+0	0.00 e+0	1.00 e-5	4.29 e-4	*1.00 e-5*
mercury	1	53.33	3.33	D	0.00 e+0	0.00 e+0	0.00 e+0	*3.00 e-4*	3.00 e-4	*3.00 e-4*
silver	1	0.1	0	D	0.00 e+0	0.00 e+0	0.00 e+0	5.00 e-3	*5.00 e-3*	*5.00 e-3*
pesticides										
4,4'-DDT	1	1	0	B2	3.40 e-1	2.77 e-2	*3.40 e-1*	5.00 e-4	*5.00 e-4*	*5.00 e-4*
semivolatile organics (SemiVols, SVOCs)										
benz(a)anthracene	1	...	0.05	B2	7.30 e-1	6.10 e-1	*7.30 e-1*	2.00 e-2	2.00 e-2	2.00 e-2
benzo(a)pyrene	1	...	0.05	B2	7.30 e+0	6.10 e+0	*7.30 e+0*	2.00 e-2	2.00 e-2	2.00 e-2
benzo(b)fluoranthene	1	...	0.05	B2	7.30 e-1	6.10 e-1	*7.30 e-1*	2.00 e-2	2.00 e-2	2.00 e-2
benzo(k)fluoranthene	1	...	0.05	B2	7.30 e-2	6.10 e-2	*7.30 e-2*	2.00 e-2	2.00 e-2	2.00 e-2
chrysene	1	...	0.05	B2	1.15 e+0	1.15 e+0	*1.15 e+0*	2.00 e-2	2.00 e-2	2.00 e-2
dibenzo(a,h)anthracene	1	...	0.05	B2	7.30 e+0	6.10 e+0	*7.30 e+0*	2.00 e-2	2.00 e-2	2.00 e-2
pentachlorophenol	1	1	1	B2	1.20 e-1	*1.20 e-1*	*1.20 e-1*	3.00 e-2	*3.00 e-2*	*3.00 e-2*
volatile organics (VOCs)										
1,2,4-trimethylbenzene	1	...	...	D	0.00 e+0	0.00 e+0	0.00 e+0	*1.06 e+0*	1.06 e+0	*1.06 e+0*
ethylbenzene	1	...	0.5	D	0.00 e+0	0.00 e+0	0.00 e+0	1.00 e-1	2.86 e-1	*1.00 e-1*

*Adapted from toxicological literature and other sources including:

IRIS. *Integrated Risk Information System* database. Toxnet, access date(s) March 2002;

HSDB. *Hazardous Substances Data Bank.* Toxnet, access date(s) March 2002.

Exposure Pathways of Potential Concern

Complete exposure pathways of potential concern include air and soil pathways, but not groundwater pathways, given the depth to groundwater Air pathways include direct inhalation of vapors and airborne dust particles outdoors, as well as inhalation of vapors seeping through basement cracks conservatively assumed to exist in on-site structure, even new structures. Soil pathways include dermal contact and ingestion via hand-to-mouth contact. Groundwater pathways deemed incomplete include direct ingestion, given use of an off-site public water supply; and soil leaching to groundwater, given the depth of groundwater. Surface water pathways, including recreational swimming and wading, are deemed incomplete because on-site bodies of surface water are absent, and will continue to be absent when site development is complete. Finally, hunting and fishing pathways are deemed incomplete, as are pathways involving farming and animal husbandry, because of the urban location of the site and inconsistency of these uses with the small size of the site, planned uses of the site, and zoning ordinances proscribing these activities on the site.

CONCLUSIONS: RISK CHARACTERIZATION

Potential Cancer Risks

Potential cancer risks are quantified in Table 7. Numerical cancer risk values are dimensionless; for example a risk value of 1.00 e-6 is equivalent to 1.00 x 10^{-6}, which is a risk of one per million. As indicated by Table 7, total potential incremental lifetime cancer risks under the baseline scenario are 2.38 per million for the off-site residential receptors and 47.4 per million for on-site commercial receptors. This latter risk is in the order of 10 times higher than potential risks traditionally deemed to be acceptable, typically ranging from one to 10 per million. However, the subjectivity of value judgments, such as the issue of risk acceptability, precludes deciding them via drawing a scientific conclusion.

Potential Non-Cancer Risks

Potential non-cancer risks are quantified in Table 8. Non-cancer risks are quantified via the hazard index (HI) and hazard quotient (HQ). These are dimensionless parameters denoting the ratio of estimated exposure to acceptable exposure, where unity (one) is defined as the acceptable upper limit. HQ is the ratio of exposure to acceptable exposure to a single substance (or family of substances), whereas HI is the sum of all HQ values, denoting the ratio of estimated exposure to all substances to acceptable exposure. As indicated by Table 8, under the baseline scenario HI = 0.000035 for the off-site residential receptor. This would be deemed acceptable compared with a defined acceptability criterion of unity (HI $\leq$ 1). In contrast, however, HI = 70.1 for on-site commercial receptors. This latter risk is 70 times higher than potential non-cancer risks traditionally deemed to be acceptable for simultaneous and/or sequential exposure to multiple site-related substances of potential concern.

Table 7. Potential Worst-Case Cancer Risks Under Baseline (No-Action) Scenario

substance(s)	CAS no.	air pathways		surface soil pathways *(ingestion + dermal)*		groundwater pathways		total potential worst-case cancer risk	
...	...	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential
metals									
arsenic	7440-38-2	1.70 e-8	2.00 e-8	3.50 e-6	0.00 e+0	0.00 e+0	0.00 e+0	3.52 e-6	2.00 e-8
barium	7440-39-3	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
chromium	7440-47-3	2.00 e-6	2.30 e-6	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	2.00 e-6	2.30 e-6
lead	7439-92-1	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
mercury	7439-97-6	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
silver	7440-22-4	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
pesticides									
4,4'-DDT	50-29-3	8.10 e-11	9.60 e-11	1.70 e-7	0.00 e+0	0.00 e+0	0.00 e+0	1.70 e-7	9.60 e-11
semivolatile organics (SemiVols, SVOCs)									
benz(a)anthracene	56-55-3	2.90 e-9	3.30 e-9	2.70 e-6	0.00 e+0	0.00 e+0	0.00 e+0	2.70 e-6	3.30 e-9
benzo(a)pyrene	50-32-8	2.70 e-8	3.10 e-8	2.20 e-5	0.00 e+0	0.00 e+0	0.00 e+0	2.20 e-5	3.10 e-8
benzo(b)fluoranthene	205-99-2	1.40 e-8	1.60 e-8	4.00 e-6	0.00 e+0	0.00 e+0	0.00 e+0	4.01 e-6	1.60 e-8
benzo(k)fluoranthene	207-08-9	9.70 e-11	1.10 e-10	8.40 e-8	0.00 e+0	0.00 e+0	0.00 e+0	8.41 e-8	1.10 e-10
chrysene	218-01-9	7.50 e-9	8.50 e-9	4.20 e-6	0.00 e+0	0.00 e+0	0.00 e+0	4.21 e-6	8.50 e-9
dibenzo(a, h)anthracene	53-70-3	3.20 e-13	3.80 e-13	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	3.20 e-13	3.80 e-13
pentachlorophenol	87-86-5	4.40 e-10	5.10 e-10	8.70 e-6	0.00 e+0	0.00 e+0	0.00 e+0	8.70 e-6	5.10 e-10
volatile organics (VOCs)									
1, 2, 4 - trimethylbenzene	95-63-6	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
ethylbenzene	100-41-4	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
total cancer risk	...	**2.07 e-6**	**2.38 e-6**	**4.54 e-5**	**0.00 e+0**	**0.00 e+0**	**0.00 e+0**	**4.74 e-5**	**2.38 e-6**

Table 8. Potential Worst-Case Non-Cancer Risks Under Baseline (No-Action) Scenario

substance(s)	CAS no.	air pathways		surface soil pathways *(ingestion + dermal)*		groundwater pathways		total potential worst-case non-cancer risk	
...	...	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential
metals									
arsenic	7440-38-2	0.00 e+0	0.00 e+0	2.20 e-2	0.00 e+0	0.00 e+0	0.00 e+0	2.20 e-2	0.00 e+0
barium	7440-39-3	0.00 e+0	0.00 e+0	1.30 e-3	0.00 e+0	0.00 e+0	0.00 e+0	1.30 e-3	0.00 e+0
chromium	7440-47-3	0.00 e+0	0.00 e+0	4.50 e-3	0.00 e+0	0.00 e+0	0.00 e+0	4.50 e-3	0.00 e+0
lead	7439-92-1	0.00 e+0	0.00 e+0	6.90 e+1	0.00 e+0	0.00 e+0	0.00 e+0	6.90 e+1	0.00 e+0
mercury	7439-97-6	0.00 e+0	0.00 e+0	1.60 e+0	0.00 e+0	0.00 e+0	0.00 e+0	1.60 e+0	0.00 e+0
silver	7440-22-4	0.00 e+0	0.00 e+0	5.20 e-5	0.00 e+0	0.00 e+0	0.00 e+0	5.20 e-5	0.00 e+0
pesticides									
4,4'-DDT	50-29-3	0.00 e+0	0.00 e+0	2.80 e-3	0.00 e+0	0.00 e+0	0.00 e+0	2.80 e-3	0.00 e+0
semivolatile organics (SemiVols, SVOCs)									
benz(a)anthracene	56-55-3	6.60 e-7	6.30 e-7	5.20 e-4	0.00 e+0	0.00 e+0	0.00 e+0	5.21 e-4	6.30 e-7
benzo(a)pyrene	50-32-8	6.20 e-7	5.90 e-7	4.20 e-4	0.00 e+0	0.00 e+0	0.00 e+0	4.21 e-4	5.90 e-7
benzo(b)fluoranthene	205-99-2	3.30 e-6	3.00 e-6	7.60 e-4	0.00 e+0	0.00 e+0	0.00 e+0	7.63 e-4	3.00 e-6
benzo(k)fluoranthene	207-08-9	2.20 e-7	2.10 e-7	1.60 e-4	0.00 e+0	0.00 e+0	0.00 e+0	1.60 e-4	2.10 e-7
chrysene	218-01-9	9.20 e-7	8.60 e-7	5.20 e-4	0.00 e+0	0.00 e+0	0.00 e+0	5.21 e-4	8.60 e-7
dibenzo(a, h)anthracene	53-70-3	7.40 e-12	7.30 e-12	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	7.40 e-12	7.30 e-12
pentachlorophenol	87-86-5	0.00 e+0	0.00 e+0	6.80 e-3	0.00 e+0	0.00 e+0	0.00 e+0	6.80 e-3	0.00 e+0
volatile organics (VOCs)									
1, 2, 4 - trimethylbenzene	95-63-6	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0
ethylbenzene	100-41-4	3.60 e-5	3.00 e-5	0.00 e+0	0.00 e+0	0.00 e+0	0.00 e+0	3.60 e-5	3.00 e-5
total hazard index (HI)	...	**4.17 e-5**	**3.53 e-5**	**7.06 e+1**	**0.00 e+0**	**0.00 e+0**	**0.00 e+0**	**7.06 e+1**	**3.53 e-5**

Fractional Contributions of Substances to Total Risks

Fractional contributions of individual substances or families of substances of potential concern to total potential incremental cancer and non-cancer risks are quantified in Table 9.

Cancer risk. As Table 9 indicates, a single substance dominates in determining cancer risks to off-site residential receptors. Specifically, 97 percent of total risk is posed by chromium and its compounds. With respect to off-site residential receptors, therefore, site remediation could focus most efficiently upon chromium. With respect to on-site commercial receptors, however, Table 9 indicates that chromium and compounds account for only four percent of total risk. Site remediation to mitigate potential cancer risks, therefore, must focus upon additional substances. Specifically, the PAH benz(a)pyrene accounts for 46 percent of total risk, and the carcinogenic PAHs together account for 88 percent of total potential cancer risk [1.9 times benz(a)pyrene alone, that is, 1.9 benz(a)pyrene equivalents]. Inasmuch as the PAHs typically are generated as products of incomplete combustion, they typically also constitute a co-occurring family of contaminants. Accordingly, site remediation for cancer risks most efficiently could focus upon the PAHs and chromium as dominant contributors to on-site commercial and off-site residential risks, respectively.

Non-cancer risk. As Table 9 indicates, a single substance dominates in determining non-cancer risks to off-site residential receptors: 85 percent of total risk is posed by ethylbenzene. With respect to off-site residential receptors, therefore, site remediation could focus most efficiently upon ethylbenzene. With respect to on-site commercial receptors, however, Table 9 indicates that ethylbenzene accounts for 0.00 percent of total risk. Site remediation to mitigate potential non-cancer risks, therefore, must focus on additional substances. Specifically, lead (Pb) and its compounds account for 98 percent of total potential non-cancer risk. Accordingly, site remediation for non-cancer risks most efficiently could focus upon ethylbenzene and lead as dominant contributors to on-site commercial and off-site residential risks, respectively.

Table 9. Fractional Contributions of Substances to Total Potential Worst-Case Risks

substance(s)	CAS no.	total potential worst-case cancer risk		percentage of all-substance total		total potential worst-case non-cancer risk		percentage of all-substance total	
...	...	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential	on-site commercial	off-site residential
metals									
arsenic	7440-38-2	3.52 e-6	2.00 e-8	7.42	0.84	2.20 e-2	0.00 e+0	0.03	0.00
barium	7440-39-3	0.00 e+0	0.00 e+0	0.00	0.00	1.30 e-3	0.00 e+0	0.00	0.00
chromium	7440-47-3	2.00 e-6	2.30 e-6	4.22	96.66	4.50 e-3	0.00 e+0	0.01	0.00
lead	7439-92-1	0.00 e+0	0.00 e+0	0.00	0.00	6.90 e+1	0.00 e+0	97.68	0.00
mercury	7439-97-6	0.00 e+0	0.00 e+0	0.00	0.00	1.60 e+0	0.00 e+0	2.27	0.00
silver	7440-22-4	0.00 e+0	0.00 e+0	0.00	0.00	5.20 e-5	0.00 e+0	0.00	0.00
pesticides									
4,4'-DDT	50-29-3	1.70 e-7	9.60 e-11	0.36	0.00	2.80 e-3	0.00 e+0	0.00	0.00
semivolatile organics (SemiVols, SVOCs)									
benz(a)anthracene	56-55-3	2.70 e-6	3.30 e-9	5.70	0.14	5.21 e-4	6.30 e-7	0.00	1.79
benzo(a)pyrene	50-32-8	2.20 e-5	3.10 e-8	46.45	1.30	4.21 e-4	5.90 e-7	0.00	1.67
benzo(b)fluoranthene	205-99-2	4.01 e-6	1.60 e-8	8.46	0.67	7.63 e-4	3.00 e-6	0.00	8.50
benzo(k)fluoranthene	207-08-9	8.41 e-8	1.10 e-10	0.18	0.00	1.60 e-4	2.10 e-7	0.00	0.60
chrysene	218-01-9	4.21 e-6	8.50 e-9	8.87	0.36	5.21 e-4	8.60 e-7	0.00	2.44
dibenzo(a, h)anthracene	53-70-3	3.20 e-13	3.80 e-13	0.00	0.00	7.40 e-12	7.30 e-12	0.00	0.00
pentachlorophenol	87-86-5	8.70 e-6	5.10 e-10	18.35	0.02	6.80 e-3	0.00 e+0	0.01	0.00
volatile organics (VOCs)									
1, 2, 4 - trimethylbenzene	95-63-6	0.00 e+0	0.00 e+0	0.00	0.00	0.00 e+0	0.00 e+0	0.00	0.00
ethylbenzene	100-41-4	0.00 e+0	0.00 e+0	0.00	0.00	3.60 e-5	3.00 e-5	0.00	85.01
total cancer risk or hazard index (HI)	...	**4.74 e-5**	**2.38 e-6**	**100.0**	**100.0**	**7.06 e+1**	**3.53 e-5**	**100.0**	**100.0**

Uncertainties

One simplification introducing uncertainty into the HRA was the assumption that undetected substances were present at a maximum value of zero. Clearly, the values must have been above zero, though only marginally so. This inaccuracy was deemed insignificant for two reasons. First, background values also are above zero (sometimes more than marginally so), and the exceedance of background values, not the exceedance of zero, is the factor of critical importance in assessing 'incremental risk'. Second, even ignoring item 1, detection limits were sufficiently low (as reported with respect to each substance of potential concern in Tables 4 and 5) to render insignificant the difference between zero and the detection limit (or, likewise, between zero and half of the detection limit).

A second source of uncertainty was the fraction of total detected chromium in the CrIII vs. CrVI vs. metallic (zero) valence state. CrVI is most toxic. Accordingly, all environmental residues reported as "chromium" were assumed to be CrVI. This form of chromium, though carcinogenic via inhalation, is non-carcinogenic via ingestion routes because its valence is reduced (CrVI –> CrIII) by hydrogen ions in the acidic environment of the stomach.

Other sources of uncertainty generally were addressed via adoption in the HRA of highly conservative assumptions about exposure and exposure duration. For example, contaminant residues were assumed present at concentrations higher than those at which they were actually measured in environmental samples. That is, detected substances of potential concern were assumed present at the 95-percent upper confidence bound on their mean concentrations. The result is that, with a high degree of confidence, this HRA assesses potential incremental cancer and con-cancer risks to reference individuals under a worst-case scenario. A worst-case scenario is an assumed scenario that seeks to overestimate rather than underestimate, or even accurately estimate, potential risks. Such actual risks, therefore, are unlikely to exceed the worst-case scenario by which they were modeled in the HRA.

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