

# **EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**

## **INDUSTRI-PLEX SUPERFUND SITE OPERABLE UNIT 1**

**WOBURN, MASSACHUSETTS**

**June 2018**



**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NEW ENGLAND - REGION 1  
5 POST OFFICE SQUARE  
BOSTON, MA 02109-3912**

U.S. EPA Region 1  
Explanation of Significant Differences (ESD)  
Industri-Plex Superfund Site, Operable Unit 1  
June 2018

## Contents

I.	INTRODUCTION .....	4
A.	Site Name and Location.....	4
B.	Lead and Support Agencies .....	5
C.	Legal Authority for ESD.....	5
D.	Summary of Circumstances Necessitating this ESD .....	5
II.	SUMMARY OF SITE HISTORY, CONTAMINATION PROBLEMS AND SELECTED REMEDY.....	7
III.	BASIS FOR THE DOCUMENT .....	9
IV.	DESCRIPTION OF SIGNIFICANT DIFFERENCES .....	9
A.	120 Commerce Way (Tax Map 10-1-3; and Institutional Controls Lot # IC-20) .....	9
B.	200 Presidential Way (Tax Map 5-4-2; and Institutional Controls Lot # IC-36) .....	12
V.	SUPPORT AGENCY COMMENTS .....	14
VI.	STATUTORY DETERMINATION .....	14
VII.	PUBLIC PARTICIPATION COMPLIANCE .....	14

**FIGURES:**

Figure 1 – Industri-Plex OU-1, Area Impacted by ESD

Figure 2 – Industri-Plex OU-1, 120 Commerce Way & 200 Presidential Way properties

Figure 3 – Industri-plex OU-1, 120 Commerce Way – Land Classifications and Exploration

**TABLES:**

Table 1 – 120 Commerce Way Risk Assessment Summary Table

Table 2 – 200 Presidential Way Risk Assessment Summary Table

**ATTACHMENTS:**

Attachment 1 – MassDEP ESD Letter of Support

Attachment 2 – Responsiveness Summary

Attachment 3 – 120 Commerce Way Risk Assessment Guidance for Superfund (RAGS) – Part D Tables

Attachment 4 – 200 Presidential Way Risk Assessment Guidance for Superfund (RAGS) – Part D Tables

## I. INTRODUCTION

### A. SITE NAME & LOCATION

Site Name: Industri-Plex Superfund Site

Site Location: Woburn, Middlesex County, Massachusetts

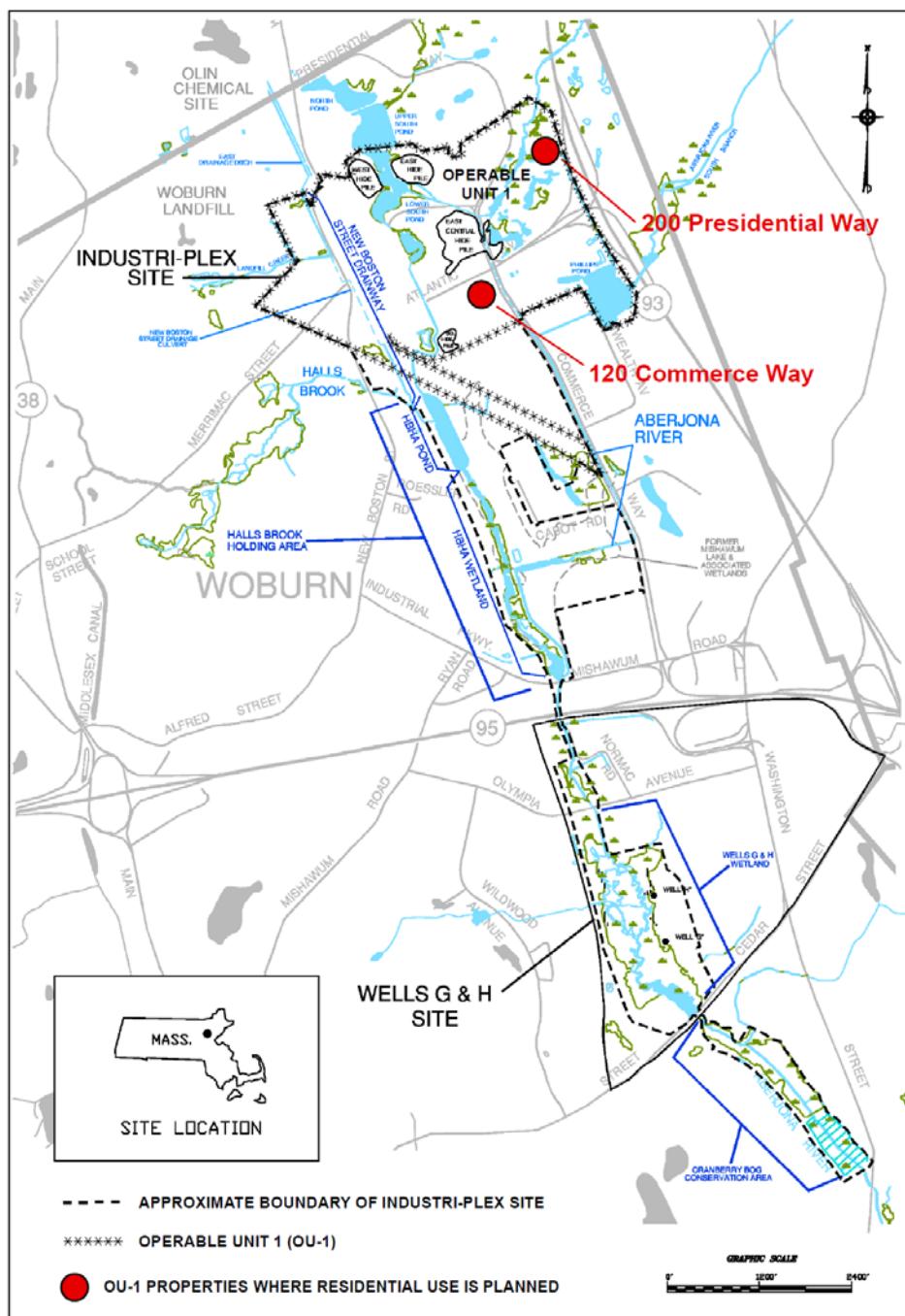


FIGURE 1

## B. LEAD AND SUPPORT AGENCIES

Lead Agency: United States Environmental Protection Agency (EPA)

- *Contact: Joseph LeMay, EPA Remedial Project Manager, (617) 918-1323*

Support Agency: Massachusetts Department of Environmental Protection (MassDEP)

- *Contact: Jennifer McWeeney, MassDEP Project Manager, (617) 654-6560.*

## C. LEGAL AUTHORITY FOR ESD

This Explanation of Significant Differences (ESD) for the Industri-Plex Superfund Site (Site), Operable Unit 1 (OU-1), documents differences in certain components of the remedy as originally set forth in the September 30, 1986 Record of Decision (ROD).

This ESD has been prepared to provide the public with an explanation of and an opportunity to comment on an EPA modification of the selected remedy for OU-1 of the Site. The EPA is required to publish this ESD by Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C. § 9617(c), and the rule at 40 C.F.R. § 300.435(c)(2)(i). EPA is seeking public comment on this ESD pursuant to 40 C.F.R. § 300.825(b).

Under Section 117(c) of CERCLA, 42 U.S.C. § 9617(c), the rule at 40 C.F.R. § 300.435(c)(2)(i), and EPA guidance (Office of Solid Waste and Emergency Response [OSWER] Directive 9200.1-23P), if the EPA determines that differences in the remedial action significantly change, but do not fundamentally alter the remedy selected in the ROD, with respect to scope, performance, or cost, the EPA shall publish an ESD to describe the differences between the remedial action being undertaken and the remedial action set forth in the ROD, and the reasons such changes are being made. EPA has determined that the adjustments to the ROD provided in this ESD are significant, but do not fundamentally alter the overall remedy for the Industri-Plex Superfund Site, Operable Unit 1, with respect to scope, performance, or cost. Therefore, this ESD is properly issued.

## D. SUMMARY OF CIRCUMSTANCES NECESSITATING THIS ESD

1. The September 1986 ROD for Industri-Plex Superfund Site, OU-1, described the Site as “a highly industrialized area of the City.” (ROD, p. 11) The ROD’s selected remedy includes Alternative S-11, which “will eliminate the potential for direct contact with contaminated soils at levels above 300 ppm arsenic, 600 ppm lead, and 1000 ppm chromium. These levels were established in the Endangerment Assessment (EA) as being protective of the public health and welfare and the environment for certain site uses and exposures. Specifically, the alternative will

cap contaminated soils with clean materials to a depth sufficient to minimize the effects of the freeze-thaw cycle and the potential for exposure resulting from erosion.” (ROD, p. 81) Since the site was primarily used for industrial and commercial purposes, the soil action levels of 300 ppm for arsenic, 600 ppm for lead, and 1,000 ppm for chromium were developed assuming industrial and commercial use and not considered protective for on-site residential use.<sup>1</sup>

2. The selected soil remedy for OU-1 also included, “... any areas containing wastes above the action levels will receive institutional controls. These controls are designed to ensure the long-term effectiveness of the remedial action by preventing the unauthorized or inadvertent disturbance of the waste deposits. The nature and scope of the institutional controls will be similar to those required under Part 264 Subpart G of RCRA. Specifically, §264.117 Post Closure care and use of Property, §264.119 Notice to local land Authority and §264.120 Notice in deed to Property.” (ROD, p. 82) The institutional controls for the property were designed and finalized in the Model OU-1 Notice of Activity and Use Limitation (Model OU-1 NAUL)<sup>2</sup>. The institutional controls restrict, among other things, residential use.
3. Between 2016-2018, two groups of prospective purchasers/property owners (Project Proponents) proposed residential uses on two separate properties within the boundaries of OU-1 at the Site (see Figures 1 and 2):

120 Commerce Way  
Woburn, MA 01801; and

200 Presidential Way  
Woburn, MA 01801

EPA required the Project Proponents to prepare baseline human health risk assessments (baseline risk assessments) for each property to evaluate potential risks associated with future residential, trespasser<sup>3</sup>, and construction worker exposures. The information was then used by EPA to assess the need for any additional remedial actions that might be required to allow a change in use of the properties for residential development. The Project Proponents’ baseline risk assessments demonstrated that the baseline risk assessment calculations for the evaluated soil exposure scenarios on their parcels did not exceed EPA’s risk management criteria. On December 22, 2017 and March 27, 2018, EPA issued letters that accepted the Project Proponents’ risk assessment results for the 200 Presidential Way and 120 Commerce Way properties, respectively. Therefore, this ESD documents that residential use is acceptable on these properties, as discussed

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<sup>1</sup> Woburn Environmental Studies, Phase II Report, Volume 2, Feasibility Study, April 1985, Appendix F, by Stauffer Chemical Company.

<sup>2</sup> Model OU-1 NAUL, January 18, 2018.

<sup>3</sup> Required for the 120 Commerce Way property only, based on the Model OU-1 GERE and Model OU-1 NAUL’s classification of properties abutting/near the 120 Commerce Way property.

in detail below.

4. The supporting documentation for this ESD, and the Administrative Record are available to the public at the following locations and may be reviewed at the times listed:

Online: <https://semspub.epa.gov/src/collection/01/AR65578>

EPA New England  
Office of Site Remediation & Restoration  
Records and Information Center  
5 Post Office Square, Suite 100 (OSRR02-3)  
Boston, MA 02109-3912  
(by appointment)  
617-918-1440 (phone)  
617-918-0440 (fax)

Woburn Public Library  
45 Pleasant Street  
Woburn, MA 01801  
781-933-0148 (phone)  
<http://woburnpubliclibrary.org>

Additional information about the Site is also available at  
[www.epa.gov/superfund/industriflex](http://www.epa.gov/superfund/industriflex)

An administrative record file is required by Section 113(k) of CERCLA, 42 U.S.C. § 9613(k).

## II. SUMMARY OF SITE HISTORY, CONTAMINATION AND SELECTED REMEDY FOR OPERABLE UNIT 1 (OU-1) AND OPERABLE UNIT 2 (OU-2)

Various chemical and glue manufacturing facilities operated on the Industri-Plex Superfund Site from 1853 to 1969. EPA established a 1986 Record of Decision for the first phase of cleanup at Industri-Plex (OU-1), which included the construction of protective caps (i.e., engineered and equivalent caps/covers) over approximately 110 acres of soils contaminated with heavy metals and animal wastes (permeable cap over approximately 105 acres, impermeable cap over approximately 5 acres) to prevent people from coming into contact with the contamination; the construction of a thermal oxidation unit to treat gases collected from the impermeable capped waste deposits; and inauguration of institutional controls. The OU-1 permeable caps were required for soils exceeding the soil action levels for arsenic (300 ppm), lead (600

ppm) and chromium (1,000 ppm). OU-1 groundwater contained elevated levels of metals (*e.g.*, arsenic) and elevated levels of volatile organic compounds (*e.g.*, benzene, toluene). It is important to note that these soil action levels were not considered protective for on-site residential use. In 1998, construction of the OU-1 caps were completed. In 2005, model institutional controls for OU-1 were drafted in the form of a Grant of Environmental Restrictions and Easements (GERE) (Model OU-1 GERE)<sup>4</sup>, which was to be recorded on all properties with contamination left in place. In 2008, Cover Certification Reports were established for the Site. In 2014, the State modified its environmental land use control regulations to allow, in addition to GEREs, Notices of Activity and Use Limitations (NAULs) to be used as a form of recorded institutional controls for CERCLA cleanup sites in Massachusetts. In 2018, a Model OU-1 NAUL was drafted for use at this site.

The Model OU-1 GERE and the Model OU-1 NAUL for this site divide the properties within OU-1 into four (4) land classes of restrictions based on the level of contamination present (Land Classifications A, B, C and D, where A is the least contaminated and D the most contaminated)<sup>5</sup>. The institutional control requirements of the Model OU-1 NAUL restricted residential, daycare and school use on all four (4) land classes, as well as restrict contact/ extraction of groundwater. The 200 Presidential Way property is in Class A Land and the 120 Commerce Way property is primarily in Class B Land, with a small area, 150 square feet, in Class C Land, as described below.

EPA established a 2006 ROD for the final phase of cleanup at the Industri-Plex Superfund Site, (known as Operable Unit 2 or OU-2). The 2006 OU-2 ROD addressed contamination originating from Industri-Plex OU-1 and downstream migration of OU-1 contamination via groundwater discharges. Groundwater and surface water were primarily impacted by arsenic, ammonia and benzene, and sediments by arsenic<sup>6</sup>. OU-2 included the construction of Halls Brook Holding Area (HBHA) Pond Remedy (primary and secondary treatment cells) component to intercept and treat contaminated groundwater and achieve water standards at the compliance point (outlet of the HBHA Pond Remedy), capping contaminated soils adjacent to the HBHA Pond, dredging and restoration of near shore sediments, wetland mitigation, and institutional controls. In 2006, the Site boundaries were extended to include OU-2. In 2017, construction of the OU-2 remedy was completed.

Additional details regarding history, contamination and risks can be found in the 1986 and 2006 OU-1 and OU-2 RODs and 2014 OU-2 ESD and their respective

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<sup>4</sup> Model OU-1 GERE, March 2005.

<sup>5</sup> Under the terms of a 1989 Consent Decree (Attachment B – Institutional Controls) with the OU-1 Settling Parties (OU-1 CD): “Where Institutional Controls are required, they may provide for defined classes of disturbance or modification, such as major or minor, combined with various categories of governmental notification and approval requirements.”

<sup>6</sup> A 2014 OU2 ESD added benzene as an additional sediment contaminant.

Administrative Records.

### III. BASIS FOR THE DOCUMENT

The OU-1 soil cleanup levels were not developed for protection of residential use, and the Model OU-1 NAUL prohibits residential, schools and day care use. The two groups of Project Proponents within OU-1 at the Site (*i.e.* 120 Commerce Way, Woburn, MA 01801, and 200 Presidential Way, Woburn, MA 01801) proposed potential residential use on their properties. EPA required each of the Project Proponents to collect data, prepare baseline risk assessments assessing potential future residential use on the properties, and coordinate with EPA and MassDEP regarding the results and any further steps/considerations. The Project Proponents' baseline risk assessments demonstrated that the baseline risk assessment for the new proposed potential soil exposure scenarios including residential did not exceed EPA's risk management criteria. On December 22, 2017 and March 27, 2018, EPA issued letters that accepted the Project Proponents' conclusions for the 200 Presidential Way and 120 Commerce Way properties, respectively. Therefore, residential use on each of the properties is permissible (with conditions, in the case of 120 Commerce Way), as described below.

### IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

As noted above, Industri-Plex OU-1 ROD soil cleanup levels were not based upon residential use. The OU-1 ROD remedy is modified through this ESD to:

- incorporate the Project Proponents soil sampling results and baseline risk assessments into the remedy for the two properties;
- based on this modification to the Site's risk assessment, the OU1 ROD remedy is further modified to permit residential development at 200 Presidential Way (located on Class A Land) with no conditions (including no NAUL) and at 120 Commerce Way, with certain conditions specific to permitting residential uses on Class B Land; and
- based on soil contaminant testing, a small area of Class C Land located on the 120 Commerce Way property will be reclassified as Class B Land. A small area of Class C engineered cover on the property (approximately 150 square feet) can be removed, with a new edge of the Class C cover established on the adjacent property that is still Class C Land. See Figure 3.

#### A. 120 COMMERCE WAY, WOBURN, MA 01801 (Property within Industri-Plex OU-1; Tax Map 10-1-3; and Institutional Controls Lot # IC-20)

The property at 120 Commerce Way is approximately 3.4 acres and under the Model OU-1 NAUL (see Figure 2), includes primarily Class B Land restriction and a very small portion of Class C Land restriction.

The Project Proponents prepared, after consultation with EPA and MassDEP, a baseline risk assessment/ completion report entitled “*Draft-Final Site Investigation Completion Report, 120 Commerce Way (Associated with Industri-Plex Operable Unit 1), Woburn, Massachusetts, EPA Site Identification Number: MAD076580950*”, dated March 2018 (120 Commerce Way Report). The 120 Commerce Way Report included the results of various samples collected on the property and incorporated these results into the baseline risk assessment.

Based upon the 120 Commerce Way Report, the following exposure pathways were determined to be incomplete for the proposed residential reuse, and were not evaluated in the baseline risk assessment for the following reasons:

- Potable or non-potable uses of groundwater are associated with incomplete exposure pathways because extraction and use of groundwater for any purposes is prohibited, in accordance with the ROD and the Model OU-1 NAUL. In addition, the NAUL recorded on the property will document the restrictions required under this ESD.
- Direct contact with groundwater is an incomplete exposure pathway because construction excavation is not expected to extend to the groundwater table. If construction dewatering will be performed or if groundwater is encountered during excavation activities, workers will follow a health and safety plan required under the ROD and Model OU-1 NAUL that describes how groundwater will be managed and worker exposures controlled. In addition, the NAUL recorded on the property will document the restrictions required under this ESD.
- Direct contact with soil greater than six (6) feet below ground surface (bgs) is not a complete exposure pathway because excavation greater than six (6) feet bgs is prohibited, in accordance with the ROD and Model OU-1 NAUL. If excavation greater than six (6) feet bgs is required, then the ROD and Model OU-1 NAUL provide provisions for management of potential exposures to that soil. These provisions will require workers engaged in construction activities for soil deeper than six (6) feet bgs to follow a health and safety plan that describes how soil will be managed, and worker exposures controlled. In addition, the final NAUL recorded on the property will document the restrictions required under this ESD.

- Migration of vapors from groundwater to indoor air (*i.e.*, vapor intrusion) is an incomplete exposure pathway because the building design and construction will include a vapor mitigation system, as described in the 120 Commerce Way Report, that will be installed beneath the occupied ground floor building spaces.

The baseline risk assessment within the 120 Commerce Way Report evaluated the following exposure scenarios:

Soils (0 – six (6) feet bgs):

- Child Trespasser
- Residential Use (*i.e.*, adult and child)
- Construction Worker

For the trespasser exposure scenario, the potential health risks were evaluated for older children (7 to 18 years of age) who are assumed to live at the property in the future and would trespass onto other nearby areas of the Industri-Plex Site (within areas of Class B and A Land, since these land types did not require protective covers to prevent exposure to higher levels of contaminated soil).<sup>7</sup> The evaluation (*see* 120 Commerce Way Report, Appendix F) concluded that the incremental lifetime cancer risk (ILCR) for a trespasser exposed to surface soil is within EPA's acceptable risk management range of  $10^{-6}$  to  $10^{-4}$ , the hazard index (HI) is below 1, and the estimated blood lead levels are below consensus values used by EPA to manage lead risks.

For the residential and construction work exposure scenarios, the baseline risk assessment demonstrated that the ILCR was within EPA's acceptable risk management range of  $10^{-6}$  to  $10^{-4}$  for residential exposures to soil from 0 to six (6) feet bgs, the ILCR was within the acceptable risk management range of  $10^{-6}$  to  $10^{-4}$  for construction worker exposures to soil from 0 to six (6) feet bgs, and the soil non-cancer hazard did not exceed the target organ-specific HI of 1 for either scenario (residential or construction worker exposures). The risk assessment summary table for these evaluations can be found in the Table 1, and Risk Assessment Guidance for Superfund (RAGS) – Part D tables can be found in Attachment 3.

Based upon the above information, EPA agrees that the baseline risk assessment calculations for the evaluated soil exposure scenarios in soil from 0 to six (6) feet bgs do not exceed EPA's risk management criteria. Therefore, EPA is proposing to modify the

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<sup>7</sup> EPA, in consultation with MassDEP, reviewed and approved the location of the Project Proponents' sampling of adjacent properties most likely to have access to trespassers.

remedy in the 1986 ROD and the NAUL for the 120 Commerce Way property to incorporate these revised baseline risk assessment calculations and conclusions into the remedy through this ESD, if adopted. This ESD includes a determination that the proposed residential use of the property, as well as daycare and school uses (with exposure similar to or less than residential use), is reasonable with restrictions on any excavation and/or exposure to soil below 6 (six) feet bgs.

The institutional controls for the property established through the ESD shall consider the soil data presented in the baseline risk assessment and be implemented, in part, through the property's NAUL to allow residential use, as well as daycare and school uses, restricted to soil exposure from the ground surface (0 feet) to six (6) feet bgs.

The CERCLA remedy for the property will be further modified to identify the entire property as Class B Land, whose soil restrictions apply at greater than six (6) feet bgs (Note: The soil sampling and baseline risk assessment demonstrate that the previously identified small section of Class C Land area [*i.e.*, engineered cover] on the property [approximately 150 square feet] can be removed and the area reclassified as Class B Land). See Figure 3. The revised institutional controls for the property, reflecting the requirements under the ESD, shall be recorded at the registry of deeds in the form of a NAUL.

**B. 200 PRESIDENTIAL WAY, WOBURN, MA 01801 (Property within Industri-Plex OU-1; Tax Map 5-4-2; and Institutional Controls Lot # IC-36)**

The property at 200 Presidential Way is approximately 10.7 acres and under the Model OU-1 NAUL (see Figure 2) contains Class A Land restriction.

The property owner/prospective purchaser prepared a baseline risk assessment/completion report entitled "*Completion Report, Industri-Plex Site – Operable Unit 1, 200 Presidential Way, Woburn, Massachusetts*", dated December 22, 2017 (200 Presidential Way Report). The 200 Presidential Way Report included the results of various samples collected on the property and incorporated these results into the baseline risk assessment.

MassDEP's August 26, 1997 Use and Value Determination for the Industri-Plex Superfund Site identified the area as a "Non-Potential Drinking Water Source Area"; therefore, human consumption of groundwater was not evaluated as an exposure pathway. Use of groundwater for irrigation purposes is consistent with the State's Use and Value Determination. The 200 Presidential Way Report included a copy of the 1997

## Use and Value Determination in Appendix H.

The baseline risk assessment within the 200 Presidential Way Report evaluated the following exposure scenarios:

### Soils:

- Residential Use (*i.e.*, adult and child)
- Construction Worker

### Groundwater:

- Residential Use (*i.e.*, adult and child) associated with vapor intrusion pathway through occupied buildings and irrigation water exposure
- Construction Worker

The trespasser risk calculations for 120 Commerce Way would apply to 200 Presidential Way, and would be within EPA's acceptable risk management range. See above Section IV, A.

The baseline risk assessment demonstrated that the incremental lifetime cancer risk (ILCR) was below the acceptable risk management range of  $10^{-6}$  to  $10^{-4}$  for construction worker exposure to soil, the ILCR was within the acceptable risk management range for residents (maximum calculated risk was at  $1 \times 10^{-5}$ ) for soil, and the soil non-cancer hazard did not exceed the target organ-specific HI value of 1 for either scenario. The risk assessment also demonstrated that the groundwater ILCR was below the acceptable risk management range of  $10^{-6}$  to  $10^{-4}$  and the non-cancer hazard did not exceed the target organ-specific HI value of 1 for resident exposure to irrigation water or for construction worker contact with shallow groundwater. In addition, volatile compound concentrations in groundwater do not exceed vapor intrusion screening levels indicating the vapor intrusion pathway is incomplete at the property. The risk assessment summary table for these evaluations can be found in the Table 2, and Risk Assessment Guidance for Superfund (RAGS) – Part D tables can be found in Attachment 4.

Based upon the above information, EPA agrees that the baseline risk assessment calculations for the evaluated soil and groundwater exposure scenarios do not exceed EPA's risk management criteria, and the proposed future residential exposure to soils on the property, future residential exposure to groundwater associated with the vapor intrusion pathway and irrigation water, and future construction worker exposures to soil and groundwater are acceptable. Therefore, EPA has determined that the proposed residential use, as well as daycare and school uses (with exposure similar to or less than residential use), of the property is reasonable, and no further Superfund restrictions apply

to the property with these exposure scenarios. Therefore, a NAUL to notify future owners of CERCLA land use restrictions will not be recorded on the property.

## V. SUPPORTING AGENCY COMMENTS

The Commonwealth of Massachusetts (through MassDEP) has reviewed the ESD and provided its letter of support in Attachment 1.

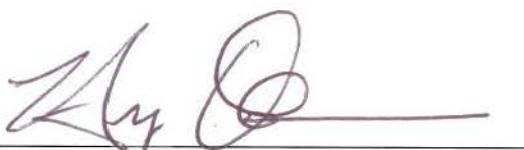
## VI. STATUTORY DETERMINATIONS

This ESD documents EPA's modification of the OU-1 ROD and the modifications that will be made to the Model OU-1 NAUL language in the 120 Commerce Way NAUL to permit residential use at 120 Commerce Way, Woburn, MA (Tax Map 10-1-3, Institutional Controls Lot # IC-20) and 200 Presidential Way, Woburn, MA (Tax Map 5-4-2; and Institutional Controls Lot # IC-36). EPA believes that the modified remedy as stated in this ESD remains protective of human health and the environment, complies with all Federal and State requirements that are applicable or relevant and appropriate to this remedial action, meets the remedial action objectives specified in the ROD, and is cost-effective.

## VII. PUBLIC PARTICIPATION COMPLIANCE

EPA provided a 14-day public comment period on the draft ESD from May 1, 2018 through May 17, 2018. Notice of availability for review of the draft ESD and the Administrative Record was published in the Woburn Daily Times Chronicle newspaper on May 1, 2018 encouraging the public to submit comments on the draft ESD. EPA placed copies of the Notice and the draft ESD and Administrative Record on the EPA Industri-Plex Superfund Site web page, and mailed copies of the draft ESD and Administrative Record to the property owners and prospective purchasers for 120 Commerce Way and 200 Presidential Way properties, OU-1 and OU-2 Settling Defendants Project Coordinators, Aberjona Study Coalition, and City of Woburn. Any substantive comments received during the public comment period were addressed in a responsiveness summary. EPA determined the ESD did not need to be modified or withdrawn, based on public comments. This final ESD is issued, and the responsiveness summary is attached to the document in Attachment 2. In accordance with Section 117(d) of CERCLA and Section 300.825(a) of the National Contingency Plan (NCP), this ESD and supporting documentation shall become part of the Administrative Record for the Site.

This ESD and the Administrative Record are available for public review at the locations and times listed in Section I(D) above.



6/14/18

Bryan Olson, Director  
Office of Site Remediation and Restoration

Date

## Figures

## Tables

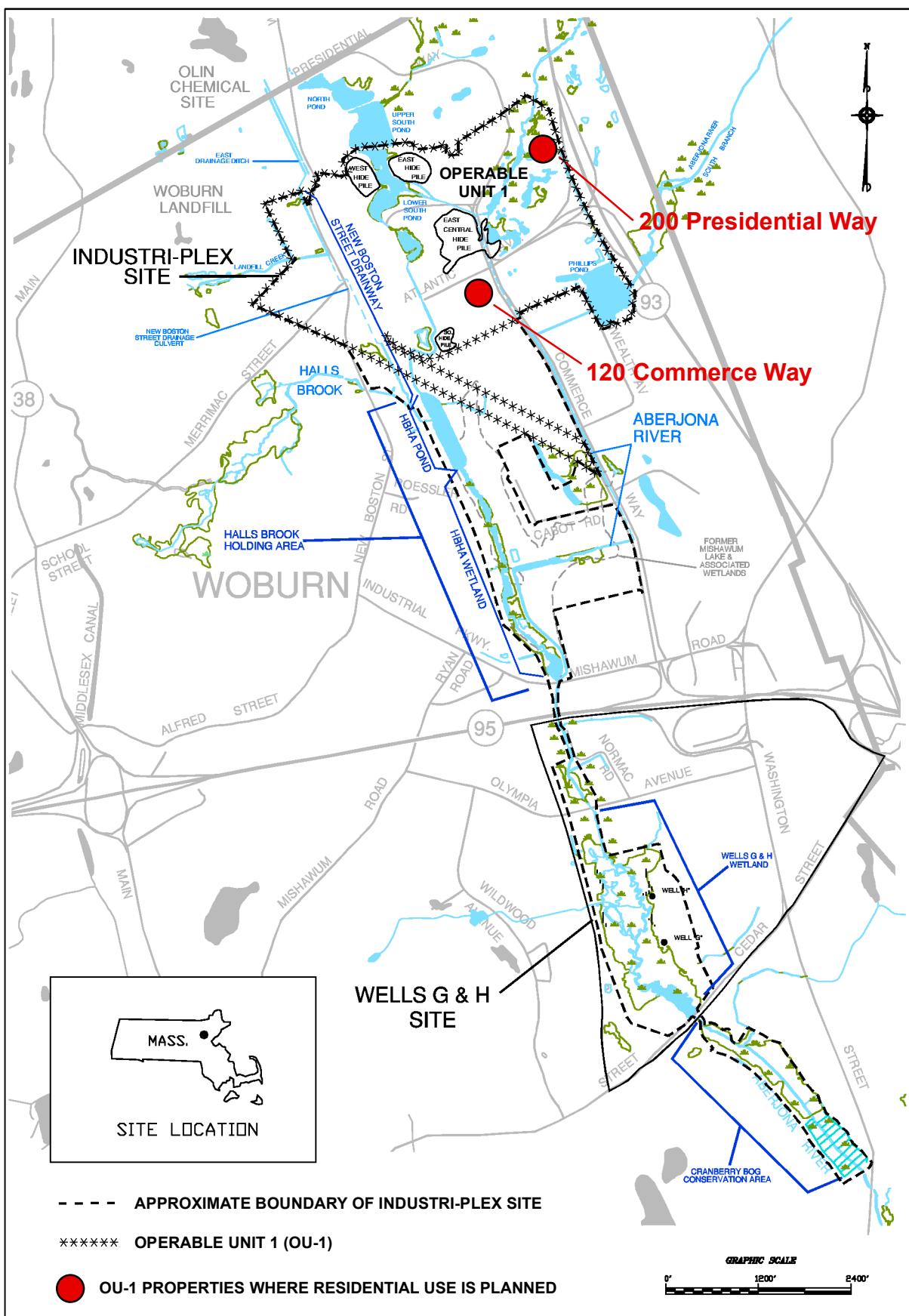
Attachment 1 – MassDEP ESD Letter of Support

Attachment 2 – Responsiveness Summary

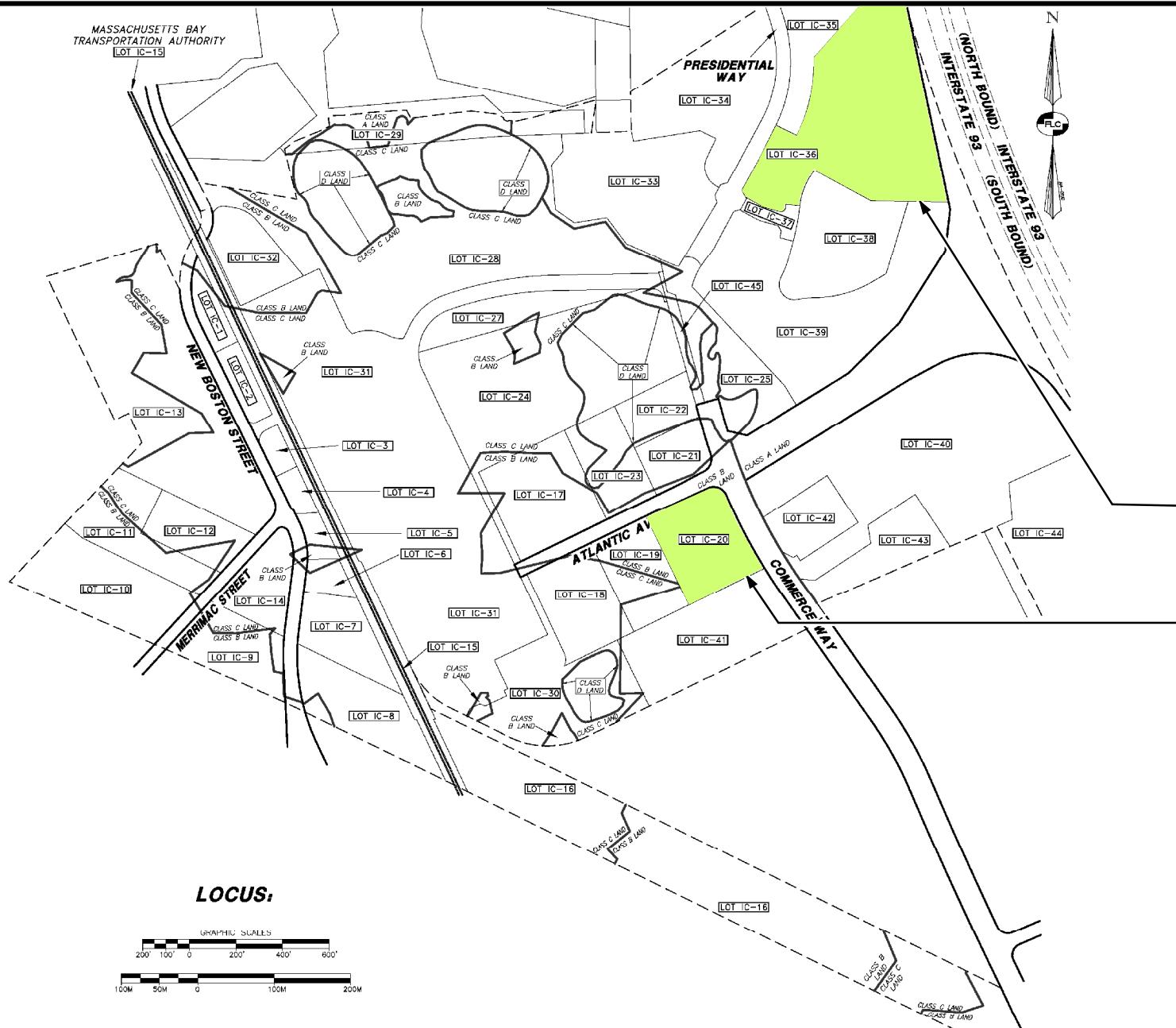
Attachment 3 – 120 Commerce Way Risk Assessment Guidance for Superfund (RAGS) –  
Part D Tables

Attachment 4 – 200 Presidential Way Risk Assessment Guidance for Superfund (RAGS)  
– Part D Tables

# **FIGURES**



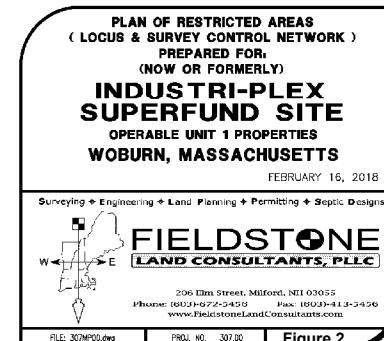
## FIGURE 1

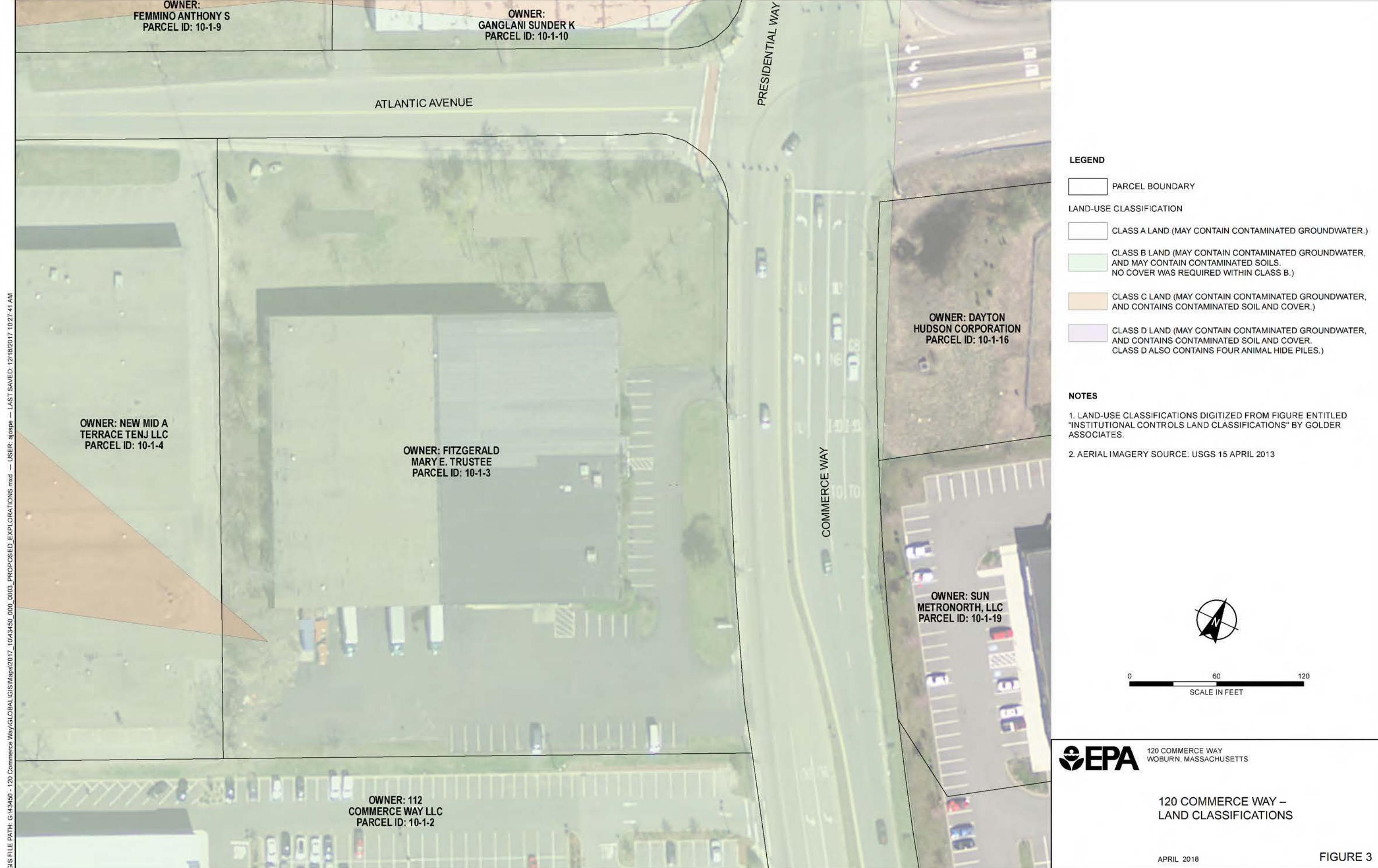


CLASS OF LAND	DESCRIPTION
A	MAY CONTAIN CONTAMINATED GROUNDWATER
B	MAY CONTAIN CONTAMINATED GROUNDWATER, AND MAY CONTAIN CONTAMINATED SOILS. NO COVER WAS REQUIRED WITHIN CLASS B.
C	MAY CONTAIN CONTAMINATED GROUNDWATER AND CONTAMINATED SOILS. NO COVER.
D	MAY CONTAIN CONTAMINATED GROUNDWATER AND CONTAIN CONTAMINATED SOIL AND COVER. CLASS D ALSO CONTAINS FAIR ANIMAL HIDE PILES

**200 Presidential Way  
Lot IC-36  
Tax Map 5-4-2**

**120 Commerce Way  
Lot IC-20  
Tax Map 10-1-3**





# **TABLES**

TABLE 1  
SUMMARY OF RECEPTOR RISKS  
120 COMMERCE WAY  
INDUSTRI-PLEX SUPERFUND SITE OPERABLE UNIT 1

Exposure Point	Scenario/Receptor	Exposure Media	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Major contributors to risk (> 1E-06, HI > 1)
Off-Property Area	Future Child Trespasser	Surface Soil (0-0.5 feet)	2E-05	3E-01	N/A	N/A
120 Commerce Way	Future Young Child/Adult Resident	Surface Soil (0-0.5 feet)	1E-04	3E+00	N/A	N/A (no target organ HI >1)
120 Commerce Way	Future Young Child/Adult Resident	Subsurface Soil (0.5-6 feet)	3E-05	1E+00	N/A	N/A
120 Commerce Way *	Future Young Child/Adult Resident	Surface Soil (0-0.5 feet) - Asphalt Removed	6E-05	1E+00	N/A	N/A
120 Commerce Way *	Future Young Child/Adult Resident	All Soil (0-6 feet) - Asphalt Removed	3E-05	1E+00	N/A	N/A
120 Commerce Way	Future Construction Worker	Surface Soil (0-0.5 feet)	1E-06	5E-01	N/A	N/A
120 Commerce Way	Future Construction Worker	Subsurface Soil (0.5-6 feet)	7E-07	3E-01	N/A	N/A
120 Commerce Way *	Future Construction Worker	All Soil (0-6 feet) - Asphalt Removed	7E-07	3E-01	N/A	N/A

Notes

Bolded values exceed risk management criteria (a cancer risk > 1E-04 or a target organ HI > 1).

N/A - Not Applicable

HI - Hazard Index

\* - Risks were re-calculated after the assumed removal of surface soil samples containing asphalt with elevated polycyclic aromatic hydrocarbons.

These asphalt-containing surface soils (0-6 inches) will be removed as part of property re-development.

See Attachment 3 for backup documentation for the resident and construction worker.

See Appendix F of the March 2018 Draft Final Site Investigation Report for 120 Commerce Way for backup documentation for the trespasser.

TABLE 2  
 SUMMARY OF RECEPTOR RISKS  
 200 PRESIDENTIAL WAY  
 INDUSTRI-PLEX SUPERFUND SITE OPERABLE UNIT 1

Exposure Point *	Scenario/Receptor	Exposure Media	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Major contributors to risk (> 1E-06, HI > 1)
200 Presidential Way	Future Young Child/Adult Resident	Undisturbed Surface Soil (0-0.5 feet)	1E-05	2E+00	N/A	N/A (no target organ HI >1)
200 Presidential Way	Future Young Child/Adult Resident	Disturbed Surface Soil (0-0.5 feet)	1E-05	1E+00	N/A	N/A
200 Presidential Way	Future Young Child/Adult Resident	Disturbed Subsurface Soil (0.5-6 feet)	1E-05	1E+00	N/A	N/A
200 Presidential Way	Future Construction Worker	Disturbed Soil (0-6 feet)	3E-07	2E-01	N/A	N/A

Notes

Bolded values exceed risk management criteria (a cancer risk > 1E-04 or a target organ HI > 1).

N/A - Not Applicable

HI - Hazard Index

COPC - Chemical of Potential Concern

Undisturbed - Soil that will not be moved during re-development activities.

Disturbed - Soil that will be moved during re-development activities.

\* - Groundwater was also evaluated for irrigation use and vapor intrusion potential. No COPCs were selected for these pathway, so no risks were estimated.

See Attachment 4 for backup documentation for the resident and construction worker.

# **ATTACHMENTS**

**Attachment 1**

**MassDEP ESD Letter of Support**



Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

## Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker  
Governor

Matthew A. Beaton  
Secretary

Karyn E. Polito  
Lieutenant Governor

Martin Suuberg  
Commissioner

June 12, 2018

Ms. Lynne Jennings, Chief  
Massachusetts Superfund Section  
US EPA, Mail Code: OSRR07-01  
5 Post Office Square, Suite 100  
Boston, MA 02109

Re: MassDEP letter of support  
Draft ESD 2018,  
Industriplex Superfund Site, OU1  
Woburn, MA

Dear Ms. Jennings:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the proposed Explanation of Significant Differences (ESD) prepared by the USEPA and dated June 6, 2018, for the first Operable Unit (OU1) of the Industri-Plex Superfund Site. The primary purpose of the ESD is to modify the OU1 remedy to allow residential land use of two parcels of land: 120 Commerce Way and 200 Presidential Way. A second purpose is to reclassify a very small area of land within 120 Commerce Way (approximately 150 square feet) from Class C to Class B land. This letter was written to provide MassDEP's support of the USEPA 2018 ESD.

As you know, the 1986 Industri-Plex OU1 Remedy was developed based on the assumption that the Site would continue to only be used for commercial and industrial purposes. Soil cleanup levels presented in the ROD were not developed to be protective for residential use. Between 2016-2018, prospective purchasers/property owners (Project Proponents) for two different properties within OU1 proposed to redevelop the land for residential use. EPA required each of the Project Proponents to collect data and prepare baseline human health risk assessments for each property to evaluate potential risks associated with future residential, trespasser, and construction worker exposures.

The additional soil data and baseline risk assessments support both the proposed residential use of 120 Commerce Way and 200 Presidential Way, and also the reclassification of a very small area of land at 120 Commerce Way from Class C to Class B land. MassDEP reviewed the additional soil data and the baseline risk assessments and concurs with this conclusion. Therefore, MassDEP supports this

This information is available in alternate format. Contact Michelle Waters-Ekanem, Director of Diversity/Civil Rights at 617-292-5751.

TTY# MassRelay Service 1-800-439-2370

MassDEP Website: [www.mass.gov/dep](http://www.mass.gov/dep)

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Page 2  
Industri-Plex OU1 ESD  
June 12, 2018

EPA's decision to allow residential use of these two properties, 120 Commerce Way and 200 Presidential Way, as well as to allow reclassification of the very small area of land at 120 Commerce Way from Class C to Class B land.

If you have any questions concerning this letter, please contact the MassDEP project manager, Jennifer McWeeney,, at 617-654-6560.

Sincerely,

*Paul Craffey*

*for*

Paul Locke  
Assistant Commissioner, BWSC  
MassDEP

Cc: Joseph LeMay, USEPA  
Jennifer McWeeney, USEPA

**Attachment 2**

**Responsiveness Summary**

## **Attachment 2 - Responsiveness Summary**

### **Industri-plex Superfund Site, Operable Unit 1 (OU-1)**

#### **Explanation of Significant Difference (ESD)**

**June 2018**

EPA released a draft Explanation of Significant Difference (ESD) and Administrative Record (AR) on May 3, 2018, which was posted on EPA's Industri-plex Superfund Site web page (<http://www.epa.gov/region1/superfund/sites/industriplex>) and available at the following locations: Woburn Public Library, 45 Pleasant Street, Woburn, MA 01801; and U.S. Environmental Protection Agency, Records Center, 5 Post Office Square, Suite 100, Boston, MA 02109. In addition, electronic copies of the draft ESD and AR were provided to the Industri-plex OU-1 and OU-2 Settling Defendants Coordinators, Aberjona Study Coalition (recipient of EPA's Technical Assistant Grant for the Industri-plex Superfund Site), City of Woburn, owners of 120 Commerce Way and 200 Presidential Way properties, and the developers proposing redevelopment/development of the properties including Cabot, Cabot & Forbes and National Development. EPA published a legal notice of the draft ESD in the Woburn Daily Times Chronicle on May 3, 2018 announcing a 14-day public comment period, which concluded on May 17, 2018.

Outlined below are comments received during the public comment period and EPA's response to those comments.

#### *A. Comments by Michael Raymond, member of the Aberjona Study Coalition (ASC):*

1. *In general, ASC would have liked to had been informed sooner of the this proposed use change.*

**EPA Response 1:** EPA appreciates your dedication to this project, efficient review of the Draft ESD, and the comments you provided during the comment period. Regarding the timing of the release, EPA did not initiate the public comment period until the Draft ESD and the supporting documentation in the Administrative Record were completed so that the public would have a full record to review and comment on.

2. *120 Commerce Way: The risk assessment does not consider the migration of vapors from groundwater to indoor air based on the claim that the residential building design will include a vapor mitigation system that will be installed beneath occupied ground floor building spaces. No recent groundwater data or soil gas data from beneath the existing building on the property are included in the draft final site investigation completion report. Collecting such data should be required to ensure that the vapor*

*mitigation system is properly designed.*

**EPA Response 2:** Vapors in indoor air have not been identified as a risk at Industri-plex OU1. However, elevated concentrations of ammonia have historically been detected in groundwater at the 120 Commerce Way property that could pose a vapor intrusion concern with future residential use. These groundwater data can be found in the March 2005 Remedial Investigation Report (<https://semspub.epa.gov/src/document/01/213091>) on EPA's Industri-plex Superfund Site web page. The 120 Commerce Way proponent/developer understands groundwater contamination is present on the property, and has agreed in their 120 Commerce Way Report, included in the Administrative Record and referenced in the ESD, to voluntarily design and install a vapor mitigation system for the new building and institute a testing plan to verify system effectiveness. In addition, the proponent has recently installed monitoring wells on the property, and will collect groundwater samples before construction. EPA will review the proponent's Work Plans and ensure the collection of sufficient data on levels of contaminants in groundwater and their potential to create vapor intrusion risks.

3. *120 Commerce Way: No details are provided regarding the vapor mitigation system to be used except that it will be installed beneath occupied ground floor building spaces. A passive system, such as a well-ventilated parking garage beneath the building would be ideal, as this would require minimal monitoring or maintenance to ensure the effectiveness of the system. However, it is more likely that the proponent is going to propose an active system such as a sub-slab depressurization system similar to those typically used to control radon in basements. Such systems can be very effective, but only if maintained and operated permanently. The system should be tested to ensure it is operating properly. Additionally, the system should be set up to automatically report to EPA and the building owner if it goes offline due to a power failure, mechanical failure, or other cause.*

**EPA Response 3:** See EPA Response 2 above.

4. *120 Commerce Way: A deed restriction or other means should be implemented to ensure that any future building owners will continue operation of the vapor mitigation system.*

**EPA Response 4:** EPA will coordinate with the State on what institutional controls will be incorporated into the Notice of Activity and Use Limitation (NAUL) to be recorded for the property, including the vapor mitigation system for the new building, and testing and monitoring of the vapor mitigation system to verify system effectiveness.

5. *120 Commerce Way: The exposure point concentration used to evaluate arsenic in soil at the 120 Commerce Way property is 25 mg/kg. This is the 95% UCL on the mean concentration measured in surface soil from depths of 0 to 6 inches at the site. Arsenic is a significant contaminant of concern at the Industri-Plex Site, and this concentration is elevated above background levels. Arsenic is a significant contributor to the total cancer risks estimated for future residents of 120 Commerce Way, contributing  $3 \times 10^{-5}$  to the total cancer risk estimate. Arsenic contributes approximately 50% of the total cancer risk if asphalt-containing surface soils are removed from the property as part of redevelopment. Based on the presence of arsenic in surface soil, a layer of clean soil should be required for parts of the property that are not covered by the residential structure or pavement after redevelopment. The risk assessment states that most of the property will be covered by the building and parking areas, so placing clean soil above remaining landscaped areas should not be a significant hindrance to the project.*

**EPA Response 5:** EPA has concluded in the ESD that the baseline risk assessment results, including the arsenic exposure point concentration (EPC) of 25 mg/kg, are within the Agency's risk management range, and further action to cover these soils with clean soil is not warranted. EPA would also like to point out the 120 Commerce Way Report also states that "All existing pavement and 6 inches of soils underneath the pavement on the property will be removed as a component of construction for the proposed mixed-use development, and, as a consequence of this pavement and underlying soil removal, the cancer risks for surface soil and surface plus subsurface soil will be further decreased by approximately two-fold and five-fold, respectively." Soil borings HA-120COM-5, HA-120COM-6 and HA-120COM-7 are within these areas of existing pavement where the pavement and underlying 6 inches of soils will be removed. Table 17 of the Report includes the EPCs of shallow soil (0 to 6 inches) with the asphalt-related data removed (i.e., HA-120COM-5, HA-120COM-6 and HA-120COM-7). As shown in Table 17, the arsenic EPC in surface soil from depths of 0 to 6 inches is 15 mg/kg. These surface soil are also within the Agency's risk management range, and further action to cover these soils with clean soil is not warranted. EPA will confirm that the 0 to 6 inches of soils are removed as part of property redevelopment.

The conclusions of the 120 Commerce Way Report do not warrant that "a layer of clean soil should be required for parts of the property that are not covered by the residential structure or pavement after redevelopment," as suggested in the comment.

6. *120 Commerce Way: The risk assessment estimates total cancer risks for a future resident of  $1 \times 10^{-4}$  for contact with all surface soil or  $6 \times 10^{-5}$  if soil samples containing asphalt are removed from the site as part of property*

*redevelopment. This is at or near the upper end of the Superfund target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . EPA has adopted the upper end of the Superfund cancer risk range ( $1 \times 10^{-4}$ ) for regulating the Site. It should be noted that the estimated cancer risks exceed the allowable cancer risk limit under the Massachusetts Contingency Plan ( $1 \times 10^{-5}$ ) by factors of 10 and 6, respectively.*

**EPA Response 6:** EPA and MassDEP have reviewed the risk assessments and agree with the ESD conclusions (see Attachment 1 - MassDEP ESD Letter of Support). Risk assessments conducted for the EPA Superfund Program differ from those conducted under the State (Massachusetts Contingency Plan; MCP) Program. Exposure assumptions used by EPA for soil pathways are more conservative than those used by MassDEP. As examples, EPA's child soil ingestion rate is 200 milligrams per day (mg/day) while MassDEP uses an ingestion rate of 100 mg/day, and EPA assumes exposure at residential properties occurs for 350 days per year while MassDEP assumes 150 days per year. The use of more health-protective exposure assumptions by EPA allows for the use of the upper end target cancer risk range of  $10^{-4}$ .

7. *120 Commerce Way: The total noncancer hazard index for residents exposed to surface soil summed over all contaminants is 3. The allowable hazard index is 1 for each target organ. The risk assessment lists primary target organs for each contaminant of concern and concludes that the hazard index does not exceed 1 for any target organ. Was any account taken of possible secondary target organs for contaminants of concern when calculating the hazard index by target organ? Additional target organs for contaminants of concern should be considered when calculating hazard indices by target organ. Requiring the removal of asphalt containing surface soil samples from the site would reduce the total hazard index to the allowable limit of 1.*

**EPA Response 7:** EPA Risk Assessment Guidance for Superfund Part A (1989) indicates that major effects, including the critical effect, should be identified to perform target organ segregation. Even though only the critical effect (primary target organ) was identified for target organ segregation, the developer has committed to the removal of the top 6 inches of asphalt-containing surface soil from the property.

8. *200 Presidential Way: Tables 2.l\_SG1, 2.lA\_SG2A, and 2.l\_SG2A+B of the risk assessment do not correctly indicate chemicals identified as Contaminants of Potential Concern (COPCs). The COPC flag indicates "N" for all contaminants though screening levels are exceeded for several contaminants as indicated in the Rationale for Selection or Deletion.*

**EPA Response 8:** Thank you for pointing out this error on the Table 2s, as referenced above. Please note that even though the COPC flag on these tables indicated “N” for compounds that should have been flagged “Y”, the correct COPCs were carried forward in the risk assessment. Therefore, this error does not change the conclusions of the risk assessment. Nonetheless, these Table 2s were corrected and incorporated in the revised 200 Presidential Way Report included in the ESD’s Administrative Record.

### **Attachment 3**

### **120 Commerce Way Risk Assessment Guidance for Superfund (RAGS) – Part D Tables**

**TABLE 4**  
**SUMMARY OF SURFACE SOIL DATA AND SELECTION OF COPCs**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 2.1: Occurrence, Distribution, and Selection of Chemicals of Potential Concern

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Surface Soil (0-6 in bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	67-64-1	Acetone	0.003 J	0.012 J	mg/kg	HA-120COM-5-0-0_5	8 / 10	0.002 : 0.0023	0.012	NA	6100 n	NA	NA	no	BSL
	71-43-2	Benzene	0.00067 J	0.00067 J	mg/kg	HA-120COM-6-0-0_5	1 / 10	0.0002 : 0.0002	0.00067	NA	1.2 c**	NA	NA	no	BSL
	100-41-4	Ethylbenzene	0.00025 J	0.00025 J	mg/kg	HA-120COM-6-0-0_5	1 / 10	0.0001 : 0.0002	0.00025	NA	5.8 c*	NA	NA	no	BSL
	91-20-3	Naphthalene	0.00014 J	0.012	mg/kg	HA-120COM-6-0-0_5	4 / 10	0.0001 : 0.0002	0.012	NA	3.8 c**	NA	NA	no	BSL
	108-88-3	Toluene	0.00025 J	0.0076	mg/kg	HA-120COM-6-0-0_5	2 / 10	0.0002 : 0.0002	0.0076	NA	490 n	NA	NA	no	BSL
	1330-20-7	Xylene (total)	0.0005 J	0.0005 J	mg/kg	HA-120COM-6-0-0_5	1 / 10	0.0003 : 0.0004	0.0005	NA	58 n	NA	NA	no	BSL
	91-57-6	2-Methylnaphthalene	0.025 J	0.059 J	mg/kg	HA-120COM-6-0-0_5	2 / 10	0.021 : 0.025	0.059	NA	24 n	NA	NA	no	BSL
	83-32-9	Acenaphthene	0.048 J	0.63 J	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.018 : 0.02	0.63	NA	360 n	NA	NA	no	BSL
	208-96-8	Acenaphthylene	0.062 J	0.15 J	mg/kg	HA-120COM-7-0-0_5	4 / 10	0.027 : 0.031	0.15	NA	180 n	NA	NA	no	BSL
	120-12-7	Anthracene	0.18	3.15	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.035 : 0.039	3.15	NA	1800 n	NA	NA	no	BSL
	56-55-3	Benzo(a)anthracene	0.022 J	13.3	mg/kg	HA-120COM-7-0-0_5	7 / 10	0.02 : 0.021	13.3	NA	1.1 c	NA	NA	YES	ASL
	50-32-8	Benzo(a)pyrene	0.33	12.6	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.044 : 0.048	12.6	NA	0.11 c*	NA	NA	YES	ASL
	205-99-2	Benzo(b)fluoranthene	0.034 J	20	mg/kg	HA-120COM-7-0-0_5	7 / 10	0.03 : 0.032	20	NA	1.1 c	NA	NA	YES	ASL
	191-24-2	Benzo(g,h,i)perylene	0.027 J	9.3	mg/kg	HA-120COM-7-0-0_5	6 / 10	0.021 : 0.022	9.3	NA	180 n	NA	NA	no	BSL
	207-08-9	Benzo(k)fluoranthene	0.17	5.7	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.028 : 0.032	5.7	NA	11 c	NA	NA	no	BSL
	218-01-9	Chrysene	0.026 J	16	mg/kg	HA-120COM-7-0-0_5	7 / 10	0.018 : 0.02	16	NA	110 c	NA	NA	no	BSL
	53-70-3	Dibenz(a,h)anthracene	0.057 J	2.15	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.021 : 0.023	2.15	NA	0.11 c	NA	NA	YES	ASL
	132-64-9	Dibenzofuran	0.028 J	0.45	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.017 : 0.019	0.45	NA	7.3 n	NA	NA	no	BSL
	206-44-0	Fluoranthene	0.025 J	46	mg/kg	HA-120COM-7-0-0_5	8 / 10	0.02 : 0.021	46	NA	240 n	NA	NA	no	BSL
	86-73-7	Fluorene	0.063 J	0.87	mg/kg	HA-120COM-7-0-0_5	5 / 10	0.017 : 0.019	0.87	NA	240 n	NA	NA	no	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.029 J	10.35	mg/kg	HA-120COM-7-0-0_5	6 / 10	0.025 : 0.026	10.35	NA	1.1 c	NA	NA	YES	ASL
	91-20-3	Naphthalene	0.026 J	0.07	mg/kg	HA-120COM-7-0-0_5	3 / 10	0.022 : 0.025	0.07	NA	3.8 c**	NA	NA	no	BSL
	85-01-8	Phenanthrene	0.029 J	19	mg/kg	HA-120COM-7-0-0_5	6 / 10	0.022 : 0.023	19	NA	180 n	NA	NA	no	BSL
	129-00-0	Pyrene	0.02 J	34	mg/kg	HA-120COM-7-0-0_5	8 / 10	0.018 : 0.018	34	NA	180 n	NA	NA	no	BSL
HA-EPHC11-C22A	MADEP C11-C22 Aromatic Hydrocarbons, Adj.	13.5	1385	mg/kg	HA-120COM-7-0-0_5	6 / 10	6.99 : 7.47	1385	NA	11 n	NA	NA	NA	YES	ASL
HA-EPHC19-C36	MADEP C19-C36 Aliphatic Hydrocarbons	9.67	322.5	mg/kg	HA-120COM-7-0-0_5	5 / 10	6.99 : 7.81	322.5	NA	23000 ns	NA	NA	no	BSL	
7429-90-5	Aluminum	3400	10000 J-	mg/kg	HA-120COM-10-0-0_5	10 / 10		10000	NA	7700 n	NA	NA	YES	ASL	
7440-36-0	Antimony	0.33 J+	0.33 J+	mg/kg	HA-120COM-10-0-0_5	1 / 10	0.32 : 0.38	0.33	NA	3.1 n	NA	NA	no	BSL	
7440-38-2	Arsenic	4.1	58	mg/kg	HA-120COM-3-0-0_5	17 / 17		58	NA	0.68 c**R	NA	NA	YES	ASL	
7440-39-3	Barium	11	59	mg/kg	HA-120COM-10-0-0_5	10 / 10		59	NA	1500 n	NA	NA	no	BSL	
7440-41-7	Beryllium	0.07 J	0.22 J	mg/kg	HA-120COM-5-0-0_5	9 / 10		0.22	NA	16 n	NA	NA	no	BSL	
7440-43-9	Cadmium	0.12 J	0.26 J	mg/kg	HA-120COM-4-0-0_5	2 / 10	0.08 : 0.09	0.26	NA	7.1 n	NA	NA	no	BSL	
7440-70-2	Calcium	500	3400	mg/kg	HA-120COM-10-0-0_5	10 / 10		3400	NA	NA	NA	NA	no	EN	
7440-47-3	Chromium, total	9.2	850 J-	mg/kg	HA-120COM-3-0-0_5	17 / 17		850	NA	12000 n	NA	NA	no	BSL	
7440-48-4	Cobalt	1.2 J	10	mg/kg	HA-120COM-10-0-0_5	10 / 10		10	NA	2.3 n	NA	NA	YES	ASL	
7440-50-8	Copper	4.2	25	mg/kg	HA-120COM-10-0-0_5	10 / 10		25	NA	310 n	NA	NA	no	BSL	
57-12-5	Cyanide	1.7	1.7	mg/kg	HA-120COM-5-0-0_5	1 / 10	1 : 1.2	1.7	NA	2.3 n	NA	NA	no	BSL	
7439-89-6	Iron	4200	15000	mg/kg	HA-120COM-10-0-0_5	10 / 10		15000	NA	5500 n	NA	NA	YES	ASL	
7439-92-1	Lead	2.5 J	171	mg/kg	IP/S-1/047/006/1/1/1	17 / 17		171	NA	400 n	NA	NA	no	BSL	
7439-95-4	Magnesium	960	7500	mg/kg	HA-120COM-10-0-0_5	10 / 10		7500	NA	NA	NA	NA	no	EN	

**TABLE 4**  
**SUMMARY OF SURFACE SOIL DATA AND SELECTION OF COPCs**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 2.1: Occurrence, Distribution, and Selection of Chemicals of Potential Concern

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Surface Soil (0-6 in bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)	
	7439-96-5	Manganese	37	220	mg/kg	HA-120COM-10-0-0_5	10 / 10	0.069 : 0.081	220	NA	180	n	NA	NA	YES	ASL
	7439-97-6	Mercury	0.075	0.612	mg/kg	HA-120COM-4-0-0_5	2 / 10		0.612	NA	1.1	n	NA	NA	no	BSL
	7440-02-0	Nickel	3.4	26	mg/kg	HA-120COM-10-0-0_5	10 / 10		26	NA	150	n	NA	NA	no	BSL
	7440-09-7	Potassium	340	2600	mg/kg	HA-120COM-10-0-0_5	10 / 10		2600	NA	NA	NA	NA	NA	no	EN
	7440-23-5	Sodium	30 J	110 J	mg/kg	HA-120COM-10-0-0_5	10 / 10		110	NA	NA	NA	NA	NA	no	EN
	7440-62-2	Vanadium	5.6	25	mg/kg	HA-120COM-10-0-0_5	10 / 10		25	NA	39	n	NA	NA	no	BSL
	7440-66-6	Zinc	9.5	105.5	mg/kg	HA-120COM-7-0-0_5	10 / 10		105.5	NA	2300	n	NA	NA	no	BSL
	72-54-8	4,4'-DDD	0.0219	0.0219	mg/kg	HA-120COM-5-0-0_5	1 / 10		0.0219	NA	2.3	c	NA	NA	no	BSL
	72-55-9	4,4'-DDE	0.0137	0.0819	mg/kg	HA-120COM-5-0-0_5	3 / 10		0.0819	NA	2	c	NA	NA	no	BSL
	50-29-3	4,4'-DDT	0.051	0.111	mg/kg	HA-120COM-5-0-0_5	2 / 10		0.111	NA	1.9	c**	NA	NA	no	BSL
	57-74-9	Chlordane	0.361 J	0.361 J	mg/kg	HA-120COM-4-0-0_5	1 / 10		0.361	NA	1.7	c**	NA	NA	no	BSL
	1024-57-3	Heptachlor epoxide	0.022 J	0.022 J	mg/kg	HA-120COM-4-0-0_5	1 / 10		0.022	NA	0.07	c**	NA	NA	no	BSL

Footnotes:

(1) J - value is estimated.

(2) Maximum concentration used to screen data.

(3) No back ground values available.

(4) Regional Screening Levels (RSL) are the Residential Soil values, based on a cancer risk of 1E-06 and a hazard index of 0.1 and were obtained from United States Environmental Protection Agency Regions 3, 6, and 9, Regional Screening Table, [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), updated November 2017.

c = cancer; \* = where: n SL < 100X c SL; \*\* = where n SL < 10X c SL; n = noncancer

s = Concentration may exceed chemical saturation limit (See RSL User Guide)

L = see RSL user guide on lead ; R = RBA applied (See User Guide for Arsenic notice)

Pyrene RSL used as a surrogate for benzo(ghi)perylene, and phenanthrene.

Total petroleum hydrocarbons (aliphatic high) RSL used for C19-C36 aliphatic hydrocarbons.

Total petroleum hydrocarbons (aromatic medium) RSL used for C11-C22 aromatic hydrocarbons.

Trivalent chromium RSL used as a surrogate for Chromium, Total.

Hexavalent chromium was not detected in soil samples collected at the Property (see Table 2).

The RSL value for lead is not reduced by a factor of 10 because lead risk is not additive with other COPCs.

(5) A compound was selected as a COPC if the maximum detected level exceeded the Residential RSL

ASL - Above Screening Level, compound selected as a COPC.

BSL - Below Screening Level, compound not selected as a COPC.

EN - Essential Nutrient, compound not selected as a COPC.

NSL - No Screening Level available, compound selected as a COPC.

**TABLE 5**  
**SUMMARY OF SUBSURFACE SOIL DATA AND SELECTION OF COPCS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 2.2: Occurrence, Distribution, and Selection of Chemicals of Potential Concern

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Subsurface Soil (0.5-6 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	120-82-1	1,2,4-Trichlorobenzene	0.00072	0.00072 J	mg/kg	HA-120COM-5-4-6	1 / 29	0.00014 : 0.00027	0.00072	NA	5.8 n	NA	NA	no	BSL
	95-63-6	1,2,4-Trimethylbenzene	0.0012 J	0.0069	mg/kg	HA-120COM-5-4-6	2 / 29	0.00012 : 0.00023	0.0069	NA	30 n	NA	NA	no	BSL
	95-50-1	1,2-Dichlorobenzene	0.00041 J	0.0014 J	mg/kg	HA-120COM-5-4-6	3 / 29	0.00012 : 0.00023	0.0014	NA	180 n	NA	NA	no	BSL
	108-67-8	1,3,5-Trimethylbenzene	0.00018 J	0.0029 J	mg/kg	HA-120COM-5-4-6	2 / 29	0.00011 : 0.0002	0.0029	NA	27 n	NA	NA	no	BSL
	541-73-1	1,3-Dichlorobenzene	0.00025 J	0.0015 J	mg/kg	HA-120COM-6-4-6	3 / 29	0.00014 : 0.00027	0.0015	NA	NA	NA	NA	YES	NSL
	106-46-7	1,4-Dichlorobenzene	0.00082 J	0.0033 J	mg/kg	HA-120COM-6-4-6	3 / 29	0.00012 : 0.00023	0.0033	NA	2.6 c	NA	NA	no	BSL
	78-93-3	2-Butanone (Methyl Ethyl Ketone)	0.0024 J	0.055	mg/kg	HA-120COM-5-4-6	20 / 29	0.00059 : 0.00083	0.055	NA	2700 n	NA	NA	no	BSL
	135-98-8	2-Phenylbutane (sec-Butyl/benzene)	0.00042 J	0.0015	mg/kg	HA-120COM-6-4-6	3 / 29	0.00014 : 0.00027	0.0015	NA	780 ns	NA	NA	no	BSL
	67-64-1	Acetone	0.0032 J	0.25 J	mg/kg	HA-120COM-5-4-6	24 / 29	0.0019 : 0.0028	0.25	NA	6100 n	NA	NA	no	BSL
	71-43-2	Benzene	0.00018 J	0.00018 J	mg/kg	HA-120COM-5-4-6	1 / 29	0.00013 : 0.00024	0.00018	NA	1.2 c**	NA	NA	no	BSL
	75-15-0	Carbon disulfide	0.00095 J	0.0037 J	mg/kg	HA-120COM-6-4-6	9 / 28	0.00081 : 0.0014	0.0037	NA	77 n	NA	NA	no	BSL
	108-90-7	Chlorobenzene	0.00078 J	0.0034 J	mg/kg	HA-120COM-6-4-6	3 / 29	0.00023 : 0.00043	0.0034	NA	28 n	NA	NA	no	BSL
	99-87-6	Cymene (p-Isopropyltoluene)	0.00068 J	0.0018	mg/kg	HA-120COM-5-4-6	2 / 29	0.00013 : 0.00025	0.0018	NA	NA	NA	NA	YES	NSL
	100-41-4	Ethylbenzene	0.00042 J	0.00042 J	mg/kg	HA-120COM-5-4-6	2 / 29	0.00011 : 0.00021	0.00042	NA	5.8 c*	NA	NA	no	BSL
	98-82-8	Isopropylbenzene (Cumene)	0.00029 J	0.00043 J	mg/kg	HA-120COM-6-4-6	2 / 29	0.00013 : 0.00024	0.00043	NA	190 n	NA	NA	no	BSL
	91-20-3	Naphthalene	0.0003 J	0.17	mg/kg	HA-120COM-5-4-6	5 / 29	0.00009 : 0.00017	0.17	NA	3.8 c**	NA	NA	no	BSL
	104-51-8	n-Butylbenzene	0.00036 J	0.0017	mg/kg	HA-120COM-6-4-6	3 / 29	0.00015 : 0.00028	0.0017	NA	390 ns	NA	NA	no	BSL
	103-65-1	n-Propylbenzene	0.00026 J	0.00082 J	mg/kg	HA-120COM-6-4-6	2 / 29	0.00014 : 0.00027	0.00082	NA	380 ns	NA	NA	no	BSL
	108-88-3	Toluene	0.00024 J	0.00064 J	mg/kg	HA-120COM-5-4-6	3 / 29	0.00013 : 0.00024	0.00064	NA	490 n	NA	NA	no	BSL
	1330-20-7	Xylene (total)	0.0013 J	0.0013 J	mg/kg	HA-120COM-5-4-6	1 / 29	0.00022 : 0.00042	0.0013	NA	58 n	NA	NA	no	BSL
	91-57-6	2-Methylnaphthalene	0.034 J	0.034 J	mg/kg	HA-120COM-4-2-4	1 / 29	0.021 : 0.026	0.034	NA	24 n	NA	NA	no	BSL
	83-32-9	Acenaphthene	0.019 J	0.1 J	mg/kg	HA-120COM-6-4-6	5 / 29	0.018 : 0.022	0.1	NA	360 n	NA	NA	no	BSL
	120-12-7	Anthracene	0.043 J	0.22	mg/kg	HA-120COM-6-4-6	6 / 29	0.034 : 0.041	0.22	NA	1800 n	NA	NA	no	BSL
	56-55-3	Benz(a)anthracene	0.057 J	0.78	mg/kg	HA-120COM-6-4-6	7 / 29	0.019 : 0.024	0.78	NA	1.1 c	NA	NA	no	BSL
	50-32-8	Benz(a)pyrene	0.052 J	0.87	mg/kg	HA-120COM-6-4-6	7 / 29	0.042 : 0.052	0.87	NA	0.11 c*	NA	NA	YES	ASL
	205-99-2	Benz(b)fluoranthene	0.077 J	1.3	mg/kg	HA-120COM-6-4-6	7 / 29	0.029 : 0.036	1.3	NA	1.1 c	NA	NA	YES	ASL
	191-24-2	Benz(g,h,i)perylene	0.04 J	0.63	mg/kg	HA-120COM-6-4-6	7 / 29	0.02 : 0.025	0.63	NA	180 n	NA	NA	no	BSL
	207-08-9	Benzo(k)fluoranthene	0.15	0.47	mg/kg	HA-120COM-6-4-6	6 / 29	0.028 : 0.034	0.47	NA	11 c	NA	NA	no	BSL
	218-01-9	Chrysene	0.021 J	1.1	mg/kg	HA-120COM-6-4-6	8 / 29	0.018 : 0.022	1.1	NA	110 c	NA	NA	no	BSL
	53-70-3	Dibenz(a,h)anthracene	0.048 J	0.14	mg/kg	HA-120COM-6-4-6	6 / 29	0.02 : 0.024	0.14	NA	0.11 c	NA	NA	YES	ASL
	132-64-9	Dibenzofuran	0.021 J	0.08 J	mg/kg	HA-120COM-6-4-6	4 / 29	0.016 : 0.02	0.08	NA	7.3 n	NA	NA	no	BSL
	206-44-0	Fluoranthene	0.033 J	3.3	mg/kg	HA-120COM-6-4-6	9 / 29	0.02 : 0.024	3.3	NA	240 n	NA	NA	no	BSL
	86-73-7	Fluorene	0.021 J	0.19	mg/kg	HA-120COM-5-4-6	5 / 29	0.017 : 0.021	0.19	NA	240 n	NA	NA	no	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.043 J	0.68	mg/kg	HA-120COM-6-4-6	7 / 29	0.024 : 0.03	0.68	NA	1.1 c	NA	NA	no	BSL
	91-20-3	Naphthalene	0.067 J	0.19	mg/kg	HA-120COM-5-4-6	5 / 29	0.021 : 0.026	0.19	NA	3.8 c**	NA	NA	no	BSL
	85-01-8	Phenanthrene	0.075 J	2	mg/kg	HA-120COM-6-4-6	7 / 29	0.021 : 0.026	2	NA	180 n	NA	NA	no	BSL
	129-00-0	Pyrene	0.021 J	2.4	mg/kg	HA-120COM-6-4-6	10 / 29	0.017 : 0.021	2.4	NA	180 n	NA	NA	no	BSL
HA-EPHC11-C22A	MADEP C11-C22 Aromatic Hydrocarbons, Adju	8.625	29.4	mg/kg	HA-120COM-7-4-6	9 / 29	6.59 : 8.5	29.4	NA	11 n	NA	NA	YES	ASL	
HA-EPHC19-C36	MADEP C19-C36 Aliphatic Hydrocarbons	7.16	28.2	mg/kg	HA-120COM-6-4-6	10 / 29	6.59 : 8.5	28.2	NA	23000 ns	NA	NA	no	BSL	
7429-90-5	Aluminum	2800 J-	17000 J-	mg/kg	HA-120COM-10-4-6	29 / 29		17000	NA	7700 n	NA	NA	YES	ASL	
7440-36-0	Antimony	0.38 J+	0.84 J+	mg/kg	HA-120COM-1-4-6	6 / 29	0.301 : 0.39	0.84	NA	3.1 n	NA	NA	no	BSL	
7440-38-2	Arsenic	0.574 J	73	mg/kg	HA-120COM-4-2-4	41 / 41		73	NA	0.68 c**R	NA	NA	YES	ASL	

**TABLE 5**  
**SUMMARY OF SUBSURFACE SOIL DATA AND SELECTION OF COPCS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 2.2: Occurrence, Distribution, and Selection of Chemicals of Potential Concern

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Subsurface Soil (0.5-6 ft bgs)

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)	
	7440-39-3	Barium	9.1	170	mg/kg	HA-120COM-10-4-6	29 / 29		170	NA	1500	n	NA	NA	no	BSL
	7440-41-7	Beryllium	0.08 J	0.31 J	mg/kg	HA-120COM-3-4-6	21 / 29	0.026 : 0.03	0.31	NA	16	n	NA	NA	no	BSL
	7440-43-9	Cadmium	0.089 J	0.21 J	mg/kg	HA-120COM-4-4-6	11 / 29	0.08 : 0.1	0.21	NA	7.1	n	NA	NA	no	BSL
	7440-70-2	Calcium	460	5000	mg/kg	HA-120COM-6-4-6	29 / 29		5000	NA	NA		NA	NA	no	EN
	7440-47-3	Chromium	6.5	850	mg/kg	IP/S-1/043/018/1/1/1	41 / 41		850	NA	12000	n	NA	NA	no	BSL
	7440-48-4	Cobalt	0.93 J	19.4	mg/kg	IA-120COMM-13-2-5-3	29 / 29		19.4	NA	2.3	n	NA	NA	YES	ASL
	7440-50-8	Copper	3	53	mg/kg	HA-120COM-7-4-6	29 / 29		53	NA	310	n	NA	NA	no	BSL
	57-12-5	Cyanide	1.7	1.7	mg/kg	HA-120COM-5-2-4	1 / 29	0.98 : 1.2	1.7	NA	2.3	n	NA	NA	no	BSL
	7439-89-6	Iron	3500	26800 J	mg/kg	IA-120COMM-13-2-5-3	29 / 29		26800	NA	5500	n	NA	NA	YES	ASL
	7439-92-1	Lead	1.83 J	460	mg/kg	HA-120COM-4-2-4	36 / 41	5.3 : 6.1	460	NA	400	L	NA	NA	YES	ASL
	7439-95-4	Magnesium	950	14000	mg/kg	HA-120COM-10-4-6	29 / 29		14000	NA	NA		NA	NA	no	EN
	7439-96-5	Manganese	35	460	mg/kg	HA-120COM-10-4-6	29 / 29		460	NA	180	n	NA	NA	YES	ASL
	7439-97-6	Mercury	0.088	0.301	mg/kg	HA-120COM-4-2-4	4 / 29	0.066 : 0.085	0.301	NA	1.1	n	NA	NA	no	BSL
	7440-02-0	Nickel	2.7	54.4	mg/kg	IA-120COMM-13-1-5-2	29 / 29		54.4	NA	150	n	NA	NA	no	BSL
	7440-09-7	Potassium	400	7100	mg/kg	HA-120COM-10-4-6	29 / 29		7100	NA	NA		NA	NA	no	EN
	7782-49-2	Selenium	0.377 J	1 J	mg/kg	HA-120COM-4-2-4	10 / 29	0.21 : 0.26	1	NA	39	n	NA	NA	no	BSL
	7440-22-4	Silver	0.39 J	0.39 J	mg/kg	HA-120COM-1-4-6	1 / 29	0.224 : 0.29	0.39	NA	39	n	NA	NA	no	BSL
	7440-23-5	Sodium	31 J	209	mg/kg	IA-120COMM-11-5-5-6	29 / 29		209	NA	NA		NA	NA	no	EN
	7440-62-2	Vanadium	5.5	39	mg/kg	HA-120COM-10-4-6	29 / 29		39	NA	39	n	NA	NA	no	BSL
	7440-66-6	Zinc	6.4	160	mg/kg	HA-120COM-4-4-6	29 / 29		160	NA	2300	n	NA	NA	no	BSL
	72-55-9	4,4'-DDE	0.0087	0.0119	mg/kg	HA-120COM-4-4-6	2 / 29	0.00825 : 0.0101	0.0119	NA	2	c**	NA	NA	no	BSL
	57-74-9	Chlordane	0.0932 J	0.0932 J	mg/kg	HA-120COM-4-2-4	1 / 29	0.067 : 0.0818	0.0932	NA	1.7	c**	NA	NA	no	BSL

Footnotes:

- (1) J - value is estimated; J- value is estimated and potentially biased low; J+ - value is estimated and potentially biased high.
- (2) Maximum concentration used to screen data.
- (3) No back ground values available.
- (4) Regional Screening Levels (RSL) are the Residential Soil values, based on a cancer risk of 1E-06 and a hazard index of 0.1 and were obtained from United States Environmental Protection Agency Regions 3, 6, and 9, Regional Screening Table, [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), updated November 2017.

c = cancer; \* = where: n SL < 100X c SL; \*\* = where n SL < 10X c SL; n = noncancer

s = Concentration may exceed chemical saturation limit (See RSL User Guide)

L = see RSL user guide on lead ; R = RBA applied (See User Guide for Arsenic notice)

Pyrene RSL used as a surrogate for benzo(ghi)perylene, and phenanthrene.

Total petroleum hydrocarbons (aliphatic high) RSL used for C19-C36 aliphatic hydrocarbons.

Total petroleum hydrocarbons (aromatic medium) RSL used for C11-C22 aromatic hydrocarbons.

Trivalent chromium RSL used as a surrogate for Chromium, Total.

Hexavalent chromium was not detected in soil samples collected at the Property (see Table 2).

The RSL value for lead is not reduced by a factor of 10 because lead risk is not additive with other COPCs.

- (5) A compound was selected as a COPC if the maximum detected level exceeded the Residential RSL

ASL - Above Screening Level, compound selected as a COPC.

BSL - Below Screening Level, compound not selected as a COPC.

EN - Essential Nutrient, compound not selected as a COPC.

NSL - No Screening Level available, compound selected as a COPC.

TABLE 6

## SELECTION OF EXPOSURE PATHWAYS

120 COMMERCE WAY

WOBURN, MASSACHUSETTS

FILE NO 43450

RAGS Part D Table 1: Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
FUTURE	Soil	Soil 0 - 0.5 ft and Soil 0 - 6 ft	120 Commerce Way (Class B and C Land)	Resident	Adult	Dermal Ingestion	Quantitative Quantitative	The re-developed property will be almost entirely covered with a building and paved parking areas, which will render exposure pathways to soil incomplete. However, the risk assessment assumes that residents could come into contact with soil during outdoor activities while at their place of residence, and that soil as deep as 6 feet below ground surface could be placed at or near the ground surface, making it accessible for potential exposures.
					Child	Dermal Ingestion	Quantitative Quantitative	Visitors are assumed to contact soil during outdoor activities, while visiting the property. The residential scenario is protective for visitors; therefore, a visitor scenario is not quantitatively evaluated.
				Visitor	Adult	Dermal Ingestion	Qualitative Qualitative	
					Child	Dermal Ingestion	Qualitative Qualitative	
				C/I Worker	Adult	Dermal Ingestion	Quantitative Quantitative	Commercial workers are assumed to contact soil during outdoor activities, while working at the property. The residential scenario is protective for commercial workers; therefore, a commercial worker scenario is not quantitatively evaluated.
				Construction Worker	Adult	Dermal Ingestion	Quantitative Quantitative	Construction/excavation workers are assumed to incidentally ingest and dermally contact soil during redevelopment work.
	Air - Dust	120 Commerce Way (Class B and C Land)	Resident	Adult	Inhalation	Quantitative	Windborne dust can be inhaled by persons at or down-wind of unvegetated soil.	
				Child	Inhalation	Quantitative	Windborne dust can be inhaled by persons at or down-wind of unvegetated soil. Residential scenario is protective for visitors.	
			Visitor	Adult	Inhalation	Qualitative		
				Child	Inhalation	Qualitative		
			C/I Worker	Adult	Inhalation	Qualitative	Windborne dust can be inhaled by persons at or down-wind of unvegetated soil. Residential scenario is protective for workers.	
			Construction Worker	Adult	Inhalation	Quantitative	Excavation activities could produce dust.	
	Air - Vapors	120 Commerce Way (Class B and C Land)	Resident	Adult	Inhalation	Quantitative	Only three marginally volatile chemicals (benzo(a)anthracene, 1,3-dichlorobenzene, and C11-C22 Aromatic EPH) were identified as COPCs in soil; potential exposures to those COPCs are quantitatively evaluated. Otherwise, this exposure pathway is qualitatively evaluated via the COPC screening process.	
				Child	Inhalation	Quantitative		
			Visitor	Adult	Inhalation	Qualitative		
				Child	Inhalation	Qualitative		
			C/I Worker	Adult	Inhalation	Qualitative		
			Construction Worker	Adult	Inhalation	Quantitative		
	Indoor Air	120 Commerce Way (Class B and C Land)	Resident	Adult	Inhalation	None	Vapor intrusion from soil is unlikely to be a significant exposure pathway because volatile chemicals have been detected in soil at very low concentrations. Nonetheless, the building will include a vapor mitigation system to ensure that the vapor intrusion pathway is incomplete.	
				Child	Inhalation	None		
			Visitor	Adult	Inhalation	None		
				Child	Inhalation	None		
			C/I Worker	Adult	Inhalation	None		
			Construction Worker	Adult	Inhalation	None		
	Soil greater than 6 ft	120 Commerce Way (Class B and C Land)	Resident	Adult	Dermal Ingestion	None None	Excavation of soil greater than 6 feet is prohibited by existing Class B land use restrictions. Excavation of soil greater than 6 feet requires a soil management plan. A soil management plan and health and safety plan will be implemented during re-development to ensure that any potential exposures to soil deeper than 6 feet will be managed, to ensure that construction workers are not exposed to levels of constituents in soil that would pose an unacceptable health risk.	
				Child	Dermal Ingestion	None None		
			Visitor	Adult	Dermal Ingestion	None None		
				Child	Dermal Ingestion	None None		
			C/I Worker	Adult	Dermal Ingestion	None None		
			Construction Worker	Adult	Dermal Ingestion	None None		
			Air - Dust	Resident	Inhalation	None		
				Child	Inhalation	None		
				Visitor	Inhalation	None		
				Child	Inhalation	None		
				C/I Worker	Inhalation	None		
				Construction Worker	Inhalation	None		

TABLE 6

## SELECTION OF EXPOSURE PATHWAYS

120 COMMERCE WAY

WOBURN, MASSACHUSETTS

FILE NO 43450

RAGS Part D Table 1: Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Air - Vapors	120 Commerce Way (Class B and C Land)	Resident	Adult	Inhalation	None		Soil deeper than 6 feet is generally within the saturated zone, indicating that migration of vapors is unlikely. However, a soil management plan and health and safety plan will be implemented during re-development to ensure that any potential exposures to soil deeper than 6 feet will be managed, to ensure that construction workers are not exposed to levels of constituents in soil that would pose an unacceptable health risk.
				Child	Inhalation	None		
				Visitor	Adult	Inhalation	None	
				Child	Inhalation	None		
			C/I Worker	Adult	Inhalation	None		
			Construction Worker	Adult	Inhalation	None		
	Indoor Air	120 Commerce Way (Class B and C Land)	Resident	Adult	Inhalation	None		Soil deeper than 6 feet is generally within the saturated zone, indicating that migration of vapors is unlikely. Nonetheless, the building will include a vapor mitigation system to ensure that the vapor intrusion pathway is incomplete.
				Child	Inhalation	None		
				Visitor	Adult	Inhalation	None	
				Child	Inhalation	None		
			C/I Worker	Adult	Inhalation	None		
			Construction Worker	Adult	Inhalation	None		
	Groundwater	Overburden Groundwater	120 Commerce Way (Class B and C Land)	Resident	Adult	Dermal Inhalation Ingestion	None None None	Use of groundwater for any purposes is prohibited by existing land use restrictions. Those restrictions will remain in effect under future use conditions.
					Child	Dermal Inhalation Ingestion	None None None	
					Visitor	Adult	Dermal Inhalation Ingestion	
					Child	Dermal Inhalation Ingestion	None None None	
					C/I Worker	Adult	Dermal Inhalation Ingestion	
					Construction Worker	Adult	Dermal Inhalation Ingestion	Groundwater is deeper than the depths that most excavations are anticipated. However, a health and safety plan and groundwater dewatering management plan will be implemented to ensure that any potential exposures to groundwater will be managed, to ensure that construction workers are not exposed to levels of constituents in groundwater that would pose an unacceptable health risk.
					Resident	Adult	Inhalation	
					Child	Inhalation	None	
					Visitor	Adult	Inhalation	
					C/I Worker	Adult	Inhalation	
			120 Commerce Way (Class B and C Land)	Construction Worker	Adult	Inhalation	None	The building will include a vapor mitigation system to ensure that the vapor intrusion pathway is incomplete.

C/I - Commercial/Industrial

**TABLE 7**  
**SELECTION OF EXPOSURE POINT CONCENTRATIONS - SURFACE SOIL**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

## RAGS Part D Table 3.1: Exposure Point Concentration Summary

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Surface Soil (0-6 in bgs)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
	Benzo(a)anthracene	mg/kg	2.3	4.821 N [a]	13.3	4.8E+00	mg/kg	95% UCL	(3)
	Benzo(a)pyrene	mg/kg	2.3	4.818 N [a]	12.6	4.8E+00	mg/kg	95% UCL	(3)
	Benzo(b)fluoranthene	mg/kg	3.8	7.788 N [a]	20	7.8E+00	mg/kg	95% UCL	(3)
	Dibenz(a,h)anthracene	mg/kg	0.41	0.855 N [a]	2.15	8.6E-01	mg/kg	95% UCL	(3)
	Indeno(1,2,3-cd)pyrene	mg/kg	1.9	3.954 N [a]	10.35	4.0E+00	mg/kg	95% UCL	(3)
	MADEP C11-C22 Aromatic Hydrocarbons, Adju	mg/kg	182	1622 G [b]	1385	1.4E+03	mg/kg	Maximum	(4)
	Aluminum	mg/kg	5405	7008 LN [c]	10000 J-	7.0E+03	mg/kg	95% UCL	(3)
	Arsenic	mg/kg	12.0	24.98 NP [d]	58	2.5E+01	mg/kg	95% UCL	(3)
	Cobalt	mg/kg	3.6	5.931 G [e]	10	5.9E+00	mg/kg	95% UCL	(3)
	Iron	mg/kg	7350	9566 LN [c]	15000	9.6E+03	mg/kg	95% UCL	(3)
	Manganese	mg/kg	87	133.6 G [e]	220	1.3E+02	mg/kg	95% UCL	(3)

Footnotes:

- (1) 95% UCL = 95% upper confidence limit on the arithmetic mean
  - N [a] - Normal Distribution - 95% KM (t) UCL
  - G [b] - Gamma Distribution - 95% KM Bootstrap t UCL
  - LN [c] - Lognormal Distribution - 95% H-UCL
  - NP [d] - Nonparametric Distribution - 95% Chebyshev (Mean, Sd) UCL
  - G [e] - Gamma Distribution - 95% Adjusted Gamma UCL
- (2) EPCs are the lower value of either the calculated 95% Upper Confidence Limit (95%UCL), or the maximum detected concentrations of COPCs. 95%UCLs are calculated using 2016 EPA ProUCL software, version 5.1.002.
- (3) Maximum concentration exceeds the 95% UCL, 95% UCL selected as the Exposure Point Concentration
- (4) Maximum concentration is less than the 95% UCL, maximum concentration selected as the Exposure Point Concentration

**TABLE 8**  
**SELECTION OF EXPOSURE POINT CONCENTRATIONS - SUBSURFACE SOIL**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 3.2: Exposure Point Concentration Summary

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Subsurface Soil (0.5-6 ft bgs)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
Subsurface Soil	1,3-Dichlorobenzene	mg/kg	0.00017	0.000309 N [a]	0.0015 J	3.1E-04	mg/kg	95% UCL	(3)
	Cymene (p-Isopropyltoluene)	mg/kg	0.00017	0.00057 NP [b]	0.0018	5.7E-04	mg/kg	95% UCL	(3)
	Benzo(a)pyrene	mg/kg	0.11	0.187 N [a]	0.87	1.9E-01	mg/kg	95% UCL	(3)
	Benzo(b)fluoranthene	mg/kg	0.15	0.261 N [a]	1.3	2.6E-01	mg/kg	95% UCL	(3)
	Dibenz(a,h)anthracene	mg/kg	0.024	0.0401 N [a]	0.14	4.0E-02	mg/kg	95% UCL	(3)
	MADEP C11-C22 Aromatic Hydrocarbons, Adju	mg/kg	8.3	12.4 N [a]	29.4	1.2E+01	mg/kg	95% UCL	(3)
	Aluminum	mg/kg	7742	9254 G [c]	17000 J-	9.3E+03	mg/kg	95% UCL	(3)
	Arsenic	mg/kg	10.8	16.3 LN [d]	73	1.6E+01	mg/kg	95% UCL	(3)
	Cobalt	mg/kg	7.5	10.36 G [c]	19.4	1.0E+01	mg/kg	95% UCL	(3)
	Iron	mg/kg	11860	15355 LN [d]	26800 J	1.5E+04	mg/kg	95% UCL	(3)
	Lead	mg/kg	33	94.94 NP [b]	460	3.3E+01	mg/kg	Mean	(5)
	Manganese	mg/kg	165	220.1 G [c]	460	2.2E+02	mg/kg	95% UCL	(3)

Footnotes:

- (1) 95% UCL = 95% upper confidence limit on the arithmetic mean
  - N [a] - Normal Distribution - 95% KM (t) UCL
  - NP [b] - Nonparametric Distribution - 95% KM (Chebyshev) UCL
  - G [c] - Gamma Distribution - 95% Adjusted Gamma UCL
  - LN [d] - Lognormal Distribution - 95% H-UCL
- (2) EPCs are the lower value of either the calculated 95% Upper Confidence Limit (95%UCL), or the maximum detected concentrations of COPCs. 95%UCLs are calculated using the 2016 EPA ProUCL software, version 5.1.002.
- (3) Maximum concentration exceeds the 95% UCL, 95% UCL selected as the Exposure Point Concentration
- (4) Maximum concentration is less than the 95% UCL, maximum concentration selected as the Exposure Point Concentration
- (5) In accordance with USEPA guidance, the arithmetic mean is the appropriate EPC for lead in soil (USEPA, 2007)

**TABLE 9**  
**EXPOSURE PARAMETERS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 4: Values Used For Daily Intake Calculations

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Surface soil and Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Ingestion	Resident	Child (ages 0 - <6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW AT-N CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Averaging Time (Non-Cancer) Conversion Factor Oral absorption factor	95% UCL 200 1 350 6 15 365 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg day kg/mg unitless	USEPA, 1994 USEPA, 2014 Assumption USEPA, 2014 Balance of 26-yr exposure USEPA, 2014 USEPA, 2014 / equal to ED	CHEMICAL INTAKE-INGESTION (non-cancer) (mg/kg-day) = CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
	Resident	Child (ages 0 - <2)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW ADAF AT-C CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Age-Dependent Adjustment Factor Averaging Time (Cancer) Conversion Factor Oral absorption factor	95% UCL 100 1 350 2 80 10 25550 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg unitless day kg/mg unitless	USEPA, 1994 USEPA, 2014 Assumption USEPA, 2014 Ages 0 - <2 USEPA, 2014 USEPA, 2008 USEPA, 2014	CHEMICAL INTAKE-INGESTION (cancer) (mg/kg-day) = CS-c x IFSM x FI x EF x ABS x CF1 x 1/AT where IFSM (mg-yg/kg-day) = (child ED [0-2] x child IR [0-2] x ADAF [0-2] / child BW [0-2]) + (child ED [2-6] x child IR [2-6] x ADAF [2-6] / child BW [2-6]) + (adol. ED [6-16] xadol. IR [6-16] x ADAF [6-16] /adol. BW [6-16]) + (adult ED x adult IR x adult ADAF / adult BW)
	Resident	Child (ages 2 - <6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW ADAF AT-C CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Age-Dependent Adjustment Factor Averaging Time (Cancer) Conversion Factor Oral absorption factor	95% UCL 100 1 350 4 80 3 25550 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg unitless day kg/mg unitless	USEPA, 1994 USEPA, 2014 Assumption USEPA, 2014 Ages 2 - <6 USEPA, 2014 USEPA, 2008 USEPA, 2014	For carcinogens that do not act through a mutagenic mode of action, ADAF is set equal to 1 for all age groups
	Resident	Adolescent (ages 6 - <16)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW ADAF AT-C CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Age-Dependent Adjustment Factor Averaging Time (Cancer) Conversion Factor Oral absorption factor	95% UCL 100 1 350 10 80 3 25550 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg unitless day kg/mg unitless	USEPA, 1994 USEPA, 2014 Assumption USEPA, 2014 Ages 6 - <16 USEPA, 2014 USEPA, 2008 USEPA, 2014	
	Resident	Adult (ages 16 - 26)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW ADAF AT-C CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Age-Dependent Adjustment Factor Averaging Time (Cancer) Conversion Factor Oral absorption factor	95% UCL 100 1 350 10 80 1 25550 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg unitless day kg/mg unitless	USEPA, 1994 USEPA, 2014 Assumption USEPA, 2014 Balance of 26-yr exposure USEPA, 2014 USEPA, 2008 USEPA, 2014	

**TABLE 9**  
**EXPOSURE PARAMETERS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 4: Values Used For Daily Intake Calculations

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Surface soil and Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
	Construction Worker	Adult	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c IR-S FI EF ED BW AT-C AT-N CF1 ABS	Chemical Concentration in Soil Ingestion Rate of Soil Fraction Ingested Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) Conversion Factor Oral absorption factor	95% UCL 330 1 250 1 80 25550 365 1.0E-06 chemical-specific	mg/kg mg/day unitless day/yr yr kg day kg/mg unitless	USEPA, 1994 USEPA, 2002 Assumption Assumption [2] USEPA, 2002 USEPA, 2014 USEPA, 2014 USEPA, 2014 USEPA, 2014 / equal to ED	CHEMICAL INTAKE-INGESTION (non-cancer) (mg/kg-day) = CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
Dermal	Resident	Child (ages 1 - 6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS DAevent SA EF ED EV AF ABSD BW AT-N CF	Chemical Concentration in Soil Dose Absorbed Per Event Skin Surface Area Available for Contact Exposure Frequency Exposure Duration Events per Day Adherence Factor Dermal Absorption Factor Body Weight Averaging Time (Non-Cancer) Conversion Factor	95% UCL chemical-specific 2373 350 6 1 0.2 chemical-specific 15 2190 1.0E-06	mg/kg mg/cm <sup>2</sup> -event cm <sup>2</sup> day/yr yr event/day mg/cm <sup>2</sup> -event unitless kg day kg/mg	USEPA, 1994 USEPA, 2004 USEPA, 2014 USEPA, 2014 USEPA, 2014 USEPA, 2014 USEPA, 2004 USEPA, 2014 USEPA, 2014 / equal to ED	INTAKE-DERMAL (non-cancer) (mg/kg-day) = DAevent x SA x EF x ED x EV x 1/BW x 1/AT  Where DAevent = CS x AF x ABSd x CF
	Resident	Child (ages 0 - <2)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS DAevent SA EF ED EV ADAF AF ABSD BW AT-C CF	Chemical Concentration in Soil Dose Absorbed Per Event Skin Surface Area Available for Contact Exposure Frequency Exposure Duration Events per Day Age-Dependent Adjustment Factor Adherence Factor Dermal Absorption Factor Body Weight Averaging Time (Cancer) Conversion Factor	95% UCL chemical-specific 2373 350 2 1 10 0.2 chemical-specific 15 25550 1.0E-06	mg/kg mg/cm <sup>2</sup> -event cm <sup>2</sup> day/yr yr event/day unitless mg/cm <sup>2</sup> -event unitless kg day kg/mg	USEPA, 1994 USEPA, 2004 USEPA, 2014 USEPA, 2014 Ages 0 - <2 USEPA, 2014 USEPA, 2008 USEPA, 2014 USEPA, 2004 USEPA, 2014 USEPA, 2014	INTAKE-DERMAL (cancer) (mg/kg-day) = DAevent x SA x EF x EV x 1/AT  Where DAevent = CS x DFSM x ABSd x CF  Where DFSM (mg-yr/kg-day) = (child ED [0-2] x child SA [0-2] x child AF [0-2] x ADAF [0-2] / child BW [0-2]) + (child ED [2-6] x child SA [2-6] x child AF [2-6] x ADAF [2-6] / child BW [2-6]) + (adol. ED [6-16] x adul. SA [6-16] x adul. AF [6-16] x ADAF [6-16] / adul. BW [6-16]) + (adult ED x adult SA x adult AF x adult ADAF / adult BW)
	Resident	Child (ages 2 - <6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS DAevent SA EF ED EV ADAF AF ABSD BW AT-C CF	Chemical Concentration in Soil Dose Absorbed Per Event Skin Surface Area Available for Contact Exposure Frequency Exposure Duration Events per Day Age-Dependent Adjustment Factor Adherence Factor Dermal Absorption Factor Body Weight Averaging Time (Cancer) Conversion Factor	95% UCL chemical-specific 2373 350 4 1 3 0.2 chemical-specific 15 25550 1.0E-06	mg/kg mg/cm <sup>2</sup> -event cm <sup>2</sup> day/yr yr event/day unitless mg/cm <sup>2</sup> -event unitless kg day kg/mg	USEPA, 1994 USEPA, 2004 USEPA, 2014 USEPA, 2014 Ages 2 - <6 USEPA, 2014 USEPA, 2008 USEPA, 2014 USEPA, 2004 USEPA, 2014 USEPA, 2014	For carcinogens that do not act through a mutagenic mode of action, ADAF is set equal to 1 for all age groups

**TABLE 9**  
**EXPOSURE PARAMETERS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 4: Values Used For Daily Intake Calculations

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Surface soil and Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Resident	Adolescent (ages 6 - <16)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)		CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm <sup>2</sup> -event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	6032	cm <sup>2</sup>	USEPA, 2014	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	10	yr	Ages 6 - <16	
				EV	Events per Day	1	event/day	USEPA, 2014	
				ADAF	Age-Dependent Adjustment Factor	3	unitless	USEPA, 2008	
				AF	Adherence Factor	0.07	mg/cm <sup>2</sup> -event	USEPA, 2014	
				ABSD	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	80	kg	USEPA, 2014	
Resident	Adult (ages 16 - 26)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)		AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				CF	Conversion Factor	1.0E-06	kg/mg	USEPA, 2014	
				CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm <sup>2</sup> -event	USEPA, 2004	
				SA	Skin Surface Area Available for Contact	6032	cm <sup>2</sup>	USEPA, 2014	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	10	yr	Balance of 26-yr exposure	
				EV	Events per Day	1	event/day	USEPA, 2014	
				ADAF	Age-Dependent Adjustment Factor	1	unitless	USEPA, 2008	
				AF	Adherence Factor	0.07	mg/cm <sup>2</sup> -event	USEPA, 2014	
Construction Worker	Adult	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)		ABSD	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	INTAKE-DERMAL (mg/kg-day) = DAevent x SA x EF x ED x EV x 1/BW x 1/AT  Where DAevent = CS x AF x ABSD x CF
				BW	Body Weight	80	kg	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	day	USEPA, 2014	
				CF	Conversion Factor	1.00E-06	kg/mg	USEPA, 2014 / equal to ED	

**TABLE 9**  
**EXPOSURE PARAMETERS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 4: Values Used For Daily Intake Calculations

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Surface soil and Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Dust Ambient Vapor Inhalation	Resident	Child (ages 1 - 6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INHALATION (non-cancer) ( $\mu\text{g}/\text{m}^3$ ) = CAair x ED x EF x ET x 1/AT x 1/24 hours CAair = CS-c x 1/PEF x 1000 $\mu\text{g}/\text{mg}$ CS-c x 1/VF x 1000 $\mu\text{g}/\text{mg}$
				CAair	Concentration in Air	95% UCL	ug/m <sup>3</sup>	Modeled from soil	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	6	yr	USEPA, 2014	
				ET	Exposure Time	24	hr/hr	USEPA, 2014	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 2014 / equal to ED per USEPA, 2002 [1]	
				VF	Volatilization Factor	chemical-specific	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				PEF	Particulate Emission Factor	7.90E+09	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INHALATION (cancer) ( $\mu\text{g}/\text{m}^3$ ) = CAair x INMH x 1/AT x 1/24 hours CAair = CS-c x 1/PEF x 1000 $\mu\text{g}/\text{mg}$ CS-c x 1/VF x 1000 $\mu\text{g}/\text{mg}$
				CAair	Concentration in Air	95% UCL	ug/m <sup>3</sup>	Modeled from soil	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	2	yr	Ages 0 - <2	
				ET	Exposure Time	24	hr/hr	USEPA, 2014	
				ADAF	Age-Dependent Adjustment Factor	10	unitless	USEPA, 2008	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	730	day	USEPA, 2014 / equal to ED per USEPA, 2002 [1]	
				VF	Volatilization Factor	chemical-specific	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				PEF	Particulate Emission Factor	7.90E+09	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	INHM = (child ET [0-2] x child EF [0-2] x child ED [0-2] x ADAF [0-2]) + (child ET [2-6] x child EF [2-6] x child ED [2-6] x ADAF [2-6]) + (adol. ET [6-16] xadol. EF [6-16] xadol. ED [6-16] x ADAF [6-16]) + (adult ET x adult EF x adult ED x adult ADAF)
		Child (ages 2-<6)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CAair	Concentration in Air	95% UCL	ug/m <sup>3</sup>	Modeled from soil	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	4	yr	Ages 2 - <6	
				ET	Exposure Time	24	hr/hr	USEPA, 2014	
				ADAF	Age-Dependent Adjustment Factor	3	unitless	USEPA, 2008	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	1460	day	USEPA, 2014 / equal to ED per USEPA, 2002 [1]	
				VF	Volatilization Factor	chemical-specific	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
		Child (ages 6-<16)	Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	PEF	Particulate Emission Factor	7.90E+09	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	For carcinogens that do not act through a mutagenic mode of action, ADAF is set equal to 1 for all age groups
				CAair	Concentration in Air	95% UCL	ug/m <sup>3</sup>	Modeled from soil	
				EF	Exposure Frequency	350	day/yr	USEPA, 2014	
				ED	Exposure Duration	10	yr	Balance of 26-yr exposure	
				ET	Exposure Time	24	hr/hr	USEPA, 2014	
				ADAF	Age-Dependent Adjustment Factor	3	unitless	USEPA, 2008	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	3650	day	USEPA, 2014 / equal to ED per USEPA, 2002 [1]	
				VF	Volatilization Factor	chemical-specific	m <sup>3</sup> /kg	per USEPA, 2002 [1]	
				PEF	Particulate Emission Factor	7.90E+09	m <sup>3</sup> /kg	per USEPA, 2002 [1]	

**TABLE 9**  
**EXPOSURE PARAMETERS**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 4: Values Used For Daily Intake Calculations

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Surface soil and Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Construction Worker	Adult		Surface soil (0-6 inches) Subsurface soil (0.5 - 6 ft)	CS-c CAair EF ED ET AT-C AT-N VF PEF	Chemical Concentration in Soil Concentration in Air Exposure Frequency Exposure Duration Exposure Time Averaging Time (Cancer) Averaging Time (Non-Cancer) Volatilization Factor Particulate Emission Factor	95% UCL 95% UCL 250 1 8 25550 365 chemical-specific 6.76E+07	mg/kg ug/m <sup>3</sup> day/yr yr hr/hr day day m <sup>3</sup> /kg m <sup>3</sup> /kg	USEPA, 1994 Modeled from soil Assumption [2] USEPA, 2014 USEPA, 2002 USEPA, 2014 USEPA, 2014 / equal to ED per USEPA, 2002 [1] per USEPA, 2002 [1]	CHEMICAL INTAKE-INHALATION (non-cancer) (ug/m <sup>3</sup> ) = CAair x ED x EFo x ETo x 1/AT CAair = CS-c x 1/PEF x 1000 ug/mg CS-c x 1/VF x 1000 ug/mg

USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No. 2

USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005

EPA, 2008. "Handbook for Implementing Supplemental Cancer Guidance at Waste and Cleanup Sites"; Office of Emergency and Remedial Response

EPA, 2014 - Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120. February 6, 2014

[1] - Dispersion models are in Attachment C

[2] - Based on site-specific assumption that construction will occur over a 1-year period.

NA - Not Applicable

m<sup>3</sup> - cubic meters

ug - micrograms

kg - kilograms

mg - milligrams

UCL - upper confidence limit

cm<sup>2</sup> - square centimeters

yr - year

hr - hour

**TABLE 10**  
**CANCER TOXICITY DATA -- ORAL/DERMAL**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO. 43450**

Page 1 of 1

RAGS Part D Table 6.1: Cancer Toxicity Values - Oral/Dermal

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source(s)	Date(s)
Isopropyltoluene	ND			ND		ND		
1,3-Dichlorobenzene	NA			NA		D	IRIS	December 2017
Benzo(a)anthracene	1.0E-01	(mg/kg/day) <sup>-1</sup>	89%	1.0E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Benzo(a)pyrene	1.0E+00	(mg/kg/day) <sup>-1</sup>	89%	1.0E+00	(mg/kg/day) <sup>-1</sup>	Carcinogenic to humans	IRIS	December 2017
Benzo(b)fluoranthene	1.0E-01	(mg/kg/day) <sup>-1</sup>	89%	1.0E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Dibenzo(a,h)anthracene	1.0E+00	(mg/kg/day) <sup>-1</sup>	89%	1.0E+00	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Indeno(1,2,3-cd)pyrene	1.0E-01	(mg/kg/day) <sup>-1</sup>	89%	1.0E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Aluminum	ND			ND		ND		
Arsenic	1.5E+00	(mg/kg/day) <sup>-1</sup>	60%	1.5E+00	(mg/kg/day) <sup>-1</sup>	A	IRIS	December 2017
Cobalt	ND			ND		ND		
Iron	ND			ND		ND		
Lead	NA			NA		B2	IRIS	December 2017
Manganese	NA			NA		D	IRIS	December 2017
C11-C22 Aromatics	ND			ND				

**Notes:**

In accordance with OSWER 9285.7-53, slope factors are identified from the following hierarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System:

December 2017

ND = no data available

kg = kilogram

mg = milligram

m<sup>3</sup> = cubic meter

ug = microgram

BW = body weight

NA: not applicable

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004)

Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal SF = Oral SF / Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

**Weight of Evidence:**

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

**TABLE 11**  
**CANCER TOXICITY DATA -- INHALATION**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO. 43450**

RAGS Part D Table 6.2: Cancer Toxicity Values - Inhalation

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor (1)		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units	Value	Units		Source(s)	Date(s)
Isopropyltoluene	ND		ND		ND		
1,3-Dichlorobenzene	NA		NA		D	IRIS	December 2017
Benzo(a)anthracene	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.1E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Benzo(a)pyrene	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.1E+00	(mg/kg/day) <sup>-1</sup>	Carcinogenic to humans	IRIS	December 2017
Benzo(b)fluoranthene	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.1E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Dibenzo(a,h)anthracene	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.1E+00	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Indeno(1,2,3-cd)pyrene	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.1E-01	(mg/kg/day) <sup>-1</sup>	B2	IRIS	December 2017
Aluminum	ND		ND		ND		
Arsenic	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.5E+01	(mg/kg/day) <sup>-1</sup>	A	IRIS	December 2017
Cobalt	9.0E-03		3.2E+01	(mg/kg/day) <sup>-1</sup>	Likely to be carcinogenic in humans	PPRTV	December 2017
Iron	ND		ND		ND		
Lead	NA		NA		B2	IRIS	December 2017
Manganese	NA		NA		D	IRIS	December 2017
C11-C22 Aromatics	ND		ND		ND		

**Notes:**

In accordance with OSWER 9285.7-53, unit risk values are identified from the following hierarchy of sources:

Tier 1: IRIS = Integrated Risk Information System: December 2017

Tier 2: PPRTV = Preliminary Peer-Reviewed Reference Toxicity Value December 2017 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants at Superfund Sites

(1) - Inhalation cancer dose-response values are typically published as unit risk values. Unit risk values may be converted to slope factors using the following equation (HEAST, 1997):  
 Adjustment = 70 kg [adult body weight] \* 1000 ug/mg [conversion factor] / 20 m<sup>3</sup>/day [inhalation rate]  
 and: Inhalation Slope Factor = Unit Risk \* Adjustment  
 For inhalation dose-response values published as slope factors it is assumed that the value has been converted from a Unit Risk value. Therefore, the slope factor is converted back to a unit risk value as follows: 20 m<sup>3</sup>/day / 70 kg \* 1000 ug/mg

**Weight of Evidence:**

- A - Human carcinogen
- B1 - Probable human carcinogen - indicates that limited human data are available
- B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - Possible human carcinogen
- D - Not classifiable as a human carcinogen

BW = body weight

kg = kilogram

m<sup>3</sup> = cubic meter

mg = milligram

μg = microgram

ND = no data available

**TABLE 12**  
**NON-CANCER TOXICITY DATA -- ORAL/DERMAL**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO. 43450**

RAGS Part D Table 5.1: Non-Cancer Toxicity Values - Oral/Dermal

Chemical of Potential Concern	Chronic/Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
Isopropyltoluene	chronic	ND			ND					
	subchronic	ND			ND					
1,3-Dichlorobenzene	chronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Endocrine	100	Subchronic	
	subchronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Endocrine	100	MRL	June 2017
Benzo(a)anthracene	chronic	ND			ND				IRIS	December 2017
	subchronic	ND			ND					
Benzo(a)pyrene	chronic	3.0E-04	mg/kg/day	89%	3.0E-04	mg/kg/day	Developmental; neurobehavioral changes	300	IRIS	December 2017
	subchronic	3.0E-04	mg/kg/day	89%	3.0E-04	mg/kg/day	Developmental; neurobehavioral changes	300	Chronic	
Benzo(b)fluoranthene	chronic	ND			ND				IRIS	December 2017
	subchronic	ND			ND					
Dibenzo(a,h)anthracene	chronic	ND			ND					
	subchronic	ND			ND					
Indeno(1,2,3-cd)pyrene	chronic	ND			ND				IRIS	December 2017
	subchronic	ND			ND					
Aluminum	chronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	CNS; NeuROTOXICITY	100	PPRTV	December 2017
	subchronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	NeuROTOXICITY	30	MRL	June 2017
Arsenic	chronic	3.0E-04	mg/kg/day	60%	3.0E-04	mg/kg/day	Skin; keratosis and hyperpigmentation	3/1	IRIS	December 2017
	subchronic	3.0E-04	mg/kg/day	60%	3.0E-04	mg/kg/day	Skin; keratosis and hyperpigmentation	3/1	Chronic	
Cobalt	chronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	Thyroid; decreased iodine uptake	3,000	PPRTV	December 2017
	subchronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	Thyroid; decreased iodine uptake	300	PPRTV	December 2017
Iron	chronic	7.0E-01	mg/kg/day	100%	7.0E-01	mg/kg/day	GI system; gastrointestinal effects	1.5	PPRTV	December 2017
	subchronic	7.0E-01	mg/kg/day	100%	7.0E-01	mg/kg/day	GI system; gastrointestinal effects	1.5	PPRTV	December 2017
Lead	chronic	ND			ND				IRIS	December 2017
	subchronic	ND			ND					
Manganese (non-diet)	chronic	2.4E-02	mg/kg/day	4%	9.6E-04	mg/kg/day	CNS; CNS effects	3/1	IRIS	December 2017
	subchronic	2.4E-02	mg/kg/day	4%	9.6E-04	mg/kg/day	CNS; Impairment of neurobehavioral function	1/3	Chronic	
C11-C22 Aromatics	chronic	3.0E-02	mg/kg/day	100%	3.0E-02	mg/kg/day	Hematological; Anemia	3,000	PPRTV	December 2017
	subchronic	3.0E-01	mg/kg/day	100%	3.0E-01	mg/kg/day	Hematological; anemia	300	PPRTV	December 2017

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following hierarchy of sources:

- Tier 1: IRIS = Integrated Risk Information System: December 2017  
 Tier 2: PPRTV = Preliminary Peer-Reviewed Toxicity Value: December 2017 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants at Superfund Sites  
 Tier 3: HEAST= Health Effects Assessment Summary Tables: December 2017  
 Minimum Risk Level June 2017

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004)

Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal RfD = Oral RfD x Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

(3) For non-dietary manganese exposures: As recommended in the IRIS file, a non-dietary RfD is obtained by subtracting typical dietary intake of manganese (5 mg/day) from critical dose (10 mg/day) and using a uncertainty factor of 3.

(4) RfD for C11-C22 aromatics is the value for high flash naptha (excluding naphthalene and 2-methylnaphthalene)

**Abbreviations:**

BW = body weight  
 ND: no data available

mg = milligram  
 kg = kilogram

chronic - the chronic value is used as the subchronic RfD  
 subchronic - the subchronic value is used as the chronic RfD

**TABLE 13**  
**NON-CANCER TOXICITY DATA -- INHALATION**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO. 43450**

Page 1 of 1

RAGS Part D Table 5.2: Non-Cancer Toxicity Values - Inhalation

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
Isopropyltoluene	chronic	ND		ND					
	subchronic	ND		ND					
1,3-Dichlorobenzene	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Benzo(a)anthracene	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Benzo(a)pyrene	chronic	2.0E-06	mg/m3	5.7E-07	mg/kg/day	Developmental; decreased embryo and fetal survival	3,000	IRIS	December 2017
	subchronic	2.0E-06	mg/m3	5.7E-07	mg/kg/day	Developmental; decreased embryo and fetal survival	3,000	Chronic	
Benzo(b)fluoranthene	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Dibenzo(a,h)anthracene	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Indeno(1,2,3-cd)pyrene	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Aluminum	chronic	5.0E-03	mg/m3	1.4E-03	mg/kg/day	CNS; Psychomotor and cognitive impairment	300	PPRTV	December 2017
	subchronic	5.0E-03	mg/m3	1.4E-03	mg/kg/day	Neurotoxicity	300	Chronic	
Arsenic	chronic	1.5E-05	mg/m3	4.3E-06	mg/kg/day	Developmental; cardiovascular; CNS	REL	June 2017	
	subchronic	1.5E-05	mg/m3	4.3E-06	mg/kg/day	Developmental; cardiovascular; CNS		Chronic	
Cobalt	chronic	6.0E-06	mg/m3	1.7E-06	mg/kg/day	Respiratory; lung function	300	PPRTV	December 2017
	subchronic	2.0E-05	mg/m3	5.7E-06	mg/kg/day	Respiratory; lung function	100	PPRTV	December 2017
Iron	chronic	ND		ND					
	subchronic	ND		ND					
Lead	chronic	ND		ND				IRIS	December 2017
	subchronic	ND		ND					
Manganese	chronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS; impairment of neurobehavioral function	1,000/1	IRIS	December 2017
	subchronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS; impairment of neurobehavioral function	1,000/1	Chronic	
C11-C22 Aromatics	chronic	1.0E-01	mg/m3	2.9E-02	mg/kg/day	Hematological; Anemia	1000	PPRTV	December 2017
	subchronic	1.0E+00	mg/m3	2.9E-01	mg/kg/day	Hematological; Anemia	100	PPRTV	December 2017

**Notes:**

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1: IRIS = Integrated Risk Information System:

December 2017

Tier 2: PPRTV = Preliminary Peer-Reviewed Toxicity Value:

December 2017

Tier 3: HEAST= Health Effects Assessment Summary Tables:

December 2017

MRL = Minimum Risk Level (ATSDR: chronic MRLs):

June 2017

REL - CALEPA

June 2017

chronic - the chronic value is used as the subchronic RfD

**Abbreviations:**

ND: no data available

mg = milligram

kg = kilogram

ug - microgram

$m^3$  - cubic meter

BW = body weight

(1) Inhalation non-cancer dose-response values are

typically published as Rfc values. Rfc

values may be converted to RfDs using

the following equation (HEAST, 1997):

$RfD \text{ (mg/kg-d)} = Rfc \text{ (mg/m3)} \times 20 \text{ m3/d} / 70 \text{ kg}$ , unless otherwise indicated.

(2) Rfc for C11-C22 aromatics is the value for

high flash naphtha (excluding naphthalene and 2-methylnaphthalene)

**TABLE 16**  
**SELECTION OF EXPOSURE POINT CONCENTRATIONS - SURFACE SOIL DATA WITH ASPHALT-RELATED DATA REMOVED**  
**120 COMMERCE WAY**  
**WOBURN, MASSACHUSETTS**  
**FILE NO 43450**

RAGS Part D Table 3.3: Exposure Point Concentration Summary

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	Surface Soil (0-6 in bgs) excluding Asphalt Samples

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
	Benzo(a)anthracene	mg/kg	0.24	0.596 N [a]	1.2	1.2E+00	mg/kg	Maximum	(4)
	Benzo(a)pyrene	mg/kg	0.28	1.464 NP [b]	1.5	1.5E+00	mg/kg	Maximum	(4)
	Benzo(b)fluoranthene	mg/kg	0.43	1.131 N [a]	2.4	2.4E+00	mg/kg	Maximum	(4)
	Dibenz(a,h)anthracene	mg/kg	0.052	0.243 NP [b]	0.25	2.5E-01	mg/kg	Maximum	(4)
	Indeno(1,2,3-cd)pyrene	mg/kg	0.22	0.589 N [a]	1.2	1.2E+00	mg/kg	Maximum	(4)
	MADEP C11-C22 Aromatic Hydrocarbons, Adjusted	mg/kg	14.60	31.2 NP [b]	55.4	5.5E+01	mg/kg	Maximum	(4)
	Aluminum	mg/kg	5405	7008 LN [c]	10000 J-	7.0E+03	mg/kg	95% UCL	(3)
	Arsenic	mg/kg	12.0	24.98 NP [d]	58	2.5E+01	mg/kg	95% UCL	(3)
	Cobalt	mg/kg	3.6	5.931 G [e]	10	5.9E+00	mg/kg	95% UCL	(3)
	Iron	mg/kg	7350	9566 LN [c]	15000	9.6E+03	mg/kg	95% UCL	(3)
	Manganese	mg/kg	87	133.6 G [e]	220	1.3E+02	mg/kg	95% UCL	(3)

Footnotes:

- (1) 95% UCL = 95% upper confidence limit on the arithmetic mean
  - N [a] - Normal Distribution - 95% KM (t) UCL
  - NP [b] - Nonparametric Distribution - 95% KM Chebyshev UCL
  - LN [c] - Lognormal Distribution - 95% H-UCL
  - NP [d] - Nonparametric Distribution - 95% Chebyshev (Mean, Sd) UCL
  - G [e] - Gamma Distribution - 95% Adjusted Gamma UCL
- (2) EPCs are the lower value of either the calculated 95% Upper Confidence Limit (95%UCL), or the maximum detected concentrations of COPCs. 95%UCLs are calculated using the 2016 EPA ProUCL software, version 5.1.002.
- (3) Maximum concentration exceeds the 95% UCL, 95% UCL selected as the Exposure Point Concentration
- (4) Maximum concentration is used as the Exposure Point Concentration because there are fewer than 10 data points in the data set

**TABLE 17****SELECTION OF EXPOSURE POINT CONCENTRATIONS - ALL SOIL DATA WITH ASPHALT-RELATED DATA REMOVED****120 COMMERCE WAY****WOBURN, MASSACHUSETTS****FILE NO 43450****RAGS Part D Table 3.4: Exposure Point Concentration Summary**

Scenario Timeframe:	Future
Medium:	Soil
Exposure Medium:	All Soil (0-6 ft bgs) excluding Asphalt Samples

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (2)	Rationale
	Benzo(a)anthracene	mg/kg	0.13	0.209 N [a]	1.2	2.1E-01	mg/kg	95% UCL	(3)
	Benzo(a)pyrene	mg/kg	0.14	0.226 G [c]	1.5	2.3E-01	mg/kg	95% UCL	(3)
	Benzo(b)fluoranthene	mg/kg	0.21	0.351 N [a]	2.4	3.5E-01	mg/kg	95% UCL	(3)
	Dibenz(a,h)anthracene	mg/kg	0.029	0.0396 G [c]	0.25	4.0E-02	mg/kg	95% UCL	(3)
	Indeno(1,2,3-cd)pyrene	mg/kg	0.11	0.185 G [c]	1.2	1.9E-01	mg/kg	95% UCL	(3)
	MADEP C11-C22 Aromatic Hydrocarbons, Adjusted	mg/kg	9.6	15.9 G [c]	55.4	1.6E+01	mg/kg	95% UCL	(3)
	Aluminum	mg/kg	7143	8172 NP [f]	17000 J-	8.2E+03	mg/kg	95% UCL	(3)
	Arsenic	mg/kg	11.2	15.11 LN [d]	73	1.5E+01	mg/kg	95% UCL	(3)
	Cobalt	mg/kg	6.5	8.46 G [c]	19.4	8.5E+00	mg/kg	95% UCL	(3)
	Iron	mg/kg	10704	15423 NP [e]	26800 J	1.5E+04	mg/kg	95% UCL	(3)
	Lead	mg/kg	31	76.2 NP [b]	460	3.1E+01	mg/kg	Mean	(5)
	Manganese	mg/kg	145	231 NP [b]	460	2.3E+02	mg/kg	95% UCL	(3)

Footnotes:

(1) 95% UCL = 95% upper confidence limit on the arithmetic mean

N [a] - Normal Distribution - 95% KM (t) UCL

NP [b] - Nonparametric Distribution - 95% KM Chebyshev UCL

G [c] - Gamma Distribution - 95% Adjusted Gamma UCL

LN [d] - Lognormal Distribution - 95% H-UCL

NP [e] - Nonparametric Distribution - 95% Chebyshev(Mean, Sd) UCL

NP [f] - Nonparametric Distribution - 95% Student's-t UCL

(2) EPCs are the lower value of either the calculated 95% Upper Confidence Limit (95%UCL), or the maximum detected concentrations of COPCs. 95%UCL are calculated using the 2016 EPA ProUCL software, version 5.1.002.

(3) Maximum concentration exceeds the 95% UCL, 95% UCL selected as the Exposure Point Concentration

(4) Maximum concentration is less than the 95% UCL, maximum concentration selected as the Exposure Point Concentration

(5) In accordance with USEPA guidance, the arithmetic mean is the appropriate EPC for lead in soil (USEPA, 2007)

TABLE 7.1  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOXBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS				NON-CANCER HAZARD CALCULATIONS				HAZARD QUOTIENT			
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK	CANCER RISK	INTAKE/EXPOSURE CONCENTRATION	RID/RIC (1)						
							VALUE	UNITS										
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS)	INGESTION	Benz[a]anthracene	4.8	mg/kg	3.1E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.0E-06	6.2E-05	mg/kg/day	NTV	NTV			
				Benz[al]pyrene	4.8	mg/kg	3.1E-05	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.0E-05	6.2E-05	mg/kg/day	3.0E-04	2.E-01			
				Benz[b]fluoranthene	7.8	mg/kg	5.1E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	5.0E-06	1.0E-04	mg/kg/day	NTV	NTV			
				Dibenz[a,h]anthracene	0.9	mg/kg	5.6E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	6.0E-06	1.1E-05	mg/kg/day	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	2.6E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.0E-06	5.1E-05	mg/kg/day	NTV	NTV			
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	mg/kg/day				1.8E-02	mg/kg/day	3.0E-02	6.E-01			
				Aluminum	7008	mg/kg	NC	mg/kg/day				9.0E-02	mg/kg/day	1.0E+00	9.E-02			
				Arsenic	25.0	mg/kg	2.2E-05	mg/kg/day				1.9E-04	mg/kg/day	3.0E-04	6.E-01			
				Cobalt	5.9	mg/kg	NC	mg/kg/day				7.6E-05	mg/kg/day	3.0E-04	3.E-01			
				Iron	9566	mg/kg	NC	mg/kg/day				1.2E-01	mg/kg/day	7.0E-01	2.E-01			
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NC	mg/kg/day				1.7E-03	mg/kg/day	2.4E-02	7.E-02			
														2.E+00				
				DERMAL	Benz[a]anthracene	4.8	mg/kg	1.1E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.0E-06	1.9E-05	mg/kg/day	NTV	NTV		
				Benz[al]pyrene	4.8	mg/kg	1.0E-05	mg/kg/day	1.0E+00	(mg/kg/day)-1	1.0E-05	1.9E-05	mg/kg/day	3.0E-04	6.E-02			
				Benz[b]fluoranthene	7.8	mg/kg	1.7E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.0E-06	3.1E-05	mg/kg/day	NTV	NTV			
				Dibenz[a,h]anthracene	0.9	mg/kg	1.9E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.0E-06	3.4E-06	mg/kg/day	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	8.6E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	9.0E-07	1.6E-05	mg/kg/day	NTV	NTV			
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	mg/kg/day				4.2E-03	mg/kg/day	3.0E-02	6.E-01			
				Aluminum	7008	mg/kg	NC	mg/kg/day				1.0E-00	mg/kg/day	1.E-01	1.E-01			
				Arsenic	25.0	mg/kg	3.0E-06	mg/kg/day				2.3E-05	mg/kg/day	3.0E-04	8.E-02			
				Cobalt	5.9	mg/kg	NC	mg/kg/day				7.0E-01	mg/kg/day	5.6E-03	mg/kg/day			
			EXPOSURE POINT TOTAL	Manganese	134	mg/kg	NC	mg/kg/day							3.E-01			
														2.E+00				
				EXPOSURE ROUTE TOTAL											2.E+00			
															EXPOSURE MEDIUM TOTAL			
				AIR	DUST AT SITE	DUST INHALATION	Benz[a]anthracene	4.8	mg/kg	6.0E-07	ug/m³	6.0E-05	(ug/m³)-1	4.8E-11	5.8E-10	mg/m³	NTV	
				Benz[al]pyrene	4.8	mg/kg	6.0E-07	ug/m³	6.0E-04	(ug/m³)-1	4.8E-10	5.8E-10	mg/m³	2.0E-06	mg/m³	3.E-04		
				Benz[b]fluoranthene	7.8	mg/kg	9.7E-07	ug/m³	6.0E-05	(ug/m³)-1	6.0E-11	9.4E-10	mg/m³	NTV	NTV			
				Dibenz[a,h]anthracene	0.9	mg/kg	1.1E-07	ug/m³	6.0E-04	(ug/m³)-1	6.0E-11	1.0E-10	mg/m³	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	4.9E-07	ug/m³	6.0E-05	(ug/m³)-1	3.0E-11	4.8E-10	mg/m³	NTV	NTV			
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	ug/m³				1.7E-07	mg/m³	1.0E-01	2.E-06			
				Aluminum	7008	mg/kg	NC	ug/m³				8.5E-07	mg/m³	5.0E-03	2.E-04			
				Arsenic	25.0	mg/kg	1.1E-06	ug/m³	4.3E-03	(ug/m³)-1	5.0E-09	3.0E-09	mg/m³	1.5E-05	mg/m³	2.E-04		
				Cobalt	5.9	mg/kg	2.7E-07	ug/m³	9.0E-03	(ug/m³)-1	2.0E-09	7.2E-10	mg/m³	6.0E-06	mg/m³	1.E-04		
				Iron	9566	mg/kg	NC	ug/m³				1.2E-06	mg/m³	5.0E-05	mg/m³	NTV		
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NC	ug/m³				1.6E-08	mg/m³	5.0E-05	mg/m³	3.E-04		
															1.E-03			
				EXPOSURE POINT TOTAL											1.E-03			
				AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	Benz[a]anthracene	4.8	mg/kg	1.9E-03	ug/m³	6.0E-05	(ug/m³)-1	1.0E-07	1.8E-06	mg/m³	NTV	
				Benz[al]pyrene	4.8	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	2.0E-06	mg/m³	3.E-04		
				Benz[b]fluoranthene	7.8	mg/kg	NV	ug/m³	6.0E-03	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV			
				Dibenz[a,h]anthracene	0.9	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV			
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	ug/m³				2.6E-02	mg/m³	1.0E-01	3.E-01			
				Aluminum	7008	mg/kg	NV	ug/m³				5.0E-03	mg/m³	5.0E-03	3.E-01			
				Arsenic	25.0	mg/kg	NV	ug/m³	4.3E-03	(ug/m³)-1	NV	NV	mg/m³	1.5E-05	mg/m³	3.E-01		
				Cobalt	5.9	mg/kg	NV	ug/m³	9.0E-03	(ug/m³)-1	NV	NV	mg/m³	6.0E-06	mg/m³	3.E-01		
				Iron	9566	mg/kg	NV	ug/m³				NV	mg/m³	5.0E-05	mg/m³	3.E-01		
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NV	ug/m³				1.0E-07	mg/m³	1.0E-07	3.E-01			
														3.E-01				
			EXPOSURE POINT TOTAL											1.E-07				
				EXPOSURE MEDIUM TOTAL										1.E-07	3.E-01			
<b>SOIL TOTAL</b>													<b>1.E-04</b>		<b>3.E+00</b>			
										<b>TOTAL RECEPTOR RISK ACROSS ALL MEDIA</b>			<b>1.E-04</b>	<b>TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA</b>		<b>3.E+00</b>		

NOTES:

(1) - Blank cells indicate that an RID or RFC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

Non-cancer hazards are presented for child (ages 0 - 6).

TABLE 7.2  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS				NON-CANCER HAZARD CALCULATIONS								
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION	CSF/UNIT RISK	CANCER RISK		INTAKE/EXPOSURE CONCENTRATION	RID/RIC (1)	HAZARD QUOTIENT						
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	INGESTION	1,3-Dichlorobenzene	0.00031	mg/kg	NC	mg/kg/day			4.0E-09	mg/kg/day	2.0E-02	mg/kg/day	2.E-07				
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	1.E-06	2.4E-06	mg/kg/day	3.0E-04	mg/kg/day	8.E-03			
				Benz[a]pyrene	0.19	mg/kg	1.2E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.E-07	3.3E-06	mg/kg/day		NTV				
				Benz[b]fluoranthene	0.26	mg/kg	1.7E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.E-07	5.1E-07	mg/kg/day		NTV				
				Dibenz[a,h]anthracene	0.04	mg/kg	2.6E-07	mg/kg/day	1.0E+00	(mg/kg/day)-1		1.6E-04	mg/kg/day	3.0E-02	mg/kg/day	5.E-03			
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	mg/kg/day			1.5E+00	(mg/kg/day)-1	2.E-05	1.2E-01	mg/kg/day	1.E-01			
				Aluminum	9254	mg/kg	NC	mg/kg/day					1.3E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01		
				Arsenic	16.3	mg/kg	1.4E-05	mg/kg/day					2.0E-01	mg/kg/day	7.0E-01	mg/kg/day	3.E-01		
				Cobalt	10.4	mg/kg	NC	mg/kg/day					4.2E-04	mg/kg/day		NTV			
				Iron	15355	mg/kg	NC	mg/kg/day					2.8E-03	mg/kg/day	2.4E-02	mg/kg/day	1.E-01		
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	EXPOSURE ROUTE TOTAL	Lead	33.0	mg/kg	4.7E-05	mg/kg/day								1.E+00			
				Manganese	220	mg/kg	NC	mg/kg/day											
				DERMAL	1,3-Dichlorobenzene	0.00031	mg/kg	NC	mg/kg/day			1.2E-09	mg/kg/day	2.0E-02	mg/kg/day	6.E-08			
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	mg/kg/day	4.1E-07	mg/kg/day	1.0E+00	(mg/kg/day)-1	4.E-07	7.4E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03	
				Benz[a]pyrene	0.19	mg/kg	5.7E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	6.E-08	1.0E-06	mg/kg/day		NTV				
				Benz[b]fluoranthene	0.26	mg/kg	8.7E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	9.E-08	1.6E-07	mg/kg/day	3.0E-02	mg/kg/day	1.E-03			
				Dibenz[a,h]anthracene	0.04	mg/kg	NC	mg/kg/day			1.5E+00	(mg/kg/day)-1	3.E-06	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	5.E-02	
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	mg/kg/day						5.6E-03	mg/kg/day		NTV		
				Aluminum	9254	mg/kg	NC	mg/kg/day											
				Arsenic	16.3	mg/kg	2.0E-06	mg/kg/day											
SOIL	SOIL	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Cobalt	10.4	mg/kg	NC	mg/kg/day								5.E-02			
				Iron	15355	mg/kg	NC	mg/kg/day								1.E+00			
				Lead	33.0	mg/kg	NC	mg/kg/day											
				Manganese	220	mg/kg	NC	mg/kg/day											
				AIR	DUST AT SITE	DUST INHALATION	1,3-Dichlorobenzene	0.00031	mg/kg	NC	ug/m³	3.8E-14	mg/m³		NTV				
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	ug/m³	2.3E-08	ug/m³	6.0E-04	(ug/m³)-1	1.E-11	6.9E-14	mg/m³	1.E-05			
				Benz[a]pyrene	0.19	mg/kg	3.3E-08	ug/m³	6.0E-05	ug/m³	6.0E-04	(ug/m³)-1	2.E-12	2.3E-11	mg/m³	2.E-04			
				Benz[b]fluoranthene	0.26	mg/kg	5.0E-09	ug/m³	6.0E-04	ug/m³		(ug/m³)-1	3.E-12	3.2E-11	mg/m³	1.E-04			
				Dibenz[a,h]anthracene	0.04	mg/kg	NC	ug/m³	7.3E-07	ug/m³	4.3E-03	(ug/m³)-1	3.E-09	4.9E-12	mg/m³	2.E-03			
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	ug/m³	9.0E-03	ug/m³	9.0E-03	(ug/m³)-1	4.E-09	1.5E-09	mg/m³	5.0E-03			
				Aluminum	9254	mg/kg	NC	ug/m³						1.1E-06	mg/m³	1.5E-05			
				Arsenic	16.3	mg/kg	NC	ug/m³						1.3E-09	mg/m³	6.0E-06			
				Cobalt	10.4	mg/kg	NC	ug/m³						1.9E-06	mg/m³				
				Iron	15355	mg/kg	NC	ug/m³						4.0E-09	mg/m³				
SOIL	SOIL	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Lead	33.0	mg/kg	NC	ug/m³								5.E-04			
				Manganese	220	mg/kg	NC	ug/m³											
				AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	1,3-Dichlorobenzene	0.00031	mg/kg	NC	ug/m³	2.3E-09	mg/m³		NTV				
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NV	ug/m³	0.19	mg/kg	6.0E-04	(ug/m³)-1	NV	2.0E-06	mg/m³	1.E-05			
				Benz[a]pyrene	0.26	mg/kg	NV	ug/m³	0.26	mg/kg	6.0E-05	(ug/m³)-1	NV		NV				
				Benz[b]fluoranthene	0.04	mg/kg	NV	ug/m³	0.04	mg/kg	6.0E-04	(ug/m³)-1	NV		NV				
				Dibenz[a,h]anthracene	12.4	mg/kg	NC	ug/m³	12.4	mg/kg	4.3E-03	(ug/m³)-1	NV		2.3E-04	mg/m³	2.E-03		
				Petroleum Aromatics_C11 to C22	9254	mg/kg	NV	ug/m³	9254	mg/kg	9.0E-03	(ug/m³)-1	NV		5.0E-03	mg/m³			
				Aluminum	16.3	mg/kg	NV	ug/m³	16.3	mg/kg	9.0E-03	(ug/m³)-1	NV		1.5E-05	mg/m³			
				Arsenic	10.4	mg/kg	NV	ug/m³	10.4	mg/kg	9.0E-03	(ug/m³)-1	NV		6.0E-06	mg/m³			
SOIL	SOIL	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Cobalt	33.0	mg/kg	NV	ug/m³	33.0	mg/kg	NV								
				Manganese	220	mg/kg	NV	ug/m³	220	mg/kg	NV								
SOIL TOTAL																1.E+00			
TOTAL RECEPTOR RISK ACROSS ALL MEDIA																1.E+00			
TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA																1.E+00			

NOTES:  
(1) - Blank cells indicate that an RID or RFC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable: exposure route not applicable for this chemical/exposure medium.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

Non-cancer hazards are presented for child (ages 0 - 6).

TABLE 7.3  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS – REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: CONSTRUCTION WORKER  
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS						NON-CANCER HAZARD CALCULATIONS								
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RID/RfC (1)		HAZARD QUOTIENT					
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS						
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS)	INGESTION	Benz[a]anthracene	4.8	mg/kg	1.9E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.E-08	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	NTV					
				Benz[a]pyrene	4.8	mg/kg	1.9E-07	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.E-07	1.4E-05	mg/kg/day			5.E-02					
				Benz[b]fluoranthene	7.8	mg/kg	3.1E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.E-08	2.2E-05	mg/kg/day			NTV					
				Dibenz[a,h]anthracene	0.9	mg/kg	3.5E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.E-08	2.4E-06	mg/kg/day			NTV					
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	1.6E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.E-08	1.1E-05	mg/kg/day			NTV					
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	mg/kg/day				3.9E-03	mg/kg/day	3.0E-01	mg/kg/day	1.E-02					
				Aluminum	7008	mg/kg	NC	mg/kg/day				2.0E-02	mg/kg/day	1.0E+00	mg/kg/day	2.E-02					
				Arsenic	25	mg/kg	6.0E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-07	4.2E-05	mg/kg/day	3.0E-04	mg/kg/day	1.E-01					
				Cobalt	5.9	mg/kg	NC	mg/kg/day				1.7E-05	mg/kg/day	3.0E-03	mg/kg/day	6.E-03					
				Iron	9566	mg/kg	NC	mg/kg/day				2.7E-02	mg/kg/day	7.0E-01	mg/kg/day	4.E-02					
				Manganese	134	mg/kg	NC	mg/kg/day				3.8E-04	mg/kg/day	2.4E-02	mg/kg/day	2.E-02					
			EXPOSURE ROUTE TOTAL								1.E-06						3.E-01				
				DERMAL	Benz[a]anthracene	4.8	mg/kg	8.1E-08	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-09	5.7E-06	mg/kg/day	3.0E-04	mg/kg/day	NTV				
				Benz[a]pyrene	4.8	mg/kg	8.1E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	8.E-08	5.7E-06	mg/kg/day			2.E-02					
				Benz[b]fluoranthene	7.8	mg/kg	1.3E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-08	9.2E-06	mg/kg/day			NTV					
				Dibenz[a,h]anthracene	0.9	mg/kg	1.4E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	1.E-08	1.0E-06	mg/kg/day			NTV					
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	6.7E-08	mg/kg/day	1.0E-01	(mg/kg/day)-1	7.E-09	4.7E-06	mg/kg/day			NTV					
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	mg/kg/day				1.3E-03	mg/kg/day	3.0E-01	mg/kg/day	4.E-03					
				Aluminum	7008	mg/kg	NC	mg/kg/day				3.0E-04	mg/kg/day	1.0E+00	mg/kg/day						
				Arsenic	25	mg/kg	9.7E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.E-07	6.8E-06	mg/kg/day	3.0E-04	mg/kg/day	2.E-02					
				Cobalt	5.9	mg/kg	NC	mg/kg/day				3.0E-03	mg/kg/day	7.0E-01	mg/kg/day						
			EXPOSURE ROUTE TOTAL								3.E-07						5.E-02				
											1.E-06						3.E-01				
											1.E-06						3.E-01				
EXPOSURE MEDIUM TOTAL	AIR	DUST AT SITE	DUST INHALATION	Benz[a]anthracene	4.8	mg/kg	2.3E-07	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.E-11	1.6E-08	mg/m <sup>3</sup>	2.0E-06	mg/m <sup>3</sup>	NTV					
				Benz[a]pyrene	4.8	mg/kg	2.3E-07	ug/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.E-10	1.6E-08	mg/m <sup>3</sup>		8.E-03	NTV					
				Benz[b]fluoranthene	7.8	mg/kg	3.8E-07	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.E-11	2.6E-08	mg/m <sup>3</sup>			NTV					
				Dibenz[a,h]anthracene	0.9	mg/kg	4.1E-08	ug/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.E-11	2.9E-09	mg/m <sup>3</sup>			NTV					
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	1.9E-07	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.E-11	1.3E-08	mg/m <sup>3</sup>			NTV					
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	ug/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	5.E-09	4.7E-06	mg/m <sup>3</sup>	1.0E+00	mg/m <sup>3</sup>	5.E-06					
				Aluminum	7008	mg/kg	NC	ug/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	3.E-09	2.4E-05	mg/m <sup>3</sup>	5.0E-03	mg/m <sup>3</sup>	5.E-03					
				Arsenic	25	mg/kg	2.9E-07	ug/m <sup>3</sup>				2.0E-08	mg/m <sup>3</sup>	1.5E-05	mg/m <sup>3</sup>	6.E-03					
				Cobalt	5.9	mg/kg	NC	ug/m <sup>3</sup>				3.2E-05	mg/m <sup>3</sup>	2.0E-05	mg/m <sup>3</sup>	1.E-03					
				Iron	9566	mg/kg	NC	ug/m <sup>3</sup>				4.5E-07	mg/m <sup>3</sup>	5.0E-05	mg/m <sup>3</sup>	9.E-03					
			EXPOSURE ROUTE TOTAL								8.E-09						3.E-02				
											8.E-09						3.E-02				
EXPOSURE MEDIUM TOTAL	AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	Benz[a]anthracene	4.8	mg/kg	1.2E-04	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	7.E-09	8.2E-06	mg/m <sup>3</sup>	2.0E-06	mg/m <sup>3</sup>	NTV					
				Benz[a]pyrene	4.8	mg/kg	NV	ug/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Benz[b]fluoranthene	7.8	mg/kg	NV	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Dibenz[a,h]anthracene	0.86	mg/kg	NV	ug/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Indeno[1,2,3-cd]pyrene	4.0	mg/kg	NV	ug/m <sup>3</sup>	6.0E-05	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Petroleum Aromatics_C11 to C22	1385	mg/kg	NC	ug/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Aluminum	7008	mg/kg	NV	ug/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	NV	NV				NV					
				Arsenic	25	mg/kg	NV	ug/m <sup>3</sup>			NV	NV				NV					
				Cobalt	5.9	mg/kg	NV	ug/m <sup>3</sup>			NV	NV				NV					
				Iron	9566	mg/kg	NV	ug/m <sup>3</sup>			NV	NV				NV					
				Manganese	134	mg/kg	NV	ug/m <sup>3</sup>			NV	NV				NV					
				EXPOSURE ROUTE TOTAL							7.E-09						1.E-01				
EXPOSURE MEDIUM TOTAL	SOIL TOTAL										7.E-09						1.E-01				
											2.E-08						1.E-01				
SOIL TOTAL											1.E-06						5.E-01				
											1.E-06						5.E-01				
NOTES:										(1) - Blank cells indicate that an RID or RfC is not available from the sources used to obtain dose-response data for this risk assessment.											
NC - Not carcinogenic by this exposure route.										NA - Not applicable: exposure route not applicable for this chemical/exposure medium.											
NV - Not volatile; exposure route not complete for this chemical.										-- Not calculated; dose-response data and/or dermal absorption values are not available.											

TABLE 7.4  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS – REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: CURRENT/FUTURE  
RECEPTOR POPULATION: CONSTRUCTION WORKER  
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS						NON-CANCER HAZARD CALCULATIONS					
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RID/RFC (1)		HAZARD QUOTIENT		
VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	VALUE	UNITS	
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	INGESTION	1,3-Dichlorobenzene	0.00031	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	8.E-09	8.7E-10	mg/kg/day	2.0E-02	mg/kg/day	4.E-08		
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-09	5.3E-07	mg/kg/day	3.0E-04	mg/kg/day	2.E-03		
				Benz[a]pyrene	0.19	mg/kg	7.5E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.4E-07	7.4E-07	mg/kg/day	NTV	NTV	NTV		
				Benz[b]fluoranthene	0.26	mg/kg	1.1E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.E-09	1.1E-07	mg/kg/day	NTV	NTV	NTV		
				Dibenzo(a,b)anthracene	0.04	mg/kg	1.6E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.E-07	3.5E-05	mg/kg/day	3.0E-01	mg/kg/day	1.E-04		
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	2.6E-02	mg/kg/day	1.0E+00	mg/kg/day	3.E-02		
				Aluminum	9254	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	2.8E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02		
				Arsenic	16.3	mg/kg	3.9E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	2.9E-05	mg/kg/day	3.0E-03	mg/kg/day	1.E-02		
				Cobalt	10.4	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	4.3E-02	mg/kg/day	7.0E-01	mg/kg/day	6.E-02		
				Iron	15355	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	9.3E-05	mg/kg/day	2.4E-02	mg/kg/day	NTV		
			EXPOSURE ROUTE TOTAL	Lead	33.0	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	6.2E-04	mg/kg/day	3.E-02	mg/kg/day	NTV		
				Manganese	220	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	6.E-07	1.E-07	mg/kg/day	2.E-01	mg/kg/day	NTV		
				DERMAL	1,3-Dichlorobenzene	0.00031	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.E-09	3.6E-10	mg/kg/day	2.0E-02	mg/kg/day	2.E-08	
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	4.E-10	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	7.E-04		
				Benz[a]pyrene	0.19	mg/kg	3.1E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	3.1E-07	mg/kg/day	NTV	NTV	NTV		
				Benz[b]fluoranthene	0.26	mg/kg	4.4E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	4.7E-08	mg/kg/day	NTV	NTV	NTV		
				Dibenzo(a,b)anthracene	0.04	mg/kg	6.7E-10	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.1E-05	mg/kg/day	3.0E-01	mg/kg/day	4.E-05		
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	4.4E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02		
				Aluminum	9254	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	5.6E-03	mg/kg/day	3.0E-03	mg/kg/day	NTV		
				Arsenic	16.3	mg/kg	6.3E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.E-07	mg/kg/day	2.E-02	mg/kg/day	NTV		
			EXPOSURE ROUTE TOTAL	Cobalt	10.4	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.E-07	mg/kg/day	2.E-01	mg/kg/day	NTV		
				Iron	15355	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.E-07	mg/kg/day	2.E-01	mg/kg/day	NTV		
				Lead	33.0	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.E-07	mg/kg/day	2.E-01	mg/kg/day	NTV		
				Manganese	220	mg/kg	NC	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	1.E-07	mg/kg/day	2.E-01	mg/kg/day	NTV		
				EXPOSURE POINT TOTAL								8.E-09				3.E-02		
				EXPOSURE MEDIUM TOTAL								8.E-09				3.E-02		
AIR	DUST AT SITE	DUST INHALATION	DUST INHALATION	1,3-Dichlorobenzene	0.00031	mg/kg	NC	ug/m³	6.0E-04	(ug/m³)-1	5.E-12	1.0E-12	mg/m³	1.9E-12	mg/m³	NTV		
				Cymene (p-Isopropyltoluene)	0.00057	mg/kg	NC	ug/m³	6.0E-04	(ug/m³)-1	6.3E-10	6.3E-10	mg/m³	2.0E-06	mg/m³	3.E-04		
				Benz[a]pyrene	0.19	mg/kg	9.0E-09	ug/m³	6.0E-05	(ug/m³)-1	8.E-13	8.8E-10	mg/m³	NTV	mg/m³	NTV		
				Benz[b]fluoranthene	0.26	mg/kg	1.3E-08	ug/m³	6.0E-04	(ug/m³)-1	1.E-12	1.4E-10	mg/m³	NTV	mg/m³	NTV		
				Dibenzo(a,b)anthracene	0.04	mg/kg	1.9E-09	ug/m³	6.0E-04	(ug/m³)-1	1.E-12	4.2E-08	mg/m³	3.1E-05	mg/m³	4.E-08		
				Petroleum Aromatics_C11 to C22	12.4	mg/kg	NC	ug/m³	6.0E-04	(ug/m³)-1	1.E-12	3.0E-08	mg/m³	5.0E-03	mg/m³	6.E-03		
				Aluminum	9254	mg/kg	NC	ug/m³	6.0E-04	(ug/m³)-1	1.E-12	5.2E-05	mg/m³	1.5E-05	mg/m³	2.E-03		
				Arsenic	16.3	mg/kg	7.9E-07	ug/m³	4.3E-03	(ug/m³)-1	3.E-09	5.5E-08	mg/m³	2.0E-05	mg/m³	4.E-03		
				Cobalt	10.4	mg/kg	5.0E-07	ug/m³	9.0E-03	(ug/m³)-1	5.E-09	3.5E-08	mg/m³	1.1E-07	mg/m³	NTV		
				Iron	15355	mg/kg	NC	ug/m³	1.0E+00	(ug/m³)-1	7.E-10	7.4E-07	mg/m³	5.0E-05	mg/m³	NTV		
			EXPOSURE ROUTE TOTAL	Lead	33.0	mg/kg	NC	ug/m³	1.0E+00	(ug/m³)-1	7.E-10	1.E-07	mg/m³	2.E-01	mg/m³	NTV		
				Manganese	220	mg/kg	NC	ug/m³	1.0E+00	(ug/m³)-1	7.E-10	1.E-07	mg/m³	2.E-01	mg/m³	NTV		
				EXPOSURE POINT TOTAL								0.E+00				1.E-03		
				EXPOSURE MEDIUM TOTAL								8.E-09				3.E-02		
SOIL TOTAL												7.E-07				3.E-01		
												7.E-07				3.E-01		
TOTAL RECEPTOR RISK ACROSS ALL MEDIA												7.E-07				3.E-01		
TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA												7.E-07				3.E-01		

NOTES:

(1) - Blank cells indicate that an RID or RFC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

TABLE 7.5  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS						NON-CANCER HAZARD CALCULATIONS								
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RD/RfC (1)		HAZARD QUOTIENT					
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS						
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS) ASPHALT REMOVED	INGESTION	Benz[a]anthracene	1.20	mg/kg	7.8E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-07	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	NTV					
				Benz[a]pyrene	1.5	mg/kg	9.8E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	1.E-05	1.9E-05	mg/kg/day	6.E-02	mg/kg/day	6.E-02					
				Benz[b]fluoranthene	2.4	mg/kg	1.6E-05	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.E-06	3.1E-05	mg/kg/day	NTV	mg/kg/day	NTV					
				Dibenz[a,h]anthracene	0.25	mg/kg	1.6E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.E-06	3.2E-06	mg/kg/day	NTV	mg/kg/day	NTV					
				Indeno[1,2,3-cd]pyrene	1.20	mg/kg	7.8E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-07	1.5E-05	mg/kg/day	NTV	mg/kg/day	NTV					
				Petroleum Aromatics_C11 to C22	55.4	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	7.1E-04	mg/kg/day	3.0E-02	mg/kg/day	2.E-02					
				Aluminum	7008	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	9.0E-02	mg/kg/day	1.0E+00	mg/kg/day	9.E-02					
				Arsenic	25	mg/kg	2.2E-05	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	1.9E-04	mg/kg/day	3.0E-04	mg/kg/day	6.E-01					
				Cobalt	5.9	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	7.6E-05	mg/kg/day	3.0E-04	mg/kg/day	3.E-01					
				Iron	9566	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	1.2E-01	mg/kg/day	7.0E-01	mg/kg/day	2.E-01					
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	1.7E-03	mg/kg/day	2.4E-02	mg/kg/day	7.E-02					
				DERMAL	Benz[a]anthracene	1.20	mg/kg	2.6E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.E-07	4.7E-06	mg/kg/day	3.0E-04	mg/kg/day	NTV				
				Benz[a]pyrene	1.5	mg/kg	3.3E-06	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.E-06	5.9E-06	mg/kg/day	6.E-02	mg/kg/day	2.E-02					
				Benz[b]fluoranthene	2.4	mg/kg	5.2E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	5.E-07	9.5E-06	mg/kg/day	NTV	mg/kg/day	NTV					
				Dibenz[a,h]anthracene	0.25	mg/kg	5.4E-07	mg/kg/day	1.0E+00	(mg/kg/day)-1	5.E-07	9.9E-07	mg/kg/day	NTV	mg/kg/day	NTV					
				Indeno[1,2,3-cd]pyrene	1.20	mg/kg	2.6E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.E-07	4.7E-06	mg/kg/day	NTV	mg/kg/day	NTV					
				Petroleum Aromatics_C11 to C22	55.4	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	1.7E-04	mg/kg/day	3.0E-02	mg/kg/day	6.E-03					
				Aluminum	7008	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	2.3E-05	mg/kg/day	1.0E+00	mg/kg/day	8.E-02					
				Arsenic	25	mg/kg	3.0E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	3.0E-04	mg/kg/day	7.0E-01	mg/kg/day	8.E-02					
				Cobalt	5.9	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	5.6E-03	mg/kg/day	5.0E-05	mg/m³	3.E-04					
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-05	9.E-06	mg/kg/day	1.E-01	mg/m³	1.E-01					
				EXPOSURE POINT TOTAL							6.E-05					1.E+00					
				EXPOSURE POINT TOTAL							6.E-05					1.E+00					
				EXPOSURE POINT TOTAL							6.E-05					1.E+00					
				AIR	DUST AT SITE	DUST INHALATION	Benz[a]anthracene	1.20	mg/kg	1.5E-07	ug/m³	6.0E-05	(ug/m³)-1	9.E-12	1.5E-10	mg/m³	NTV				
				Benz[a]pyrene	1.5	mg/kg	1.9E-07	ug/m³	6.0E-04	(ug/m³)-1	1.E-10	1.8E-10	mg/m³	2.0E-06	mg/m³	9.E-05					
				Benz[b]fluoranthene	2.4	mg/kg	3.0E-07	ug/m³	6.0E-05	(ug/m³)-1	2.E-11	2.9E-10	mg/m³	NTV	mg/m³	NTV					
				Dibenz[a,h]anthracene	0.25	mg/kg	3.1E-08	ug/m³	6.0E-04	(ug/m³)-1	2.E-11	3.0E-11	mg/m³	NTV	mg/m³	NTV					
				Indeno[1,2,3-cd]pyrene	1.20	mg/kg	1.5E-07	ug/m³	6.0E-05	(ug/m³)-1	9.E-12	1.5E-10	mg/m³	NTV	mg/m³	NTV					
				Petroleum Aromatics_C11 to C22	55.4	mg/kg	NC	ug/m³	1.1E-06	(ug/m³)-1	4.3E-03	8.5E-07	mg/m³	1.0E-01	mg/m³	7.E-08					
				Aluminum	7008	mg/kg	NC	ug/m³	1.1E-06	(ug/m³)-1	9.0E-03	3.0E-09	mg/m³	5.0E-03	mg/m³	2.E-04					
				Arsenic	25	mg/kg	2.7E-07	ug/m³	1.2E-06	(ug/m³)-1	2.E-09	7.2E-10	mg/m³	1.5E-05	mg/m³	2.E-04					
				Cobalt	5.9	mg/kg	NC	ug/m³	1.2E-06	(ug/m³)-1	2.E-09	1.2E-06	mg/m³	6.0E-06	mg/m³	1.E-04					
				Iron	9566	mg/kg	NC	ug/m³	1.2E-06	(ug/m³)-1	2.E-09	1.6E-08	mg/m³	5.0E-05	mg/m³	3.E-04					
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NC	ug/m³	1.5E+00	(ug/m³)-1	3.E-05	7.E-09	mg/m³	1.E-01	mg/m³	9.E-04					
				EXPOSURE POINT TOTAL							7.E-09					9.E-04					
				EXPOSURE POINT TOTAL							7.E-09					9.E-04					
				AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	Benz[a]anthracene	1.20	mg/kg	4.7E-04	ug/m³	6.0E-05	(ug/m³)-1	3.E-08	4.5E-07	mg/m³	NTV				
				Benz[a]pyrene	1.5	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	2.0E-06	mg/m³	NV					
				Benz[b]fluoranthene	2.4	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	5.0E-03	mg/m³	NV					
				Dibenz[a,h]anthracene	0.25	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	1.5E-05	mg/m³	NV					
				Indeno[1,2,3-cd]pyrene	1.20	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	6.0E-06	mg/m³	NV					
				Petroleum Aromatics_C11 to C22	55.4	mg/kg	NC	ug/m³	4.3E-03	(ug/m³)-1	NV	NV	mg/m³	5.0E-05	mg/m³	NV					
				Aluminum	7008	mg/kg	NV	ug/m³	9.0E-03	(ug/m³)-1	NV	NV	mg/m³	1.0E-01	mg/m³	1.E-02					
				Arsenic	25	mg/kg	NV	ug/m³	1.2E-01	(ug/m³)-1	NV	NV	mg/m³	5.0E-03	mg/m³	1.E-02					
				Cobalt	5.9	mg/kg	NV	ug/m³	1.2E-01	(ug/m³)-1	NV	NV	mg/m³	1.5E-05	mg/m³	NV					
				Iron	9566	mg/kg	NV	ug/m³	1.2E-01	(ug/m³)-1	NV	NV	mg/m³	6.0E-06	mg/m³	NV					
			EXPOSURE ROUTE TOTAL	Manganese	134	mg/kg	NV	ug/m³	1.5E+00	(ug/m³)-1	3.E-08					1.E-02					
				EXPOSURE POINT TOTAL							3.E-08					1.E-02					
				EXPOSURE POINT TOTAL							4.E-08					1.E-02					
<b>SOIL TOTAL</b>											6.E-05					<b>1.E+00</b>					
											6.E-05					<b>1.E+00</b>					
											6.E-05					<b>1.E+00</b>					
<b>TOTAL RECEPTOR RISK ACROSS ALL MEDIA</b>																					

NOTES:

(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable: exposure route not complete for this chemical.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

Non-cancer hazards are presented for the child (0 - 6).

TABLE 7.6  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS -- REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS						NON-CANCER HAZARD CALCULATIONS						
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT			
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS				
SOIL	SOIL	ALL SOIL (0-6 FT BGS) ASPHALT REMOVED	INGESTION	Benz[a]anthracene	0.21	mg/kg	1.4E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-07	2.7E-06	mg/kg/day	3.0E-04	mg/kg/day	NTV			
				Benz[a]pyrene	0.23	mg/kg	1.5E-06	mg/kg/day	1.0E-00	(mg/kg/day)-1	1.E-06	2.9E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02			
				Benz[b]fluoranthene	0.35	mg/kg	2.3E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	2.E-07	4.5E-06	mg/kg/day	NTV	NTV	NTV			
				Dibenz[a,h]anthracene	0.040	mg/kg	2.6E-07	mg/kg/day	1.0E+00	(mg/kg/day)-1	3.E-07	5.1E-07	mg/kg/day	NTV	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	1.2E-06	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-07	2.4E-06	mg/kg/day	NTV	NTV	NTV			
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.E-05	2.0E-04	mg/kg/day	3.0E-02	mg/kg/day	7.E-03			
				Aluminum	8172	mg/kg	NC	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-01	1.0E-01	mg/kg/day	1.0E+00	mg/kg/day	1.E-01			
				Arsenic	15.1	mg/kg	1.3E-05	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.2E-04	3.0E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01			
				Cobalt	8.5	mg/kg	NC	mg/kg/day	1.1E-04	(mg/kg/day)-1	1.1E-04	3.0E-04	mg/kg/day	3.0E-04	mg/kg/day	4.E-01			
				Iron	15423	mg/kg	NC	mg/kg/day	2.0E-01	(mg/kg/day)-1	4.0E-04	7.0E-01	mg/kg/day	7.0E-01	mg/kg/day	3.E-01			
SOIL	SOIL	EXPOSURE ROUTE TOTAL	DERMAL	Benz[a]anthracene	0.21	mg/kg	4.6E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	5.E-08	8.2E-07	mg/kg/day	3.0E-04	mg/kg/day	NTV			
				Benz[a]pyrene	0.23	mg/kg	4.9E-07	mg/kg/day	1.0E-00	(mg/kg/day)-1	5.E-07	8.9E-07	mg/kg/day	3.0E-04	mg/kg/day	3.E-03			
				Benz[b]fluoranthene	0.35	mg/kg	7.6E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-08	1.4E-06	mg/kg/day	NTV	NTV	NTV			
				Dibenz[a,h]anthracene	0.040	mg/kg	8.6E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	9.E-08	1.6E-07	mg/kg/day	NTV	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	4.0E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	4.E-08	7.3E-07	mg/kg/day	4.8E-05	mg/kg/day	2.E-03			
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.E-06	1.4E-05	mg/kg/day	3.0E-02	mg/kg/day	5.E-02			
				Aluminum	8172	mg/kg	NC	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.0E-01	1.0E-00	mg/kg/day	3.0E-04	mg/kg/day	5.E-02			
				Arsenic	15.1	mg/kg	1.8E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.4E-05	5.6E-03	mg/kg/day	5.6E-03	mg/kg/day	NTV			
				Cobalt	8.5	mg/kg	NC	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.0E-01	1.0E-01	mg/kg/day	3.0E-04	mg/kg/day	5.E-02			
				Iron	15423	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.5E-05	6.0E-06	mg/kg/day	6.0E-06	mg/kg/day	2.E-04			
SOIL	SOIL	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Benz[a]anthracene	0.21	mg/kg	4.6E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	5.E-08	8.2E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-02			
				Benz[a]pyrene	0.23	mg/kg	4.9E-07	mg/kg/day	1.0E-00	(mg/kg/day)-1	5.E-07	8.9E-07	mg/kg/day	3.0E-04	mg/kg/day	5.E-02			
				Benz[b]fluoranthene	0.35	mg/kg	7.6E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-08	1.4E-06	mg/kg/day	NTV	NTV	NTV			
				Dibenz[a,h]anthracene	0.040	mg/kg	8.6E-08	mg/kg/day	1.0E+00	(mg/kg/day)-1	9.E-08	1.6E-07	mg/kg/day	NTV	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	4.0E-07	mg/kg/day	1.0E-01	(mg/kg/day)-1	4.E-08	7.3E-07	mg/kg/day	4.8E-05	mg/kg/day	2.E-03			
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.5E-05	6.0E-06	mg/kg/day	6.0E-06	mg/kg/day	2.E-04			
				Aluminum	8172	mg/kg	NC	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.0E-01	1.0E-00	mg/kg/day	3.0E-04	mg/kg/day	5.E-02			
				Arsenic	15.1	mg/kg	6.8E-07	mg/m³	4.3E-03	(ug/m³)-1	3.E-09	9.9E-07	mg/m³	5.0E-03	mg/m³	2.E-04			
				Cobalt	8.5	mg/kg	3.8E-07	mg/m³	9.0E-03	(ug/m³)-1	3.E-09	1.8E-09	mg/m³	1.5E-05	mg/m³	1.E-04			
				Iron	15423	mg/kg	NC	mg/m³	1.0E-01	(mg/m³)-1	1.0E-09	3.8E-09	mg/m³	6.0E-06	mg/m³	2.E-04			
SOIL	AIR	DUST AT SITE	DUST INHALATION	Benz[a]anthracene	0.21	mg/kg	2.6E-08	ug/m³	6.0E-05	(ug/m³)-1	2.E-12	2.5E-11	mg/m³	2.0E-06	mg/m³	NTV			
				Benz[a]pyrene	0.23	mg/kg	2.8E-08	ug/m³	6.0E-04	(ug/m³)-1	2.E-11	2.7E-11	mg/m³	1.0E-01	mg/m³	1.E-05			
				Benz[b]fluoranthene	0.35	mg/kg	4.4E-08	ug/m³	6.0E-05	(ug/m³)-1	3.E-12	4.3E-11	mg/m³	NTV	NTV	NTV			
				Dibenz[a,h]anthracene	0.0396	mg/kg	4.9E-09	ug/m³	6.0E-04	(ug/m³)-1	3.E-12	4.8E-12	mg/m³	NTV	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	2.3E-08	ug/m³	6.0E-05	(ug/m³)-1	1.E-12	2.2E-11	mg/m³	1.9E-09	mg/m³	2.E-08			
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	ug/m³	6.0E-05	(ug/m³)-1	1.E-12	1.9E-09	mg/m³	1.0E-01	mg/m³	1.E-04			
				Aluminum	8172	mg/kg	NC	ug/m³	6.0E-05	(ug/m³)-1	1.E-12	1.9E-09	mg/m³	5.0E-03	mg/m³	2.E-04			
				Arsenic	15.1	mg/kg	6.8E-07	ug/m³	4.3E-03	(ug/m³)-1	3.E-09	1.8E-09	mg/m³	1.5E-05	mg/m³	1.E-04			
				Cobalt	8.5	mg/kg	3.8E-07	ug/m³	9.0E-03	(ug/m³)-1	3.E-09	1.0E-09	mg/m³	6.0E-06	mg/m³	2.E-04			
				Iron	15423	mg/kg	NC	ug/m³	1.0E-01	(mg/m³)-1	1.0E-06	3.8E-09	mg/m³	5.0E-05	mg/m³	6.E-04			
SOIL	AIR	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Benz[a]anthracene	0.21	mg/kg	8.1E-05	ug/m³	6.0E-05	(ug/m³)-1	5.E-09	7.9E-08	mg/m³	2.0E-06	mg/m³	NTV			
				Benz[a]pyrene	0.23	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV	NTV			
				Benz[b]fluoranthene	0.35	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV	NTV			
				Dibenz[a,h]anthracene	0.0396	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV	NTV			
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	3.0E-04	mg/m³	3.E-03			
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	5.0E-03	mg/m³	5.E-03			
				Aluminum	8172	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV	mg/m³	1.5E-05	mg/m³	1.NV			
				Arsenic	15.1	mg/kg	NV	ug/m³	4.3E-03	(ug/m³)-1	NV	NV	mg/m³	6.0E-06	mg/m³	1.NV			
				Cobalt	8.5	mg/kg	NV	ug/m³	9.0E-03	(ug/m³)-1	NV	NV	mg/m³	5.0E-05	mg/m³	1.NV			
				Iron	15423	mg/kg	NV	ug/m³	1.0E-01	(mg/m³)-1	NV	NV	mg/m³	5.0E-05	mg/m³	1.NV			
SOIL TOTAL	AIR	EXPOSURE POINT TOTAL	EXPOSURE ROUTE TOTAL	Benz[a]anthracene	0.21	mg/kg	8.1E-05	ug/m³	6.0E-05	(ug/m³)-1	5.E-09	7.9E-08	mg/m³	2.0E-06	mg/m³	NTV			
				Benz[a]pyrene	0.23	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV	mg/m³	NTV	NTV	NTV			
EXPOSURE MEDIUM TOTAL					1.E-08						5.E-09					4.E-03			
SOIL TOTAL					3.E-05						3.E-05					1.E+00			
TOTAL RECEPTOR RISK ACROSS ALL MEDIA					3.E-05						3.E-05					1.E+00			

NOTES:

(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable: exposure route not applicable for this chemical/exposure medium.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

Non-cancer hazards are presented for the child (0 - 6).

TABLE 7.7  
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS – REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS						NON-CANCER HAZARD CALCULATIONS					
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RID/RIC (I)		HAZARD QUOTIENT		
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS			
SOIL	SOIL	ALL SOIL (0-6 FT BGS) ASPHALT REMOVED	INGESTION	Benz[a]anthracene	0.21	mg/kg	8.4E-09	mg/kg/day	1.0E-01	(mg/kg/day)-1	8.E-10	5.9E-07	mg/kg/day	3.0E-04	mg/kg/day	NTV		
				Benz[al]pyrene	0.23	mg/kg	9.1E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	9.E-09	6.4E-07	mg/kg/day			2.E-03		
				Benz[b]fluoranthene	0.35	mg/kg	1.4E-08	mg/kg/day	1.0E-01	(mg/kg/day)-1	1.E-09	9.9E-07	mg/kg/day			NTV		
				Dibenzo[a,h]anthracene	0.040	mg/kg	1.6E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	2.E-09	1.1E-07	mg/kg/day			NTV		
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	7.5E-09	mg/kg/day	1.0E-01	(mg/kg/day)-1	7.E-10	5.2E-07	mg/kg/day			NTV		
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	mg/kg/day				4.5E-05	mg/kg/day	3.0E-01	mg/kg/day	1.E-04		
				Aluminum	8172	mg/kg	NC	mg/kg/day				2.3E-02	mg/kg/day	1.0E+00	mg/kg/day	2.E-02		
				Arsenic	15.1	mg/kg	3.7E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	5.E-07	2.6E-05	mg/kg/day	3.0E-04	mg/kg/day	9.E-02		
				Cobalt	8.5	mg/kg	NC	mg/kg/day				2.4E-05	mg/kg/day	3.0E-03	mg/kg/day	8.E-03		
				Iron	15423	mg/kg	NC	mg/kg/day				4.4E-02	mg/kg/day	7.0E-01	mg/kg/day	6.E-02		
SOIL	SOIL	EXPOSURE ROUTE TOTAL	DERMAL	Benz[a]anthracene	0.21	mg/kg	3.5E-09	mg/kg/day	1.0E-01	(mg/kg/day)-1	4.E-10	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	NTV		
				Benz[al]pyrene	0.23	mg/kg	3.8E-09	mg/kg/day	1.0E+00	(mg/kg/day)-1	4.E-09	2.7E-07	mg/kg/day			9.E-04		
				Benz[b]fluoranthene	0.35	mg/kg	5.9E-09	mg/kg/day	1.0E-01	(mg/kg/day)-1	6.E-10	4.1E-07	mg/kg/day			NTV		
				Dibenzo[a,h]anthracene	0.040	mg/kg	6.7E-10	mg/kg/day	1.0E+00	(mg/kg/day)-1	7.E-10	4.7E-08	mg/kg/day			NTV		
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	3.1E-09	mg/kg/day	1.0E-01	(mg/kg/day)-1	3.E-10	2.2E-07	mg/kg/day			NTV		
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	mg/kg/day				1.4E-05	mg/kg/day	3.0E-01	mg/kg/day	5.E-05		
				Aluminum	8172	mg/kg	NC	mg/kg/day				1.0E-00	mg/kg/day	1.0E+00	mg/kg/day			
				Arsenic	15.1	mg/kg	5.9E-08	mg/kg/day	1.5E+00	(mg/kg/day)-1	9.E-08	4.1E-06	mg/kg/day	3.0E-04	mg/kg/day	1.E-02		
				Cobalt	8.5	mg/kg	NC	mg/kg/day				3.0E-03	mg/kg/day	7.0E-01	mg/kg/day			
				Iron	15423	mg/kg	NC	mg/kg/day				5.6E-03	mg/kg/day			NTV		
SOIL	SOIL	EXPOSURE ROUTE TOTAL	EXPOSURE POINT TOTAL	Benz[a]anthracene							9.E-08					1.E-02		
				Benz[al]pyrene							7.E-07					2.E-01		
				Benz[b]fluoranthene							7.E-07					2.E-01		
				Dibenzo[a,h]anthracene							7.E-07					EXPOSURE POINT TOTAL		
				Indeno[1,2,3-cd]pyrene							7.E-07					EXPOSURE POINT TOTAL		
				Petroleum Aromatics_C11 to C22							7.E-07					EXPOSURE POINT TOTAL		
				Aluminum							7.E-07					EXPOSURE POINT TOTAL		
				Arsenic							7.E-07					EXPOSURE POINT TOTAL		
				Cobalt							7.E-07					EXPOSURE POINT TOTAL		
				Iron							7.E-07					EXPOSURE POINT TOTAL		
AIR	DUST AT SITE	DUST INHALATION	EXPOSURE ROUTE TOTAL	Benz[a]anthracene	0.21	mg/kg	1.0E-08	ug/m³	6.0E-05	(ug/m³)-1	6.E-13	7.1E-10	mg/m³	2.0E-06	mg/m³	NTV		
				Benz[al]pyrene	0.23	mg/kg	1.1E-08	ug/m³	6.0E-04	(ug/m³)-1	7.E-12	7.6E-10	mg/m³		4.E-04			
				Benz[b]fluoranthene	0.35	mg/kg	1.7E-08	ug/m³	6.0E-05	(ug/m³)-1	1.E-12	1.2E-09	mg/m³			NTV		
				Dibenzo[a,h]anthracene	0.040	mg/kg	1.9E-09	ug/m³	6.0E-04	(ug/m³)-1	1.E-12	1.3E-10	mg/m³			NTV		
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	8.9E-09	ug/m³	6.0E-05	(ug/m³)-1	5.E-13	6.3E-10	mg/m³			NTV		
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	ug/m³				5.4E-08	mg/m³	1.0E+00	mg/m³	5.E-08		
				Aluminum	8172	mg/kg	NC	ug/m³				2.8E-05	mg/m³	5.0E-03	mg/m³	6.E-03		
				Arsenic	15.1	mg/kg	7.3E-07	ug/m³	4.3E-03	(ug/m³)-1	3.E-09	5.1E-08	mg/m³	1.5E-05	mg/m³	3.E-03		
				Cobalt	8.5	mg/kg	4.1E-07	ug/m³	9.0E-03	(ug/m³)-1	4.E-09	2.9E-08	mg/m³	2.0E-05	mg/m³	1.E-03		
				Iron	15423	mg/kg	NC	ug/m³				5.2E-05	mg/m³			NTV		
AIR	AMBIENT VAPORS AT SITE	AMBIENT VAPOR INHALATION	EXPOSURE ROUTE TOTAL	Benz[a]anthracene	0.21	mg/kg	5.1E-06	ug/m³	6.0E-05	(ug/m³)-1	3.E-10	3.6E-07	mg/m³	2.0E-06	mg/m³	NTV		
				Benz[al]pyrene	0.23	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV				NV		
				Benz[b]fluoranthene	0.35	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV				NV		
				Dibenzo[a,h]anthracene	0.040	mg/kg	NV	ug/m³	6.0E-04	(ug/m³)-1	NV	NV				NV		
				Indeno[1,2,3-cd]pyrene	0.19	mg/kg	NV	ug/m³	6.0E-05	(ug/m³)-1	NV	NV				NV		
				Petroleum Aromatics_C11 to C22	15.9	mg/kg	NC	ug/m³				1.3E-03	mg/m³	1.0E+00	mg/m³	1.E-03		
				Aluminum	8172	mg/kg	NV	ug/m³				5.0E-03	mg/m³	5.0E-03	mg/m³			
				Arsenic	15.1	mg/kg	NV	ug/m³	4.3E-03	(ug/m³)-1	NV	NV				NV		
				Cobalt	8.5	mg/kg	NV	ug/m³	9.0E-03	(ug/m³)-1	NV	NV				NV		
				Iron	15423	mg/kg	NV	ug/m³				NV				NV		
SOIL TOTAL											7.E-07					3.E-02		
											7.E-07					3.E-01		
<b>TOTAL RECEPTOR RISK ACROSS ALL MEDIA</b>											<b>7.E-07</b>					<b>TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA</b>	<b>3.E-01</b>	

NOTES:

(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment.

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

NV - Not volatile; exposure route not complete for this chemical.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

**TABLE 9.1**  
**SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)**  
**HUMAN HEALTH RISK ASSESSMENT**  
**120 COMMERCE WAY**  
**WORURN MA**

**SCENARIO TIMEFRAME: FUTURE**  
**RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)**  
**RECEPTOR AGE: ADULT/ADOLESCENT/CHILD**

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)						
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL		
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS)	Benz[a]anthracene	3.1E-06	NA	1.1E-06	NA	4.2E-06	Developmental	NTV	NA	NTV	2.7E-01		
			Benz[a]pyrene	3.1E-05	NA	1.0E-05	NA	4.2E-05		2.1E-01	NA	6.3E-02			
			Benz[b]fluoranthene	5.1E-06	NA	1.7E-06	NA	6.8E-06		NTV	NA	NTV			
			Dibenz[a,h]anthracene	5.6E-06	NA	1.9E-06	NA	7.4E-06		NTV	NA	NTV			
			Indeno[1,2,3-cd]pyrene	2.6E-06	NA	8.6E-07	NA	3.4E-06		NTV	NA	NTV			
			Petroleum Aromatics_C11 to C22			NA			Hematological Nervous System Skin Endocrine GI system Nervous System	5.9E-01	NA	1.4E-01	7.3E-01		
			Aluminum			NA				9.0E-02	NA		9.0E-02		
			Arsenic			NA				6.4E-01	NA		7.1E-01		
			Cobalt			NA				2.5E-01	NA		2.5E-01		
			Iron			NA				1.7E-01	NA		1.7E-01		
			Manganese			NA				7.1E-02	NA		7.1E-02		
			CHEMICAL TOTAL	8.0E-05	--	2.1E-05	--	1E-04		2.0E+00	--	2.8E-01	2E+00		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					1E-04					2E+00		
			EXPOSURE MEDIUM TOTAL					1E-04					2E+00		
SOIL	AIR	DUST AT SITE	Benz[a]anthracene	NA	3.6E-11	NA	NA	3.6E-11	Developmental	NA	NTV	NA	2.9E-04		
			Benz[a]pyrene	NA	3.6E-10	NA	NA	3.6E-10		NA	NTV	NA			
			Benz[b]fluoranthene	NA	5.8E-11	NA	NA	5.8E-11		NA	NTV	NA			
			Dibenz[a,h]anthracene	NA	6.4E-11	NA	NA	6.4E-11		NA	NTV	NA			
			Indeno[1,2,3-cd]pyrene	NA	3.0E-11	NA	NA	3.0E-11		NA	NTV	NA			
			Petroleum Aromatics_C11 to C22			NA			Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	1.7E-06	NA		1.7E-06		
			Aluminum			NA				NA	1.7E-04	NA	1.7E-04		
			Arsenic	NA	4.8E-09	NA	NA	4.8E-09		NA	2.0E-04	NA	2.0E-04		
			Cobalt	NA	2.4E-09	NA	NA	2.4E-09		NA	1.2E-04	NA	1.2E-04		
			Iron			NA				NA	NTV	NA			
			Manganese			NA				NA	3.2E-04	NA	3.2E-04		
			CHEMICAL TOTAL	--	7.8E-09	--	--	8E-09		--	1.1E-03	--	1E-03		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					8E-09					1E-03		
			EXPOSURE MEDIUM TOTAL												
SOIL	AIR	AMBIENT VAPORS AT SITE	Benz[a]anthracene	NA	1.1E-07	NA	NA	1.1E-07	Developmental	NA	NTV	NA			
			Benz[a]pyrene	NA	NV	NA	NA			NA	NV	NA			
			Benz[b]fluoranthene	NA	NV	NA	NA			NA	NV	NA			
			Dibenz[a,h]anthracene	NA	NV	NA	NA			NA	NV	NA			
			Indeno[1,2,3-cd]pyrene	NA	NV	NA	NA			NA	NV	NA			
			Petroleum Aromatics_C11 to C22			NA			Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	2.6E-01	NA		2.6E-01		
			Aluminum	NA	NV	NA	NA			NA	NV	NA			
			Arsenic	NA	NV	NA	NA			NA	NV	NA			
			Cobalt	NA	NV	NA	NA			NA	NV	NA			
			Iron	NA	NV	NA	NA			NA	NV	NA			
			Manganese	NA	NV	NA	NA			NA	NV	NA			
			CHEMICAL TOTAL	--	1.1E-07	--	--	1E-07		--	2.6E-01	--	3E-01		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					1E-07					3E-01		
			EXPOSURE MEDIUM TOTAL					1E-07					3E-01		
SOIL TOTAL								1E-04					3E+00		
RECEPTOR TOTAL								1E-04					3E+00		
TOTAL RISK ACROSS ALL MEDIA								1E-04					3E+00		

TABLE 9.1  
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
 HUMAN HEALTH RISK ASSESSMENT  
 120 COMMERCE WAY  
 WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

TOTAL CARDIOVASCULAR HI =	2.0E-04
TOTAL DEVELOPMENTAL HI =	2.7E-01
TOTAL ENDOCRINE HI =	2.5E-01
--	
TOTAL GI SYSTEM HI =	1.7E-01
TOTAL HEMATOLOGICAL HI =	9.9E-01
--	
--	
--	
TOTAL NERVOUS SYSTEM HI =	1.6E-01
--	
--	
TOTAL SKIN HI =	7.1E-01
TOTAL RESPIRATORY HI =	1.2E-04

TABLE 9.2  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	I,3-Dichlorobenzene				NA		Endocrine	2.0E-07	NA	6.1E-08	2.6E-07
			Cymene (p-Isopropyltoluene)				NA		Developmental	NTV	NA	NTV	
			Benz[a]pyrene	1.2E-06	NA	4.1E-07	NA	1.6E-06		8.0E-03	NA	2.5E-03	1.0E-02
			Benz[b]fluoranthene	1.7E-07	NA	5.7E-08	NA	2.3E-07		NTV	NA	NTV	
			Dibenz[a,h]anthracene	2.6E-07	NA	8.7E-08	NA	3.5E-07		NTV	NA	NTV	
			Petroleum Aromatics_C11 to C22				NA		Hematological	5.3E-03	NA	1.3E-03	6.5E-03
			Aluminum				NA		Nervous System	1.2E-01	NA		1.2E-01
			Arsenic				NA		Skin	4.2E-01	NA	4.9E-02	4.7E-01
			Cobalt				NA		Endocrine	4.4E-01	NA		4.4E-01
			Iron				NA		GI system	2.8E-01	NA		2.8E-01
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	Lead				NA		Nervous System	NTV	NA	NTV	
			Manganese				NA			1.2E-01	NA		1.2E-01
			CHEMICAL TOTAL	2.3E-05	--	3.5E-06	--	3E-05		1.4E+00	--	5.3E-02	1E+00
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						3E-05					1E+00
		EXPOSURE MEDIUM TOTAL						3E-05					1E+00
SOIL	AIR	DUST AT SITE	I,3-Dichlorobenzene				NA		Developmental	NA	NTV	NA	
			Cymene (p-Isopropyltoluene)				NA			NA	NTV	NA	
			Benz[a]pyrene				NA			NA	1.1E-05	NA	1.1E-05
			Benz[b]fluoranthene				NA		Hematological	NA	NTV	NA	
			Dibenz[a,h]anthracene				NA		Nervous System	NA	1.5E-08	NA	1.5E-08
			Petroleum Aromatics_C11 to C22				NA			NA	2.2E-04	NA	2.2E-04
			Aluminum				NA						
			Arsenic				NA		Developmental / Cardiovascular / Nervous system	NA	1.3E-04	NA	1.3E-04
			Cobalt				NA		Respiratory	NA	2.1E-04	NA	2.1E-04
			Iron				NA			NA	NTV	NA	
SOIL	AIR	DUST AT SITE	Lead				NA		Nervous System	NA	5.3E-04	NA	5.3E-04
			Manganese				NA						
			CHEMICAL TOTAL	--	7.4E-09	--	--	7E-09		--	1.1E-03	--	1E-03
			RADIONUCLIDE TOTAL										1E-03
		EXPOSURE POINT TOTAL						7E-09					
SOIL	AIR	AMBIENT VAPORS AT SITE	I,3-Dichlorobenzene				NA		Developmental	NA	NTV	NA	
			Cymene (p-Isopropyltoluene)				NA			NA	NTV	NA	
			Benz[a]pyrene				NA		Hematological	NA	NTV	NA	
			Benz[b]fluoranthene				NA		Nervous System	NA	2.3E-03	NA	2.3E-03
			Dibenz[a,h]anthracene				NA			NA	2.3E-03	NA	
			Petroleum Aromatics_C11 to C22				NA						
			Aluminum				NA						
			Arsenic				NA		Developmental / Cardiovascular / Nervous system	NA	NTV	NA	
			Cobalt				NA		Respiratory	NA	NTV	NA	
			Iron				NA			NA	NTV	NA	
SOIL	AIR	AMBIENT VAPORS AT SITE	Lead				NA		Nervous System	NA	NTV	NA	
			Manganese				NA						
			CHEMICAL TOTAL	--	--	--	--	0E+00		--	2.3E-03	--	2E-03
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						0E+00					2E-03
		EXPOSURE MEDIUM TOTAL						7E-09					3E-03
		SOL TOTAL						3E-05					1E+00
		RECEPTOR TOTAL						3E-05					1E+00
		TOTAL RISK ACROSS ALL MEDIA						3E-05					1E+00
		TOTAL HAZARD ACROSS ALL MEDIA											

TABLE 9.2  
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
 HUMAN HEALTH RISK ASSESSMENT  
 120 COMMERCE WAY  
 WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

-- - Not calculated; dose-response data and/or dermal absorption values are not available.

TOTAL CARDIOVASCULAR HI =	1.3E-04
TOTAL DEVELOPMENTAL HI =	1.1E-02
TOTAL ENDOCRINE HI =	4.4E-01
	--
TOTAL GI SYSTEM HI =	2.8E-01
TOTAL HEMATOLOGICAL HI =	8.9E-03
	--
	--
	--
TOTAL NERVOUS SYSTEM HI =	2.4E-01
	--
	--
TOTAL SKIN HI =	4.7E-01
TOTAL RESPIRATORY HI =	2.1E-04

TABLE 9.3  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: CONSTRUCTION WORKER  
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)						
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL		
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS)	Benz[a]anthracene	1.9E-08	NA	8.1E-09	NA	2.8E-08	Developmental	NTV	NA	NTV	6.4E-02		
			Benz[a]pyrene	1.9E-07	NA	8.1E-08	NA	2.8E-07		4.5E-02	NA	1.9E-02			
			Benz[b]fluoranthene	3.1E-08	NA	1.3E-08	NA	4.5E-08		NTV	NA	NTV			
			Dibenz[a,h]anthracene	3.5E-08	NA	1.4E-08	NA	4.9E-08		NTV	NA	NTV			
			Indeno[1,2,3-cd]pyrene	1.6E-08	NA	6.7E-09	NA	2.3E-08		NTV	NA	NTV			
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Skin Endocrine GI system Nervous System	1.3E-02	NA	4.2E-03	1.7E-02		
			Aluminum							2.0E-02	NA	2.3E-02	2.0E-02		
			Arsenic							1.4E-01	NA		1.6E-01		
			Cobalt							5.6E-03	NA		5.6E-03		
			Iron							3.9E-02	NA		3.9E-02		
			Manganese							1.6E-02	NA		1.6E-02		
			CHEMICAL TOTAL	1.2E-06	--	2.7E-07	--	1E-06		2.8E-01	--	4.6E-02	3E-01		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL										3E-01		
			EXPOSURE MEDIUM TOTAL										3E-01		
SOIL	AIR	DUST AT SITE	Benz[a]anthracene	NA	1.4E-11	NA	NA	1.4E-11	Developmental	NA	NTV	NA	8.1E-03		
			Benz[a]pyrene	NA	1.4E-10	NA	NA	1.4E-10		NA	NTV	NA			
			Benz[b]fluoranthene	NA	2.3E-11	NA	NA	2.3E-11		NA	NTV	NA			
			Dibenz[a,h]anthracene	NA	2.5E-11	NA	NA	2.5E-11		NA	NTV	NA			
			Indeno[1,2,3-cd]pyrene	NA	1.1E-11	NA	NA	1.1E-11		NA	NTV	NA	4.7E-06		
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	4.7E-06	NA	4.7E-03	4.7E-03		
			Aluminum							NA	4.7E-03	NA			
			Arsenic	NA	5.2E-09	NA	NA	5.2E-09		5.6E-03	NA		5.6E-03		
			Cobalt	NA	2.6E-09	NA	NA	2.6E-09		1.0E-03	NA		1.0E-03		
			Iron							NTV	NA				
			Manganese							9.0E-03	NA		9.0E-03		
			CHEMICAL TOTAL	--	8.0E-09	--	--	8E-09		--	2.9E-02	--	3E-02		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					8E-09					3E-02		
SOIL	AIR	AMBIENT VAPORS AT SITE	Benz[a]anthracene	NA	7.0E-09	NA	NA	7.0E-09	Developmental	NA	NTV	NA			
			Benz[a]pyrene	NA	NV	NA	NA			NA	NV	NA			
			Benz[b]fluoranthene	NA	NV	NA	NA			NA	NV	NA			
			Dibenz[a,h]anthracene	NA	NV	NA	NA			NA	NV	NA			
			Indeno[1,2,3-cd]pyrene	NA	NV	NA	NA			NA	NV	NA	1.2E-01		
			Petroleum Aromatics_C11 to C22		NV	NA	NA		Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	1.2E-01	NA	NV			
			Aluminum	NA	NV	NA	NA			NA	NV	NA			
			Arsenic	NA	NV	NA	NA			NA	NV	NA			
			Cobalt	NA	NV	NA	NA			NA	NV	NA			
			Iron	NA	NV	NA	NA			NA	NV	NA			
			Manganese	NA	NV	NA	NA			NA	NV	NA			
			CHEMICAL TOTAL	--	7.0E-09	--	--	7E-09		--	1.2E-01	--	1E-01		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					7E-09					1E-01		
			EXPOSURE MEDIUM TOTAL					2E-08					1E-01		
<b>SOIL TOTAL</b>								1E-06					5E-01		
<b>RECEPTOR TOTAL</b>								<b>1E-06</b>					<b>5E-01</b>		
<b>TOTAL RISK ACROSS ALL MEDIA</b>								<b>1E-06</b>					<b>5E-01</b>		
<b>TOTAL HAZARD ACROSS ALL MEDIA</b>															

TABLE 9.3  
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
 HUMAN HEALTH RISK ASSESSMENT  
 120 COMMERCE WAY  
 WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (II)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

-- - Not calculated; dose-response data and/or dermal absorption values are not available.

TOTAL CARDIOVASCULAR HI =	5.6E-03
TOTAL DEVELOPMENTAL HI =	7.8E-02
TOTAL ENDOCRINE HI =	5.6E-03
TOTAL GI SYSTEM HI =	3.9E-02
TOTAL HEMATOLOGICAL HI =	1.3E-01
TOTAL NERVOUS SYSTEM HI =	5.5E-02
TOTAL SKIN HI =	1.6E-01
TOTAL RESPIRATORY HI =	1.0E-03

TABLE 9.4  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)							
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL			
SOIL	SOIL	GREATER THAN 6 INCHES BELOW GROUND SURFACE SUBSURFACE SOIL	1,3-Dichlorobenzene			NA			Endocrine	4.4E-08	NA	1.8E-08	6.2E-08			
			Cymene (p-Isopropyltoluene)			NA			Developmental	NTV	NA	NTV				
			Benz[a]pyrene	7.5E-09	NA	3.1E-09	NA	1.1E-08		1.8E-03	NA	7.3E-04	2.5E-03			
			Benz[b]fluoranthene	1.1E-09	NA	4.4E-10	NA	1.5E-09		NTV	NA	NTV				
			Dibenzo[a,h]anthracene	1.6E-09	NA	6.7E-10	NA	2.3E-09		NTV	NA	NTV				
			Petroleum Aromatics_C11 to C22			NA			Hematological	1.2E-04	NA	3.7E-05	1.5E-04			
			Aluminum			NA			Nervous System	2.6E-02	NA	1.5E-02	2.6E-02			
			Arsenic			NA			Skin	9.2E-02	NA	1.1E-01				
			Cobalt			NA			Endocrine	9.8E-03	NA	9.8E-03				
			Iron			NA			GI system	6.2E-02	NA	6.2E-02				
			Lead			NA			Nervous System	NTV	NA	NTV				
			Manganese			NA				2.6E-02	NA	2.6E-02				
			CHEMICAL TOTAL	6.0E-07	--	9.9E-08	--	7E-07			--	1.6E-02	2E-01			
			RADIONUCLIDE TOTAL													
			EXPOSURE POINT TOTAL					7E-07					2E-01			
			EXPOSURE MEDIUM TOTAL					7E-07					2E-01			
		DUST AT SITE	1,3-Dichlorobenzene			NA			Developmental	NA	NTV	NA				
			Cymene (p-Isopropyltoluene)			NA				NA	NTV	NA				
			Benz[a]pyrene		NA	5.4E-12	NA	NA		NA	3.2E-04	NA	3.2E-04			
			Benz[b]fluoranthene		NA	7.6E-13	NA	NA		NA	NTV	NA				
			Dibenzo[a,h]anthracene		NA	1.2E-12	NA	NA		NA	4.2E-08	NA	4.2E-08			
			Petroleum Aromatics_C11 to C22			NA				NA	6.3E-03	NA	6.3E-03			
			Aluminum			NA										
			Arsenic		NA	3.4E-09	NA	NA		Developmental / Cardiovascular / Nervous system	3.7E-03	NA	3.7E-03			
			Cobalt		NA	4.5E-09	NA	NA		Respiratory	1.8E-03	NA	1.8E-03			
			Iron			NA					NTV	NA				
			Lead			NA					NTV	NA				
			Manganese			NA				Nervous System	1.5E-02	NA	1.5E-02			
			CHEMICAL TOTAL	--	7.9E-09	--	--	8E-09			--	2.7E-02	--			
			RADIONUCLIDE TOTAL										3E-02			
			EXPOSURE POINT TOTAL					8E-09					3E-02			
		AMBIENT VAPORS AT SITE	1,3-Dichlorobenzene			NA			Developmental	NA	NTV	NA				
			Cymene (p-Isopropyltoluene)			NA				NA	NV	NA				
			Benz[a]pyrene			NA				NA	NV	NA				
			Benz[b]fluoranthene			NA				NA	NV	NA				
			Dibenzo[a,h]anthracene			NA				NA	NV	NA				
			Petroleum Aromatics_C11 to C22			NA				NA	1.0E-03	NA	1.0E-03			
			Aluminum			NA					NV	NA				
			Arsenic		NA	NV	NA	NA		Developmental / Cardiovascular / Nervous system	NV	NA				
			Cobalt		NA	NV	NA	NA		Respiratory	NV	NA				
			Iron		NA	NV	NA	NA			NV	NA				
			Lead		NA	NV	NA	NA			NV	NA				
			Manganese		NA	NV	NA	NA		Nervous System	NV	NA				
			CHEMICAL TOTAL	--	--	--	--	0E+00			--	1.0E-03	--			
			RADIONUCLIDE TOTAL													
			EXPOSURE POINT TOTAL					0E+00					1E-03			
			EXPOSURE MEDIUM TOTAL					8E-09					3E-02			
			SOIL TOTAL					7E-07					3E-01			
<b>RECEPTOR TOTAL</b>								<b>7E-07</b>					<b>3E-01</b>			
									<b>TOTAL RISK ACROSS ALL MEDIA</b>	<b>7E-07</b>				<b>3E-01</b>		
										<b>TOTAL HAZARD ACROSS ALL MEDIA</b>				<b>3E-01</b>		

TABLE 9.4  
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
 HUMAN HEALTH RISK ASSESSMENT  
 120 COMMERCE WAY  
 WOBURN, MA

SCENARIO TIMEFRAME: CURRENT/FUTURE
RECEPTOR POPULATION: CONSTRUCTION WORKER
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

-- Not calculated; dose-response data and/or dermal absorption values are not available.

TOTAL CARDIOVASCULAR HI =	3.7E-03
TOTAL DEVELOPMENTAL HI =	6.5E-03
TOTAL ENDOCRINE HI =	9.8E-03
--	--
TOTAL GI SYSTEM HI =	6.2E-02
TOTAL HEMATOLOGICAL HI =	1.2E-03
--	--
--	--
TOTAL NERVOUS SYSTEM HI =	7.7E-02
--	--
--	--
TOTAL SKIN HI =	1.1E-01
TOTAL RESPIRATORY HI =	1.8E-03

TABLE 9.5  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)						
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL		
SOIL	SOIL	SURFACE SOIL (0-6 IN BGS) ASPHALT REMOVED	Benz[a]anthracene	7.8E-07	NA	2.6E-07	NA	1.0E-06	Developmental	NTV	NA	NTV	8.4E-02		
			Benz[a]pyrene	9.8E-06	NA	3.3E-06	NA	1.3E-05		6.4E-02	NA	2.0E-02			
			Benz[b]fluoranthene	1.6E-06	NA	5.2E-07	NA	2.1E-06		NTV	NA	NTV			
			Dibenz[a,h]anthracene	1.6E-06	NA	5.4E-07	NA	2.2E-06		NTV	NA	NTV			
			Indeno[1,2,3-cd]pyrene	7.8E-07	NA	2.6E-07	NA	1.0E-06		NTV	NA	NTV			
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Skin Endocrine GI system Nervous System	2.4E-02	NA	5.6E-03	2.9E-02		
			Aluminum							9.0E-02	NA	7.6E-02	9.0E-02		
			Arsenic	3.2E-05	NA	4.5E-06	NA	NA		6.4E-01	NA	7.1E-01	7.1E-01		
			Cobalt							2.5E-01	NA	2.5E-01			
			Iron							1.7E-01	NA	1.7E-01	1.7E-01		
			Manganese							7.1E-02	NA		7.1E-02		
			CHEMICAL TOTAL	4.7E-05	--	9.4E-06	--	6E-05		1.3E+00	--	1.0E-01	1E+00		
			RADIOMNUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					6E-05					1E+00		
			EXPOSURE MEDIUM TOTAL					6E-05					1E+00		
SOIL	AIR	DUST AT SITE	Benz[a]anthracene	NA	9.0E-12	NA	NA	9.0E-12	Developmental	NA	NTV	NA	9.1E-05		
			Benz[a]pyrene	NA	1.1E-10	NA	NA	1.1E-10		NA	NTV	NA	9.1E-05		
			Benz[b]fluoranthene	NA	1.8E-11	NA	NA	1.8E-11		NA	NTV	NA			
			Dibenz[a,h]anthracene	NA	1.9E-11	NA	NA	1.9E-11		NA	NTV	NA			
			Indeno[1,2,3-cd]pyrene	NA	9.0E-12	NA	NA	9.0E-12		NA	NTV	NA	6.7E-08		
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	NA	6.7E-08	NA	6.7E-08		
			Aluminum							NA	1.7E-04	NA	1.7E-04		
			Arsenic	NA	4.8E-09	NA	NA	4.8E-09		NA	2.0E-04	NA	2.0E-04		
			Cobalt	NA	2.4E-09	NA	NA	2.4E-09		NA	1.2E-04	NA	1.2E-04		
			Iron							NA	NTV	NA			
			Manganese							NA	3.2E-04	NA	3.2E-04		
			CHEMICAL TOTAL	--	7.4E-09	--	--	7E-09		--	9.1E-04	--	9E-04		
			RADIOMNUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					7E-09					9E-04		
			EXPOSURE MEDIUM TOTAL												
SOIL	AIR	AMBIENT VAPORS AT SITE	Benz[a]anthracene	NA	2.8E-08	NA	NA	2.8E-08	Developmental	NA	NTV	NA			
			Benz[a]pyrene	NA	NV	NA	NA			NA	NV	NA			
			Benz[b]fluoranthene	NA	NV	NA	NA			NA	NV	NA			
			Dibenz[a,h]anthracene	NA	NV	NA	NA			NA	NV	NA			
			Indeno[1,2,3-cd]pyrene	NA	NV	NA	NA			NA	NV	NA	1.0E-02		
			Petroleum Aromatics_C11 to C22		NV	NA	NA		Hematological Nervous System Developmental / Cardiovascular / Nervous system Respiratory Nervous System	NA	1.0E-02	NA			
			Aluminum	NA	NV	NA	NA			NA	NV	NA			
			Arsenic	NA	NV	NA	NA			NA	NV	NA			
			Cobalt	NA	NV	NA	NA			NA	NV	NA			
			Iron	NA	NV	NA	NA			NA	NV	NA			
			Manganese	NA	NV	NA	NA			NA	NV	NA			
			CHEMICAL TOTAL	--	2.8E-08	--	--	3E-08		--	1.0E-02	--	1E-02		
			RADIOMNUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					3E-08					1E-02		
			EXPOSURE MEDIUM TOTAL					4E-08					1E-02		
<b>SOIL TOTAL</b>								6E-05					1E+00		
<b>RECEPTOR TOTAL</b>								<b>6E-05</b>					<b>1E+00</b>		
<b>TOTAL RISK ACROSS ALL MEDIA</b>								<b>6E-05</b>					<b>1E+00</b>		
<b>TOTAL HAZARD ACROSS ALL MEDIA</b>															

TABLE 9.5  
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
 HUMAN HEALTH RISK ASSESSMENT  
 120 COMMERCE WAY  
 WOBURN, MA

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL

NOTES:

NC - Not carcinogenic by this exposure route.

NA - Not applicable; exposure route not applicable for this chemical/exposure medium.

-- - Not calculated; dose-response data and/or dermal absorption values are not available.

TOTAL CARDIOVASCULAR HI =	2.0E-04
TOTAL DEVELOPMENTAL HI =	8.4E-02
TOTAL ENDOCRINE HI =	2.5E-01
	--
TOTAL GI SYSTEM HI =	1.7E-01
TOTAL HEMATOLOGICAL HI =	4.0E-02
	--
	--
	--
TOTAL NERVOUS SYSTEM HI =	1.6E-01
	--
	--
TOTAL SKIN HI =	7.1E-01
TOTAL RESPIRATORY HI =	1.2E-04

TABLE 9.6  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)  
RECEPTOR AGE: ADULT/ADOLESCENT/CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)						
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL		
SOIL	SOIL	ALL SOIL (0-6 FT BGS) ASPHALT REMOVED	Benz[a]anthracene	1.4E-07	NA	4.6E-08	NA	1.8E-07	Developmental	NTV	NA	NTV	3.0E-03		
			Benz[a]pyrene	1.5E-06	NA	4.9E-07	NA	2.0E-06		9.6E-03	NA	NTV	1.3E-02		
			Benz[b]fluoranthene	2.3E-07	NA	7.6E-08	NA	3.1E-07		NTV	NA	NTV			
			Dibenz[a,h]anthracene	2.6E-07	NA	8.6E-08	NA	3.4E-07		NTV	NA	NTV			
			Indeno[1,2,3-cd]pyrene	1.2E-07	NA	4.0E-08	NA	1.6E-07		6.8E-03	NA	1.6E-03	8.4E-03		
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Skin Endocrine GI system Nervous System	1.0E-01	NA	4.6E-02	1.0E-01		
			Aluminum							3.9E-01	NA	NA	4.3E-01		
			Arsenic							3.6E-01	NA	NA	3.6E-01		
			Cobalt							2.8E-01	NA	NA	2.8E-01		
			Iron							NTV	NA	NTV			
			Lead							1.2E-01	NA	NA	1.2E-01		
			Manganese												
			CHEMICAL TOTAL	2.2E-05	--	3.5E-06	--	3E-05		1.3E+00	--	5.0E-02	1E+00		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					3E-05					1E+00		
			EXPOSURE MEDIUM TOTAL					3E-05					1E+00		
SOIL	AIR	DUST AT SITE	Benz[a]anthracene	NA	1.6E-12	NA	NA	1.6E-12	Developmental	NA	NTV	NA	1.4E-05		
			Benz[a]pyrene	NA	1.7E-11	NA	NA	1.7E-11		NA	NTV	NA	1.4E-05		
			Benz[b]fluoranthene	NA	2.6E-12	NA	NA	2.6E-12		NA	NTV	NA			
			Dibenz[a,h]anthracene	NA	3.0E-12	NA	NA	3.0E-12		NA	NTV	NA			
			Indeno[1,2,3-cd]pyrene	NA	1.4E-12	NA	NA	1.4E-12		NA	1.9E-08	NA	1.9E-08		
			Petroleum Aromatics_C11 to C22						Hematological Nervous System Developmental / Cardiovascular / Nervous system	1.9E-08	NA	2.0E-04	2.0E-04		
			Aluminum							NA	NA	NA			
			Arsenic	NA	2.9E-09	NA	NA	2.9E-09		1.2E-04	NA	NA	1.2E-04		
			Cobalt	NA	3.4E-09	NA	NA	3.4E-09		1.7E-04	NA	NA	1.7E-04		
			Iron							NTV	NA	NA			
			Lead							NTV	NA	NA			
			Manganese							5.6E-04	NA	NA	5.6E-04		
			CHEMICAL TOTAL	--	6.4E-09	--	--	6E-09		--	1.1E-03	--	1E-03		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					6E-09					1E-03		
SOIL	AIR	AMBIENT VAPORS AT SITE	Benz[a]anthracene	NA	4.9E-09	NA	NA	4.9E-09	Developmental	NA	NTV	NA			
			Benz[a]pyrene	NA	NV	NA	NA			NA	NV	NA			
			Benz[b]fluoranthene	NA	NV	NA	NA			NA	NV	NA			
			Dibenz[a,h]anthracene	NA	NV	NA	NA			NA	NV	NA			
			Indeno[1,2,3-cd]pyrene	NA	NV	NA	NA			NA	NV	NA	3.0E-03		
			Petroleum Aromatics_C11 to C22		NV	NA	NA		Hematological Nervous System Developmental / Cardiovascular / Nervous system	3.0E-03	NA	NA			
			Aluminum		NV	NA	NA			NA	NV	NA			
			Arsenic	NA	NV	NA	NA			NA	NV	NA			
			Cobalt	NA	NV	NA	NA			NA	NV	NA			
			Iron	NA	NV	NA	NA			NA	NV	NA			
			Lead	NA	NV	NA	NA			NA	NV	NA			
			Manganese	NA	NV	NA	NA			NA	NV	NA			
			CHEMICAL TOTAL	--	4.9E-09	--	--	5E-09		--	3.0E-03	--	3E-03		
			RADIONUCLIDE TOTAL												
			EXPOSURE POINT TOTAL					5E-09					3E-03		
			EXPOSURE MEDIUM TOTAL					1E-08					4E-03		
<b>SOIL TOTAL</b>								3E-05					1E+00		
<b>RECEPTOR TOTAL</b>								<b>3E-05</b>					<b>IE+00</b>		
				<b>TOTAL RISK ACROSS ALL MEDIA</b>				<b>3E-05</b>	<b>TOTAL HAZARD ACROSS ALL MEDIA</b>				<b>IE+00</b>		

**TABLE 9.6**  
**SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)**  
**HUMAN HEALTH RISK ASSESSMENT**  
**120 COMMERCE WAY**  
**WOBBURN, MA**

**SCENARIO TIMEFRAME: FUTURE**  
**RECEPTOR POPULATION: RESIDENT (4 AGES) - TOTAL RESIDENT (AGES birth - 26)**  
**RECEPTOR AGE: ADULT/ADOLESCENT/CHILD**

TABLE 9.7  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT  
HUMAN HEALTH RISK ASSESSMENT  
120 COMMERCE WAY  
WOBURN, MA

SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: CONSTRUCTION WORKER  
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (I)					NON-CARCINOGENIC HAZARD QUOTIENT (I)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
SOIL	SOIL	ALL SOIL (0-6 FT BGS) ASPHALT REMOVED	Benz[a]anthracene	8.4E-10	NA	3.5E-10	NA	1.2E-09	Developmental  Hematological  Nervous System  Skin  Endocrine  GI system  Nervous System	NTV	NA	NTV	3.0E-03
			Benz[a]pyrene	9.1E-09	NA	3.8E-09	NA	1.3E-08		2.1E-03	NA	8.9E-04	
			Benz[b]fluoranthene	1.4E-09	NA	5.9E-10	NA	2.0E-09		NTV	NA	NTV	
			Dibenz[a,h]anthracene	1.6E-09	NA	6.7E-10	NA	2.3E-09		NTV	NA	NTV	
			Indeno[1,2,3-cd]pyrene	7.5E-10	NA	3.1E-10	NA	1.1E-09		NTV	NA	NTV	
			Petroleum Aromatics_C11 to C22							1.5E-04	NA	4.8E-05	2.0E-04
			Aluminum	5.5E-07	NA	8.8E-08	NA	6.4E-07		2.3E-02	NA	1.4E-02	2.3E-02
			Arsenic							8.5E-02	NA		9.9E-02
			Cobalt							8.0E-03	NA		8.0E-03
			Iron							6.2E-02	NA		6.2E-02
SOIL	SOIL	RADIONUCLIDE TOTAL	Lead							NTV	NA	NTV	
			Manganese							2.7E-02	NA		2.7E-02
			CHEMICAL TOTAL	5.6E-07	--	9.4E-08	--	7E-07		2.1E-01	--	1.5E-02	2E-01
			EXPOSURE POINT TOTAL										2E-01
			EXPOSURE MEDIUM TOTAL										2E-01
SOIL	AIR	DUST AT SITE	Benz[a]anthracene	NA	6.1E-13	NA	NA	6.1E-13	Developmental  Hematological  Nervous System  Developmental / Cardiovascular / Nervous system  Respiratory  Nervous System	NA	NTV	NA	3.8E-04
			Benz[a]pyrene	NA	6.5E-12	NA	NA	6.5E-12		NA	NTV	NA	3.8E-04
			Benz[b]fluoranthene	NA	1.0E-12	NA	NA	1.0E-12		NA	NTV	NA	
			Dibenz[a,h]anthracene	NA	1.1E-12	NA	NA	1.1E-12		NA	NTV	NA	
			Indeno[1,2,3-cd]pyrene	NA	5.4E-13	NA	NA	5.4E-13		NA	5.4E-08	NA	5.4E-08
			Petroleum Aromatics_C11 to C22							NA	5.5E-03	NA	5.5E-03
			Aluminum							3.4E-03	NA	3.4E-03	
			Arsenic	NA	3.1E-09	NA	NA	3.1E-09		1.4E-03	NA	1.4E-03	
			Cobalt	NA	3.7E-09	NA	NA	3.7E-09		NTV	NA	NTV	
			Iron							1.6E-02	NA	1.6E-02	
SOIL	AIR	RADIONUCLIDE TOTAL	Lead										
			Manganese										
			CHEMICAL TOTAL	--	6.8E-09	--	--	7E-09		--	2.6E-02	--	3E-02
			EXPOSURE POINT TOTAL										3E-02
			EXPOSURE MEDIUM TOTAL										
			SOIL TOTAL										
			RECEPTOR TOTAL										
			TOTAL RISK ACROSS ALL MEDIA										

**TABLE 9.7**  
**SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS - REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE - CONSTRUCTION WORKER - ADULT**  
**HUMAN HEALTH RISK ASSESSMENT**  
**120 COMMERCE WAY**  
**WOBURN, MA**

**SCENARIO TIMEFRAME: FUTURE  
RECEPTOR POPULATION: CONSTRUCTION WORKER  
RECEPTOR AGE: ADULT**

## **Attachment 4**

### **200 Presidential Way Risk Assessment Guidance for Superfund (RAGS) – Part D Tables**

TABLE 1  
SELECTION OF EXPOSURE PATHWAYS  
200 Presidential Way  
Woburn, MA

Scenario Timeframe	Medium	Exposure Medium	Exposure Points	Receptor Populations	Receptor Ages	Exposure Routes	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathways
Future	Soil	Surface and Subsurface Soil	Site-Wide – Undisturbed Soil Samples (0-6")	Adult and Child Residents	Child 0-6 years Adult 6-26 years	Incidental Ingestion Dermal Contact, Inhalation	Quantitative Risk Assessment	Include: Site will be developed as residential.
			Site-Wide – Disturbed Surface Soils (0-6")					
			Site-Wide – Disturbed Deep Soils (2-4', 4-6')					
	Groundwater	Vapor	Indoor air	Adult and Child Residents	Child 0-6 years Adult 6-26 years	Inhalation	Quantitative Risk Assessment	Include: Site will be developed as residential and buildings on the site could have indoor air impacts via vapor intrusion from groundwater. However, no detected chemicals in groundwater were selected as chemicals of potential concern (COPCs) since they did not exceed the vapor intrusion screening levels (VISLs) for groundwater, and thus a quantitative risk assessment was not done.
		Irrigation	Groundwater					Include: Although groundwater use at the Site is restricted, potential use of the groundwater as irrigation water to fill a pool and potential contact during swimming has been evaluated.
Future	Soil	Surface and Subsurface Soil	Site-Wide – Disturbed Soils (0-6", 2-4', 4-6')	Construction Worker	Adult	Incidental Ingestion Dermal Contact, Inhalation	Quantitative Risk Assessment for construction worker exposed for one year during construction activities	Include: Site will be developed and site preparation, including soil excavation, will occur.
	Groundwater	Groundwater	Groundwater	Construction Worker	Adult	Incidental Ingestion Dermal Contact	Quantitative Risk Assessment	Include: Site will be developed and excavation will occur, with potential contact with groundwater.
Current and Future	Soil	Surface and Subsurface Soil	Site-Wide – Undisturbed Soil Samples (0-6")  Site-Wide – Disturbed Surface Soils (0-6")  Site-Wide – Disturbed Deep Soils (2-4', 4-6')	Visitor, Trespasser, Outdoor Worker	Adult or child	Incidental Ingestion Dermal Contact, Inhalation	None	Exclude: Intensity and frequency of potential exposures to chemicals would be lower than for construction worker and resident.

Abbreviations:

COPC=chemical of potential concern

VISL=vapor intrusion screening level

TABLE 2.1\_SG1 - Soils Group 1

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits		Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
									Minimum Detection Limit	Maximum Detection Limit							
Soil	67-64-1	VOCs															
	67-64-1	Acetone	0.0045	0.37	mg/kg	SH-AP-1/0-6"	11	11	–	–	0.37	–	6100 n	N/A	N/A	N	Max concentration below screening level.
	71-43-2	Benzene	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	1.2 c**	N/A	N/A	N	Not detected.
	108-86-1	Bromobenzene	–	–	mg/kg	–	0	11	0.0032	0.0058	–	–	29 n	N/A	N/A	N	Not detected.
	74-97-5	Bromo(chloromethane)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	15 n	N/A	N/A	N	Not detected.
	75-27-4	Bromodichloromethane	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	0.29 c	N/A	N/A	N	Not detected.
	75-25-2	Bromoform	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	19 c**	N/A	N/A	N	Not detected.
	74-83-9	Bromomethane	0.059	0.059	mg/kg	SH-AP-1/0-6"	1	11	0.0013	0.0023	0.059	–	0.68 n	N/A	N/A	N	Max concentration below screening level.
	104-51-8	Butylbenzene (n-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	390 ns	N/A	N/A	N	Not detected.
	135-98-8	Butylbenzene (sec-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	780 ns	N/A	N/A	N	Not detected.
	98-06-6	Butylbenzene (tert-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	780 ns	N/A	N/A	N	Not detected.
	75-15-0	Carbon disulfide	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	77 n	N/A	N/A	N	Not detected.
	56-23-5	Carbon tetrachloride	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	0.65 c*	N/A	N/A	N	Not detected.
	108-90-7	Chlorobenzene	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	28 n	N/A	N/A	N	Not detected.
	75-00-3	Chloroethane	–	–	mg/kg	–	0	11	0.0013	0.0023	–	–	1400 n	N/A	N/A	N	Not detected.
	67-66-3	Chloroform	–	–	mg/kg	–	0	11	0.00095	0.1	–	–	0.32 c*	N/A	N/A	N	Not detected.
	74-87-3	Chloromethane	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	11 n	N/A	N/A	N	Not detected.
	95-49-8	Chlorotoluene (o-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	160 n	N/A	N/A	N	Not detected.
	106-43-4	Chlorotoluene (p-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	160 n	N/A	N/A	N	Not detected.
	96-12-8	Dibromo-3-chloropropane (1,2-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	0.0053 c*	N/A	N/A	N	Not detected.
	124-48-1	Dibromochloromethane	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	8.3 c*	N/A	N/A	N	Not detected.
	106-93-4	Dibromoethane (1,2-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	0.036 c	N/A	N/A	N	Not detected.
	74-95-3	Dibromomethane	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	2.4 n	N/A	N/A	N	Not detected.
	95-50-1	Dichlorobenzene (1,2-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	180 n	N/A	N/A	N	Not detected.
	541-73-1	Dichlorobenzene (1,3-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	2.6 c	N/A	N/A	N	Not detected.
	106-46-7	Dichlorobenzene (1,4-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	2.6 c	N/A	N/A	N	Not detected.
	75-71-8	Dichlorodifluoromethane	–	–	mg/kg	–	0	11	0.0063	0.69	–	–	8.7 n	N/A	N/A	N	Not detected.
	75-34-3	Dichloroethane (1,1-)	–	–	mg/kg	–	0	11	0.00095	0.1	–	–	3.6 c	N/A	N/A	N	Not detected.
	107-06-2	Dichloroethane (1,2-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	0.46 c**	N/A	N/A	N	Not detected.
	75-35-4	Dichloroethene (1,1-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	23 n	N/A	N/A	N	Not detected.
	156-59-2	Dichloroethene (cis-1,2-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	16 n	N/A	N/A	N	Not detected.
	156-60-5	Dichloroethene (trans-1,2-)	–	–	mg/kg	–	0	11	0.00063	0.069	–	–	160 n	N/A	N/A	N	Not detected.
	540-59-0	Dichloroethene (1,2-), Total	–	–	mg/kg	–	0	11	0.00095	0.1	–	–	--	N/A	N/A	N	Not detected.
	78-87-5	Dichloropropene (1,2-)	–	–	mg/kg	–	0	11	0.0022	0.004	–	–	0.28 c**	N/A	N/A	N	Not detected.
	142-28-9	Dichloropropene (1,3-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	160 n	N/A	N/A	N	Not detected.
	594-20-7	Dichloropropene (2,2-)	–	–	mg/kg	–	0	11	0.0032	0.0058	–	–	--	N/A	N/A	N	Not detected.
	563-58-6	Dichloropropene (1,1-)	–	–	mg/kg	–	0	11	0.0025	0.0046	–	–	--	N/A	N/A	N	Not detected.

TABLE 2.1\_SG1 - Soils Group 1

## OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	10061-01-5	Dichloropropene (cis-1,3-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	--	N/A	N/A	N	Not detected.
	10061-02-6	Dichloropropene (trans-1,3-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	--	N/A	N/A	N	Not detected.
	542-75-6	Dichloropropene (1,3-), Total	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	1.8 c**	N/A	N/A	N	Not detected.
	60-29-7	Diethyl ether	-	-	mg/kg	-	0	11	0.0032 / 0.0058	-	-	1600 n	N/A	N/A	N	Not detected.
	108-20-3	Diisopropyl Ether	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	220 n	N/A	N/A	N	Not detected.
	123-91-1	Dioxane (1,4-)	-	-	mg/kg	-	0	11	0.025 / 0.046	-	-	5.3 c*	N/A	N/A	N	Not detected.
	100-41-4	Ethylbenzene	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	5.8 c*	N/A	N/A	N	Not detected.
	637-92-3	Ethyl-Tert-Butyl-Ether	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	--	N/A	N/A	N	Not detected.
	87-68-3	Hexachlorobutadiene	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	1.2 c**	N/A	N/A	N	Not detected.
	591-78-6	Hexanone (2-)	-	-	mg/kg	-	0	11	0.0063 / 0.69	-	-	20 n	N/A	N/A	N	Not detected.
	98-82-8	Isopropylbenzene (Cumene)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	190 n	N/A	N/A	N	Not detected.
	99-87-6	Isopropyltoluene (p-)	0.00026	0.00026	mg/kg	SH-AP-5/0-6"	1	11	0.00063 / 0.069	0.00026	-	190 n	N/A	N/A	N	Max concentration below screening level.
	78-93-3	Methyl ethyl ketone	0.0045	0.0086	mg/kg	SH-AP-1/0-6"	3	11	0.0078 / 0.011	0.0086	-	2700 n	N/A	N/A	N	Max concentration below screening level.
	108-10-1	Methyl isobutyl ketone	-	-	mg/kg	-	0	11	0.0063 / 0.69	-	-	3300 n	N/A	N/A	N	Not detected.
	1634-04-4	Methyl tert butyl ether	-	-	mg/kg	-	0	11	0.0013 / 0.0023	-	-	47 c*	N/A	N/A	N	Not detected.
	75-09-2	Methylene chloride	-	-	mg/kg	-	0	11	0.0063 / 0.69	-	-	35 n	N/A	N/A	N	Not detected.
	91-20-3	Naphthalene	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	3.8 c**	N/A	N/A	N	Not detected.
	103-65-1	Propylbenzene (n-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	380 ns	N/A	N/A	N	Not detected.
	100-42-5	Styrene	-	-	mg/kg	-	0	11	0.0013 / 0.0023	-	-	600 n	N/A	N/A	N	Not detected.
	994-05-8	Tertiary-Amyl Methyl Ether	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	--	N/A	N/A	N	Not detected.
	630-20-6	Tetrachloroethane (1,1,1,2-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	2 c	N/A	N/A	N	Not detected.
	79-34-5	Tetrachloroethane (1,1,2,2-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	0.6 c	N/A	N/A	N	Not detected.
	127-18-4	Tetrachloroethene	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	8.1 n	N/A	N/A	N	Not detected.
	109-99-9	Tetrahydrofuran	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	1800 n	N/A	N/A	N	Not detected.
	108-88-3	Toluene	-	-	mg/kg	-	0	11	0.00095 / 0.1	-	-	490 n	N/A	N/A	N	Not detected.
	87-61-6	Trichlorobenzene (1,2,3-)	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	6.3 n	N/A	N/A	N	Not detected.
	120-82-1	Trichlorobenzene (1,2,4-)	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	5.8 n	N/A	N/A	N	Not detected.
	71-55-6	Trichloroethane (1,1,1-)	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	810 ns	N/A	N/A	N	Not detected.
	79-00-5	Trichloroethane (1,1,2-)	-	-	mg/kg	-	0	11	0.00095 / 0.1	-	-	0.15 n	N/A	N/A	N	Not detected.
	79-01-6	Trichloroethene	-	-	mg/kg	-	0	11	0.00063 / 0.069	-	-	0.41 n	N/A	N/A	N	Not detected.
	75-69-4	Trichlorofluoromethane	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	2300 ns	N/A	N/A	N	Not detected.
	96-18-4	Trichloropropane (1,2,3-)	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	0.0051 c*	N/A	N/A	N	Not detected.
	95-63-6	Trimethylbenzene (1,2,4-)	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	30 n	N/A	N/A	N	Not detected.
	108-67-8	Trimethylbenzene (1,3,5-)	-	-	mg/kg	-	0	11	0.0025 / 0.0046	-	-	27 n	N/A	N/A	N	Not detected.
	75-01-4	Vinyl chloride	-	-	mg/kg	-	0	11	0.0013 / 0.0023	-	-	0.059 c	N/A	N/A	N	Not detected.
	95-47-6	Xylene (o-)	-	-	mg/kg	-	0	11	0.0013 / 0.0023	-	-	65 n	N/A	N/A	N	Not detected.
	108-38-3	Xylene (p/m-)	-	-	mg/kg	-	0	11	0.0013 / 0.0023	-	-	55 n	N/A	N/A	N	Not detected.

TABLE 2.1\_SG1 - Soils Group 1

## OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	1330-20-7	Xylenes, Total	-	-	mg/kg	-	0	11	0.0013	0.0023	-	58 n	N/A	N/A	N	Not detected.	
	83-32-9	SVOCs															
	208-96-8	Acenaphthene	-	-	mg/kg	-	0	11	0.14	0.21	-	360 n	N/A	N/A	N	Not detected.	
	98-86-2	Acenaphthylene	0.076	0.076	mg/kg	SH-AP-4/0-6"	1	11	0.14	0.21	0.076	360 n	N/A	N/A	N	Max concentration below screening level.	
	62-53-3	Acetophenone	-	-	mg/kg	-	0	11	0.17	0.27	-	780 n	N/A	N/A	N	Not detected.	
	120-12-7	Aniline	-	-	mg/kg	-	0	11	0.2	0.32	-	44 n	N/A	N/A	N	Not detected.	
	103-33-3	Anthracene	0.0565	0.0565	mg/kg	SH-AP-4/0-6"	1	11	0.1	0.16	0.0565	1800 n	N/A	N/A	N	Max concentration below screening level.	
	56-55-3	Azobenzene	-	-	mg/kg	-	0	11	0.17	0.27	-	5.6 c	N/A	N/A	N	Not detected.	
	50-32-8	Benz(a)anthracene	0.025	0.195	mg/kg	SH-AP-4/0-6"	7	11	0.1	0.12	0.195	1.1 c	N/A	N/A	N	Max concentration below screening level.	
	205-99-2	Benzo(a)pyrene	0.007	0.135	mg/kg	SH-AP-4/0-6"	11	11	-	-	0.135	2	0.11 c*	N/A	N/A	Y	Max concentration exceeds screening level.
	191-24-2	Benzo(b)fluoranthene	0.036	0.27	mg/kg	SH-AP-4/0-6"	8	11	0.1	0.12	0.27	-	1.1 c	N/A	N/A	N	Max concentration below screening level.
	207-08-9	Benzo(ghi)perylene	0.029	0.157	mg/kg	SH-AP-4/0-6"	6	11	0.14	0.18	0.157	-	1.1 c	N/A	N/A	N	Max concentration below screening level.
	111-91-1	Benzo(k)fluoranthene	0.034	0.0835	mg/kg	SH-AP-4/0-6"	2	11	0.1	0.16	0.0835	-	11 c	N/A	N/A	N	Max concentration below screening level.
	111-44-4	Bis(2-chloroethoxy)methane	-	-	mg/kg	-	0	11	0.18	0.29	-	-	19 n	N/A	N/A	N	Not detected.
	108-60-1	Bis(2-chloroethyl)ether	-	-	mg/kg	-	0	11	0.15	0.24	-	-	0.23 c	N/A	N/A	N	Not detected.
	117-81-7	Bis(2-chloroisopropyl)ether	-	-	mg/kg	-	0	11	0.2	0.32	-	-	310 n	N/A	N/A	N	Not detected.
	101-55-3	Bis(2-ethylhexyl)phthalate	-	-	mg/kg	-	0	11	0.17	0.27	-	-	39 c**	N/A	N/A	N	Not detected.
	85-68-7	Bromophenyl phenyl ether (4-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	--	N/A	N/A	N	Not detected.
	106-47-8	Butyl benzyl phthalate	-	-	mg/kg	-	0	11	0.17	0.27	-	-	290 c**	N/A	N/A	N	Not detected.
	91-58-7	Chloroaniline (4-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	2.7 c**	N/A	N/A	N	Not detected.
	95-57-8	Chloronaphthalene (2-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	480 n	N/A	N/A	N	Not detected.
	218-01-9	Chlorophenol (2-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	39 n	N/A	N/A	N	Not detected.
	53-70-3	Chrysene	0.022	0.18	mg/kg	SH-AP-4/0-6"	9	11	0.1	0.1	0.18	-	110 c	N/A	N/A	N	Max concentration below screening level.
	132-64-9	Dibenzo(a,h)anthracene	0.0365	0.0365	mg/kg	SH-AP-4/0-6"	1	11	0.1	0.16	0.0365	-	0.11 c	N/A	N/A	N	Max concentration below screening level.
	95-50-1	Dibenzofuran	-	-	mg/kg	-	0	11	0.17	0.27	-	-	7.3 n	N/A	N/A	N	Not detected.
	541-73-1	Dichlorobenzene (1,2-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	180 n	N/A	N/A	N	Not detected.
	106-46-7	Dichlorobenzene (1,3-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	--	N/A	N/A	N	Not detected.
	91-94-1	Dichlorobenzidine (3,3')	-	-	mg/kg	-	0	11	0.17	0.27	-	-	2.6 c	N/A	N/A	N	Not detected.
	120-83-2	Dichlorophenol (2,4-)	-	-	mg/kg	-	0	11	0.15	0.24	-	-	1.2 c	N/A	N/A	N	Not detected.
	84-66-2	Diethyl phthalate	-	-	mg/kg	-	0	11	0.17	0.27	-	-	5100 n	N/A	N/A	N	Not detected.
	131-11-3	Dimethyl phthalate	-	-	mg/kg	-	0	11	0.17	0.27	-	-	--	N/A	N/A	N	Not detected.
	105-67-9	Dimethylphenol (2,4-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	130 n	N/A	N/A	N	Not detected.
	84-74-2	Di-n-butylphthalate	-	-	mg/kg	-	0	11	0.17	0.27	-	-	630 n	N/A	N/A	N	Not detected.
	51-28-5	Dinitrophenol (2,4-)	-	-	mg/kg	-	0	11	0.82	1.3	-	-	13 n	N/A	N/A	N	Not detected.
	121-14-2	Dinitrotoluene (2,4-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	1.7 c**	N/A	N/A	N	Not detected.
	606-20-2	Dinitrotoluene (2,6-)	-	-	mg/kg	-	0	11	0.17	0.27	-	-	0.36 c**	N/A	N/A	N	Not detected.

TABLE 2.1\_SG1 - Soils Group 1

## OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	117-84-0	Di-n-octylphthalate	-	-	mg/kg	-	0	11	0.17 0.27	-	-	63 n	N/A	N/A	N	Not detected.
	206-44-0	Fluoranthene	0.029	0.325	mg/kg	SH-AP-4/0-6"	10	11	0.1 0.1	0.325	-	240 n	N/A	N/A	N	Max concentration below screening level.
	86-73-7	Fluorene	-	-	mg/kg	-	0	11	0.17 0.27	-	-	240 n	N/A	N/A	N	Not detected.
	118-74-1	Hexachlorobenzene	-	-	mg/kg	-	0	11	0.00958 0.16	-	-	0.21 c*	N/A	N/A	N	Not detected.
	87-68-3	Hexachlorobutadiene	-	-	mg/kg	-	0	11	0.17 0.27	-	-	1.2 c**	N/A	N/A	N	Not detected.
	67-72-1	Hexachloroethane	-	-	mg/kg	-	0	11	0.14 0.21	-	-	1.8 c**	N/A	N/A	N	Not detected.
	193-39-5	Indeno(1,2,3-cd)pyrene	0.03	0.143	mg/kg	SH-AP-4/0-6"	6	11	0.14 0.18	0.143	-	1.1 c	N/A	N/A	N	Max concentration below screening level.
	78-59-1	Isophorone	-	-	mg/kg	-	0	11	0.15 0.24	-	-	570 c**	N/A	N/A	N	Not detected.
	91-57-6	Methylnaphthalene (2-)	-	-	mg/kg	-	0	11	0.2 0.32	-	-	24 n	N/A	N/A	N	Not detected.
	95-48-7	Methylphenol (2-)	-	-	mg/kg	-	0	11	0.17 0.27	-	-	320 n	N/A	N/A	N	Not detected.
	108-39-4	Methylphenol (3-)/Methylphenol (4-)	-	-	mg/kg	-	0	11	0.24 0.38	-	-	320 n	N/A	N/A	N	Not detected.
	91-20-3	Naphthalene	-	-	mg/kg	-	0	11	0.17 0.27	-	-	3.8 c**	N/A	N/A	N	Not detected.
	98-95-3	Nitrobenzene	0.18	0.18	mg/kg	SH-AP-1/0-6"	1	11	0.15 0.24	0.18	-	5.1 c**	N/A	N/A	N	Max concentration below screening level.
	88-75-5	Nitrophenol (2-)	-	-	mg/kg	-	0	11	0.37 0.58	-	-	13 n	N/A	N/A	N	Not detected.
	100-02-7	Nitrophenol (4-)	-	-	mg/kg	-	0	11	0.24 0.37	-	-	13 n	N/A	N/A	N	Not detected.
	87-86-5	Pentachlorophenol	-	-	mg/kg	-	0	11	0.34 0.53	-	-	1 c*	N/A	N/A	N	Not detected.
	85-01-8	Phenanthrene	0.03	0.1285	mg/kg	SH-AP-4/0-6"	6	11	0.1 0.13	0.1285	-	240 n	N/A	N/A	N	Max concentration below screening level.
	108-95-2	Phenol	-	-	mg/kg	-	0	11	0.17 0.27	-	-	1900 n	N/A	N/A	N	Not detected.
	129-00-0	Pyrene	0.025	0.295	mg/kg	SH-AP-4/0-6"	10	11	0.1 0.1	0.295	-	180 n	N/A	N/A	N	Max concentration below screening level.
	120-82-1	Trichlorobenzene (1,2,4-)	-	-	mg/kg	-	0	11	0.17 0.27	-	-	5.8 n	N/A	N/A	N	Not detected.
	95-95-4	Trichlorophenol (2,4,5-)	-	-	mg/kg	-	0	11	0.17 0.27	-	-	630 n	N/A	N/A	N	Not detected.
	88-06-2	Trichlorophenol (2,4,6-)	-	-	mg/kg	-	0	11	0.1 0.16	-	-	6.3 n	N/A	N/A	N	Not detected.
		TPH														
	HA-VPHC9-C10	C9-C10 Aromatics	-	-	mg/kg	-	0	11	2.63 5.54	-	-	11 n	N/A	N/A	N	Not detected.
	HA-EPHC11-C22A	C11-C22 Aromatics, Adjusted	8.46	50.9	mg/kg	SH-AP-11/0-6"	10	11	6.91 6.91	50.9	-	11 n	N/A	N/A	Y	Max concentration exceeds screening level.
	HA-VPHC5-C8A	C5-C8 Aliphatics, Adjusted	-	-	mg/kg	-	0	11	2.63 5.54	-	-	52 n	N/A	N/A	N	Not detected.
	HA-VPHC9-C12A	C9-C12 Aliphatics, Adjusted	-	-	mg/kg	-	0	11	2.63 5.54	-	-	9.6 ns	N/A	N/A	N	Not detected.
	HA-EPHC9-C18	C9-C18 Aliphatics	-	-	mg/kg	-	0	11	6.71 10.4	-	-	9.6 ns	N/A	N/A	N	Not detected.
	HA-EPHC19-C36	C19-C36 Aliphatics	8.63	33.5	mg/kg	SH-AP-11/0-6"	9	11	6.91 8.61	33.5	-	250 n	N/A	N/A	N	Max concentration below screening level.
		Pesticides														
	309-00-2	Aldrin	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	0.039 c**	N/A	N/A	N	Not detected.
	319-84-6	BHC (Alpha-)	-	-	mg/kg	-	0	11	0.00329 0.00538	-	-	0.086 c	N/A	N/A	N	Not detected.
	319-85-7	BHC (Beta-)	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	0.3 c	N/A	N/A	N	Not detected.
	319-86-8	BHC (Delta-)	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	0.086 c	N/A	N/A	N	Not detected.
	58-89-9	BHC (Gamma-) (Lindane)	-	-	mg/kg	-	0	11	0.00263 0.0043	-	-	0.57 c**	N/A	N/A	N	Not detected.
	57-74-9	Chlordane	-	-	mg/kg	-	0	11	0.0641 0.105	-	-	1.7 c**	N/A	N/A	N	Not detected.
	72-54-8	DDD (4,4')	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	2.3 c	N/A	N/A	N	Not detected.

TABLE 2.1\_SG1 - Soils Group 1  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	72-55-9	DDE (4,4')	0.0134	0.014	mg/kg	SH-AP-2/0-6"	2	11	0.00789 0.0129	0.014	-	2 c	N/A	N/A	N	Max concentration below screening level.
	50-29-3	DDT (4,4')	-	-	mg/kg	-	0	11	0.0148 0.0242	-	-	1.9 c**	N/A	N/A	N	Not detected.
	60-57-1	Dieldrin	-	-	mg/kg	-	0	11	0.00493 0.00807	-	-	0.034 c**	N/A	N/A	N	Not detected.
	959-98-8	Endosulfan I	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	47 n	N/A	N/A	N	Not detected.
	33213-65-9	Endosulfan II	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	47 n	N/A	N/A	N	Not detected.
	1031-07-8	Endosulfan sulfate	-	-	mg/kg	-	0	11	0.00329 0.00538	-	-	47 n	N/A	N/A	N	Not detected.
	72-20-8	Endrin	-	-	mg/kg	-	0	11	0.00329 0.00538	-	-	1.9 n	N/A	N/A	N	Not detected.
	53494-70-5	Endrin ketone	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	1.9 n	N/A	N/A	N	Not detected.
	76-44-8	Heptachlor	-	-	mg/kg	-	0	11	0.00394 0.00646	-	-	0.13 c*	N/A	N/A	N	Not detected.
	1024-57-3	Heptachlor epoxide	-	-	mg/kg	-	0	11	0.0148 0.0242	-	-	0.07 c**	N/A	N/A	N	Not detected.
	118-74-1	Hexachlorobenzene	-	-	mg/kg	-	0	11	0.00789 0.0129	-	-	0.21 c*	N/A	N/A	N	Not detected.
	72-43-5	Methoxychlor	-	-	mg/kg	-	0	11	0.0148 0.0242	-	-	32 n	N/A	N/A	N	Not detected.
		PCBs														
	12674-11-2	Aroclor 1016	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.41 n	N/A	N/A	N	Not detected.
	11104-28-2	Aroclor 1221	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.2 c	N/A	N/A	N	Not detected.
	11141-16-5	Aroclor 1232	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.17 c	N/A	N/A	N	Not detected.
	53469-21-9	Aroclor 1242	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.23 c	N/A	N/A	N	Not detected.
	12672-29-6	Aroclor 1248	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.23 c	N/A	N/A	N	Not detected.
	11097-69-1	Aroclor 1254	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.12 n	N/A	N/A	N	Not detected.
	11096-82-5	Aroclor 1260	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.24 c	N/A	N/A	N	Not detected.
	37324-23-5	Aroclor 1262	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.12 n	N/A	N/A	N	Not detected.
	11100-14-4	Aroclor 1268	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.12 n	N/A	N/A	N	Not detected.
	1336-36-3	PCBs, Total	-	-	mg/kg	-	0	11	0.0335 0.052	-	-	0.23 c	N/A	N/A	N	Not detected.
		Metals														
	7440-38-2	Arsenic, Total	2.1	14	mg/kg	SH-AP-7/0-6"	11	11	- -	14	20	0.68 c**R	N/A	N/A	Y	Max concentration exceeds screening level.
	7429-90-5	Aluminum, Total	1,100	21,600	mg/kg	SH-AP-1/0-6"	11	11	- -	21600	10,000	7700 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-36-0	Antimony, Total	0.562	0.562	mg/kg	SH-AP-11/0-6"	1	11	4.04 6.16	0.562	-	3.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-39-3	Barium, Total	7.94	36.3	mg/kg	SH-AP-1/0-6"	11	11	- -	36.3	-	1500 n	N/A	N/A	N	Max concentration below screening level.
	7440-41-7	Beryllium, Total	0.077	0.229	mg/kg	SH-AP-6/0-6"	11	11	- -	0.229	-	16 n	N/A	N/A	N	Max concentration below screening level.
	7440-43-9	Cadmium, Total	0.235	1.53	mg/kg	SH-AP-1/0-6"	11	11	- -	1.53	-	7.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-70-2	Calcium, Total	58.1	2,680	mg/kg	SH-AP-4/0-6"	11	11	- -	2680	-	--	N/A	N/A	N	No screening level.
	18540-29-9	Chromium, Hexavalent	-	-	mg/kg	-	0	11	0.83	11	-	0.3 c*	N/A	N/A	N	Not detected.
	7440-47-3	Chromium, Total	3.39	41.1	mg/kg	SH-AP-1/0-6"	11	11	- -	41.1	-	12000 n	N/A	N/A	N	Max concentration below screening level.
	7440-48-4	Cobalt, Total	0.494	17.1	mg/kg	SH-AP-1/0-6"	11	11	- -	17.1	4	2.3 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-50-8	Copper, Total	4.87	45.9	mg/kg	SH-AP-1/0-6"	11	11	- -	45.9	-	310 n	N/A	N/A	N	Max concentration below screening level.
	7439-89-6	Iron, Total	1,460	29,600	mg/kg	SH-AP-1/0-6"	11	11	- -	29600	20,000	5500 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7439-92-1	Lead, Total	4.95	80.9	mg/kg	SH-AP-7/0-6"	11	11	- -	80.9	-	400	N/A	N/A	N	Max concentration below screening level.

TABLE 2.1\_SG1 - Soils Group 1  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Undisturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening	Background Value	Screening Toxicity Value (N/C)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	7439-95-4	Magnesium, Total	70	5,800	mg/kg	SH-AP-1/0-6"	11	11	—	5800	—	—	N/A	N/A	N	Max concentration below screening level.	
	7439-96-5	Manganese, Total	6.43	193	mg/kg	SH-AP-1/0-6"	11	11	—	193	300	180 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7439-97-6	Mercury, Total	0.096	0.126	mg/kg	SH-AP-7/0-6"	4	11	0.065	0.085	—	1.1 n	N/A	N/A	N	Max concentration below screening level.	
	7440-02-0	Nickel, Total	1.93	33.4	mg/kg	SH-AP-1/0-6"	11	11	—	33.4	—	150 n	N/A	N/A	N	Max concentration below screening level.	
	7440-09-7	Potassium, Total	62.1	986	mg/kg	SH-AP-1/0-6"	11	11	—	986	—	—	N/A	N/A	N	No screening level.	
	7782-49-2	Selenium, Total	0.311	1.07	mg/kg	SH-AP-10/0-6"	8	11	4.04	4.75	1.07	—	39 n	N/A	N/A	N	Max concentration below screening level.
	7440-22-4	Silver, Total	—	—	mg/kg	—	0	11	0.808	1.23	—	—	39 n	N/A	N/A	N	Not detected.
	7440-23-5	Sodium, Total	20.6	173	mg/kg	SH-AP-2/0-6"	11	11	—	173	—	—	N/A	N/A	N	No screening level.	
	7440-28-0	Thallium, Total	—	—	mg/kg	—	0	11	0.2	0.31	—	0.6	0.078 n	N/A	N/A	N	Not detected.
	7440-31-5	Tin, Total	0.944	3.11	mg/kg	SH-AP-1/0-6"	9	11	8.08	8.2	3.11	—	4700 n	N/A	N/A	N	Max concentration below screening level.
	7440-62-2	Vanadium, Total	7.26	69.5	mg/kg	SH-AP-1/0-6"	11	11	—	69.5	30	39 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7440-66-6	Zinc, Total	6.8	61.6	mg/kg	SH-AP-1/0-6"	11	11	—	61.6	—	2300 n	N/A	N/A	N	Max concentration below screening level.	
		Other Parameters															
	57-12-5	Cyanide, Physiologically Available	—	—	mg/kg	—	0	11	0.95	1.5	—	—	2.3 n	N/A	N/A	N	Not detected.
	57-12-5	Cyanide, Total	—	—	mg/kg	—	0	11	0.98	1.6	—	—	2.3 n	N/A	N/A	N	Not detected.
	HA-ORP	Oxidation/Reduction Potential (mV)	290	420	mV	SH-AP-7/0-6"	11	11	—	420	—	—	N/A	N/A	N	No screening level.	
	12408-02-5	pH (H) (pH units)	3.4	5.15	pH units	SH-AP-4/0-6"	11	11	—	5.15	—	—	N/A	N/A	N	No screening level.	
	IGNIT	Ignitability (unitless)	—	—	unitless	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	
	RCYAN	Cyanide, Reactive	—	—	mg/kg	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	
	RSULF	Sulfide, Reactive	—	—	mg/kg	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	

## Footnotes:

(1) USEPA Residential RSLs TR-1e-06 and THQ=0.1.

c = cancer

(2) MassDEP Background Levels for Natural Soil.

n = noncancer

(3) From USEPA Residential RSLs.

\* = where: noncancer screening level (SL) &lt; 100X cancer SL

## Abbreviations:

CAS=Chemical Abstracts Service

\*\* = where noncancer SL &lt; 10X cancer SL

ARAR/TBC=Applicable or Relevant and Appropriate Requirements/To Be Considered

s = concentration may exceed soil saturation concentration (Csat)

N/A=not available

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Soil		VOCs														
	67-64-1	Acetone	0.016	0.18	mg/kg	SH-305/0-6"	5	8	0.026 / 0.03	0.18	-	6100 n	N/A	N/A	N	Max concentration below screening level.
	71-43-2	Benzene	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	1.2 c**	N/A	N/A	N	Not detected.
	108-86-1	Bromobenzene	-	-	mg/kg	-	0	8	0.0031 / 0.0047	-	-	29 n	N/A	N/A	N	Not detected.
	74-97-5	Bromochloromethane	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	15 n	N/A	N/A	N	Not detected.
	75-27-4	Bromodichloromethane	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	0.29 c	N/A	N/A	N	Not detected.
	75-25-2	Bromoform	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	19 c**	N/A	N/A	N	Not detected.
	74-83-9	Bromomethane	-	-	mg/kg	-	0	8	0.0012 / 0.0019	-	-	0.68 n	N/A	N/A	N	Not detected.
	104-51-8	Butylbenzene (n-)	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	390 ns	N/A	N/A	N	Not detected.
	135-98-8	Butylbenzene (sec-)	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	780 ns	N/A	N/A	N	Not detected.
	98-06-6	Butylbenzene (tert-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	780 ns	N/A	N/A	N	Not detected.
	75-15-0	Carbon disulfide	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	77 n	N/A	N/A	N	Not detected.
	56-23-5	Carbon tetrachloride	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	0.65 c*	N/A	N/A	N	Not detected.
	108-90-7	Chlorobenzene	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	28 n	N/A	N/A	N	Not detected.
	75-00-3	Chloroethane	-	-	mg/kg	-	0	8	0.0012 / 0.0019	-	-	1400 n	N/A	N/A	N	Not detected.
	67-66-3	Chloroform	-	-	mg/kg	-	0	8	0.00094 / 0.0014	-	-	0.32 c*	N/A	N/A	N	Not detected.
	74-87-3	Chloromethane	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	11 n	N/A	N/A	N	Not detected.
	95-49-8	Chlorotoluene (o-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	160 n	N/A	N/A	N	Not detected.
	106-43-4	Chlorotoluene (p-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	160 n	N/A	N/A	N	Not detected.
	96-12-8	Dibromo-3-chloropropane (1,2-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	0.0053 c*	N/A	N/A	N	Not detected.
	124-48-1	Dibromochloromethane	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	8.3 c*	N/A	N/A	N	Not detected.
	106-93-4	Dibromoethane (1,2-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	0.036 c	N/A	N/A	N	Not detected.
	74-95-3	Dibromomethane	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	2.4 n	N/A	N/A	N	Not detected.
	95-50-1	Dichlorobenzene (1,2-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	180 n	N/A	N/A	N	Not detected.
	541-73-1	Dichlorobenzene (1,3-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	2.6 c	N/A	N/A	N	Not detected.
	106-46-7	Dichlorobenzene (1,4-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	2.6 c	N/A	N/A	N	Not detected.
	75-71-8	Dichlorodifluoromethane	-	-	mg/kg	-	0	8	0.0063 / 0.0095	-	-	8.7 n	N/A	N/A	N	Not detected.
	75-34-3	Dichloroethane (1,1-)	-	-	mg/kg	-	0	8	0.00094 / 0.0014	-	-	3.6 c	N/A	N/A	N	Not detected.
	107-06-2	Dichloroethane (1,2-)	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	0.46 c**	N/A	N/A	N	Not detected.
	75-35-4	Dichloroethene (1,1-)	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	23 n	N/A	N/A	N	Not detected.
	156-59-2	Dichloroethene (cis-1,2-)	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	16 n	N/A	N/A	N	Not detected.
	156-60-5	Dichloroethene (trans-1,2-)	-	-	mg/kg	-	0	8	0.00094 / 0.0014	-	-	160 n	N/A	N/A	N	Not detected.
	540-59-0	Dichloroethene (1,2-), Total	-	-	mg/kg	-	0	8	0.00063 / 0.00095	-	-	--	N/A	N/A	N	Not detected.
	78-87-5	Dichloropropane (1,2-)	-	-	mg/kg	-	0	8	0.0022 / 0.0033	-	-	0.28 c**	N/A	N/A	N	Not detected.
	142-28-9	Dichloropropane (1,3-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	160 n	N/A	N/A	N	Not detected.
	594-20-7	Dichloropropane (2,2-)	-	-	mg/kg	-	0	8	0.0031 / 0.0047	-	-	--	N/A	N/A	N	Not detected.
	563-58-6	Dichloropropene (1,1-)	-	-	mg/kg	-	0	8	0.0025 / 0.0038	-	-	--	N/A	N/A	N	Not detected.

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	10061-01-3	Dichloropropene (cis-1,3-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	--	N/A	N/A	N	Not detected.
	10061-02-4	Dichloropropene (trans-1,3-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	--	N/A	N/A	N	Not detected.
	542-75-6	Dichloropropene (1,3-), Total	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	1.8 c**	N/A	N/A	N	Not detected.
	60-29-7	Diethyl ether	–	–	mg/kg	–	0	8	0.0031 / 0.0047	–	–	1600 n	N/A	N/A	N	Not detected.
	108-20-3	Diisopropyl Ether	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	220 n	N/A	N/A	N	Not detected.
	123-91-1	Dioxane (1,4-)	–	–	mg/kg	–	0	8	0.025 / 0.038	–	–	5.3 c*	N/A	N/A	N	Not detected.
	100-41-4	Ethylbenzene	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	5.8 c*	N/A	N/A	N	Not detected.
	637-92-3	Ethyl-Tert-Butyl-Ether	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	--	N/A	N/A	N	Not detected.
	87-68-3	Hexachlorobutadiene	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	1.2 c**	N/A	N/A	N	Not detected.
	591-78-6	Hexanone (2-)	–	–	mg/kg	–	0	8	0.0063 / 0.0095	–	–	20 n	N/A	N/A	N	Not detected.
	98-82-8	Isopropylbenzene (Cumene)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	190 n	N/A	N/A	N	Not detected.
	99-87-6	Isopropyltoluene (p-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	190 n	N/A	N/A	N	Not detected.
	78-93-3	Methyl ethyl ketone	0.0027	0.0082	mg/kg	SH-305/0-6"	2	8	0.0063 / 0.0084	0.0082	–	2700 n	N/A	N/A	N	Max concentration below screening level.
	108-10-1	Methyl isobutyl ketone	–	–	mg/kg	–	0	8	0.0063 / 0.0095	–	–	3300 n	N/A	N/A	N	Not detected.
	1634-04-4	Methyl tert butyl ether	–	–	mg/kg	–	0	8	0.0012 / 0.0019	–	–	47 c*	N/A	N/A	N	Not detected.
	75-09-2	Methylene chloride	–	–	mg/kg	–	0	8	0.0063 / 0.0095	–	–	35 n	N/A	N/A	N	Not detected.
	91-20-3	Naphthalene	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	3.8 c**	N/A	N/A	N	Not detected.
	103-65-1	Propylbenzene (n-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	380 ns	N/A	N/A	N	Not detected.
	100-42-5	Styrene	–	–	mg/kg	–	0	8	0.0012 / 0.0019	–	–	600 n	N/A	N/A	N	Not detected.
	994-05-8	Tertiary-Amyl Methyl Ether	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	--	N/A	N/A	N	Not detected.
	630-20-6	Tetrachloroethane (1,1,1,2-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	2 c	N/A	N/A	N	Not detected.
	79-34-5	Tetrachloroethane (1,1,2,2-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	0.6 c	N/A	N/A	N	Not detected.
	127-18-4	Tetrachloroethene	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	8.1 n	N/A	N/A	N	Not detected.
	109-99-9	Tetrahydrofuran	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	1800 n	N/A	N/A	N	Not detected.
	108-88-3	Toluene	–	–	mg/kg	–	0	8	0.00094 / 0.0014	–	–	490 n	N/A	N/A	N	Not detected.
	87-61-6	Trichlorobenzene (1,2,3-)	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	6.3 n	N/A	N/A	N	Not detected.
	120-82-1	Trichlorobenzene (1,2,4-)	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	5.8 n	N/A	N/A	N	Not detected.
	71-55-6	Trichloroethane (1,1,1-)	–	–	mg/kg	–	0	8	0.00063 / 0.00095	–	–	810 ns	N/A	N/A	N	Not detected.
	79-00-5	Trichloroethane (1,1,2-)	–	–	mg/kg	–	0	8	0.00094 / 0.0014	–	–	0.15 n	N/A	N/A	N	Not detected.
	79-01-6	Trichloroethene	0.0018	0.0018	mg/kg	SH-303/0-6"	1	8	0.00063 / 0.00095	0.0018	–	0.41 n	N/A	N/A	N	Max concentration below screening level.
	75-69-4	Trichlorofluoromethane	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	2300 ns	N/A	N/A	N	Not detected.
	96-18-4	Trichloropropane (1,2,3-)	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	0.0051 c*	N/A	N/A	N	Not detected.
	95-63-6	Trimethylbenzene (1,2,4-)	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	30 n	N/A	N/A	N	Not detected.
	108-67-8	Trimethylbenzene (1,3,5-)	–	–	mg/kg	–	0	8	0.0025 / 0.0038	–	–	27 n	N/A	N/A	N	Not detected.
	75-01-4	Vinyl chloride	–	–	mg/kg	–	0	8	0.0012 / 0.0019	–	–	0.059 c	N/A	N/A	N	Not detected.
	95-47-6	Xylene (o-)	–	–	mg/kg	–	0	8	0.0012 / 0.0019	–	–	65 n	N/A	N/A	N	Not detected.
	108-38-3	Xylene (p/m-)	–	–	mg/kg	–	0	8	0.0012 / 0.0019	–	–	55 n	N/A	N/A	N	Not detected.

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	1330-20-7	Xylenes, Total SVOCs	–	–	mg/kg	–	0	8	0.0012	0.0019	–	58 n	N/A	N/A	N	Not detected.	
	83-32-9	Acenaphthene	–	–	mg/kg	–	0	8	0.14	0.15	–	360 n	N/A	N/A	N	Not detected.	
	208-96-8	Acenaphthylene	–	–	mg/kg	–	0	8	0.14	0.15	–	360 n	N/A	N/A	N	Not detected.	
	98-86-2	Acetophenone	–	–	mg/kg	–	0	8	0.17	0.18	–	780 n	N/A	N/A	N	Not detected.	
	62-53-3	Aniline	–	–	mg/kg	–	0	8	0.21	0.22	–	44 n	N/A	N/A	N	Not detected.	
	120-12-7	Anthracene	–	–	mg/kg	–	0	8	0.1	0.11	–	1800 n	N/A	N/A	N	Not detected.	
	103-33-3	Azobenzene	–	–	mg/kg	–	0	8	0.17	0.18	–	5.6 c	N/A	N/A	N	Not detected.	
	56-55-3	Benzo(a)anthracene	0.02	0.02	mg/kg	SH-305/0-6"	1	8	0.1	0.11	0.02	1.1 c	N/A	N/A	N	Max concentration below screening level.	
	50-32-8	Benzo(a)pyrene	0.00555	0.017	mg/kg	SH-301/0-6"	3	8	0.0069	0.0073	0.017	2	0.11 c*	N/A	N/A	N	Max concentration below screening level.
	205-99-2	Benzo(b)fluoranthene	0.034	0.034	mg/kg	SH-305/0-6"	1	8	0.1	0.11	0.034	–	1.1 c	N/A	N/A	N	Max concentration below screening level.
	191-24-2	Benzo(ghi)perylene	–	–	mg/kg	–	0	8	0.14	0.15	–	1.1 c	N/A	N/A	N	Not detected.	
	207-08-9	Benzo(k)fluoranthene	–	–	mg/kg	–	0	8	0.1	0.11	–	11 c	N/A	N/A	N	Not detected.	
	111-91-1	Bis(2-chloroethoxy)methane	–	–	mg/kg	–	0	8	0.19	0.2	–	19 n	N/A	N/A	N	Not detected.	
	111-44-4	Bis(2-chloroethyl)ether	–	–	mg/kg	–	0	8	0.16	0.16	–	0.23 c	N/A	N/A	N	Not detected.	
	108-60-1	Bis(2-chloroisopropyl)ether	–	–	mg/kg	–	0	8	0.21	0.22	–	310 n	N/A	N/A	N	Not detected.	
	117-81-7	Bis(2-ethylhexyl)phthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	39 c**	N/A	N/A	N	Not detected.	
	101-55-3	Bromophenyl phenyl ether (4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	--	N/A	N/A	N	Not detected.	
	85-68-7	Butyl benzyl phthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	290 c**	N/A	N/A	N	Not detected.	
	106-47-8	Chloroaniline (4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	2.7 c**	N/A	N/A	N	Not detected.	
	91-58-7	Chloronaphthalene (2-)	–	–	mg/kg	–	0	8	0.17	0.18	–	480 n	N/A	N/A	N	Not detected.	
	95-57-8	Chlorophenol (2-)	–	–	mg/kg	–	0	8	0.17	0.18	–	39 n	N/A	N/A	N	Not detected.	
	218-01-9	Chrysene	0.018	0.028	mg/kg	SH-305/0-6"	2	8	0.1	0.11	0.028	–	110 c	N/A	N/A	N	Max concentration below screening level.
	53-70-3	Dibenzo(a,h)anthracene	–	–	mg/kg	–	0	8	0.1	0.11	–	0.11 c	N/A	N/A	N	Not detected.	
	132-64-9	Dibenzofuran	–	–	mg/kg	–	0	8	0.17	0.18	–	7.3 n	N/A	N/A	N	Not detected.	
	95-50-1	Dichlorobenzene (1,2-)	–	–	mg/kg	–	0	8	0.17	0.18	–	180 n	N/A	N/A	N	Not detected.	
	541-73-1	Dichlorobenzene (1,3-)	–	–	mg/kg	–	0	8	0.17	0.18	–	--	N/A	N/A	N	Not detected.	
	106-46-7	Dichlorobenzene (1,4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	2.6 c	N/A	N/A	N	Not detected.	
	91-94-1	Dichlorobenzidine (3,3'-)	–	–	mg/kg	–	0	8	0.17	0.18	–	1.2 c	N/A	N/A	N	Not detected.	
	120-83-2	Dichlorophenol (2,4-)	–	–	mg/kg	–	0	8	0.16	0.16	–	19 n	N/A	N/A	N	Not detected.	
	84-66-2	Diethyl phthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	5100 n	N/A	N/A	N	Not detected.	
	131-11-3	Dimethyl phthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	--	N/A	N/A	N	Not detected.	
	105-67-9	Dimethylphenol (2,4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	130 n	N/A	N/A	N	Not detected.	
	84-74-2	Di-n-butylphthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	630 n	N/A	N/A	N	Not detected.	
	51-28-5	Dinitrophenol (2,4-)	–	–	mg/kg	–	0	8	0.83	0.88	–	13 n	N/A	N/A	N	Not detected.	
	121-14-2	Dinitrotoluene (2,4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	1.7 c**	N/A	N/A	N	Not detected.	
	606-20-2	Dinitrotoluene (2,6-)	–	–	mg/kg	–	0	8	0.17	0.18	–	0.36 c**	N/A	N/A	N	Not detected.	

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	117-84-0	Di-n-octylphthalate	–	–	mg/kg	–	0	8	0.17	0.18	–	63 n	N/A	N/A	N	Not detected.	
	206-44-0	Fluoranthene	0.028	0.043	mg/kg	SH-305/0-6"	2	8	0.1	0.11	0.043	–	240 n	N/A	N/A	N	Max concentration below screening level.
	86-73-7	Fluorene	–	–	mg/kg	–	0	8	0.17	0.18	–	–	240 n	N/A	N/A	N	Not detected.
	118-74-1	Hexachlorobenzene	–	–	mg/kg	–	0	8	0.00843	0.11	–	–	0.21 c*	N/A	N/A	N	Not detected.
	87-68-3	Hexachlorobutadiene	–	–	mg/kg	–	0	8	0.17	0.18	–	–	1.2 c**	N/A	N/A	N	Not detected.
	67-72-1	Hexachloroethane	–	–	mg/kg	–	0	8	0.14	0.15	–	–	1.8 c**	N/A	N/A	N	Not detected.
	193-39-5	Indeno(1,2,3-cd)pyrene	–	–	mg/kg	–	0	8	0.14	0.15	–	–	1.1 c	N/A	N/A	N	Not detected.
	78-59-1	Isophorone	–	–	mg/kg	–	0	8	0.16	0.16	–	–	570 c**	N/A	N/A	N	Not detected.
	91-57-6	Methylnaphthalene (2-)	–	–	mg/kg	–	0	8	0.21	0.22	–	–	24 n	N/A	N/A	N	Not detected.
	95-48-7	Methylphenol (2-)	–	–	mg/kg	–	0	8	0.17	0.18	–	–	320 n	N/A	N/A	N	Not detected.
	108-39-4	Methylphenol (3-)/Methylphenol (4-)	–	–	mg/kg	–	0	8	0.25	0.26	–	–	320 n	N/A	N/A	N	Not detected.
	91-20-3	Naphthalene	–	–	mg/kg	–	0	8	0.17	0.18	–	–	3.8 c**	N/A	N/A	N	Not detected.
	98-95-3	Nitrobenzene	–	–	mg/kg	–	0	8	0.16	0.16	–	–	5.1 c**	N/A	N/A	N	Not detected.
	88-75-5	Nitrophenol (2-)	–	–	mg/kg	–	0	8	0.37	0.39	–	–	13 n	N/A	N/A	N	Not detected.
	100-02-7	Nitrophenol (4-)	–	–	mg/kg	–	0	8	0.24	0.26	–	–	13 n	N/A	N/A	N	Not detected.
	87-86-5	Pentachlorophenol	–	–	mg/kg	–	0	8	0.35	0.36	–	–	1 c*	N/A	N/A	N	Not detected.
	85-01-8	Phenanthrene	0.024	0.024	mg/kg	SH-305/0-6"	1	8	0.1	0.11	0.024	–	240 n	N/A	N/A	N	Max concentration below screening level.
	108-95-2	Phenol	–	–	mg/kg	–	0	8	0.17	0.18	–	–	1900 n	N/A	N/A	N	Not detected.
	129-00-0	Pyrene	0.023	0.036	mg/kg	SH-305/0-6"	2	8	0.1	0.11	0.036	–	180 n	N/A	N/A	N	Max concentration below screening level.
	120-82-1	Trichlorobenzene (1,2,4-)	–	–	mg/kg	–	0	8	0.17	0.18	–	–	5.8 n	N/A	N/A	N	Not detected.
	95-95-4	Trichlorophenol (2,4,5-)	–	–	mg/kg	–	0	8	0.17	0.18	–	–	630 n	N/A	N/A	N	Not detected.
	88-06-2	Trichlorophenol (2,4,6-)	–	–	mg/kg	–	0	8	0.1	0.11	–	–	6.3 n	N/A	N/A	N	Not detected.
		TPH															
	HA-VPHC9-C10 Aromatics	–	–	mg/kg	–	0	8	2.39	3.22	–	–	11 n	N/A	N/A	N	Not detected.	
	HA-EPHC1C11-C22 Aromatics, Adjusted	11.9	11.9	mg/kg	SH-305/0-6"	1	8	6.64	7.04	11.9	–	11 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	HA-VPHC5-C8 Aliphatics, Adjusted	–	–	mg/kg	–	0	8	2.39	3.22	–	–	52 n	N/A	N/A	N	Not detected.	
	HA-VPHC9-C12 Aliphatics, Adjusted	–	–	mg/kg	–	0	8	2.39	3.22	–	–	9.6 ns	N/A	N/A	N	Not detected.	
	HA-EPHC9-C9-C18 Aliphatics	–	–	mg/kg	–	0	8	6.64	7.08	–	–	9.6 ns	N/A	N/A	N	Not detected.	
	HA-EPHC1C19-C36 Aliphatics	10.2	10.2	mg/kg	SH-305/0-6"	1	8	6.64	7.04	10.2	–	250 n	N/A	N/A	N	Max concentration below screening level.	
		Pesticides															
	309-00-2	Aldrin	–	–	mg/kg	–	0	8	0.00806	0.00862	–	–	0.039 c**	N/A	N/A	N	Not detected.
	319-84-6	BHC (Alpha-)	–	–	mg/kg	–	0	8	0.00336	0.00359	–	–	0.086 c	N/A	N/A	N	Not detected.
	319-85-7	BHC (Beta-)	–	–	mg/kg	–	0	8	0.00806	0.00862	–	–	0.3 c	N/A	N/A	N	Not detected.
	319-86-8	BHC (Delta-)	–	–	mg/kg	–	0	8	0.00806	0.00862	–	–	0.086 c	N/A	N/A	N	Not detected.
	58-89-9	BHC (Gamma-) (Lindane)	–	–	mg/kg	–	0	8	0.00269	0.00287	–	–	0.57 c**	N/A	N/A	N	Not detected.
	57-74-9	Chlordane	–	–	mg/kg	–	0	8	0.0655	0.07	–	–	1.7 c**	N/A	N/A	N	Not detected.
	72-54-8	DDD (4,4')	–	–	mg/kg	–	0	8	0.00806	0.00862	–	–	2.3 c	N/A	N/A	N	Not detected.

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	72-55-9	DDE (4,4'-)	0.0095	0.0095	mg/kg	SH-305/0-6"	1	8	0.00806	0.00854	0.0095	-	2 c	N/A	N/A	N	Max concentration below screening level.
	50-29-3	DDT (4,4'-)	-	-	mg/kg	-	0	8	0.0151	0.0162	-	-	1.9 c**	N/A	N/A	N	Not detected.
	60-57-1	Dieldrin	-	-	mg/kg	-	0	8	0.00504	0.00539	-	-	0.034 c**	N/A	N/A	N	Not detected.
	959-98-8	Endosulfan I	-	-	mg/kg	-	0	8	0.00806	0.00862	-	-	47 n	N/A	N/A	N	Not detected.
	33213-65-9	Endosulfan II	-	-	mg/kg	-	0	8	0.00806	0.00862	-	-	47 n	N/A	N/A	N	Not detected.
	1031-07-8	Endosulfan sulfate	-	-	mg/kg	-	0	8	0.00336	0.00359	-	-	47 n	N/A	N/A	N	Not detected.
	72-20-8	Endrin	-	-	mg/kg	-	0	8	0.00336	0.00359	-	-	1.9 n	N/A	N/A	N	Not detected.
	53494-70-4	Endrin ketone	-	-	mg/kg	-	0	8	0.00806	0.00862	-	-	1.9 n	N/A	N/A	N	Not detected.
	76-44-8	Heptachlor	-	-	mg/kg	-	0	8	0.00403	0.00431	-	-	0.13 c*	N/A	N/A	N	Not detected.
	1024-57-3	Heptachlor epoxide	-	-	mg/kg	-	0	8	0.0151	0.0162	-	-	0.07 c**	N/A	N/A	N	Not detected.
	118-74-1	Hexachlorobenzene	-	-	mg/kg	-	0	8	0.00806	0.00862	-	-	0.21 c*	N/A	N/A	N	Not detected.
	72-43-5	Methoxychlor	-	-	mg/kg	-	0	8	0.0151	0.0162	-	-	32 n	N/A	N/A	N	Not detected.
		PCBs															
	12674-11-2	Aroclor 1016	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.41 n	N/A	N/A	N	Not detected.
	11104-28-2	Aroclor 1221	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.2 c	N/A	N/A	N	Not detected.
	11141-16-3	Aroclor 1232	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.17 c	N/A	N/A	N	Not detected.
	53469-21-3	Aroclor 1242	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.23 c	N/A	N/A	N	Not detected.
	12672-29-6	Aroclor 1248	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.23 c	N/A	N/A	N	Not detected.
	11097-69-1	Aroclor 1254	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.12 n	N/A	N/A	N	Not detected.
	11096-82-3	Aroclor 1260	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.24 c	N/A	N/A	N	Not detected.
	37324-23-3	Aroclor 1262	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.12 n	N/A	N/A	N	Not detected.
	11100-14-4	Aroclor 1268	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.12 n	N/A	N/A	N	Not detected.
	1336-36-3	PCBs, Total	-	-	mg/kg	-	0	8	0.0332	0.0357	-	-	0.23 c	N/A	N/A	N	Not detected.
		Metals															
	7440-38-2	Arsenic, Total	3.8	13	mg/kg	SH-305/0-6"	8	8	-	-	13	20	0.68 c**R	N/A	N/A	Y	Max concentration exceeds screening level.
	7429-90-5	Aluminum, Total	5,480	11,900	mg/kg	SH-303/0-6"	8	8	-	-	11,900	10,000	7700 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-36-0	Antimony, Total	0.342	0.954	mg/kg	SH-305/0-6"	3	8	4.08	4.16	0.954	-	3.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-39-3	Barium, Total	6.16	23.1	mg/kg	SH-305/0-6"	8	8	-	-	23.1	-	1500 n	N/A	N/A	N	Max concentration below screening level.
	7440-41-7	Beryllium, Total	0.212	0.401	mg/kg	SH-303/0-6"	8	8	-	-	0.401	-	16 n	N/A	N/A	N	Max concentration below screening level.
	7440-43-9	Cadmium, Total	0.163	0.359	mg/kg	SH-303/0-6"	4	8	0.822	0.86	0.359	-	7.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-70-2	Calcium, Total	82.5	997	mg/kg	SH-302/0-6"	8	8	-	-	997	-	--	N/A	N/A	N	No screening level.
	18540-29-3	Chromium, Hexavalent	-	-	mg/kg	-	0	8	0.84	0.88	-	-	0.3 c*	N/A	N/A	N	Not detected.
	7440-47-3	Chromium, Total	5.54	18.1	mg/kg	SH-302/0-6"	8	8	-	-	18.1	-	12000 n	N/A	N/A	N	Max concentration below screening level.
	7440-48-4	Cobalt, Total	0.956	4.63	mg/kg	SH-302/0-6"	8	8	-	-	4.63	4	2.3 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-50-8	Copper, Total	2.24	16.1	mg/kg	SH-305/0-6"	8	8	-	-	16.1	-	310 n	N/A	N/A	N	Max concentration below screening level.
	7439-89-6	Iron, Total	4,740	11,900	mg/kg	SH-303/0-6"	8	8	-	-	11,900	20,000	5500 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7439-92-1	Lead, Total	2.69	84.2	mg/kg	SH-305/0-6"	8	8	-	-	84.2	-	400	N/A	N/A	N	Max concentration below screening level.

TABLE 2.1A\_SG2A - Soils Group 2A  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Surface Soil (0-6")

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	7439-95-4	Magnesium, Total	392	2,110	mg/kg	SH-302/0-6"	8	8	–	2,110	–	--	N/A	N/A	N	No screening level.	
	7439-96-5	Manganese, Total	32.3	126.5	mg/kg	SH-304/0-6"	8	8	–	126.5	300	180 n	N/A	N/A	N	Max concentration below screening level.	
	7439-97-6	Mercury, Total	0.078	0.078	mg/kg	SH-305/0-6"	1	8	0.066	0.07	0.078	–	1.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-02-0	Nickel, Total	3.23	12.2	mg/kg	SH-302/0-6"	8	8	–	12.2	–	150 n	N/A	N/A	N	Max concentration below screening level.	
	7440-09-7	Potassium, Total	73.3	529	mg/kg	SH-302/0-6"	8	8	–	529	–	--	N/A	N/A	N	No screening level.	
	7782-49-2	Selenium, Total	0.263	0.774	mg/kg	SH-305/0-6"	4	8	4.08	4.27	0.774	–	39 n	N/A	N/A	N	Max concentration below screening level.
	7440-22-4	Silver, Total	–	–	mg/kg	–	0	8	0.816	0.86	–	–	39 n	N/A	N/A	N	Not detected.
	7440-23-5	Sodium, Total	14.4	59.8	mg/kg	SH-305/0-6"	4	8	163	171	59.8	–	--	N/A	N/A	N	No screening level.
	7440-28-0	Thallium, Total	0.1725	0.1725	mg/kg	SH-304/0-6"	1	8	0.2	0.21	0.1725	0.6	0.078 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-31-5	Tin, Total	1.9	1.9	mg/kg	SH-305/0-6"	1	8	8.16	8.54	1.9	–	4700 n	N/A	N/A	N	Max concentration below screening level.
	7440-62-2	Vanadium, Total	6.43	23.3	mg/kg	SH-305/0-6"	8	8	–	–	23.3	30	39 n	N/A	N/A	N	Max concentration below screening level.
	7440-66-6	Zinc, Total	8.92	24.8	mg/kg	SH-305/0-6"	8	8	–	–	24.8	–	2300 n	N/A	N/A	N	Max concentration below screening level.
	Other Parameters																
	57-12-5	Cyanide, Physiologically Available	–	–	mg/kg	–	0	8	1	1.1	–	–	2.3 n	N/A	N/A	N	Not detected.
	57-12-5	Cyanide, Total	–	–	mg/kg	–	0	8	0.97	1	–	–	2.3 n	N/A	N/A	N	Not detected.
	HA-ORP	Oxidation/Reduction Potential (mV)	240	330	mV	SH-301/0-6"	8	8	–	–	330	–	--	N/A	N/A	N	No screening level.
	12408-02-5	pH (H) (pH units)	4.6	5.4	pH units	SH-303/0-6"	8	8	–	–	5.4	–	--	N/A	N/A	N	No screening level.
	IGNIT	Ignitability (unitless)	–	–	unitless	–	0	8	–	–	–	–	--	N/A	N/A	N	Not detected.
	RCYAN	Cyanide, Reactive	–	–	mg/kg	–	0	8	10	10	–	–	--	N/A	N/A	N	Not detected.
	RSULF	Sulfide, Reactive	–	–	mg/kg	–	0	8	10	10	–	–	--	N/A	N/A	N	Not detected.

Footnotes:

- (1) USEPA Residential RSLs TR-1e-06 and THQ=0.1.
- (2) MassDEP Background Levels for Natural Soil.
- (3) From USEPA Residential RSLs.

c = cancer

n = noncancer

\* = where: noncancer screening level (SL) &lt; 100X cancer SL

\*\* = where noncancer SL &lt; 10X cancer SL

s = concentration may exceed soil saturation concentration (Csat)

Abbreviations:

CAS=Chemical Abstracts Service

ARAR/TBC=Applicable or Relevant and Appropriate Requirements/To Be Considered

N/A=not available

TABLE 2.1B\_SG2B - Soils Group 2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
Soil		VOCs															
67-64-1		Acetone	0.0019	0.0795	mg/kg	SH-305/4-6'	9	16	0.03	2.4	0.0795	-	6100 n	N/A	N/A	N	Max concentration below screening level.
71-43-2		Benzene	-	-	mg/kg	-	0	16	-	-	-	1.2 c**	N/A	N/A	N	Not detected.	
108-86-1		Bromobenzene	-	-	mg/kg	-	0	16	-	-	-	29 n	N/A	N/A	N	Not detected.	
74-97-5		Bromo(chloromethane)	-	-	mg/kg	-	0	16	-	-	-	15 n	N/A	N/A	N	Not detected.	
75-27-4		Bromo(dichloromethane)	-	-	mg/kg	-	0	16	-	-	-	0.29 c	N/A	N/A	N	Not detected.	
75-25-2		Bromoform	-	-	mg/kg	-	0	16	-	-	-	19 c**	N/A	N/A	N	Not detected.	
74-83-9		Bromomethane	-	-	mg/kg	-	0	16	-	-	-	0.68 n	N/A	N/A	N	Not detected.	
104-51-8		Butylbenzene (n-)	-	-	mg/kg	-	0	16	-	-	-	390 ns	N/A	N/A	N	Not detected.	
135-98-8		Butylbenzene (sec-)	-	-	mg/kg	-	0	16	-	-	-	780 ns	N/A	N/A	N	Not detected.	
98-06-6		Butylbenzene (tert-)	-	-	mg/kg	-	0	16	-	-	-	780 ns	N/A	N/A	N	Not detected.	
75-15-0		Carbon disulfide	-	-	mg/kg	-	0	16	-	-	-	77 n	N/A	N/A	N	Not detected.	
56-23-5		Carbon tetrachloride	-	-	mg/kg	-	0	16	-	-	-	0.65 c*	N/A	N/A	N	Not detected.	
108-90-7		Chlorobenzene	-	-	mg/kg	-	0	16	-	-	-	28 n	N/A	N/A	N	Not detected.	
75-00-3		Chloroethane	-	-	mg/kg	-	0	16	-	-	-	1400 n	N/A	N/A	N	Not detected.	
67-66-3		Chloroform	-	-	mg/kg	-	0	16	-	-	-	0.32 c*	N/A	N/A	N	Not detected.	
74-87-3		Chloromethane	-	-	mg/kg	-	0	16	-	-	-	11 n	N/A	N/A	N	Not detected.	
95-49-8		Chlorotoluene (o-)	-	-	mg/kg	-	0	16	-	-	-	160 n	N/A	N/A	N	Not detected.	
106-43-4		Chlorotoluene (p-)	-	-	mg/kg	-	0	16	-	-	-	160 n	N/A	N/A	N	Not detected.	
96-12-8		Dibromo-3-chloropropane (1,2-)	-	-	mg/kg	-	0	16	-	-	-	0.0053 c*	N/A	N/A	N	Not detected.	
124-48-1		Dibromo(chloromethane)	-	-	mg/kg	-	0	16	-	-	-	8.3 c*	N/A	N/A	N	Not detected.	
106-93-4		Dibromoethane (1,2-)	-	-	mg/kg	-	0	16	-	-	-	0.036 c	N/A	N/A	N	Not detected.	
74-95-3		Dibromomethane	-	-	mg/kg	-	0	16	-	-	-	2.4 n	N/A	N/A	N	Not detected.	
95-50-1		Dichlorobenzene (1,2-)	-	-	mg/kg	-	0	16	-	-	-	180 n	N/A	N/A	N	Not detected.	
541-73-1		Dichlorobenzene (1,3-)	-	-	mg/kg	-	0	16	-	-	-	2.6 c	N/A	N/A	N	Not detected.	
106-46-7		Dichlorobenzene (1,4-)	-	-	mg/kg	-	0	16	-	-	-	2.6 c	N/A	N/A	N	Not detected.	
75-71-8		Dichlorodifluoromethane	-	-	mg/kg	-	0	16	-	-	-	8.7 n	N/A	N/A	N	Not detected.	
75-34-3		Dichloroethane (1,1-)	-	-	mg/kg	-	0	16	-	-	-	3.6 c	N/A	N/A	N	Not detected.	
107-06-2		Dichloroethane (1,2-)	-	-	mg/kg	-	0	16	-	-	-	0.46 c**	N/A	N/A	N	Not detected.	
75-35-4		Dichloroethene (1,1-)	-	-	mg/kg	-	0	16	-	-	-	23 n	N/A	N/A	N	Not detected.	
156-59-2		Dichloroethene (cis-1,2-)	-	-	mg/kg	-	0	16	-	-	-	16 n	N/A	N/A	N	Not detected.	
156-60-5		Dichloroethene (trans-1,2-)	-	-	mg/kg	-	0	16	-	-	-	160 n	N/A	N/A	N	Not detected.	
540-59-0		Dichloroethene (1,2-), Total	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
78-87-5		Dichloropropane (1,2-)	-	-	mg/kg	-	0	16	-	-	-	0.28 c**	N/A	N/A	N	Not detected.	
142-28-9		Dichloropropane (1,3-)	-	-	mg/kg	-	0	16	-	-	-	160 n	N/A	N/A	N	Not detected.	
594-20-7		Dichloropropane (2,2-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
563-58-6		Dichloropropene (1,1-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	

TABLE 2.1B\_SG2B - Soils Group 2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	10061-01-5	Dichloropropene (cis-1,3-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	10061-02-6	Dichloropropene (trans-1,3-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	542-75-6	Dichloropropene (1,3-), Total	-	-	mg/kg	-	0	16	-	-	-	1.8 c**	N/A	N/A	N	Not detected.	
	60-29-7	Diethyl ether	-	-	mg/kg	-	0	16	-	-	-	1600 n	N/A	N/A	N	Not detected.	
	108-20-3	Diisopropyl Ether	-	-	mg/kg	-	0	16	-	-	-	220 n	N/A	N/A	N	Not detected.	
	123-91-1	Dioxane (1,4-)	-	-	mg/kg	-	0	16	-	-	-	5.3 c*	N/A	N/A	N	Not detected.	
	100-41-4	Ethylbenzene	-	-	mg/kg	-	0	16	-	-	-	5.8 c*	N/A	N/A	N	Not detected.	
	637-92-3	Ethyl-Tert-Butyl-Ether	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	87-68-3	Hexachlorobutadiene	-	-	mg/kg	-	0	16	-	-	-	1.2 c**	N/A	N/A	N	Not detected.	
	591-78-6	Hexanone (2-)	-	-	mg/kg	-	0	16	-	-	-	20 n	N/A	N/A	N	Not detected.	
	98-82-8	Isopropylbenzene (Cumene)	-	-	mg/kg	-	0	16	-	-	-	190 n	N/A	N/A	N	Not detected.	
	99-87-6	Isopropyltoluene (p-)	-	-	mg/kg	-	0	16	-	-	-	190 n	N/A	N/A	N	Not detected.	
	78-93-3	Methyl ethyl ketone	0.0026	0.00285	mg/kg	SH-305/4-6'	2	16	0.0072	0.65	0.00285	-	2700 n	N/A	N/A	N	Max concentration below screening level.
	108-10-1	Methyl isobutyl ketone	-	-	mg/kg	-	0	16	-	-	-	3300 n	N/A	N/A	N	Not detected.	
	1634-04-4	Methyl tert butyl ether	-	-	mg/kg	-	0	16	-	-	-	47 c*	N/A	N/A	N	Not detected.	
	75-09-2	Methylene chloride	-	-	mg/kg	-	0	16	-	-	-	35 n	N/A	N/A	N	Not detected.	
	91-20-3	Naphthalene	-	-	mg/kg	-	0	16	-	-	-	3.8 c**	N/A	N/A	N	Not detected.	
	103-65-1	Propylbenzene (n-)	-	-	mg/kg	-	0	16	-	-	-	380 ns	N/A	N/A	N	Not detected.	
	100-42-5	Styrene	-	-	mg/kg	-	0	16	-	-	-	600 n	N/A	N/A	N	Not detected.	
	994-05-8	Tertiary-Amyl Methyl Ether	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	630-20-6	Tetrachloroethane (1,1,1,2-)	-	-	mg/kg	-	0	16	-	-	-	2 c	N/A	N/A	N	Not detected.	
	79-34-5	Tetrachloroethane (1,1,2,2-)	-	-	mg/kg	-	0	16	-	-	-	0.6 c	N/A	N/A	N	Not detected.	
	127-18-4	Tetrachloroethene	-	-	mg/kg	-	0	16	-	-	-	8.1 n	N/A	N/A	N	Not detected.	
	109-99-9	Tetrahydrofuran	-	-	mg/kg	-	0	16	-	-	-	1800 n	N/A	N/A	N	Not detected.	
	108-88-3	Toluene	-	-	mg/kg	-	0	16	-	-	-	490 n	N/A	N/A	N	Not detected.	
	87-61-6	Trichlorobenzene (1,2,3-)	-	-	mg/kg	-	0	16	-	-	-	6.3 n	N/A	N/A	N	Not detected.	
	120-82-1	Trichlorobenzene (1,2,4-)	-	-	mg/kg	-	0	16	-	-	-	5.8 n	N/A	N/A	N	Not detected.	
	71-55-6	Trichloroethane (1,1,1-)	-	-	mg/kg	-	0	16	-	-	-	810 ns	N/A	N/A	N	Not detected.	
	79-00-5	Trichloroethane (1,1,2-)	-	-	mg/kg	-	0	16	-	-	-	0.15 n	N/A	N/A	N	Not detected.	
	79-01-6	Trichloroethene	0.0045	0.0045	mg/kg	SH-303/2-4'	1	16	0.00069	0.065	0.0045	-	0.41 n	N/A	N/A	N	Max concentration below screening level.
	75-69-4	Trichlorofluoromethane	-	-	mg/kg	-	0	16	-	-	-	2300 ns	N/A	N/A	N	Not detected.	
	96-18-4	Trichloropropane (1,2,3-)	-	-	mg/kg	-	0	16	-	-	-	0.0051 c*	N/A	N/A	N	Not detected.	
	95-63-6	Trimethylbenzene (1,2,4-)	-	-	mg/kg	-	0	16	-	-	-	30 n	N/A	N/A	N	Not detected.	
	108-67-8	Trimethylbenzene (1,3,5-)	-	-	mg/kg	-	0	16	-	-	-	27 n	N/A	N/A	N	Not detected.	
	75-01-4	Vinyl chloride	-	-	mg/kg	-	0	16	-	-	-	0.059 c	N/A	N/A	N	Not detected.	
	95-47-6	Xylene (o-)	-	-	mg/kg	-	0	16	-	-	-	65 n	N/A	N/A	N	Not detected.	
	108-38-3	Xylene (p/m-)	-	-	mg/kg	-	0	16	-	-	-	55 n	N/A	N/A	N	Not detected.	

TABLE 2.1B\_SG2B - Soils Group 2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	1330-20-7	Xylenes, Total SVOCs	-	-	mg/kg	-	0	16	-	-	-	58 n	N/A	N/A	N	Not detected.	
	83-32-9	Acenaphthene	-	-	mg/kg	-	0	16	-	-	-	360 n	N/A	N/A	N	Not detected.	
	208-96-8	Acenaphthylene	-	-	mg/kg	-	0	16	-	-	-	360 n	N/A	N/A	N	Not detected.	
	98-86-2	Acetophenone	-	-	mg/kg	-	0	16	-	-	-	780 n	N/A	N/A	N	Not detected.	
	62-53-3	Aniline	-	-	mg/kg	-	0	16	-	-	-	44 n	N/A	N/A	N	Not detected.	
	120-12-7	Anthracene	-	-	mg/kg	-	0	16	-	-	-	1800 n	N/A	N/A	N	Not detected.	
	103-33-3	Azobenzene	-	-	mg/kg	-	0	16	-	-	-	5.6 c	N/A	N/A	N	Not detected.	
	56-55-3	Benzo(a)anthracene	-	-	mg/kg	-	0	16	-	-	-	1.1 c	N/A	N/A	N	Not detected.	
	50-32-8	Benzo(a)pyrene	0.0078	0.0078	mg/kg	SH-301/4-6'	1	16	0.0067	0.0076	0.0078	2	0.11 c*	N/A	N/A	N	Max concentration below screening level.
	205-99-2	Benzo(b)fluoranthene	-	-	mg/kg	-	0	16	-	-	-	1.1 c	N/A	N/A	N	Not detected.	
	191-24-2	Benzo(ghi)perylene	-	-	mg/kg	-	0	16	-	-	-	1.1 c	N/A	N/A	N	Not detected.	
	207-08-9	Benzo(k)fluoranthene	-	-	mg/kg	-	0	16	-	-	-	11 c	N/A	N/A	N	Not detected.	
	111-91-1	Bis(2-chloroethoxy)methane	-	-	mg/kg	-	0	16	-	-	-	19 n	N/A	N/A	N	Not detected.	
	111-44-4	Bis(2-chloroethyl)ether	-	-	mg/kg	-	0	16	-	-	-	0.23 c	N/A	N/A	N	Not detected.	
	108-60-1	Bis(2-chloroisopropyl)ether	-	-	mg/kg	-	0	16	-	-	-	310 n	N/A	N/A	N	Not detected.	
	117-81-7	Bis(2-ethylhexyl)phthalate	-	-	mg/kg	-	0	16	-	-	-	39 c**	N/A	N/A	N	Not detected.	
	101-55-3	Bromophenyl phenyl ether (4-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	85-68-7	Butyl benzyl phthalate	-	-	mg/kg	-	0	16	-	-	-	290 c**	N/A	N/A	N	Not detected.	
	106-47-8	Chloroaniline (4-)	-	-	mg/kg	-	0	16	-	-	-	2.7 c**	N/A	N/A	N	Not detected.	
	91-58-7	Chloronaphthalene (2-)	-	-	mg/kg	-	0	16	-	-	-	480 n	N/A	N/A	N	Not detected.	
	95-57-8	Chlorophenol (2-)	-	-	mg/kg	-	0	16	-	-	-	39 n	N/A	N/A	N	Not detected.	
	218-01-9	Chrysene	-	-	mg/kg	-	0	16	-	-	-	110 c	N/A	N/A	N	Not detected.	
	53-70-3	Dibenzo(a,h)anthracene	-	-	mg/kg	-	0	16	-	-	-	0.11 c	N/A	N/A	N	Not detected.	
	132-64-9	Dibenzofuran	-	-	mg/kg	-	0	16	-	-	-	7.3 n	N/A	N/A	N	Not detected.	
	95-50-1	Dichlorobenzene (1,2-)	-	-	mg/kg	-	0	16	-	-	-	180 n	N/A	N/A	N	Not detected.	
	541-73-1	Dichlorobenzene (1,3-)	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	106-46-7	Dichlorobenzene (1,4-)	-	-	mg/kg	-	0	16	-	-	-	2.6 c	N/A	N/A	N	Not detected.	
	91-94-1	Dichlorobenzidine (3,3'-)	-	-	mg/kg	-	0	16	-	-	-	1.2 c	N/A	N/A	N	Not detected.	
	120-83-2	Dichlorophenol (2,4-)	-	-	mg/kg	-	0	16	-	-	-	19 n	N/A	N/A	N	Not detected.	
	84-66-2	Diethyl phthalate	-	-	mg/kg	-	0	16	-	-	-	5100 n	N/A	N/A	N	Not detected.	
	131-11-3	Dimethyl phthalate	-	-	mg/kg	-	0	16	-	-	-	--	N/A	N/A	N	Not detected.	
	105-67-9	Dimethylphenol (2,4-)	-	-	mg/kg	-	0	16	-	-	-	130 n	N/A	N/A	N	Not detected.	
	84-74-2	Di-n-butylphthalate	-	-	mg/kg	-	0	16	-	-	-	630 n	N/A	N/A	N	Not detected.	
	51-28-5	Dinitrophenol (2,4-)	-	-	mg/kg	-	0	16	-	-	-	13 n	N/A	N/A	N	Not detected.	
	121-14-2	Dinitrotoluene (2,4-)	-	-	mg/kg	-	0	16	-	-	-	1.7 c**	N/A	N/A	N	Not detected.	
	606-20-2	Dinitrotoluene (2,6-)	-	-	mg/kg	-	0	16	-	-	-	0.36 c**	N/A	N/A	N	Not detected.	

TABLE 2.1B\_SG2B - Soils Group 2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	117-84-0	Di-n-octylphthalate	–	–	mg/kg	–	0	16	–	–	–	63 n	N/A	N/A	N	Not detected.	
	206-44-0	Fluoranthene	–	–	mg/kg	–	0	16	–	–	–	240 n	N/A	N/A	N	Not detected.	
	86-73-7	Fluorene	–	–	mg/kg	–	0	16	–	–	–	240 n	N/A	N/A	N	Not detected.	
	118-74-1	Hexachlorobenzene	–	–	mg/kg	–	0	16	–	–	–	0.21 c*	N/A	N/A	N	Not detected.	
	87-68-3	Hexachlorobutadiene	–	–	mg/kg	–	0	16	–	–	–	1.2 c**	N/A	N/A	N	Not detected.	
	67-72-1	Hexachloroethane	–	–	mg/kg	–	0	16	–	–	–	1.8 c**	N/A	N/A	N	Not detected.	
	193-39-5	Indeno(1,2,3-cd)pyrene	–	–	mg/kg	–	0	16	–	–	–	1.1 c	N/A	N/A	N	Not detected.	
	78-59-1	Isophorone	–	–	mg/kg	–	0	16	–	–	–	570 c**	N/A	N/A	N	Not detected.	
	91-57-6	Methylnaphthalene (2-)	–	–	mg/kg	–	0	16	–	–	–	24 n	N/A	N/A	N	Not detected.	
	95-48-7	Methylphenol (2-)	–	–	mg/kg	–	0	16	–	–	–	320 n	N/A	N/A	N	Not detected.	
	108-39-4	Methylphenol (3-)/Methylphenol (4-)	–	–	mg/kg	–	0	16	–	–	–	320 n	N/A	N/A	N	Not detected.	
	91-20-3	Naphthalene	–	–	mg/kg	–	0	16	–	–	–	3.8 c**	N/A	N/A	N	Not detected.	
	98-95-3	Nitrobenzene	–	–	mg/kg	–	0	16	–	–	–	5.1 c**	N/A	N/A	N	Not detected.	
	88-75-5	Nitrophenol (2-)	–	–	mg/kg	–	0	16	–	–	–	13 n	N/A	N/A	N	Not detected.	
	100-02-7	Nitrophenol (4-)	–	–	mg/kg	–	0	16	–	–	–	13 n	N/A	N/A	N	Not detected.	
	87-86-5	Pentachlorophenol	–	–	mg/kg	–	0	16	–	–	–	1 c*	N/A	N/A	N	Not detected.	
	85-01-8	Phenanthrene	–	–	mg/kg	–	0	16	–	–	–	240 n	N/A	N/A	N	Not detected.	
	108-95-2	Phenol	–	–	mg/kg	–	0	16	–	–	–	1900 n	N/A	N/A	N	Not detected.	
	129-00-0	Pyrene	–	–	mg/kg	–	0	16	–	–	–	180 n	N/A	N/A	N	Not detected.	
	120-82-1	Trichlorobenzene (1,2,4-)	–	–	mg/kg	–	0	16	–	–	–	5.8 n	N/A	N/A	N	Not detected.	
	95-95-4	Trichlorophenol (2,4,5-)	–	–	mg/kg	–	0	16	–	–	–	630 n	N/A	N/A	N	Not detected.	
	88-06-2	Trichlorophenol (2,4,6-)	–	–	mg/kg	–	0	16	–	–	–	6.3 n	N/A	N/A	N	Not detected.	
		TPH															
	HA-VPHC9-C10	C9-C10 Aromatics	3.16	3.16	mg/kg	SH-301/2-4'	1	16	2.48	3.31	3.16	–	11 n	N/A	N/A	N	Max concentration below screening level.
	HA-EPHC11-C22A	C11-C22 Aromatics, Adjusted	–	–	mg/kg	–	0	16	–	–	–	–	11 n	N/A	N/A	N	Not detected.
	HA-VPHC5-C8A	C5-C8 Aliphatics, Adjusted	–	–	mg/kg	–	0	16	–	–	–	–	52 n	N/A	N/A	N	Not detected.
	HA-VPHC9-C12A	C9-C12 Aliphatics, Adjusted	5.66	5.66	mg/kg	SH-307/4-6'	1	16	2.48	3.31	5.66	–	9.6 ns	N/A	N/A	N	Max concentration below screening level.
	HA-EPHC9-C18	C9-C18 Aliphatics	–	–	mg/kg	–	0	16	–	–	–	–	9.6 ns	N/A	N/A	N	Not detected.
	HA-EPHC19-C36	C19-C36 Aliphatics	–	–	mg/kg	–	0	16	–	–	–	–	250 n	N/A	N/A	N	Not detected.
		Pesticides															
	309-00-2	Aldrin	–	–	mg/kg	–	0	16	–	–	–	–	0.039 c**	N/A	N/A	N	Not detected.
	319-84-6	BHC (Alpha-)	–	–	mg/kg	–	0	16	–	–	–	–	0.086 c	N/A	N/A	N	Not detected.
	319-85-7	BHC (Beta-)	–	–	mg/kg	–	0	16	–	–	–	–	0.3 c	N/A	N/A	N	Not detected.
	319-86-8	BHC (Delta-)	–	–	mg/kg	–	0	16	–	–	–	–	0.086 c	N/A	N/A	N	Not detected.
	58-89-9	BHC (Gamma-) (Lindane)	–	–	mg/kg	–	0	16	–	–	–	–	0.57 c**	N/A	N/A	N	Not detected.
	57-74-9	Chlordane	–	–	mg/kg	–	0	16	–	–	–	–	1.7 c**	N/A	N/A	N	Not detected.
	72-54-8	DDD (4,4'-)	–	–	mg/kg	–	0	16	–	–	–	–	2.3 c	N/A	N/A	N	Not detected.

TABLE 2.1B\_SG2B - Soils Group 2B

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
72-55-9	DDE (4,4'-)	mg/kg	–	–	0	16	–	–	–	–	–	2 c	N/A	N/A	N	Not detected.
50-29-3	DDT (4,4'-)	mg/kg	–	–	0	16	–	–	–	–	–	1.9 c**	N/A	N/A	N	Not detected.
60-57-1	Dieldrin	mg/kg	–	–	0	16	–	–	–	–	–	0.034 c**	N/A	N/A	N	Not detected.
959-98-8	Endosulfan I	mg/kg	–	–	0	16	–	–	–	–	–	47 n	N/A	N/A	N	Not detected.
33213-65-9	Endosulfan II	mg/kg	–	–	0	16	–	–	–	–	–	47 n	N/A	N/A	N	Not detected.
1031-07-8	Endosulfan sulfate	mg/kg	–	–	0	16	–	–	–	–	–	47 n	N/A	N/A	N	Not detected.
72-20-8	Endrin	mg/kg	–	–	0	16	–	–	–	–	–	1.9 n	N/A	N/A	N	Not detected.
53494-70-5	Endrin ketone	mg/kg	–	–	0	16	–	–	–	–	–	1.9 n	N/A	N/A	N	Not detected.
76-44-8	Heptachlor	mg/kg	–	–	0	16	–	–	–	–	–	0.13 c*	N/A	N/A	N	Not detected.
1024-57-3	Heptachlor epoxide	mg/kg	–	–	0	16	–	–	–	–	–	0.07 c**	N/A	N/A	N	Not detected.
118-74-1	Hexachlorobenzene	mg/kg	–	–	0	16	–	–	–	–	–	0.21 c*	N/A	N/A	N	Not detected.
72-43-5	Methoxychlor	mg/kg	–	–	0	16	–	–	–	–	–	32 n	N/A	N/A	N	Not detected.
	PCBs															
12674-11-2	Aroclor 1016	mg/kg	–	–	0	16	–	–	–	–	–	0.41 n	N/A	N/A	N	Not detected.
11104-28-2	Aroclor 1221	mg/kg	–	–	0	16	–	–	–	–	–	0.2 c	N/A	N/A	N	Not detected.
11141-16-5	Aroclor 1232	mg/kg	–	–	0	16	–	–	–	–	–	0.17 c	N/A	N/A	N	Not detected.
53469-21-9	Aroclor 1242	mg/kg	–	–	0	16	–	–	–	–	–	0.23 c	N/A	N/A	N	Not detected.
12672-29-6	Aroclor 1248	mg/kg	–	–	0	16	–	–	–	–	–	0.23 c	N/A	N/A	N	Not detected.
11097-69-1	Aroclor 1254	mg/kg	–	–	0	16	–	–	–	–	–	0.12 n	N/A	N/A	N	Not detected.
11096-82-5	Aroclor 1260	mg/kg	–	–	0	16	–	–	–	–	–	0.24 c	N/A	N/A	N	Not detected.
37324-23-5	Aroclor 1262	mg/kg	–	–	0	16	–	–	–	–	–	0.12 n	N/A	N/A	N	Not detected.
11100-14-4	Aroclor 1268	mg/kg	–	–	0	16	–	–	–	–	–	0.12 n	N/A	N/A	N	Not detected.
1336-36-3	PCBs, Total	mg/kg	–	–	0	16	–	–	–	–	–	0.23 c	N/A	N/A	N	Not detected.
	Metals															
7440-38-2	Arsenic, Total	3.4	13	mg/kg	SH-305/4-6'	16	16	0	0	13	20	0.68 c**R	N/A	N/A	Y	Max concentration exceeds screening level.
7429-90-5	Aluminum, Total	3,500	14,200	mg/kg	SH-303/2-4'	16	16	0	0	14,200	10,000	7700 n	N/A	N/A	Y	Max concentration exceeds screening level.
7440-36-0	Antimony, Total	0.436	0.552	mg/kg	SH-305/2-4'	2	16	3.92	4.56	0.552	–	3.1 n	N/A	N/A	N	Max concentration below screening level.
7440-39-3	Barium, Total	6.15	76.4	mg/kg	SH-303/2-4'	16	16	0	0	76.4	–	1500 n	N/A	N/A	N	Max concentration below screening level.
7440-41-7	Beryllium, Total	0.144	0.433	mg/kg	SH-303/2-4'	16	16	0	0	0.433	–	16 n	N/A	N/A	N	Max concentration below screening level.
7440-43-9	Cadmium, Total	0.128	0.49	mg/kg	SH-303/2-4'	8	16	0.814	0.912	0.49	–	7.1 n	N/A	N/A	N	Max concentration below screening level.
7440-70-2	Calcium, Total	158	2,430	mg/kg	SH-303/2-4'	16	16	0	0	2,430	–	--	N/A	N/A	N	No screening level.
18540-29-9	Chromium, Hexavalent	–	–	mg/kg	–	0	16	–	–	–	–	0.3 c*	N/A	N/A	N	Not detected.
7440-47-3	Chromium, Total	6.18	30.1	mg/kg	SH-303/4-6'	16	16	0	0	30.1	–	12000 n	N/A	N/A	N	Max concentration below screening level.
7440-48-4	Cobalt, Total	1.3	16.3	mg/kg	SH-303/2-4'	16	16	0	0	16.3	4	2.3 n	N/A	N/A	Y	Max concentration exceeds screening level.
7440-50-8	Copper, Total	2.5	31.9	mg/kg	SH-302/4-6'	16	16	0	0	31.9	–	310 n	N/A	N/A	N	Max concentration below screening level.
7439-89-6	Iron, Total	3,780	22,100	mg/kg	SH-303/2-4'	16	16	0	0	22,100	20,000	5500 n	N/A	N/A	Y	Max concentration exceeds screening level.
7439-92-1	Lead, Total	2	8.68	mg/kg	SH-305/4-6'	16	16	0	0	8.68	–	400	N/A	N/A	N	Max concentration below screening level.

TABLE 2.1B\_SG2B - Soils Group 2B

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Disturbed Deep Soil (2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	7439-95-4	Magnesium, Total	764	7,920	mg/kg	SH-303/2-4'	16	16	0	7,920	—	--	N/A	N/A	N	No screening level.	
	7439-96-5	Manganese, Total	36	254	mg/kg	SH-302/4-6'	16	16	0	254	300	180 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7439-97-6	Mercury, Total	—	—	mg/kg	—	0	16	—	—	—	1.1 n	N/A	N/A	N	Not detected.	
	7440-02-0	Nickel, Total	3.9	25.9	mg/kg	SH-303/2-4'	16	16	0	25.9	—	150 n	N/A	N/A	N	Max concentration below screening level.	
	7440-09-7	Potassium, Total	223	3,710	mg/kg	SH-303/2-4'	16	16	0	3,710	—	--	N/A	N/A	N	No screening level.	
	7782-49-2	Selenium, Total	0.214	0.528	mg/kg	SH-305/2-4'	3	16	3.92	4.52	0.528	—	39 n	N/A	N/A	N	Max concentration below screening level.
	7440-22-4	Silver, Total	—	—	mg/kg	—	0	16	—	—	—	39 n	N/A	N/A	N	Not detected.	
	7440-23-5	Sodium, Total	18.3	75.4	mg/kg	SH-303/2-4'	13	16	160	75.4	—	--	N/A	N/A	N	No screening level.	
	7440-28-0	Thallium, Total	—	—	mg/kg	—	0	16	—	—	0.6	0.078 n	N/A	N/A	N	Not detected.	
	7440-31-5	Tin, Total	—	—	mg/kg	—	0	16	—	—	—	4700 n	N/A	N/A	N	Not detected.	
	7440-62-2	Vanadium, Total	5.1	39.7	mg/kg	SH-303/2-4'	16	16	0	39.7	30	39 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7440-66-6	Zinc, Total	7.24	40.5	mg/kg	SH-303/2-4'	16	16	0	40.5	—	2300 n	N/A	N/A	N	Max concentration below screening level.	
		Other Parameters															
	57-12-5	Cyanide, Physiologically Available	—	—	mg/kg	—	0	16	—	—	—	2.3 n	N/A	N/A	N	Not detected.	
	57-12-5	Cyanide, Total	—	—	mg/kg	—	0	16	—	—	—	2.3 n	N/A	N/A	N	Not detected.	
	HA-ORP	Oxidation/Reduction Potential (mV)	240	320	mV	SH-306/2-4'	16	16	0	320	—	--	N/A	N/A	N	No screening level.	
	12408-02-5	pH (H) (pH units)	4.7	6.2	pH units	SH-307/2-4'	16	16	0	6.2	—	--	N/A	N/A	N	No screening level.	
	IGNIT	Ignitability (unitless)	—	—	unitless	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	
	RCYAN	Cyanide, Reactive	—	—	mg/kg	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	
	RSULF	Sulfide, Reactive	—	—	mg/kg	—	0	0	—	—	—	—	N/A	N/A	N	Not analyzed.	

## Footnotes:

(1) USEPA Residential RSLs TR-1e-06 and THQ=0.1.

c = cancer

(2) MassDEP Background Levels for Natural Soil.

n = noncancer

(3) From USEPA Residential RSLs.

\* = where: noncancer screening level (SL) &lt; 100X cancer SL

## Abbreviations:

CAS=Chemical Abstracts Service

\*\* = where noncancer SL &lt; 10X cancer SL

ARAR/TBC=Applicable or Relevant and Appropriate Requirements/To Be Considered

s = concentration may exceed soil saturation concentration (Csat)

N/A=not available

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
Soil		VOCs															
	67-64-1	Acetone	0.0019	0.18	mg/kg	SH-305/0-6"	14	24	0.026	2.4	0.18	-	6100 n	N/A	N/A	N	Max concentration below screening level.
	71-43-2	Benzene	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	1.2 c**	N/A	N/A	N	Not detected.
	108-86-1	Bromobenzene	-	-	mg/kg	-	0	24	0.0031	0.33	-	-	29 n	N/A	N/A	N	Not detected.
	74-97-5	Bromo(chloromethane)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	15 n	N/A	N/A	N	Not detected.
	75-27-4	Bromodichloromethane	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	0.29 c	N/A	N/A	N	Not detected.
	75-25-2	Bromoform	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	19 c**	N/A	N/A	N	Not detected.
	74-83-9	Bromomethane	-	-	mg/kg	-	0	24	0.0012	0.13	-	-	0.68 n	N/A	N/A	N	Not detected.
	104-51-8	Butylbenzene (n-)	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	390 ns	N/A	N/A	N	Not detected.
	135-98-8	Butylbenzene (sec-)	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	780 ns	N/A	N/A	N	Not detected.
	98-06-6	Butylbenzene (tert-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	780 ns	N/A	N/A	N	Not detected.
	75-15-0	Carbon disulfide	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	77 n	N/A	N/A	N	Not detected.
	56-23-5	Carbon tetrachloride	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	0.65 c*	N/A	N/A	N	Not detected.
	108-90-7	Chlorobenzene	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	28 n	N/A	N/A	N	Not detected.
	75-00-3	Chloroethane	-	-	mg/kg	-	0	24	0.0012	0.13	-	-	1400 n	N/A	N/A	N	Not detected.
	67-66-3	Chloroform	-	-	mg/kg	-	0	24	0.00094	0.098	-	-	0.32 c*	N/A	N/A	N	Not detected.
	74-87-3	Chloromethane	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	11 n	N/A	N/A	N	Not detected.
	95-49-8	Chlorotoluene (o-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	160 n	N/A	N/A	N	Not detected.
	106-43-4	Chlorotoluene (p-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	160 n	N/A	N/A	N	Not detected.
	96-12-8	Dibromo-3-chloropropane (1,2-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	0.0053 c*	N/A	N/A	N	Not detected.
	124-48-1	Dibromochloromethane	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	8.3 c*	N/A	N/A	N	Not detected.
	106-93-4	Dibromoethane (1,2-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	0.036 c	N/A	N/A	N	Not detected.
	74-95-3	Dibromomethane	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	2.4 n	N/A	N/A	N	Not detected.
	95-50-1	Dichlorobenzene (1,2-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	180 n	N/A	N/A	N	Not detected.
	541-73-1	Dichlorobenzene (1,3-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	2.6 c	N/A	N/A	N	Not detected.
	106-46-7	Dichlorobenzene (1,4-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	2.6 c	N/A	N/A	N	Not detected.
	75-71-8	Dichlorodifluoromethane	-	-	mg/kg	-	0	24	0.0063	0.65	-	-	8.7 n	N/A	N/A	N	Not detected.
	75-34-3	Dichloroethane (1,1-)	-	-	mg/kg	-	0	24	0.00094	0.098	-	-	3.6 c	N/A	N/A	N	Not detected.
	107-06-2	Dichloroethane (1,2-)	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	0.46 c**	N/A	N/A	N	Not detected.
	75-35-4	Dichloroethene (1,1-)	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	23 n	N/A	N/A	N	Not detected.
	156-59-2	Dichloroethene (cis-1,2-)	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	16 n	N/A	N/A	N	Not detected.
	156-60-5	Dichloroethene (trans-1,2-)	-	-	mg/kg	-	0	24	0.00094	0.098	-	-	160 n	N/A	N/A	N	Not detected.
	540-59-0	Dichloroethene (1,2-), Total	-	-	mg/kg	-	0	24	0.00063	0.065	-	-	--	N/A	N/A	N	Not detected.
	78-87-5	Dichloropropane (1,2-)	-	-	mg/kg	-	0	24	0.0022	0.23	-	-	0.28 c**	N/A	N/A	N	Not detected.
	142-28-9	Dichloropropane (1,3-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	160 n	N/A	N/A	N	Not detected.
	594-20-7	Dichloropropane (2,2-)	-	-	mg/kg	-	0	24	0.0031	0.33	-	-	--	N/A	N/A	N	Not detected.
	563-58-6	Dichloropropene (1,1-)	-	-	mg/kg	-	0	24	0.0025	0.26	-	-	--	N/A	N/A	N	Not detected.

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	10061-01-5	Dichloropropene (cis-1,3-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	--	N/A	N/A	N	Not detected.
	10061-02-6	Dichloropropene (trans-1,3-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	--	N/A	N/A	N	Not detected.
	542-75-6	Dichloropropene (1,3-), Total	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	1.8 c**	N/A	N/A	N	Not detected.
	60-29-7	Diethyl ether	–	–	mg/kg	–	0	24	0.0031 / 0.33	–	–	1600 n	N/A	N/A	N	Not detected.
	108-20-3	Diisopropyl Ether	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	220 n	N/A	N/A	N	Not detected.
	123-91-1	Dioxane (1,4-)	–	–	mg/kg	–	0	24	0.025 / 2.6	–	–	5.3 c*	N/A	N/A	N	Not detected.
	100-41-4	Ethylbenzene	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	5.8 c*	N/A	N/A	N	Not detected.
	637-92-3	Ethyl-Tert-Butyl-Ether	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	--	N/A	N/A	N	Not detected.
	87-68-3	Hexachlorobutadiene	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	1.2 c**	N/A	N/A	N	Not detected.
	591-78-6	Hexanone (2-)	–	–	mg/kg	–	0	24	0.0063 / 0.65	–	–	20 n	N/A	N/A	N	Not detected.
	98-82-8	Isopropylbenzene (Cumene)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	190 n	N/A	N/A	N	Not detected.
	99-87-6	Isopropyltoluene (p-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	190 n	N/A	N/A	N	Not detected.
	78-93-3	Methyl ethyl ketone	0.0026	0.0082	mg/kg	SH-305/0-6"	4	24	0.0063 / 0.65	0.0082	–	2700 n	N/A	N/A	N	Max concentration below screening level.
	108-10-1	Methyl isobutyl ketone	–	–	mg/kg	–	0	24	0.0063 / 0.65	–	–	3300 n	N/A	N/A	N	Not detected.
	1634-04-4	Methyl tert butyl ether	–	–	mg/kg	–	0	24	0.0012 / 0.13	–	–	47 c*	N/A	N/A	N	Not detected.
	75-09-2	Methylene chloride	–	–	mg/kg	–	0	24	0.0063 / 0.65	–	–	35 n	N/A	N/A	N	Not detected.
	91-20-3	Naphthalene	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	3.8 c**	N/A	N/A	N	Not detected.
	103-65-1	Propylbenzene (n-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	380 ns	N/A	N/A	N	Not detected.
	100-42-5	Styrene	–	–	mg/kg	–	0	24	0.0012 / 0.13	–	–	600 n	N/A	N/A	N	Not detected.
	994-05-8	Tertiary-Amyl Methyl Ether	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	--	N/A	N/A	N	Not detected.
	630-20-6	Tetrachloroethane (1,1,1,2-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	2 c	N/A	N/A	N	Not detected.
	79-34-5	Tetrachloroethane (1,1,2,2-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	0.6 c	N/A	N/A	N	Not detected.
	127-18-4	Tetrachloroethene	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	8.1 n	N/A	N/A	N	Not detected.
	109-99-9	Tetrahydrofuran	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	1800 n	N/A	N/A	N	Not detected.
	108-88-3	Toluene	–	–	mg/kg	–	0	24	0.00094 / 0.098	–	–	490 n	N/A	N/A	N	Not detected.
	87-61-6	Trichlorobenzene (1,2,3-)	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	6.3 n	N/A	N/A	N	Not detected.
	120-82-1	Trichlorobenzene (1,2,4-)	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	5.8 n	N/A	N/A	N	Not detected.
	71-55-6	Trichloroethane (1,1,1-)	–	–	mg/kg	–	0	24	0.00063 / 0.065	–	–	810 ns	N/A	N/A	N	Not detected.
	79-00-5	Trichloroethane (1,1,2-)	–	–	mg/kg	–	0	24	0.00094 / 0.098	–	–	0.15 n	N/A	N/A	N	Not detected.
	79-01-6	Trichloroethene	0.0018	0.0045	mg/kg	SH-303/2-4'	2	24	0.00063 / 0.065	0.0045	–	0.41 n	N/A	N/A	N	Max concentration below screening level.
	75-69-4	Trichlorofluoromethane	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	2300 ns	N/A	N/A	N	Not detected.
	96-18-4	Trichloropropane (1,2,3-)	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	0.0051 c*	N/A	N/A	N	Not detected.
	95-63-6	Trimethylbenzene (1,2,4-)	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	30 n	N/A	N/A	N	Not detected.
	108-67-8	Trimethylbenzene (1,3,5-)	–	–	mg/kg	–	0	24	0.0025 / 0.26	–	–	27 n	N/A	N/A	N	Not detected.
	75-01-4	Vinyl chloride	–	–	mg/kg	–	0	24	0.0012 / 0.13	–	–	0.059 c	N/A	N/A	N	Not detected.
	95-47-6	Xylene (o-)	–	–	mg/kg	–	0	24	0.0012 / 0.13	–	–	65 n	N/A	N/A	N	Not detected.
	108-38-3	Xylene (p/m-)	–	–	mg/kg	–	0	24	0.0012 / 0.13	–	–	55 n	N/A	N/A	N	Not detected.

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
	1330-20-7	Xylenes, Total SVOCs	–	–	mg/kg	–	0	24	0.0012   0.13	–	–	58 n	N/A	N/A	N	Not detected.
	83-32-9	Acenaphthene	–	–	mg/kg	–	0	24	0.13   0.15	–	–	360 n	N/A	N/A	N	Not detected.
	208-96-8	Acenaphthylene	–	–	mg/kg	–	0	24	0.13   0.15	–	–	360 n	N/A	N/A	N	Not detected.
	98-86-2	Acetophenone	–	–	mg/kg	–	0	24	0.17   0.19	–	–	780 n	N/A	N/A	N	Not detected.
	62-53-3	Aniline	–	–	mg/kg	–	0	24	0.2   0.23	–	–	44 n	N/A	N/A	N	Not detected.
	120-12-7	Anthracene	–	–	mg/kg	–	0	24	0.1   0.11	–	–	1800 n	N/A	N/A	N	Not detected.
	103-33-3	Azobenzene	–	–	mg/kg	–	0	24	0.17   0.19	–	–	5.6 c	N/A	N/A	N	Not detected.
	56-55-3	Benzo(a)anthracene	0.02	0.02	mg/kg	SH-305/0-6"	1	24	0.1   0.11	0.02	–	1.1 c	N/A	N/A	N	Max concentration below screening level.
	50-32-8	Benzo(a)pyrene	0.00555	0.017	mg/kg	SH-301/0-6"	4	24	0.0067   0.0076	0.017	2	0.11 c*	N/A	N/A	N	Max concentration below screening level.
	205-99-2	Benzo(b)fluoranthene	0.034	0.034	mg/kg	SH-305/0-6"	1	24	0.1   0.11	0.034	–	1.1 c	N/A	N/A	N	
	191-24-2	Benzo(ghi)perylene	–	–	mg/kg	–	0	24	0.13   0.15	–	–	1.1 c	N/A	N/A	N	Not detected.
	207-08-9	Benzo(k)fluoranthene	–	–	mg/kg	–	0	24	0.1   0.11	–	–	11 c	N/A	N/A	N	Not detected.
	111-91-1	Bis(2-chloroethoxy)methane	–	–	mg/kg	–	0	24	0.18   0.21	–	–	19 n	N/A	N/A	N	Not detected.
	111-44-4	Bis(2-chloroethyl)ether	–	–	mg/kg	–	0	24	0.15   0.17	–	–	0.23 c	N/A	N/A	N	Not detected.
	108-60-1	Bis(2-chloroisopropyl)ether	–	–	mg/kg	–	0	24	0.2   0.23	–	–	310 n	N/A	N/A	N	Not detected.
	117-81-7	Bis(2-ethylhexyl)phthalate	–	–	mg/kg	–	0	24	0.17   0.19	–	–	39 c**	N/A	N/A	N	Not detected.
	101-55-3	Bromophenyl phenyl ether (4-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	--	N/A	N/A	N	Not detected.
	85-68-7	Butyl benzyl phthalate	–	–	mg/kg	–	0	24	0.17   0.19	–	–	290 c**	N/A	N/A	N	Not detected.
	106-47-8	Chloroaniline (4-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	2.7 c**	N/A	N/A	N	Not detected.
	91-58-7	Chloronaphthalene (2-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	480 n	N/A	N/A	N	Not detected.
	95-57-8	Chlorophenol (2-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	39 n	N/A	N/A	N	Not detected.
	218-01-9	Chrysene	0.018	0.028	mg/kg	SH-305/0-6"	2	24	0.1   0.11	0.028	–	110 c	N/A	N/A	N	Max concentration below screening level.
	53-70-3	Dibenzo(a,h)anthracene	–	–	mg/kg	–	0	24	0.1   0.11	–	–	0.11 c	N/A	N/A	N	
	132-64-9	Dibenzofuran	–	–	mg/kg	–	0	24	0.17   0.19	–	–	7.3 n	N/A	N/A	N	
	95-50-1	Dichlorobenzene (1,2-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	180 n	N/A	N/A	N	Not detected.
	541-73-1	Dichlorobenzene (1,3-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	--	N/A	N/A	N	Not detected.
	106-46-7	Dichlorobenzene (1,4-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	2.6 c	N/A	N/A	N	Not detected.
	91-94-1	Dichlorobenzidine (3,3'-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	1.2 c	N/A	N/A	N	Not detected.
	120-83-2	Dichlorophenol (2,4-)	–	–	mg/kg	–	0	24	0.15   0.17	–	–	19 n	N/A	N/A	N	Not detected.
	84-66-2	Diethyl phthalate	–	–	mg/kg	–	0	24	0.17   0.19	–	–	5100 n	N/A	N/A	N	Not detected.
	131-11-3	Dimethyl phthalate	–	–	mg/kg	–	0	24	0.17   0.19	–	–	--	N/A	N/A	N	Not detected.
	105-67-9	Dimethylphenol (2,4-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	130 n	N/A	N/A	N	Not detected.
	84-74-2	Di-n-butylphthalate	–	–	mg/kg	–	0	24	0.17   0.19	–	–	630 n	N/A	N/A	N	Not detected.
	51-28-5	Dinitrophenol (2,4-)	–	–	mg/kg	–	0	24	0.8   0.92	–	–	13 n	N/A	N/A	N	Not detected.
	121-14-2	Dinitrotoluene (2,4-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	1.7 c**	N/A	N/A	N	Not detected.
	606-20-2	Dinitrotoluene (2,6-)	–	–	mg/kg	–	0	24	0.17   0.19	–	–	0.36 c**	N/A	N/A	N	Not detected.

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B

## OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
117-84-0		Di-n-octylphthalate	–	–	mg/kg	–	0	24	0.17	0.19	–	63 n	N/A	N/A	N	Not detected.	
206-44-0		Fluoranthene	0.028	0.043	mg/kg	SH-305/0-6"	2	24	0.1	0.11	0.043	–	240 n	N/A	N/A	N	Max concentration below screening level.
86-73-7		Fluorene	–	–	mg/kg	–	0	24	0.17	0.19	–	240 n	N/A	N/A	N	Not detected.	
118-74-1		Hexachlorobenzene	–	–	mg/kg	–	0	24	0.00804	0.11	–	0.21 c*	N/A	N/A	N	Not detected.	
87-68-3		Hexachlorobutadiene	–	–	mg/kg	–	0	24	0.17	0.19	–	1.2 c**	N/A	N/A	N	Not detected.	
67-72-1		Hexachloroethane	–	–	mg/kg	–	0	24	0.13	0.15	–	1.8 c**	N/A	N/A	N	Not detected.	
193-39-5		Indeno(1,2,3-cd)pyrene	–	–	mg/kg	–	0	24	0.13	0.15	–	1.1 c	N/A	N/A	N	Not detected.	
78-59-1		Isophorone	–	–	mg/kg	–	0	24	0.15	0.17	–	570 c**	N/A	N/A	N	Not detected.	
91-57-6		Methylnaphthalene (2-)	–	–	mg/kg	–	0	24	0.2	0.23	–	24 n	N/A	N/A	N	Not detected.	
95-48-7		Methylphenol (2-)	–	–	mg/kg	–	0	24	0.17	0.19	–	320 n	N/A	N/A	N	Not detected.	
108-39-4		Methylphenol (3-)/Methylphenol (4-)	–	–	mg/kg	–	0	24	0.24	0.28	–	320 n	N/A	N/A	N	Not detected.	
91-20-3		Naphthalene	–	–	mg/kg	–	0	24	0.17	0.19	–	3.8 c**	N/A	N/A	N	Not detected.	
98-95-3		Nitrobenzene	–	–	mg/kg	–	0	24	0.15	0.17	–	5.1 c**	N/A	N/A	N	Not detected.	
88-75-5		Nitrophenol (2-)	–	–	mg/kg	–	0	24	0.36	0.41	–	13 n	N/A	N/A	N	Not detected.	
100-02-7		Nitrophenol (4-)	–	–	mg/kg	–	0	24	0.23	0.27	–	13 n	N/A	N/A	N	Not detected.	
87-86-5		Pentachlorophenol	–	–	mg/kg	–	0	24	0.33	0.38	–	1 c*	N/A	N/A	N	Not detected.	
85-01-8		Phenanthrene	0.024	0.024	mg/kg	SH-305/0-6"	1	24	0.1	0.11	0.024	–	240 n	N/A	N/A	N	Max concentration below screening level.
108-95-2		Phenol	–	–	mg/kg	–	0	24	0.17	0.19	–	1900 n	N/A	N/A	N	Not detected.	
129-00-0		Pyrene	0.023	0.036	mg/kg	SH-305/0-6"	2	24	0.1	0.11	0.036	–	180 n	N/A	N/A	N	Max concentration below screening level.
120-82-1		Trichlorobenzene (1,2,4-)	–	–	mg/kg	–	0	24	0.17	0.19	–	5.8 n	N/A	N/A	N	Not detected.	
95-95-4		Trichlorophenol (2,4,5-)	–	–	mg/kg	–	0	24	0.17	0.19	–	630 n	N/A	N/A	N	Not detected.	
88-06-2		Trichlorophenol (2,4,6-)	–	–	mg/kg	–	0	24	0.1	0.11	–	6.3 n	N/A	N/A	N	Not detected.	
		TPH															
HA-VPHC9-C10		C9-C10 Aromatics	3.16	3.16	mg/kg	SH-301/2-4'	1	24	2.39	3.31	3.16	–	11 n	N/A	N/A	N	Max concentration below screening level.
HA-EPHC11-C22A		C11-C22 Aromatics, Adjusted	11.9	11.9	mg/kg	SH-305/0-6"	1	24	6.43	7.56	11.9	–	11 n	N/A	N/A	Y	Max concentration exceeds screening level.
HA-VPHC5-C8A		C5-C8 Aliphatics, Adjusted	–	–	mg/kg	–	0	24	2.39	3.31	–	52 n	N/A	N/A	N	Not detected.	
HA-VPHC9-C12A		C9-C12 Aliphatics, Adjusted	5.66	5.66	mg/kg	SH-307/4-6'	1	24	2.39	3.31	5.66	–	9.6 ns	N/A	N/A	N	Max concentration below screening level.
HA-EPHC9-C18		C9-C18 Aliphatics	–	–	mg/kg	–	0	24	6.43	7.56	–	9.6 ns	N/A	N/A	N	Not detected.	
HA-EPHC19-C36		C19-C36 Aliphatics	10.2	10.2	mg/kg	SH-305/0-6"	1	24	6.43	7.56	10.2	–	250 n	N/A	N/A	N	Max concentration below screening level.
		Pesticides															
309-00-2		Aldrin	–	–	mg/kg	–	0	24	0.00771	0.00898	–	0.039 c**	N/A	N/A	N	Not detected.	
319-84-6		BHC (Alpha-)	–	–	mg/kg	–	0	24	0.00321	0.00374	–	0.086 c	N/A	N/A	N	Not detected.	
319-85-7		BHC (Beta-)	–	–	mg/kg	–	0	24	0.00771	0.00898	–	0.3 c	N/A	N/A	N	Not detected.	
319-86-8		BHC (Delta-)	–	–	mg/kg	–	0	24	0.00771	0.00898	–	0.086 c	N/A	N/A	N	Not detected.	
58-89-9		BHC (Gamma-) (Lindane)	–	–	mg/kg	–	0	24	0.00257	0.003	–	0.57 c**	N/A	N/A	N	Not detected.	
57-74-9		Chlordane	–	–	mg/kg	–	0	24	0.0626	0.073	–	1.7 c**	N/A	N/A	N	Not detected.	
72-54-8		DDD (4,4'-)	–	–	mg/kg	–	0	24	0.00771	0.00898	–	2.3 c	N/A	N/A	N	Not detected.	

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Soil  
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
72-55-9	DDE (4,4'-)		0.0095	0.0095	mg/kg	SH-305/0-6"	1	24	0.00771 0.00898	0.0095	-	2 c	N/A	N/A	N	Max concentration below screening level.
50-29-3	DDT (4,4'-)		-	-	mg/kg	-	0	24	0.0144 0.0168	-	-	1.9 c**	N/A	N/A	N	Not detected.
60-57-1	Dieldrin		-	-	mg/kg	-	0	24	0.00482 0.00562	-	-	0.034 c**	N/A	N/A	N	Not detected.
959-98-8	Endosulfan I		-	-	mg/kg	-	0	24	0.00771 0.00898	-	-	47 n	N/A	N/A	N	Not detected.
33213-65-9	Endosulfan II		-	-	mg/kg	-	0	24	0.00771 0.00898	-	-	47 n	N/A	N/A	N	Not detected.
1031-07-8	Endosulfan sulfate		-	-	mg/kg	-	0	24	0.00321 0.00374	-	-	47 n	N/A	N/A	N	Not detected.
72-20-8	Endrin		-	-	mg/kg	-	0	24	0.00321 0.00374	-	-	1.9 n	N/A	N/A	N	Not detected.
53494-70-5	Endrin ketone		-	-	mg/kg	-	0	24	0.00771 0.00898	-	-	1.9 n	N/A	N/A	N	Not detected.
76-44-8	Heptachlor		-	-	mg/kg	-	0	24	0.00385 0.00449	-	-	0.13 c*	N/A	N/A	N	Not detected.
1024-57-3	Heptachlor epoxide		-	-	mg/kg	-	0	24	0.0144 0.0168	-	-	0.07 c**	N/A	N/A	N	Not detected.
118-74-1	Hexachlorobenzene		-	-	mg/kg	-	0	24	0.00771 0.1	-	-	0.21 c*	N/A	N/A	N	Not detected.
72-43-5	Methoxychlor		-	-	mg/kg	-	0	24	0.0144 0.0168	-	-	32 n	N/A	N/A	N	Not detected.
	PCBs															
12674-11-2	Aroclor 1016		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.41 n	N/A	N/A	N	Not detected.
11104-28-2	Aroclor 1221		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.2 c	N/A	N/A	N	Not detected.
11141-16-5	Aroclor 1232		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.17 c	N/A	N/A	N	Not detected.
53469-21-9	Aroclor 1242		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.23 c	N/A	N/A	N	Not detected.
12672-29-6	Aroclor 1248		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.23 c	N/A	N/A	N	Not detected.
11097-69-1	Aroclor 1254		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.12 n	N/A	N/A	N	Not detected.
11096-82-5	Aroclor 1260		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.24 c	N/A	N/A	N	Not detected.
37324-23-5	Aroclor 1262		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.12 n	N/A	N/A	N	Not detected.
11100-14-4	Aroclor 1268		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.12 n	N/A	N/A	N	Not detected.
1336-36-3	PCBs, Total		-	-	mg/kg	-	0	24	0.0321 0.0376	-	-	0.23 c	N/A	N/A	N	Not detected.
	Metals															
						SH-305/0-6" SH-305/4-6' SH-307/4-6'										
7440-38-2	Arsenic, Total		3.4	13	mg/kg	SH-307/4-6'	24	24	- -	13	20	0.68 c**R	N/A	N/A	Y	Max concentration exceeds screening level.
7429-90-5	Aluminum, Total		3,500	14,200	mg/kg	SH-303/2-4'	24	24	- -	14,200	10,000	7700 n	N/A	N/A	Y	Max concentration exceeds screening level.
7440-36-0	Antimony, Total		0.342	0.954	mg/kg	SH-305/0-6"	5	24	3.92 4.56	0.954	-	3.1 n	N/A	N/A	N	Max concentration below screening level.
7440-39-3	Barium, Total		6.15	76.4	mg/kg	SH-303/2-4'	24	24	- -	76.4	-	1500 n	N/A	N/A	N	Max concentration below screening level.
7440-41-7	Beryllium, Total		0.144	0.433	mg/kg	SH-303/2-4'	24	24	- -	0.433	-	16 n	N/A	N/A	N	Max concentration below screening level.
7440-43-9	Cadmium, Total		0.128	0.49	mg/kg	SH-303/2-4'	12	24	0.796 0.912	0.49	-	7.1 n	N/A	N/A	N	Max concentration below screening level.
7440-70-2	Calcium, Total		82.5	2430	mg/kg	SH-303/2-4'	24	24	- -	2,430	-	--	N/A	N/A	N	No screening level.
18540-29-9	Chromium, Hexavalent		-	-	mg/kg	-	0	24	0.82 0.93	-	-	0.3 c*	N/A	N/A	N	Not detected.
7440-47-3	Chromium, Total		5.54	30.1	mg/kg	SH-303/4-6'	24	24	- -	30.1	-	12000 n	N/A	N/A	N	Max concentration below screening level.
7440-48-4	Cobalt, Total		0.956	16.3	mg/kg	SH-303/2-4'	24	24	- -	16.3	4	2.3 n	N/A	N/A	Y	Max concentration exceeds screening level.
7440-50-8	Copper, Total		2.24	31.9	mg/kg	SH-302/4-6'	24	24	- -	31.9	-	310 n	N/A	N/A	N	Max concentration below screening level.
7439-89-6	Iron, Total		3,780	22,100	mg/kg	SH-303/2-4'	24	24	- -	22,100	20,000	5500 n	N/A	N/A	Y	Max concentration exceeds screening level.

TABLE 2.1\_SG2A+B - Soils Groups 2A+2B  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Site-Wide/Disturbed Soils (0-6", 2-4', 4-6')

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Background Value (2)	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	7439-92-1	Lead, Total	2	84.2	mg/kg	SH-305/0-6"	24	24	–	84.2	–	400	N/A	N/A	N	Max concentration below screening level.	
	7439-95-4	Magnesium, Total	392	7,920	mg/kg	SH-303/2-4'	24	24	–	7,920	–	--	N/A	N/A	N	No screening level.	
	7439-96-5	Manganese, Total	32.3	254	mg/kg	SH-302/4-6'	24	24	–	254	300	180 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7439-97-6	Mercury, Total	0.078	0.078	mg/kg	SH-305/0-6"	1	24	0.064	0.076	0.078	–	1.1 n	N/A	N/A	N	Max concentration below screening level.
	7440-02-0	Nickel, Total	3.23	25.9	mg/kg	SH-303/2-4'	24	24	–	25.9	–	150 n	N/A	N/A	N	Max concentration below screening level.	
	7440-09-7	Potassium, Total	73.3	3710	mg/kg	SH-303/2-4'	24	24	–	3,710	–	--	N/A	N/A	N	No screening level.	
	7782-49-2	Selenium, Total	0.214	0.774	mg/kg	SH-305/0-6"	7	24	3.92	4.52	0.774	–	39 n	N/A	N/A	N	Max concentration below screening level.
	7440-22-4	Silver, Total	–	–	mg/kg	–	0	24	0.784	0.912	–	–	39 n	N/A	N/A	N	Not detected.
	7440-23-5	Sodium, Total	14.4	75.4	mg/kg	SH-303/2-4'	17	24	160	171	75.4	–	--	N/A	N/A	N	No screening level.
	7440-28-0	Thallium, Total	0.1725	0.1725	mg/kg	SH-304/0-6"	1	24	0.2	0.23	0.1725	0.6	0.078 n	N/A	N/A	Y	Max concentration exceeds screening level.
	7440-31-5	Tin, Total	1.9	1.9	mg/kg	SH-305/0-6"	1	24	7.84	9.12	1.9	–	4700 n	N/A	N/A	N	Max concentration below screening level.
	7440-62-2	Vanadium, Total	5.1	39.7	mg/kg	SH-303/2-4'	24	24	–	39.7	30	39 n	N/A	N/A	Y	Max concentration exceeds screening level.	
	7440-66-6	Zinc, Total	7.24	40.5	mg/kg	SH-303/2-4'	24	24	–	40.5	–	2300 n	N/A	N/A	N	Max concentration below screening level.	
		Other Parameters															
	57-12-5	Cyanide, Physiologically Available	–	–	mg/kg	–	0	24	0.94	1.1	–	–	2.3 n	N/A	N/A	N	Not detected.
	57-12-5	Cyanide, Total	–	–	mg/kg	–	0	24	0.67	1.1	–	–	2.3 n	N/A	N/A	N	Not detected.
	HA-ORP	Oxidation/Reduction Potential (mV)	240	330	mV	SH-301/0-6"	24	24	–	–	330	–	--	N/A	N/A	N	No screening level.
	12408-02-5	pH (H) (pH units)	4.6	6.2	pH units	SH-307/2-4'	24	24	–	–	6.2	–	--	N/A	N/A	N	No screening level.
	IGNIT	Ignitability (unitless)	–	–	unitless	–	0	8	–	–	–	–	--	N/A	N/A	N	Not detected.
	RCYAN	Cyanide, Reactive	–	–	mg/kg	–	0	8	10	10	–	–	--	N/A	N/A	N	Not detected.
	RSULF	Sulfide, Reactive	–	–	mg/kg	–	0	8	10	10	–	–	--	N/A	N/A	N	Not detected.

## Footnotes:

(1) USEPA Residential RSLs TR-1e-06 and THQ=0.1.

c = cancer

(2) MassDEP Background Levels for Natural Soil.

n = noncancer

(3) From USEPA Residential RSLs.

\* = where: noncancer screening level (SL) &lt; 100X cancer SL

## Abbreviations:

CAS=Chemical Abstracts Service

\*\* = where noncancer SL &lt; 10X cancer SL

ARAR/TBC=Applicable or Relevant and Appropriate Requirements/To Be Considered

s = concentration may exceed soil saturation concentration (Csat)

N/A=not available

TABLE 2.1\_GW\_A - Groundwater  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Indoor vapor in future residential buildings resulting from groundwater vapor intrusion

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3) CMC CCC	COPC Flag (Y/N)	Rationale for Selection or Deletion
Groundwater	VOCs														
	67-64-1	Acetone	-	-	µg/l	-	0	2	5	5	-	2,300,000	-	-	N Not Detected
	71-43-2	Benzene	-	-	µg/l	-	0	2	0.5	0.5	-	1.6	-	-	N Not Detected
	108-86-1	Bromobenzene	-	-	µg/l	-	0	2	2	2	-	62	-	-	N Not Detected
	74-97-5	Bromochloromethane	-	-	µg/l	-	0	2	2	2	-	70	-	-	N Not Detected
	75-27-4	Bromodichloromethane	-	-	µg/l	-	0	2	1	1	-	0.88	-	-	N Not Detected
	75-25-2	Bromoform	-	-	µg/l	-	0	2	2	2	-	120	-	-	N Not Detected
	74-83-9	Bromomethane	-	-	µg/l	-	0	2	2	2	-	1.8	-	-	N Not Detected
	78-93-3	Butanone (2-) (MEK)	-	-	µg/l	-	0	2	5	5	-	230,000	-	-	N Not Detected
	104-51-8	Butylbenzene (n-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected
	135-98-8	Butylbenzene (sec-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected
	98-06-6	Butylbenzene (tert-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected
	75-15-0	Carbon disulfide	-	-	µg/l	-	0	2	2	2	-	130	-	-	N Not Detected
	56-23-5	Carbon tetrachloride	-	-	µg/l	-	0	2	1	1	-	0.42	-	-	N Not Detected
	108-90-7	Chlorobenzene	-	-	µg/l	-	0	2	1	1	-	42	-	-	N Not Detected
	75-00-3	Chloroethane (Ethyl Chloride)	-	-	µg/l	-	0	2	2	2	-	2,300	-	-	N Not Detected
	67-66-3	Chloroform	-	-	µg/l	-	0	2	1	1	-	0.82	-	-	N Not Detected
	74-87-3	Chloromethane	-	-	µg/l	-	0	2	2	2	-	27	-	-	N Not Detected
	95-49-8	Chlorotoluene (o-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected
	106-43-4	Chlorotoluene (p-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected
	96-12-8	Dibromo-3-chloropropane (1,2-) (DBCP)	-	-	µg/l	-	0	2	2	2	-	0.03	-	-	N Not Detected
	124-48-1	Dibromochloromethane	-	-	µg/l	-	0	2	1	1	-	-	-	-	N Not Detected
	106-93-4	Dibromoethane (1,2-) (Ethylene Dibromide) (EDB)	-	-	µg/l	-	0	2	2	2	-	0.18	-	-	N Not Detected
	74-95-3	Dibromomethane	-	-	µg/l	-	0	2	2	2	-	13	-	-	N Not Detected
	95-50-1	Dichlorobenzene (1,2-)	-	-	µg/l	-	0	2	1	1	-	270	-	-	N Not Detected
	541-73-1	Dichlorobenzene (1,3-)	-	-	µg/l	-	0	2	1	1	-	-	-	-	N Not Detected
	106-46-7	Dichlorobenzene (1,4-)	-	-	µg/l	-	0	2	1	1	-	2.6	-	-	N Not Detected
	75-71-8	Dichlorodifluoromethane	-	-	µg/l	-	0	2	2	2	-	0.75	-	-	N Not Detected
	75-34-3	Dichloroethane (1,1-)	-	-	µg/l	-	0	2	1	1	-	7.7	-	-	N Not Detected
	107-06-2	Dichloroethane (1,2-)	-	-	µg/l	-	0	2	1	1	-	2.3	-	-	N Not Detected
	75-35-4	Dichloroethene (1,1-)	-	-	µg/l	-	0	2	1	1	-	20	-	-	N Not Detected
	156-59-2	Dichloroethene (cis-1,2-)	-	-	µg/l	-	0	2	1	1	-	-	-	-	N Not Detected
	156-60-5	Dichloroethene (trans-1,2-)	-	-	µg/l	-	0	2	1	1	-	-	-	-	N Not Detected
	540-59-0	Dichloroethene (1,2-) (total)	-	-	µg/l	-	0	2	1	1	-	-	-	-	N Not Detected
	78-87-5	Dichloropropene (1,2-)	-	-	µg/l	-	0	2	1	1	-	3.7	-	-	N Not Detected
	142-28-9	Dichloropropene (1,3-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N Not Detected

TABLE 2.1\_GW\_A - Groundwater  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Indoor vapor in future residential buildings resulting from groundwater vapor intrusion

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3) CMC CCC	COPC Flag (Y/N)	Rationale for Selection or Deletion
	594-20-7	Dichloropropane (2,2-)	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	563-58-6	Dichloropropene (1,1-)	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	10061-01-5	Dichloropropene (cis-1,3-)	-	-	µg/l	-	0	2	0.5	0.5	-	-	-	N	Not Detected
	10061-02-6	Dichloropropene (trans-1,3-)	-	-	µg/l	-	0	2	0.5	0.5	-	-	-	N	Not Detected
	542-75-6	Dichloropropene (1,3-), Total	-	-	µg/l	-	0	2	0.5	0.5	-	4.9	-	N	Not Detected
	123-91-1	Dioxane (1,4-)	-	-	µg/l	-	0	2	250	250	-	2,900	-	N	Not Detected
	60-29-7	Ethyl ether	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	100-41-4	Ethylbenzene	-	-	µg/l	-	0	2	1	1	-	3.5	-	N	Not Detected
	637-92-3	Ethyl-Tert-Butyl-Ether	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	87-68-3	Hexachlorobutadiene	-	-	µg/l	-	0	2	0.6	0.6	-	0.31	-	N	Not Detected
	591-78-6	Hexanone (2-)	-	-	µg/l	-	0	2	5	5	-	830	-	N	Not Detected
	108-20-3	Isopropyl Ether (Diisopropyl Ether)	-	-	µg/l	-	0	2	2	2	-	700	-	N	Not Detected
	98-82-8	Isopropylbenzene (Cumene)	-	-	µg/l	-	0	2	2	2	-	89	-	N	Not Detected
	99-87-6	Isopropyltoluene (p-)	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	1634-04-4	Methyl tert butyl ether	-	-	µg/l	-	0	2	2	2	-	450	-	N	Not Detected
	108-10-1	Methyl-2-pentanone (4-) (MIBK)	-	-	µg/l	-	0	2	5	5	-	56,000	-	N	Not Detected
	75-09-2	Methylene chloride(Dichloromethane)	-	-	µg/l	-	0	2	2	2	-	480	-	N	Not Detected
	91-20-3	Naphthalene	-	-	µg/l	-	0	2	2	2	-	4.6	-	N	Not Detected
	103-65-1	Propylbenzene (n-)	-	-	µg/l	-	0	2	2	2	-	250	-	N	Not Detected
	100-42-5	Styrene	-	-	µg/l	-	0	2	1	1	-	930	-	N	Not Detected
	994-05-8	Tertiary-Amyl Methyl Ether	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	630-20-6	Tetrachloroethane (1,1,1,2-)	-	-	µg/l	-	0	2	1	1	-	3.8	-	N	Not Detected
	79-34-5	Tetrachloroethane (1,1,2,2-)	-	-	µg/l	-	0	2	1	1	-	3.3	-	N	Not Detected
	127-18-4	Tetrachloroethene	-	-	µg/l	-	0	2	1	1	-	5.8	-	N	Not Detected
	109-99-9	Tetrahydrofuran	-	-	µg/l	-	0	2	2	2	-	73,000	-	N	Not Detected
	108-88-3	Toluene	-	-	µg/l	-	0	2	1	1	-	2,000	-	N	Not Detected
	87-61-6	Trichlorobenzene (1,2,3-)	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	120-82-1	Trichlorobenzene (1,2,4-)	-	-	µg/l	-	0	2	2	2	-	3.6	-	N	Not Detected
	71-55-6	Trichloroethane (1,1,1-)	-	-	µg/l	-	0	2	1	1	-	750	-	N	Not Detected
	79-00-5	Trichloroethane (1,1,2-)	-	-	µg/l	-	0	2	1	1	-	0.62	-	N	Not Detected
	79-01-6	Trichloroethene	0.22	0.22	µg/l	SH-307 (OW)	1	2	1	1	0.22	0.52	-	N	Below VISL
	75-69-4	Trichlorofluoromethane	-	-	µg/l	-	0	2	2	2	-	-	-	N	Not Detected
	96-18-4	Trichloropropane (1,2,3-)	-	-	µg/l	-	0	2	2	2	-	2.3	-	N	Not Detected
	95-63-6	Trimethylbenzene (1,2,4-)	-	-	µg/l	-	0	2	2	2	-	25	-	N	Not Detected
	108-67-8	Trimethylbenzene (1,3,5-)	-	-	µg/l	-	0	2	2	2	-	18	-	N	Not Detected
	75-01-4	Vinyl chloride	-	-	µg/l	-	0	2	1	1	-	0.15	-	N	Not Detected

TABLE 2.1\_GW\_A - Groundwater  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Indoor vapor in future residential buildings resulting from groundwater vapor intrusion

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3) CMC CCC	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	95-47-6	Xylene (o-)	-	-	µg/l	-	0	2	1	1	-	50	-	-	N	Not Detected
	1330-20-7P/M	Xylene (p/m-)	-	-	µg/l	-	0	2	2	2	-	37 ¢	-	-	N	Not Detected
	1330-20-7	Xylene (Total)	-	-	µg/l	-	0	2	1	1	-	39	-	-	N	Not Detected
		SVOCs														
	83-32-9	Acenaphthene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	208-96-8	Acenaphthylene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	98-86-2	Acetophenone	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	62-53-3	Aniline	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	120-12-7	Anthracene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	103-33-3	Azobenzene	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	56-55-3	Benzo(a)anthracene	-	-	µg/l	-	0	2	0.1	0.1	-	35	-	-	N	Not Detected
	50-32-8	Benzo(a)pyrene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	205-99-2	Benzo(b)fluoranthene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	191-24-2	Benzo(ghi)perylene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	207-08-9	Benzo(k)fluoranthene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	111-91-1	Bis(2-chloroethoxy)methane	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	111-44-4	Bis(2-chloroethyl)ether	-	-	µg/l	-	0	2	2	2	-	13	-	-	N	Not Detected
	108-60-1	Bis(2-chloroisopropyl)ether	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	117-81-7	Bis(2-ethylhexyl)phthalate(Di(2-ethylhexyl)phthalate)	-	-	µg/l	-	0	2	2.9	3	-	-	-	-	N	Not Detected
	101-55-3	Bromophenyl phenyl ether (4-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	85-68-7	Butyl benzyl phthalate	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	106-47-8	Chloroaniline (4-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	91-58-7	Chloronaphthalene (2-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	95-57-8	Chlorophenol (2-)	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	218-01-9	Chrysene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	53-70-3	Dibenzo(a,h)anthracene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	-	N	Not Detected
	132-64-9	Dibenzofuran	-	-	µg/l	-	0	2	2	2	-	-	-	-	N	Not Detected
	91-94-1	Dichlorobenzidine (3,3'-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	120-83-2	Dichlorophenol (2,4-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	84-66-2	Diethyl phthalate	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	131-11-3	Dimethyl phthalate	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	105-67-9	Dimethylphenol (2,4-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	84-74-2	Di-n-butylphthalate	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	51-28-5	Dinitrophenol (2,4-)	-	-	µg/l	-	0	2	20	20	-	-	-	-	N	Not Detected
	121-14-2	Dinitrotoluene (2,4-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected
	606-20-2	Dinitrotoluene (2,6-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	-	N	Not Detected

TABLE 2.1\_GW\_A - Groundwater  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Indoor vapor in future residential buildings resulting from groundwater vapor intrusion

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3)	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	117-84-0	Di-n-octylphthalate	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	123-91-1	Dioxane (1,4-)	-	-	µg/l	-	0	2	0.142	0.16	-	2,900	-	N	Not Detected	
	206-44-0	Fluoranthene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	86-73-7	Fluorene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	118-74-1	Hexachlorobenzene	-	-	µg/l	-	0	2	0.78	0.8	-	0.088	-	N	Not Detected	
	87-68-3	Hexachlorobutadiene	-	-	µg/l	-	0	2	0.49	0.5	-	0.31	-	N	Not Detected	
	67-72-1	Hexachloroethane	-	-	µg/l	-	0	2	2	2	-	1.7	-	N	Not Detected	
	193-39-5	Indeno(1,2,3-cd)pyrene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	78-59-1	Isophorone	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	91-57-6	Methylnaphthalene (2-)	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	95-48-7	Methylphenol (2-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	108-39-4	Methylphenol (3-)/Methylphenol (4-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	98-95-3	Nitrobenzene	-	-	µg/l	-	0	2	2	2	-	72	-	N	Not Detected	
	88-75-5	Nitrophenol (2-)	-	-	µg/l	-	0	2	9.8	10	-	-	-	N	Not Detected	
	100-02-7	Nitrophenol (4-)	-	-	µg/l	-	0	2	9.8	10	-	-	-	N	Not Detected	
	87-86-5	Pentachlorophenol	-	-	µg/l	-	0	2	0.78	0.8	-	-	19	15	N	Not Detected
	85-01-8	Phenanthrene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	108-95-2	Phenol	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	129-00-0	Pyrene	-	-	µg/l	-	0	2	0.1	0.1	-	-	-	N	Not Detected	
	95-95-4	Trichlorophenol (2,4,5-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
	88-06-2	Trichlorophenol (2,4,6-)	-	-	µg/l	-	0	2	4.9	5	-	-	-	N	Not Detected	
		TPH														
	HA-VPHC9-C10	C9-C10 Aromatics	-	-	µg/l	-	0	2	50	50	-	-	-	N	Not Detected	
	HA-EPHC11-C22A	C11-C22 Aromatics, Adjusted	-	-	µg/l	-	0	2	100	100	-	-	-	N	Not Detected	
	HA-VPHC5-C8A	C5-C8 Aliphatics, Adjusted	-	-	µg/l	-	0	2	50	50	-	-	-	N	Not Detected	
	HA-VPHC9-C12A	C9-C12 Aliphatics, Adjusted	-	-	µg/l	-	0	2	50	50	-	-	-	N	Not Detected	
	HA-EPHC9-C18	C9-C18 Aliphatics	-	-	µg/l	-	0	2	100	100	-	-	-	N	Not Detected	
	HA-EPHC19-C36	C19-C36 Aliphatics	-	-	µg/l	-	0	2	100	100	-	-	-	N	Not Detected	
		Pesticides														
	309-00-2	Aldrin	-	-	µg/l	-	0	2	0.02	0.02	-	Y	3	-	N	Not Detected
	319-84-6	BHC (Alpha-)	-	-	µg/l	-	0	2	0.02	0.02	-	-	-	N	Not Detected	
	319-85-7	BHC (Beta-)	-	-	µg/l	-	0	2	0.02	0.02	-	-	-	N	Not Detected	
	319-86-8	BHC (Delta-)	-	-	µg/l	-	0	2	0.02	0.02	-	-	-	N	Not Detected	
	58-89-9	BHC (Gamma-) (Lindane)	-	-	µg/l	-	0	2	0.02	0.02	-	-	0.95	-	N	Not Detected
	57-74-9	Chlordane	-	-	µg/l	-	0	2	0.2	0.2	-	15	2	0.0043	N	Not Detected
	72-54-8	DDD (4,4'-)	-	-	µg/l	-	0	2	0.04	0.04	-	-	-	-	N	Not Detected

TABLE 2.1\_GW\_A - Groundwater  
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Scenario Timeframe: Future  
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Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3)	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	72-55-9	DDE (4,4'-)	-	-	µg/l	-	0	2	0.04	0.04	-	18	-	-	N	Not Detected
	50-29-3	DDT (4,4'-)	-	-	µg/l	-	0	2	0.04	0.04	-	-	1.1	0.001	N	Not Detected
	60-57-1	Dieldrin	-	-	µg/l	-	0	2	0.04	0.04	-	-	0.24	0.056	N	Not Detected
	959-98-8	Endosulfan I	-	-	µg/l	-	0	2	0.02	0.02	-	-	0.22	0.056	N	Not Detected
	33213-65-9	Endosulfan II	-	-	µg/l	-	0	2	0.04	0.04	-	-	0.22	0.056	N	Not Detected
	1031-07-8	Endosulfan sulfate	-	-	µg/l	-	0	2	0.04	0.04	-	-	-	-	N	Not Detected
	72-20-8	Endrin	-	-	µg/l	-	0	2	0.04	0.04	-	-	0.086	0.036	N	Not Detected
	53494-70-5	Endrin ketone	-	-	µg/l	-	0	2	0.04	0.04	-	-	0.086 £	0.036 £	N	Not Detected
	76-44-8	Heptachlor	-	-	µg/l	-	0	2	0.02	0.02	-	0.18	0.52	0.0038	N	Not Detected
	1024-57-3	Heptachlor epoxide	-	-	µg/l	-	0	2	0.02	0.02	-	1.3	0.52	0.0038	N	Not Detected
	118-74-1	Hexachlorobenzene	-	-	µg/l	-	0	2	0.02	0.02	-	0.088	-	-	N	Not Detected
	72-43-5	Methoxychlor	-	-	µg/l	-	0	2	0.2	0.2	-	-	-	0.03	N	Not Detected
		PCBs														
	12674-11-2	Aroclor 1016	-	-	µg/l	-	0	2	0.25	0.25	-	18	-	-	N	Not Detected
	11104-28-2	Aroclor 1221	-	-	µg/l	-	0	2	0.25	0.25	-	0.53	-	-	N	Not Detected
	11141-16-5	Aroclor 1232	-	-	µg/l	-	0	2	0.25	0.25	-	0.17	-	-	N	Not Detected
	53469-21-9	Aroclor 1242	-	-	µg/l	-	0	2	0.25	0.25	-	0.36	-	-	N	Not Detected
	12672-29-6	Aroclor 1248	-	-	µg/l	-	0	2	0.25	0.25	-	0.28	-	-	N	Not Detected
	11097-69-1	Aroclor 1254	-	-	µg/l	-	0	2	0.25	0.25	-	0.43	-	-	N	Not Detected
	11096-82-5	Aroclor 1260	-	-	µg/l	-	0	2	0.25	0.25	-	0.36	-	-	N	Not Detected
	37324-23-5	Aroclor 1262	-	-	µg/l	-	0	2	0.25	0.25	-	-	-	-	N	Not Detected
	11100-14-4	Aroclor 1268	-	-	µg/l	-	0	2	0.25	0.25	-	-	-	-	N	Not Detected
	1336-36-3	PCBs, Total	-	-	µg/l	-	0	2	0.25	0.25	-	-	-	0.014	N	Not Detected
		Metals														
	7429-90-5	Aluminum, Total	1300	1300	µg/l	SH-C	1	2	100	100	1300	-	750	87	N	Not Volatile
	7440-36-0	Antimony, Total	-	-	µg/l	-	0	2	4	4	-	-	-	-	N	Not Detected
	7440-38-2	Arsenic, Total	0.7	0.7	µg/l	SH-C	1	2	0.5	0.5	0.7	-	340	150	N	Not Volatile
	7440-39-3	Barium, Total	56.1	91.4	µg/l	SH-307 (OW)	2	2	-	-	91.4	-	-	-	N	Not Volatile
	7440-41-7	Beryllium, Total	-	-	µg/l	-	0	2	0.5	0.5	-	-	-	-	N	Not Detected
	7440-43-9	Cadmium, Total	-	-	µg/l	-	0	2	0.5	0.5	-	-	2	1	N	Not Detected
	7440-70-2	Calcium, Total	6460	18600	µg/l	SH-307 (OW)	2	2	-	-	18600	-	-	-	N	Not Volatile
	18540-29-9	Chromium, Hexavalent	-	-	µg/l	-	0	2	10	10	-	-	16	11	N	Not Detected
	7440-47-3	Chromium, Total	2	2	µg/l	SH-C	1	2	1	1	2	-	570 ¢	74 ¢	N	Not Volatile
	7440-48-4	Cobalt, Total	1.95	6	µg/l	SH-C	2	2	-	-	6	-	-	-	N	Not Volatile
	7440-50-8	Copper, Total	6.9	6.9	µg/l	SH-C	1	2	1	1	6.9	-	-	-	N	Not Volatile
	7439-89-6	Iron, Total	84	1490	µg/l	SH-C	2	2	-	-	1490	-	-	1,000	N	Not Volatile

TABLE 2.1\_GW\_A - Groundwater  
OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Indoor vapor in future residential buildings resulting from groundwater vapor intrusion

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency	# Detects	# Samples	Range of Detection Limits	Concentration Used for Screening (1)	Screening Toxicity Value (2) VISL	Potential ARAR AWQC (3) CMC CCC	COPC Flag (Y/N)	Rationale for Selection or Deletion	
	7439-92-1	Lead, Total	-	-	µg/l	-	0	2	1	1	-	-	65	2.5	N	Not Detected
	7439-95-4	Magnesium, Total	2120	3690	µg/l	SH-307 (OW)	2	2	-	-	3690	-	-	-	N	Not Volatile
	7439-96-5	Manganese, Total	840.5	1006.3	µg/l	SH-307 (OW)	2	2	-	-	1006.3	-	-	-	N	Not Volatile
	7439-97-6	Mercury, Total	-	-	µg/l	-	0	2	0.2	0.2	-	0.089 ź	1.4 ź	0.77 ź	N	Not Detected
	7440-02-0	Nickel, Total	6	6	µg/l	SH-C	1	2	2	2	6	-	470	52	N	Not Volatile
	7440-09-7	Potassium, Total	2595	2840	µg/l	SH-C	2	2	-	-	2840	-	-	-	N	Not Volatile
	7782-49-2	Selenium, Total	-	-	µg/l	-	0	2	5	5	-	-	-	-	N	Not Detected
	7440-22-4	Silver, Total	-	-	µg/l	-	0	2	0.5	0.5	-	-	3.2	-	N	Not Detected
	7440-23-5	Sodium, Total	8750	170000	µg/l	SH-307 (OW)	2	2	-	-	170000	-	-	-	N	Not Volatile
	7440-28-0	Thallium, Total	-	-	µg/l	-	0	2	0.5	0.5	-	-	-	-	N	Not Detected
	7440-31-5	Tin, Total	16	16	µg/l	SH-307 (OW)	1	2	50	50	16	-	-	-	N	Not Volatile
	7440-62-2	Vanadium, Total	-	-	µg/l	-	0	2	5	5	-	-	-	-	N	Not Detected
	7440-66-6	Zinc, Total	-	-	µg/l	-	0	2	10	10	-	-	120	120	N	Not Detected
		Other Parameters	-	-	µg/l	-	0	0	0	0	-	-	-	-	N	Not Detected
	57-12-5	Cyanide, Physiologically Available	-	-	µg/l	-	0	2	5	5	-	21 ☉	22 ☉	5.2 ☉	N	Not Detected
	57-12-5	Cyanide, Total	-	-	µg/l	-	0	2	5	5	-	21 ☉	22 ☉	5.2 ☉	N	Not Detected
	7664-41-7	Nitrogen, Ammonia	55	69	µg/l	SH-307 (OW)	2	2	-	-	69	80,000	-	-	N	Below VISL

Footnotes:

(1) Maximum detected concentration in groundwater

(2) VISL = Vapor Intrusion Screening Level, calculated using the VISL Calculator spreadsheet at TR=1E-06 and THQ=0.1. Accessed October 20, 2017 at <https://semspub.epa.gov/src/document/11/196702>

(3) National Recommended Water Quality Criteria -- Aquatic Criteria Table. CMC = Continuous Maximum Criteria, CCC = Continuous Chronic Criteria. Dissolved basis at hardness of 100 mg/l

Accessed 10/20/2017 at <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>

Abbreviations:

CAS=Chemical Abstracts Service

**Table 2.1\_GW\_B - Groundwater**  
**Comparison of Maximum Detected Groundwater Concentrations with Site-Specific RSLs**  
**200 Presidential Way, Woburn, MA**

Scenario Timeframe: Future  
Medium: Groundwater  
Exposure Medium: Construction Worker Contact with  
Groundwater and Irrigation Water Used in Swimming Pool

Exposure Point	CAS Number	Detected Chemicals in Groundwater	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Units	Location of Maximum Concentration	Detection Frequency		Range of Detection Limits		Concentrations Used for Screening (1)	Screening Toxicity Value Site Specific RSLs (2)		COPC Flag (Y/N)	Rationale for Selection or Deletion	
							# Detects	# Samples	Min	Max		RSLs for Construction Worker Contact with Groundwater ( $\mu\text{g/L}$ )	RSLs for Irrigation Water Exposure Scenario (Pool) ( $\mu\text{g/L}$ )			
Groundwater <sup>1</sup>	7429-90-5	Aluminum	1300	1300	$\mu\text{g/l}$	SH-C	1	2	100	100	1300	4.32E+05	3.96E+04	N	N	Below RSL
	7440-38-2	Arsenic, Inorganic	0.7	0.7	$\mu\text{g/l}$	SH-C	1	2	0.5	0.5	0.7	1.30E+02	2.67E+00	N	N	Below RSL
	7440-39-3	Barium	56.1	91.4	$\mu\text{g/l}$	SH-307 (OW)	2	2	-	-	91.4	1.93E+04	4.41E+03	N	N	Below RSL
	7440-70-2	Calcium	6460	18600	$\mu\text{g/l}$	SH-307 (OW)	2	2	-	-	18600	-	-	N	N	Essential nutrient
	NA	Chromium(III) <sup>2</sup>	Not analyzed	Not analyzed			-	-	-	-	-	3.11E+04	1.07E+04	-	-	
	18540-29-9	Chromium(VI)	-	-	$\mu\text{g/l}$	-	0	2	10	10	-	2.80E+01	3.07E-01	N	N	Not detected
	7440-47-3	Chromium, Total <sup>2</sup>	2	2	$\mu\text{g/l}$	SH-C	1	2	-	-	2	-	-	N	N	Below RSL
	7440-48-4	Cobalt	1.95	6	$\mu\text{g/l}$	SH-C	2	2	1	1	6	1.54E+02	1.23E+01	N	N	Below RSL
	7440-50-8	Copper	6.9	6.9	$\mu\text{g/l}$	SH-C	1	2	1	1	6.9	1.73E+04	1.58E+03	N	N	Below RSL
	7439-89-6	Iron	84	1490	$\mu\text{g/l}$	SH-C	2	2	-	-	1490	3.02E+05	2.77E+04	N	N	Below RSL
	7439-95-4	Magnesium	2120	3690	$\mu\text{g/l}$	SH-307 (OW)	2	2	-	-	3690	-	-	N	N	Essential nutrient
	7439-96-5	Manganese (Non-diet)	840.5	1006.3	$\mu\text{g/l}$	SH-307 (OW)	2	2	-	-	1006.3	1.43E+03	3.90E+02	N	Y	Exceeds RSL
	7440-02-0	Nickel Soluble Salts	6	6	$\mu\text{g/l}$	SH-C	1	2	2	2	6	4.23E+03	6.39E+02	N	N	Below RSL
	7440-09-7	Potassium	2595	2840	$\mu\text{g/l}$	SH-C	2	2	-	-	2840	-	-	N	N	Essential nutrient
	7440-23-5	Sodium	8750	170000	$\mu\text{g/l}$	SH-307 (OW)	2	2	-	-	170000	-	-	N	N	Essential nutrient
	7440-31-5	Tin	16	16	$\mu\text{g/l}$	SH-307 (OW)	1	2	50	50	16	2.59E+05	2.38E+04	N	N	Below RSL
	79-01-6	Trichloroethylene	0.22	0.22	$\mu\text{g/l}$	SH-307 (OW)	1	2	1	1	0.22	3.97E+01	9.81E+00	N	N	Below RSL

Notes:

1. Maximum detected concentration in groundwater.

2. Site-specific Regional Screening Levels (RSLs) with a target cancer risk (TR) of 1E-06 or target hazard quotient (THQ) of 0.1 to validated analytical results. Site-specific RSLs were calculated as described in the text.

2. Site-specific RSL for Chromium III was used for Total Chromium, as Chromium VI was not detected.

3. Abbreviations:

NA=not available

COPC=chemical of potential concern

$\mu\text{g/l}$  = micrograms per liter

RSL = Risk Screening Level

TR = Target Cancer Risk

THQ = Target Hazard Quotient

'-' = not detected

TABLE 3.1  
EXPOSURE POINT CONCENTRATION SUMMARY FOR SOIL  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and subsurface soil

**Soil Group 1**

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of the mean (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil	Aluminum; Total	mg/kg	6694	11221	21600	11221	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Arsenic; Total	mg/kg	6.864	8.81	14	8.81	mg/kg		
	Benzo(a)pyrene	mg/kg	0.0522	0.075	0.135	0.075	mg/kg		
	C11-C22 Aromatics; Adjusted	mg/kg	21.33	28	50.9	28.47	mg/kg		
	Cobalt; Total	mg/kg	3.507	8.49	17.1	8.49	mg/kg		
	Iron; Total	mg/kg	8026	14299	29600	14299	mg/kg		
	Manganese; Total	mg/kg	54.25	126.4	193	126.4	mg/kg		
	Vanadium; Total	mg/kg	18.66	30.82	69.5	30.82	mg/kg		

**Soil Group 2A**

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of the mean (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil	Aluminum; Total	mg/kg	7552	9029	11900	9029	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Arsenic; Total	mg/kg	6.219	8.44	13	8.44	mg/kg		
	Benzo(a)pyrene	mg/kg	0.0125	0.012	0.017	0.012	mg/kg		
	C11-C22 Aromatics; Adjusted	mg/kg	N/A	N/A	11.9	11.9	mg/kg		
	Cobalt; Total	mg/kg	2.154	3.01	4.63	3.01	mg/kg	single sample	only detected result
	Iron; Total	mg/kg	7119	8899	11900	8899	mg/kg		
	Manganese; Total	mg/kg	69.14	91.7	126.5	91.73	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Thallium; Total	mg/kg	N/A	N/A	0.1725	0.1725	mg/kg		
	Vanadium; Total	mg/kg	12.82	17.35	23.3	17.35	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean

**Soil Group 2B**

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of the mean (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil	Aluminum; Total	mg/kg	7408	8820	14200	8820	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Arsenic; Total	mg/kg	6.025	7.53	13.5	7.53	mg/kg		
	Benzo(a)pyrene	mg/kg	N/A	N/A	0.0078	0.0078	mg/kg		
	Cobalt; Total	mg/kg	5.592	7.50	16.3	7.50	mg/kg		
	Iron; Total	mg/kg	10068	12421	22100	12421	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Manganese; Total	mg/kg	116.4	147.1	254	147.1	mg/kg		
	Vanadium; Total	mg/kg	16.02	20.7	39.7	20.7	mg/kg		

**Soil Group 2A + 2B**

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of the mean (1)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Soil	Aluminum; Total	mg/kg	7456	8461	14200	8461	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean
	Arsenic; Total	mg/kg	6.09	7.18	13.5	7.18	mg/kg		
	Benzo(a)pyrene	mg/kg	0.0113	0.008	0.017	0.008	mg/kg		
	C11-C22 Aromatics; Adjusted	mg/kg	N/A	N/A	11.9	11.9	mg/kg		
	Cobalt; Total	mg/kg	4.446	6	16.3	6.065	mg/kg	single sample	only detected result
	Iron; Total	mg/kg	9085	10761.0	22100	10761	mg/kg		
	Manganese; Total	mg/kg	100.7	122.90	254	122.9	mg/kg		
	Thallium; Total	mg/kg	N/A	N/A	0.1725	0.1725	mg/kg		
	Vanadium; Total	mg/kg	14.96	18.94	39.7	18.94	mg/kg	95% UCL of the mean	Sufficient number of sample results to calculate a robust 95% UCL of the mean

Footnotes:

(1) UCL statistics calculated by ProUCL as described in the text and appendices.

TABLE 4.1A  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Resident  
200 Presidential Way, Woburn, MA

**\*\*Revised Draft Final\*\***

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and subsurface soil

Exposure Routes	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
						(1)			(2)
Incidental ingestion, dermal contact, and inhalation	Resident Adult	6-26	Surface and subsurface soils (0 to 6')	LT	lifetime	70	years		
				ETres	exposure time	24	hours/day		
				ETres-a	adult exposure time	24	hours/day		
				ET6-16	mutagenic exposure time (ages 6-16)	24	hours/day		
				ET16-26	mutagenic exposure time (ages 16-26)	24	hours/day		
				EDres-a	exposure duration - adult	20	years		
				ED6-16	mutagenic exposure duration (ages 6-16)	10	years		
				ED16-26	mutagenic exposure duration (ages 16-26)	10	years		
				BWres-a	body weight - adult	80	kg		
				SAre-s-a	skin surface area - adult	6032	cm <sup>2</sup> /day		
				EFres-a	exposure frequency - adult	350	days/year		
				EF6-16	mutagenic exposure frequency (ages 6-16)	350	days/year		
				EF16-26	mutagenic exposure frequency (ages 16-26)	350	days/year		
				IRSres-a	soil intake rate - adult	100	mg/day		
				AFres-a	skin adherence factor - adult	0.07	mg/cm <sup>2</sup>		
				AFres-c	skin adherence factor - child	0.2	mg/cm <sup>2</sup>		
Incidental ingestion, dermal contact, and inhalation	Resident Child	0-6	Surface and subsurface soils (0 to 6')	LT	lifetime	70	years		
				ETres	exposure time	24	hours/day		
				ETres-c	child exposure time	24	hours/day		
				ET0-2	mutagenic exposure time (ages 0-2)	24	hours/day		
				ET2-6	mutagenic exposure time (ages 2-6)	24	hours/day		
				EDres-c	exposure duration - child	6	years		
				ED0-2	mutagenic exposure duration (ages 0-2)	2	years		
				ED2-6	mutagenic exposure duration (ages 2-6)	4	years		
				BWres-c	body weight - child	15	kg		
				SAre-s-c	skin surface area - child	2373	cm <sup>2</sup> /day		
				EFres-c	exposure frequency - child	350	days/year		
				EF0-2	mutagenic exposure frequency (ages 0-2)	350	days/year		
				EF2-6	mutagenic exposure frequency (ages 2-6)	350	days/year		
				IRSres-c	soil intake rate - child	200	mg/day		
				AFres-c	skin adherence factor - child	0.2	mg/cm <sup>2</sup>		
				PEF	particulate emission factor	1.10E+10	m <sup>3</sup> /kg		
				VF (4)	volatilization factor	56900 for TPH	m <sup>3</sup> /kg	(3)	

TABLE 4.1A  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Resident  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and subsurface soil

## Footnotes:

- (1) Exposure parameters are those provided in the USEPA's Risk Calculator (<https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-june-2017#exposure>)
- (2) See text and below
- (3) The equation to calculate the PEF is shown below (from the RSL Calculator User's Guide) and defaults from the RSL Calculator are used.
- (4) Calculated only for volatile compounds as described in the RSL Calculator User's Guide.

Chronic Daily Intake (CDI) for Soil Ingestion (mg/kg/day) =	$\text{Concentration in Soil} \times \text{IRSres} \times \text{EFres} \times \text{Etres} \times \text{EDres} \times \text{CF} / (\text{BWres} \times \text{AT})$
CDI for Dermal Contact with Soil (mg/kg/day) =	$\text{Concentration in Soil} \times \text{SAsres} \times \text{AFres} \times \text{DA} \times \text{EFres} \times \text{EDres} \times \text{CF} / (\text{BWres} \times \text{AT})$
Estimated Air Exposure Concentration (Cair) (mg/m³) =	$(\text{Concentration in Air} \times \text{ETres} \times \text{EFres} \times \text{EDres}) / (\text{AT})$ $\text{Concentration in Air} = \text{Concentration in Soil} / \text{PEF or VF}$
Lifetime Average Daily Dose (LADD, used for carcinogenic risk, non-mutagens) (mg/kg/day) =	$(\text{CDI}_{\text{child}} \times \text{EDres-c} + \text{CDI}_{\text{adult}} \times \text{EDres-a}) / (\text{EDres-c} + \text{EDres-a})$
Lifetime Average Daily Dose (LADDmut, used for carcinogenic risk, mutagens, mutagenic factors in boldface) (mg/kg/day) =	$(\text{CDI}_{\text{0-2}} \times \text{ED}_{\text{0-2}} \times \mathbf{10} + \text{CDI}_{\text{2-6}} \times \text{ED}_{\text{2-6}} \times \mathbf{3} + \text{CDI}_{\text{6-16}} \times \text{ED}_{\text{6-16}} \times \mathbf{3} + \text{CDI}_{\text{16-26}} \times \text{ED}_{\text{16-26}}) / (\text{ED}_{\text{0-2}} + \text{ED}_{\text{2-6}} + \text{ED}_{\text{6-16}} + \text{ED}_{\text{16-26}})$
Lifetime Average Daily Concentration in Air (used for carcinogenic risk, mutagens, mutagenic factors in boldface) =	$(\text{Cair} \times \text{ED}_{\text{0-2}} \times \mathbf{10} + \text{Cair} \times \text{ED}_{\text{2-6}} \times \mathbf{3} + \text{Cair} \times \text{ED}_{\text{6-16}} \times \mathbf{3} + \text{Cair} \times \text{ED}_{\text{16-26}}) / (\text{ED}_{\text{0-2}} + \text{ED}_{\text{2-6}} + \text{ED}_{\text{6-16}} + \text{ED}_{\text{16-26}})$

$$\text{PEF} = \frac{\left( \frac{\text{m}^3_{\text{air}}}{\text{kg}_{\text{soil}}} \right)}{\left( \frac{\text{Q}}{\text{C}_{\text{wind}}} \right)} = \frac{\left( \frac{\text{g}}{\left( \frac{\text{m}^2}{\text{s}} \right) \cdot \text{s}} \right)}{\left( \frac{\text{kg}}{\text{m}^3} \right)} \times \frac{3,600 \left( \frac{\text{s}}{\text{hour}} \right)}{0.036 \times (1 - V) \times \left( \frac{U_m \left( \frac{\text{m}}{\text{s}} \right)}{U_t \left( \frac{\text{m}}{\text{s}} \right)} \right)^3 \times F(x)}$$

where:

$$\frac{\text{Q}}{\text{C}_{\text{wind}}} = A \times \exp \left[ \frac{\left( \ln A_s (\text{acre}) - B \right)^2}{C} \right]$$

and:

$$\text{if } x < 2, F(x) = 1.91207 - 0.0278085x + 0.48113x^2 - 1.09871x^3 + 0.335341x^4$$

$$\text{if } x \geq 2, F(x) = 0.18 \left( 6x^3 + 12x \right) e^{-x^2}$$

where:

$$x = 0.866 \times \left( \frac{U_t}{U_m} \right)$$

Parameter Used by  
Risk Calculator

Factor	Parameter Used by Risk Calculator
City <sub>PEF</sub> (Climate Zone) Selection	Hartford, CT (8)
A <sub>s</sub> (acres)	0.5
Q/C <sub>wp</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux)	73.95044953
A (PEF Dispersion Constant)	12.5907
B (PEF Dispersion Constant)	18.8368
C (PEF Dispersion Constant)	215.4377
V (fraction of vegetative cover) unitless	0.5
U <sub>m</sub> (mean annual wind speed) m/s	3.84
U <sub>t</sub> (equivalent threshold value)	11.32
F(x) (function dependent on U <sub>m</sub> /U <sub>t</sub> ) unitless	0.0345
City <sub>VF</sub> (Climate Zone) Selection	Hartford, CT (8)
A <sub>s</sub> (acres)	0.5
Q/C <sub>vol</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux)	73.95044953

TABLE 4.1B  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Construction Worker - Soil  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and subsurface soil

Exposure Routes	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference (1)	Intake Equation/Model Name (2)
Incidental ingestion, dermal contact, and inhalation	Adult Construction Worker	Adult	Surface and subsurface soils (0 to 6')	EFcw EDcw ETcw LT BWcw IRcw SAcw AFcw ATcw ATcw-a EWcw DWcw PEF VF (4)	exposure frequency - construction worker exposure duration - construction worker exposure time - construction worker lifetime body weight - construction worker soil ingestion rate - construction worker surface area - construction worker AFcw (skin adherence factor - construction worker) mg/cm <sup>2</sup> ATcw (averaging time - construction worker carcinogenic) ATcw-a (averaging time - construction worker non-carcinogenic) EWcw (overall duration of construction) weeks/year DWcw (days worked - construction worker) days/week particulate emission factor volatilization factor	250 1 8 70 80 330 3527 0.3 70 1 50 5 1.40E+09 11400 for TPH	day/yr yr hr/day yr kg mg/day cm <sup>2</sup> /day mg/cm <sup>2</sup> yr yr weeks/year days/week m <sup>3</sup> /kg m <sup>3</sup> /kg	(3)	

TABLE 4.1B  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Construction Worker - Soil  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface and subsurface soil

## Footnotes:

(1) Exposure parameters are those provided in the USEPA's Risk Calculator (<https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-june-2017#exposure>)

(2) See text and below.

(3) The equation to calculate the PEF is shown below (from the RSL Calculator User's Guide) and defaults from the RSL Calculator are used.

(4) Calculated only for volatile compounds as described in the RSL Calculator User's Guide.

Chronic Daily Intake (CDI) for Soil Ingestion (Concentration in Soil x IRSres x EFres x Etres x EDres x CF) / (BWres (mg/kg/day) x AT)
CDI for Dermal Contact with Soil (Concentration in Soil x SAres x AFres x DA x EFres x EDres x CF) / (BWres x AT) (mg/kg/day) =
Estimated Air Exposure Concentration (mg/m <sup>3</sup> ) = ( Concentration in Air x ETres x EFres x EDres)/(AT) Concentration in Air = Concentration in Soil/PEF or VF

$$\text{PEF} \left( \frac{\text{kg}_{\text{air}}}{\text{kg}_{\text{soil}}} \right) = \frac{Q}{C_{\text{wind}}} \left( \frac{\left( \frac{\text{g}}{\text{m}^2 \cdot \text{s}} \right)}{\left( \frac{\text{kg}}{\text{m}^3} \right)} \right) \times \frac{3,600 \left( \frac{\text{s}}{\text{hour}} \right)}{0.036 \times (1 - V) \times \left( \frac{U_m (\text{m})}{U_t (\text{m})} \right)^3 \times F(x)}$$

where:

$$\frac{Q}{C_{\text{wind}}} = A \times \exp \left[ \frac{(\ln A_s (\text{acre}) \cdot B)^2}{C} \right]$$

and:

$$\text{if } x < 2, F(x) = 1.91207 - 0.0278085x + 0.48113x^2 - 1.09871x^3 + 0.335341x^4$$

$$\text{if } x \geq 2, F(x) = 0.18(8x^3 + 12x) e^{-x^2}$$

where:

$$x = 0.886 \times \left( \frac{U_t}{U_m} \right)$$

Parameter Used  
by Risk  
Calculator

Factor	
City <sub>PEF</sub> (Climate Zone) Selection	Hartford, CT (8)
A <sub>s</sub> (acres)	0.5
Q/C <sub>wp</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux)	73.95044953
A (PEF Dispersion Constant)	12.5907
B (PEF Dispersion Constant)	18.8368
C (PEF Dispersion Constant)	215.4377
V (fraction of vegetative cover) unitless	0.5
U <sub>m</sub> (mean annual wind speed) m/s	3.84
U <sub>t</sub> (equivalent threshold value)	11.32
F(x) (function dependent on U <sub>m</sub> /U <sub>t</sub> ) unitless	0.0345
City <sub>VF</sub> (Climate Zone) Selection	Hartford, CT (8)
A <sub>s</sub> (acres)	0.5
Q/C <sub>vol</sub> (inverse of the ratio of the geometric mean air concentration to the emission flux)	73.95044953

TABLE 4.1C  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Irrigation Water Swimming Pool Scenario  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater used to fill a swimming pool

Exposure Routes	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference (1)	Intake Equation/Model Name (2)
Incidental ingestion and dermal contact	Adult	6-26	Groundwater used to fill a swimming pool	ETres	exposure time	1	hour/event		
				ETres-a	adult exposure time	1	hour/event		
				ET6-16	mutagenic exposure time (ages 6-16)	1	hour/event		
				ET16-26	mutagenic exposure time (ages 16-26)	1	hour/event		
				EDres-a	exposure duration - adult	26	years		
				ED6-16	mutagenic exposure duration (ages 6-16)	10	years		
				ED16-26	mutagenic exposure duration (ages 16-26)	10	years		
				BWres-a	body weight - adult	80	kg		
				SAres-a	skin surface area - adult	19652	cm <sup>2</sup> /day		
				EFres-a	exposure frequency - adult	52	days/year		
				EF6-16	mutagenic exposure frequency (ages 6-16)	52	days/year		
				EF16-26	mutagenic exposure frequency (ages 16-26)	52	days/year		
				IRWres-a	water intake rate - adult	0.005	L/hour		
				EV	events	1	event/day		
				Kp	Permeability Constant	Chemical-specific (see Table 5.3)	cm/hour		
				DAevent (nc adult)	event for manganese (only COPC in groundwater)	0.005005	µg/cm <sup>2</sup> - event		
				CF1	conversion factor	0.001	mg/µg		
				CF2	conversion factor	1000	cm <sup>3</sup> /L		
				CF3	conversion factor	1000	µg/mg		
				LT	lifetime	70	years		
				AT	Averaging time - noncarcinogenic	52	days/year		
Incidental ingestion and dermal contact	Child	0-6	Groundwater used to fill a swimming pool	ETres	exposure time	2	hours/event		
				ETres-c	child exposure time	2	hours/event		
				ET0-2	mutagenic exposure time (ages 0-2)	2	hours/event		
				ET2-6	mutagenic exposure time (ages 2-6)	2	hours/event		
				EDres-c	exposure duration - child	6	years		
				ED0-2	mutagenic exposure duration (ages 0-2)	2	years		

TABLE 4.1C  
VALUES USED FOR DAILY INTAKE CALCULATIONS  
Irrigation Water Swimming Pool Scenario  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater used to fill a swimming pool

Exposure Routes	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference (1)	Intake Equation/Model Name (2)
				ED2-6 BWres-c SAres-c EFres-c EF0-2 EF2-6 IRWres-c EV Kp DAevent (nc child) CF1 CF2 CF3 LT AT	mutagenic exposure duration (ages 2-6) body weight - child skin surface area - child exposure frequency - child mutagenic exposure frequency (ages 0-2) mutagenic exposure frequency (ages 2-6) water intake rate - child events Permeability Constant Absorbed dose per event for manganese (only COPC in groundwater) conversion factor conversion factor conversion factor lifetime Averaging time - noncarcinogenic	4 15 2373 65 65 65 0.1 1 Chemical-specific (see Table 5.3) 0.0012704 0.001 1000 1.00E+09 70 65	years kg cm <sup>2</sup> /day days/year days/year days/year L/hour event/day cm/hour µg/cm <sup>2</sup> - event mg/µg cm <sup>3</sup> /L µg/kg years days/year		

## Footnotes:

(1) Exposure parameters are those provided in the USEPA's Risk Calculator (<https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-june-2017#exposure>)

(2) See text and below

Chronic Daily Intake (CDI) for Incidental Water Ingestion (mg/kg/day) =	(Concentration in Water x IRSres x EFres x ETres x EDres x EV x CF1) / (BWres x AT)
CDI for Dermal Contact with Water (mg/kg/day) =	(Concentration in Water x DAevent x CF2)/(Kp x Etres)

DAevent = (AT x CF3 x BW)/((1/GIABS) x EV x ED x EF x SA)

TABLE 5.1  
NON-CANCER TOXICITY DATA -- ORAL/DERMAL  
200 Presidential Way, Woburn, MA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s) (1)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	1.0E+00	mg/kg-day	1	1.0E+00	mg/kg-day	Nervous system	100	PPRTV	10/23/2006
Arsenic, Inorganic	Chronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Cardiovascular, dermal	3	IRIS	09/01/91
Benzo[a]pyrene	Chronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Developmental	300	IRIS	01/19/17
Cobalt	Chronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Thyroid	3000	PPRTV	8/25/2008
Iron	Chronic	7.0E-01	mg/kg-day	1	7.0E-01	mg/kg-day	Gastrointestinal	1.5	PPRTV	09/11/06
Manganese (Non-diet)	Chronic	2.4E-02	mg/kg-day	0.04	9.6E-04	mg/kg-day	Nervous system	3	IRIS and RSL User's Guide	IRIS, 11/1/1995 and RSL User's Guide, June 2017
Thallium (Soluble Salts)	Chronic	1.0E-05	mg/kg-day	1	1.0E-05	mg/kg-day	Skin	3000	PPRTV	11/01/12
Total Petroleum Hydrocarbons (Aromatic Medium)	Chronic	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Nasal (respiratory system)	1000	PPRTV	9/30/2009; based on 2-methylnaphthalene PPRTV 9/18/2007
Vanadium and Compounds	Chronic	5.0E-03	mg/kg-day	0.026	1.3E-04	mg/kg-day	Dermal	100	Calculated from IRIS value for vanadium pentoxide (RSL User's Guide, 2017)	IRIS, 06/30/1988 and RSL User's Guide, June 2017
Aluminum	Subchronic	1.0E+00	mg/kg-day	1	1.0E+00	mg/kg-day	Nervous system	100	PPRTV	10/23/06
Arsenic, Inorganic	Subchronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Skin	3	IRIS	09/01/91
Benzo[a]pyrene	Subchronic	3.0E-04	mg/kg-day	1	3.0E-04	mg/kg-day	Developmental	300	IRIS	01/19/17
Cobalt	Subchronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Thyroid	300	PPRTV	8/25/2008
Iron	Subchronic	7.0E-01	mg/kg-day	1	7.0E-01	mg/kg-day	Gastrointestinal	1.5	PPRTV	09/11/06
Manganese (Non-diet)	Subchronic	2.4E-02	mg/kg-day	0.04	9.6E-04	mg/kg-day	Nervous system	3	IRIS and RSL User's Guide	IRIS, 11/1/1995 and RSL User's Guide, June 2017
Thallium (Soluble Salts)	Subchronic	4.0E-05	mg/kg-day	1	4.0E-05	mg/kg-day	Skin	3000	PPRTV	11/01/12
Total Petroleum Hydrocarbons (Aromatic Medium)	Subchronic	4.0E-03	mg/kg-day	1	4.0E-03	mg/kg-day	Lung	1000	PPRTV	9/30/2009, Based on 3-methyl naphthalene, IRIS 12/22/2003
Vanadium and Compounds	Subchronic	1.0E-02	mg/kg-day	0.026	2.6E-04	mg/kg-day	Respiratory	30	MRL from ATSDR	9/1/2012, Appendix A

Footnotes:

(1) Sources: Integrated Risk Information System ([www.epa.gov/iris](http://www.epa.gov/iris)) or Regional Screening Level (RSL) tables, which include PPRTV (Provisional Peer-Reviewed Toxicity Value) documents, or Minimal Risk Levels (MRLs) from Agency for Toxic Substances and Disease Registry (ATSDR) documents.

TABLE 5.2  
NON-CANCER TOXICITY DATA -- INHALATION  
200 Presidential Way, Woburn, MA

Chemical of Potential Concern	Chronic/Subchronic	Inhalation RfC		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units			Source(s) (1)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	5.00E-03	mg/m <sup>3</sup>	Nervous system	300	PPRTV	10/23/2006
Arsenic, Inorganic	Chronic	1.50E-05	mg/m <sup>3</sup>	Developmental, cardiovascular, nervous system, respiratory, skin	30	CA OEHHA	12/1/2008
Benzo[a]pyrene	Chronic	2.00E-06	mg/m <sup>3</sup>	Developmental	3000	IRIS	1/19/2017
Cobalt	Chronic	6.00E-06	mg/m <sup>3</sup>	Respiratory	300	PPRTV	8/25/2008
Iron	Chronic	-					
Manganese (Non-diet)	Chronic	5.00E-05	mg/m <sup>3</sup>	Nervous system	1000	IRIS	12/1/1993
Thallium (Soluble Salts)	Chronic	-					
Total Petroleum Hydrocarbons (Aromatic Medium)	Chronic	3.00E-03	mg/m <sup>3</sup>	Nasal (respiratory system)	3000	PPRTV	9/30/2009; based on naphthalene, IRIS 9/17/1998
Vanadium and Compounds	Chronic	1.00E-04	mg/m <sup>3</sup>	Respiratory	30	CA DTSC and ATSDR	7/1/2012
Aluminum	Subchronic	5.00E-03	mg/m <sup>3</sup>	Nervous system	300	PPRTV	10/23/2006
Arsenic, Inorganic	Subchronic	1.50E-05	mg/m <sup>3</sup>	Developmental, cardiovascular, nervous system, respiratory, skin	30	CA OEHHA	12/1/2008
Benzo[a]pyrene	Subchronic	2.00E-06	mg/m <sup>3</sup>	Developmental	3000	IRIS	1/19/2017
Cobalt	Subchronic	2.00E-05	mg/m <sup>3</sup>	Respiratory	100	PPRTV	8/25/2008
Iron	Subchronic	-					
Manganese (Non-diet)	Subchronic	5.00E-05	mg/m <sup>3</sup>	Nervous system	1000	IRIS	12/1/1993
Thallium (Soluble Salts)	Subchronic	-					
Total Petroleum Hydrocarbons (Aromatic Medium)	Subchronic	1.00E+00	mg/m <sup>3</sup>	Reproductive	100	PPRTV	9/30/2009; based on high flash aromatic naphtha (except naphthalene), PPRTV for High-Flash Aromatic Naphtha, 2009
Vanadium and Compounds	Subchronic	1.00E-04	mg/m <sup>3</sup>	Respiratory	30	ATSDR	7/1/2012

Footnotes:

(1) Sources: Integrated Risk Information System ([www.epa.gov/iris](http://www.epa.gov/iris)) or Regional Screening Level (RSL) tables, which include PPRTV (Provisional Peer-Reviewed Toxicity Value) documents, or Minimal Risk Levels (MRLs) from Agency for Toxic Substances and Disease Registry (ATSDR) documents.

TABLE 5.3  
CHEMICAL-SPECIFIC PARAMETERS  
200 Presidential Way, Woburn, MA

Chemical of Potential Concern (1)	GI Absorption (2)	Dermal Absorption (3)	Relative Bioavailability	Permeability Constant (Kp) (cm/hour)	Volatilization Factor (m <sup>3</sup> /kg)
Aluminum	1	-	1	0.001	-
Arsenic, Inorganic	1	0.03	0.6	0.001	-
Benzo[a]pyrene	1	0.13	1	0.713	-
Cobalt	1	-	1	0.0004	-
Iron	1	-	1	0.001	-
Manganese (Non-diet)	0.04	-	1	0.001	-
Thallium (Soluble Salts)	1	-	1	0.001	-
Total Petroleum Hydrocarbons (Aromatic Medium)	1	-	1	0.6915	56900 (residents); 11400 (construction workers)
Vanadium and Compounds	0.026	-	1	0.001	-

**Notes:**

(1) All chemical-specific factors were provided by the USEPA RSL calculator.

(2) GI Absorption = gastrointestinal absorption factor; used to adjust oral RfD to dermal RfD.

(3) Dermal Absorption = dermal exposure to soil is only quantified if RAGS Part E (USEPA, 2004) provides a dermal absorption value in Exhibit 3-4, regardless of volatility status; RAGs Part E provides these values for only a few of the selected COPCs, as shown.

(4) Relative Bioavailability = all chemicals assumed to be 100% bioavailable, except for arsenic, for which chemical-specific data are available. Relative bioavailability accounts for differences in the bioavailability of a contaminant between the medium of exposure (e.g., soil) and the media associated with the toxicity value (e.g., the arsenic RfD and CSF are derived from drinking water studies).

(5) Volatilization Factor = provided for TPH only; other compounds considered less likely to volatilize.

TABLE 6.1  
CANCER TOXICITY DATA -- ORAL/DERMAL  
200 Presidential Way, Woburn, MA

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s) (1)	Date(s) (MM/DD/YYYY)
Aluminum	-		1	-				
Arsenic, Inorganic	1.5	(mg/kg-day) <sup>-1</sup>	1	1.5	(mg/kg-day) <sup>-1</sup>	A (Human carcinogen) Carcinogenic to humans	IRIS	06/01/95
Benzo[a]pyrene	1	(mg/kg-day) <sup>-1</sup>	1	1	(mg/kg-day) <sup>-1</sup>		IRIS	01/19/17
Cobalt	-		1	-				
Iron	-		1	-				
Manganese (Non-diet)	-		0.04	-				
Thallium (Soluble Salts)	-		1	-				
Total Petroleum Hydrocarbons (Aromatic Medium)	-		1	-				
Vanadium and Compounds	-		0.026	-				

Footnotes:

(1) Sources: Integrated Risk Information System ([www.epa.gov/iris](http://www.epa.gov/iris)) or Regional Screening Level (RSL) tables, which include PPRTV (Provisional Peer-Reviewed Toxicity Value) documents, or Minimal Risk Levels (MRLs) from Agency for Toxic Substances and Disease Registry (ATSDR) documents.

TABLE 6.2  
CANCER TOXICITY DATA -- INHALATION  
200 Presidential Way, Woburn, MA

Chemical of Potential Concern	Inhalation Unit Risk		Weight of Evidence/ Cancer Guideline Description	Mutagen?	Inhalation Unit Risk	
	Value	Units			Source(s) (1)	Date(s) (MM/DD/YYYY)
Aluminum	-			-		
Arsenic, Inorganic	0.0043	(ug/m <sup>3</sup> ) <sup>-1</sup>	A (Human carcinogen)	no	IRIS	06/01/95
Benzo[a]pyrene	0.0006	(ug/m <sup>3</sup> ) <sup>-1</sup>	Carcinogenic to humans Not specified (based on lung cancer effects in animal studies)	yes	IRIS	01/19/17
Cobalt	0.009	(ug/m <sup>3</sup> ) <sup>-1</sup>		no	PPRTV	8/25/2008
Iron	-			-		
Manganese (Non-diet)	-			-		
Thallium (Soluble Salts)	-			-		
Total Petroleum Hydrocarbons (Aromatic Medium)	-			-		
Vanadium and Compounds	-			-		

Footnotes:

(1) Sources: Integrated Risk Information System ([www.epa.gov/iris](http://www.epa.gov/iris)) or Regional Screening Level (RSL) tables, which include PPRTV (Provisional Peer-Reviewed Toxicity Value) documents, or Minimal Risk Levels (MRLs) from Agency for Toxic Substances and Disease Registry (ATSDR) documents.

TABLE 7.1.A Child

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - CHILD ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

**Soil Group 1**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					
					Value	Units	LADD/Air Concentration		CSF		Cancer Risk	
							Value	Units	Value	Units		
Soil	Surface Soil (Site-Wide Undisturbed Soil Samples, 0-6", Soil Group 1)	Outdoor Soil	Incidental Ingestion	Aluminum	11200	mg/kg	1.2E-02	mg/kg-day	-			
				Arsenic, Inorganic	8.81	mg/kg	5.8E-06	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	8.7E-06	
				Benzo[a]pyrene	0.0752	mg/kg	4.4E-07	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>	4.4E-07	
				Cobalt	8.49	mg/kg	9.3E-06	mg/kg-day	-			
				Iron	14300	mg/kg	1.6E-02	mg/kg-day	-			
				Manganese (Non-diet)	126	mg/kg	1.4E-04	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	3.1E-05	mg/kg-day	-			
				Vanadium and Compounds	30.8	mg/kg	3.4E-05	mg/kg-day	-			
			Exp. Route Total									9.1E-06
			Dermal Contact	Aluminum	11200	mg/kg	-	mg/kg-day	-			
				Arsenic, Inorganic	8.81	mg/kg	6.9E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	1.0E-06	
				Benzo[a]pyrene	0.0752	mg/kg	1.4E-07	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>	1.4E-07	
				Cobalt	8.49	mg/kg	-	mg/kg-day	-			
				Iron	14300	mg/kg	-	mg/kg-day	-			
				Manganese (Non-diet)	126	mg/kg	-	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	-	mg/kg-day	-			
				Vanadium and Compounds	30.8	mg/kg	-	mg/kg-day	-			
			Exp. Route Total									1.2E-06
			Inhalation *	Aluminum	11200	mg/kg	8.4E-08	mg/m <sup>3</sup>	-			
				Arsenic, Inorganic	8.81	mg/kg	6.6E-11	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.8E-10	
				Benzo[a]pyrene	0.0752	mg/kg	3.0E-12	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.8E-12	
				Cobalt	8.49	mg/kg	6.3E-11	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	5.7E-10	
				Iron	14300	mg/kg	1.1E-07	mg/m <sup>3</sup>	-			
				Manganese (Non-diet)	126	mg/kg	9.4E-10	mg/m <sup>3</sup>	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	4.1E-05	mg/m <sup>3</sup>	-			
				Vanadium and Compounds	30.8	mg/kg	2.3E-10	mg/m <sup>3</sup>	-			
			Exp. Route Total									8.6E-10
			Exposure Point Total									1.0E-05
			Exposure Medium Total									1.0E-05
<b>Total of Receptor Risks Across All Media (Soil Group 1)</b>												1.0E-05

TABLE 7.1.A Child  
 CALCULATION OF CHEMICAL CANCER RISKS  
 RESIDENTIAL USE - CHILD ONLY  
 200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

**Soil Group 2A**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Cancer Risk	
					Value	Units	LADD/Air Concentration		CSF			
							Value	Units	Value	Units		
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Incidental Ingestion	Aluminum	9030	mg/kg	9.9E-03	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	8.3E-06 7.0E-08	
				Arsenic, Inorganic	8.44	mg/kg	5.5E-06	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>		
				Benzo[a]pyrene	0.0119	mg/kg	7.0E-08	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	3.3E-06	mg/kg-day	-			
				Iron	8900	mg/kg	9.8E-03	mg/kg-day	-			
				Manganese (Non-diet)	91.7	mg/kg	1.0E-04	mg/kg-day	-			
				Thallium (Soluble Salts)	0.173	mg/kg	1.9E-07	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	1.3E-05	mg/kg-day	-			
				Vanadium and Compounds	17.4	mg/kg	1.9E-05	mg/kg-day	-			
			Exp. Route Total								8.4E-06	
			Dermal Contact	Aluminum	9030	mg/kg	-	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	9.9E-07 2.1E-08	
				Arsenic, Inorganic	8.44	mg/kg	6.6E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>		
				Benzo[a]pyrene	0.0119	mg/kg	2.1E-08	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	-	mg/kg-day	-			
				Iron	8900	mg/kg	-	mg/kg-day	-			
				Manganese (Non-diet)	91.7	mg/kg	-	mg/kg-day	-			
				Thallium (Soluble Salts)	0.173	mg/kg	-	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	-	mg/kg-day	-			
				Vanadium and Compounds	17.4	mg/kg	-	mg/kg-day	-			
			Exp. Route Total								1.0E-06	
			Inhalation **	Aluminum	9030	mg/kg	6.7E-08	mg/m <sup>3</sup>	-	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.7E-10 2.8E-13 2.0E-10	
				Arsenic, Inorganic	8.44	mg/kg	6.3E-11	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Benzo[a]pyrene	0.0119	mg/kg	4.7E-13	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	2.2E-11	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Iron	8900	mg/kg	6.7E-08	mg/m <sup>3</sup>	-			
				Manganese (Non-diet)	91.7	mg/kg	6.9E-10	mg/m <sup>3</sup>	-			
				Thallium (Soluble Salts)	0.173	mg/kg	1.3E-12	mg/m <sup>3</sup>	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	1.7E-05	mg/m <sup>3</sup>	-			
				Vanadium and Compounds	17.4	mg/kg	1.7E-05	mg/m <sup>3</sup>	-			
			Exp. Route Total								4.7E-10	
			Exposure Point Total								9.4E-06	
			Exposure Medium Total								9.4E-06	
<b>Total of Receptor Risks Across All Media (Soil Group 2A)</b>											9.4E-06	

\*\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.1.A Child

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - CHILD ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

**Soil Group 2B**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Cancer Risk	
					Value	Units	LADD/Air Concentration		CSF			
							Value	Units	Value	Units		
Soil	Surface Soil (Site-Wide Disturbed Deep Soil Samples, 2-4', 4-6', Soil Group 2B)	Outdoor Soil	Incidental Ingestion	Aluminum	8820	mg/kg	9.7E-03	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	7.4E-06	
				Arsenic, Inorganic	7.53	mg/kg	5.0E-06	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>		
				Benzo[a]pyrene	0.0078	mg/kg	4.6E-08	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	7.5	mg/kg	8.2E-06	mg/kg-day	-			
				Iron	12400	mg/kg	1.4E-02	mg/kg-day	-			
				Manganese (Non-diet)	147	mg/kg	1.6E-04	mg/kg-day	-			
			Dermal Contact	Vanadium	20.7	mg/kg	2.3E-05	mg/kg-day	-		4.6E-08	
				Aluminum	8820	mg/kg	-	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>		
				Arsenic, Inorganic	7.53	mg/kg	5.9E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>		
				Benzo[a]pyrene	0.0078	mg/kg	1.4E-08	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
			Inhalation ***	Cobalt	7.5	mg/kg	-	mg/kg-day	-		8.8E-07	
				Iron	12400	mg/kg	-	mg/kg-day	-			
				Manganese (Non-diet)	147	mg/kg	-	mg/kg-day	-			
				Vanadium	20.7	mg/kg	-	mg/kg-day	-			
				Aluminum	8820	mg/kg	6.6E-08	mg/m <sup>3</sup>	-	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.4E-08	
				Arsenic, Inorganic	7.53	mg/kg	5.6E-11	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>		
			Exposure Point Total	Benzo[a]pyrene	0.0078	mg/kg	3.1E-13	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Cobalt	7.5	mg/kg	5.6E-11	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Iron	12400	mg/kg	9.3E-08	mg/m <sup>3</sup>	-			
				Manganese (Non-diet)	147	mg/kg	1.1E-09	mg/m <sup>3</sup>	-			
				Vanadium	20.7	mg/kg	1.5E-10	mg/m <sup>3</sup>	-			
				Exposure Medium Total							7.5E-10	
<b>Total of Receptor Risks Across All Media (Soil Group 2B)</b>											8.4E-06	

\*\*\* Air concentrations for chemicals of potential concern reflect particulates only

TABLE 7.1.A Child  
 CALCULATION OF CHEMICAL CANCER RISKS  
 RESIDENTIAL USE - CHILD ONLY  
 200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

**Groundwater**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Cancer Risk	
					Value	Units	LADD/Air Concentration		CSF			
							Value	Units	Value	Units		
Groundwater	Groundwater	Swimming pool	Incidental Ingestion	Manganese (Non-diet)	1006.3	µg/l	-		NA		-	
			Exp. Route Total								-	
			Dermal Contact	Manganese (Non-diet)	1006.3	µg/l	-		NA		-	
			Exp. Route Total								-	
			Exposure Point Total								-	
Exposure Medium Total								Total of Receptor Risks Across All Media (Groundwater)			-	

NA=manganese not considered a carcinogen

TABLE 7.1.B Adult

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - ADULT ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

**Soil Group 1**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations						
					Value	Units	LADD/Air Concentration			CSF			Cancer Risk
							Value	Units	Value	Units			
Soil	Surface Soil (Site-Wide Undisturbed Soil Samples, 0-6", Soil Group 1)	Outdoor Soil	Incidental Ingestion	Aluminum	11200	mg/kg	3.8E-03	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	2.7E-06	2.7E-06 5.2E-08
				Arsenic, Inorganic	8.81	mg/kg	1.8E-06	mg/kg-day	1.5E+00	1.0E+00	(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	
				Benzo[a]pyrene	0.0752	mg/kg	5.2E-08	mg/kg-day	-	-	-	-	
				Cobalt	8.49	mg/kg	2.9E-06	mg/kg-day	-	-	-	-	
				Iron	14300	mg/kg	4.9E-03	mg/kg-day	-	-	-	-	
				Manganese (Non-diet)	126	mg/kg	4.3E-05	mg/kg-day	-	-	-	-	
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	9.8E-06	mg/kg-day	-	-	-	-	
				Vanadium and Compounds	30.8	mg/kg	1.1E-05	mg/kg-day	-	-	-	-	
			Exp. Route Total										2.8E-06
			Dermal Contact	Aluminum	11200	mg/kg	-	mg/kg-day	-	-	-	-	5.7E-07 2.8E-08
				Arsenic, Inorganic	8.81	mg/kg	3.8E-07	mg/kg-day	1.5E+00	1.0E+00	(mg/kg-day) <sup>-1</sup>	(mg/kg-day) <sup>-1</sup>	
				Benzo[a]pyrene	0.0752	mg/kg	2.8E-08	mg/kg-day	-	-	-	-	
				Cobalt	8.49	mg/kg	-	mg/kg-day	-	-	-	-	
				Iron	14300	mg/kg	-	mg/kg-day	-	-	-	-	
				Manganese (Non-diet)	126	mg/kg	-	mg/kg-day	-	-	-	-	
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	-	mg/kg-day	-	-	-	-	
				Vanadium and Compounds	30.8	mg/kg	-	mg/kg-day	-	-	-	-	
			Exp. Route Total										6.0E-07
			Inhalation *	Aluminum	11200	mg/kg	2.8E-07	mg/m <sup>3</sup>	-	-	-	-	9.4E-10 2.2E-12 1.9E-09
				Arsenic, Inorganic	8.81	mg/kg	2.2E-10	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	(ug/m <sup>3</sup> ) <sup>-1</sup>	(ug/m <sup>3</sup> ) <sup>-1</sup>	
				Benzo[a]pyrene	0.0752	mg/kg	3.7E-12	mg/m <sup>3</sup>	6.0E-04	-	-	-	
				Cobalt	8.49	mg/kg	2.1E-10	mg/m <sup>3</sup>	9.0E-03	-	-	-	
				Iron	14300	mg/kg	3.6E-07	mg/m <sup>3</sup>	-	-	-	-	
				Manganese (Non-diet)	126	mg/kg	3.1E-09	mg/m <sup>3</sup>	-	-	-	-	
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	1.4E-04	mg/m <sup>3</sup>	-	-	-	-	
				Vanadium and Compounds	30.8	mg/kg	7.7E-10	mg/m <sup>3</sup>	-	-	-	-	
			Exp. Route Total										2.8E-09
			Exposure Point Total										3.4E-06
			Exposure Medium Total										3.4E-06
<b>Total of Receptor Risks Across All Media (Soil Group 1)</b>													3.4E-06

\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.1.B Adult

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - ADULT ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

**Soil Group 2A**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					
					Value	Units	LADD/Air Concentration		CSF		Cancer Risk	
							Value	Units	Value	Units		
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Incidental Ingestion	Aluminum	9030	mg/kg	3.1E-03	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	2.6E-06	
				Arsenic, Inorganic	8.44	mg/kg	1.7E-06	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	8.2E-09	
				Benzo[a]pyrene	0.0119	mg/kg	8.2E-09	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	1.0E-06	mg/kg-day	-			
				Iron	8900	mg/kg	3.0E-03	mg/kg-day	-			
				Manganese (Non-diet)	91.7	mg/kg	3.1E-05	mg/kg-day	-			
				Thallium (Soluble Salts)	0.173	mg/kg	5.9E-08	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	4.1E-06	mg/kg-day	-			
				Vanadium and Compounds	17.4	mg/kg	6.0E-06	mg/kg-day	-			
				Exp. Route Total							2.6E-06	
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Dermal Contact	Aluminum	9030	mg/kg	-	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	5.5E-07	
				Arsenic, Inorganic	8.44	mg/kg	3.7E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	4.5E-09	
				Benzo[a]pyrene	0.0119	mg/kg	4.5E-09	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	-	mg/kg-day	-			
				Iron	8900	mg/kg	-	mg/kg-day	-			
				Manganese (Non-diet)	91.7	mg/kg	-	mg/kg-day	-			
				Thallium (Soluble Salts)	0.173	mg/kg	-	mg/kg-day	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	-	mg/kg-day	-			
				Vanadium and Compounds	17.4	mg/kg	-	mg/kg-day	-			
				Exp. Route Total							5.5E-07	
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Inhalation **	Aluminum	9030	mg/kg	2.2E-07	mg/m <sup>3</sup>	-	(ug/m <sup>3</sup> ) <sup>-1</sup>	9.0E-10	
				Arsenic, Inorganic	8.44	mg/kg	2.1E-10	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	3.6E-13	
				Benzo[a]pyrene	0.0119	mg/kg	5.9E-13	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Cobalt	3.01	mg/kg	7.5E-11	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	6.7E-10	
				Iron	8900	mg/kg	2.2E-07	mg/m <sup>3</sup>	-			
				Manganese (Non-diet)	91.7	mg/kg	2.3E-09	mg/m <sup>3</sup>	-			
				Thallium (Soluble Salts)	0.173	mg/kg	4.3E-12	mg/m <sup>3</sup>	-			
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	5.7E-05	mg/m <sup>3</sup>	-			
				Vanadium and Compounds	17.4	mg/kg	5.7E-05	mg/m <sup>3</sup>	-			
				Exp. Route Total							1.6E-09	
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Exposure Point Total									3.2E-06
			Exposure Medium Total									3.2E-06
Total of Receptor Risks Across All Media (Soil Group 2A)												3.2E-06

\*\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.1.B Adult

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - ADULT ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

**Soil Group 2B**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					
					Value	Units	LADD/Air Concentration		CSF		Cancer Risk	
							Value	Units	Value	Units		
Soil	Surface Soil (Site-Wide Disturbed Deep Soil Samples, 2-4', 4-6', Soil Group 2B)	Outdoor Soil	Incidental Ingestion	Aluminum	8820	mg/kg	3.0E-03	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	2.3E-06	
				Arsenic, Inorganic	7.53	mg/kg	1.5E-06	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	5.3E-09	
				Benzo[a]pyrene	0.0078	mg/kg	5.3E-09	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	7.5	mg/kg	2.6E-06	mg/kg-day	-			
				Iron	12400	mg/kg	4.2E-03	mg/kg-day	-			
				Manganese (Non-diet)	147	mg/kg	5.0E-05	mg/kg-day	-			
				Vanadium	20.7	mg/kg	7.1E-06	mg/kg-day	-			
			Exp. Route Total								2.3E-06	
				Dermal Contact	Aluminum	8820	mg/kg	-	mg/kg-day	-	(mg/kg-day) <sup>-1</sup>	4.9E-07
			Exp. Route Total	Arsenic, Inorganic	7.53	mg/kg	3.3E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	2.9E-09	
				Benzo[a]pyrene	0.0078	mg/kg	2.9E-09	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>		
				Cobalt	7.5	mg/kg	-	mg/kg-day	-			
				Iron	12400	mg/kg	-					
				Manganese (Non-diet)	147	mg/kg	-	mg/kg-day	-			
				Vanadium	20.7	mg/kg	-	mg/kg-day	-			
			Exp. Route Total								4.9E-07	
				Inhalation ***	Aluminum	8820	mg/kg	2.2E-07	mg/m <sup>3</sup>	-	(ug/m <sup>3</sup> ) <sup>-1</sup>	8.1E-10
			Exp. Route Total	Arsenic, Inorganic	7.53	mg/kg	1.9E-10	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	2.3E-13	
				Benzo[a]pyrene	0.0078	mg/kg	3.9E-13	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.7E-09	
				Cobalt	7.5	mg/kg	1.9E-10	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>		
				Iron	12400	mg/kg	3.1E-07	mg/m <sup>3</sup>	-			
				Manganese (Non-diet)	147	mg/kg	3.7E-09	mg/m <sup>3</sup>	-			
				Vanadium	20.7	mg/kg	5.2E-10	mg/m <sup>3</sup>	-			
			Exposure Point Total								2.5E-09	
											2.8E-06	
			Exposure Medium Total									2.8E-06
<b>Total of Receptor Risks Across All Media (Soil Group 2B)</b>												2.8E-06

\*\*\* Air concentrations for chemicals of potential concern reflect particulates only

TABLE 7.1.B Adult

## CALCULATION OF CHEMICAL CANCER RISKS

RESIDENTIAL USE - ADULT ONLY

200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

**Groundwater**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				
					Value	Units	LADD/Air Concentration		CSF		Cancer Risk
							Value	Units	Value	Units	
Groundwater	Groundwater	Swimming pool	Incidental Ingestion	Manganese (Non-diet)	1006.3	µg/l	-		NA		-
				Exp. Route Total							-
				Dermal Contact	Manganese (Non-diet)	1006.3	µg/l	-	NA		-
			Exp. Route Total								-
			Exposure Point Total								-
Exposure Medium Total							Total of Receptor Risks Across All Media (Groundwater)				-

NA=manganese not considered a carcinogen

Total of Receptor Risks Across All Media (Groundwater)

TABLE 7.1C  
CALCULATION OF CHEMICAL NON-CANCER HAZARDS  
RESIDENTIAL USE  
200 Presidential Way, Woburn, MA

Scenario Timeframe Future
Receptor Population Resident
Receptor Age: Child and Adult

**Soil Group 1**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Child					Adult							
					Non-Cancer Hazard Calculations-Child					Non-Cancer Hazard Calculations-Adult									
					Value	Units	Intake/Exposure Concentration		RfD/RfC	Hazard Quotient	Intake/Exposure Concentration		RfD/RfC	Hazard Quotient					
							Value	Units	Value		Value	Units	Value		Value	Units			
Soil	Surface Soil (Site-Wide Undisturbed Soil Samples, 0-6", Soil Group 1)	Outdoor Soil	Incidental Ingestion	Aluminum	11200	mg/kg	1.4E-01	mg/kg-day	1.0E+00	mg/kg-day	0.14	1.3E-02	mg/kg-day	1.0E+00	mg/kg-day	0.013			
				Arsenic, Inorganic	8.81	mg/kg	6.8E-05	mg/kg-day	3.0E-04	mg/kg-day	0.23	6.3E-06	mg/kg-day	3.0E-04	mg/kg-day	0.021			
				Benzo[a]pyrene	0.0752	mg/kg	9.6E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0032	9.0E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00030			
				Cobalt	8.49	mg/kg	1.1E-04	mg/kg-day	3.0E-04	mg/kg-day	0.36	1.0E-05	mg/kg-day	3.0E-04	mg/kg-day	0.034			
				Iron	14300	mg/kg	1.8E-01	mg/kg-day	7.0E-01	mg/kg-day	0.26	1.7E-02	mg/kg-day	7.0E-01	mg/kg-day	0.024			
				Manganese (Non-diet)	126	mg/kg	1.6E-03	mg/kg-day	2.4E-02	mg/kg-day	0.067	1.5E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0063			
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	3.6E-04	mg/kg-day	4.0E-03	mg/kg-day	0.091	3.4E-05	mg/kg-day	4.0E-03	mg/kg-day	0.0085			
				Vanadium and Compounds	30.8	mg/kg	3.9E-04	mg/kg-day	5.0E-03	mg/kg-day	0.078	3.7E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0073			
				Exp. Route Total						1.23						0.12			
				Dermal Contact	Aluminum	11200	mg/kg	-	mg/kg-day	1.0E+00	mg/kg-day	-	mg/kg-day	1.0E+00	mg/kg-day	mg/kg-day			
				Arsenic, Inorganic	8.81	mg/kg	8.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.027	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0045			
				Benzo[a]pyrene	0.0752	mg/kg	3.0E-07	mg/kg-day	3.0E-04	mg/kg-day	0.0010	4.9E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00016			
				Cobalt	8.49	mg/kg	-	mg/kg-day	3.0E-04	mg/kg-day	-	mg/kg-day	3.0E-04	mg/kg-day	mg/kg-day				
				Iron	14300	mg/kg	-	mg/kg-day	7.0E-01	mg/kg-day	-	mg/kg-day	7.0E-01	mg/kg-day	mg/kg-day				
				Manganese (Non-diet)	126	mg/kg	-	mg/kg-day	2.4E-02	mg/kg-day	-	mg/kg-day	2.4E-02	mg/kg-day	mg/kg-day				
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	-	mg/kg-day	4.0E-03	mg/kg-day	-	mg/kg-day	4.0E-03	mg/kg-day	mg/kg-day				
				Vanadium and Compounds	30.8	mg/kg	-	mg/kg-day	5.0E-03	mg/kg-day	-	mg/kg-day	5.0E-03	mg/kg-day	mg/kg-day				
				Exp. Route Total						0.028						0.0046			
				Inhalation *	Aluminum	11200	mg/kg	9.8E-07	mg/m³	5.0E-03	ug/m³	0.00020	9.8E-07	mg/m³	5.0E-03	ug/m³	0.00020		
				Arsenic, Inorganic	8.81	mg/kg	7.7E-10	mg/m³	1.5E-05	ug/m³	0.000051	7.7E-10	mg/m³	1.5E-05	ug/m³	0.000051			
				Benzo[a]pyrene	0.0752	mg/kg	6.6E-12	mg/m³	2.0E-06	ug/m³	0.0000033	6.6E-12	mg/m³	2.0E-06	ug/m³	0.0000033			
				Cobalt	8.49	mg/kg	7.4E-10	mg/m³	6.0E-06	ug/m³	0.00012	7.4E-10	mg/m³	6.0E-06	ug/m³	0.00012			
				Iron	14300	mg/kg	-	mg/m³	-	ug/m³	-	1.2E-06	mg/m³	-	ug/m³	ug/m³			
				Manganese (Non-diet)	126	mg/kg	1.1E-08	mg/m³	5.0E-05	ug/m³	0.00022	1.1E-08	mg/m³	5.0E-05	ug/m³	0.00022			
				Total Petroleum Hydrocarbons (Aromatic Medium)	28.5	mg/kg	4.8E-04	mg/m³	3.0E-03	ug/m³	0.16	4.8E-04	mg/m³	3.0E-03	ug/m³	0.16			
				Vanadium and Compounds	30.8	mg/kg	2.7E-09	mg/m³	1.0E-04	ug/m³	0.000027	2.7E-09	mg/m³	1.0E-04	ug/m³	0.000027			
				Exp. Route Total						0.16						0.16			
Exposure Point Total										1.4						0.28			
Exposure Medium Total										1.4						0.28			

\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.1C  
CALCULATION OF CHEMICAL NON-CANCER HAZARDS  
RESIDENTIAL USE  
200 Presidential Way, Woburn, MA

Scenario Timeframe Future
Receptor Population Resident
Receptor Age: Child and Adult

**Soil Group 2A**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations-Child					Non-Cancer Hazard Calculations-Adult				
					Value	Units	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Incidental Ingestion	Aluminum	9030	mg/kg	1.2E-01	mg/kg-day	1.0E+00	mg/kg-day	0.12	1.1E-02	mg/kg-day	1.0E+00	mg/kg-day	0.011
				Arsenic, Inorganic	8.44	mg/kg	6.5E-05	mg/kg-day	3.0E-04	mg/kg-day	0.22	6.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.020
				Benzo[a]pyrene	0.0119	mg/kg	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00051	1.4E-08	mg/kg-day	3.0E-04	mg/kg-day	0.000048
				Cobalt	3.01	mg/kg	3.8E-05	mg/kg-day	3.0E-04	mg/kg-day	0.13	3.6E-06	mg/kg-day	3.0E-04	mg/kg-day	0.012
				Iron	8900	mg/kg	1.1E-01	mg/kg-day	7.0E-01	mg/kg-day	0.16	1.1E-02	mg/kg-day	7.0E-01	mg/kg-day	0.015
				Manganese (Non-diet)	91.7	mg/kg	1.2E-03	mg/kg-day	2.4E-02	mg/kg-day	0.049	1.1E-04	mg/kg-day	2.4E-02	mg/kg-day	0.0046
				Thallium (Soluble Salts)	0.173	mg/kg	2.2E-06	mg/kg-day	1.0E-05	mg/kg-day	0.22	2.1E-07	mg/kg-day	1.0E-05	mg/kg-day	0.021
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	1.5E-04	mg/kg-day	4.00E-03	mg/kg-day	0.038	1.4E-05	mg/kg-day	4.0E-03	mg/kg-day	0.0036
				Vanadium and Compounds	17.4	mg/kg	2.2E-04	mg/kg-day	5.0E-03	mg/kg-day	0.044	2.1E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0041
				Exp. Route Total							0.97					0.091
			Dermal Contact	Aluminum	9030	mg/kg	-	mg/kg-day	1.0E+00	mg/kg-day		-	mg/kg-day	1.0E+00	mg/kg-day	
				Arsenic, Inorganic	8.44	mg/kg	7.7E-06	mg/kg-day	3.0E-04	mg/kg-day	0.026	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0043
				Benzo[a]pyrene	0.0119	mg/kg	4.7E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00016	7.8E-09	mg/kg-day	3.0E-04	mg/kg-day	0.000026
				Cobalt	3.01	mg/kg	-	mg/kg-day	3.0E-04	mg/kg-day		-	mg/kg-day	3.0E-04	mg/kg-day	
				Iron	8900	mg/kg	-	mg/kg-day	7.0E-01	mg/kg-day		-	mg/kg-day	7.0E-01	mg/kg-day	
				Manganese (Non-diet)	91.7	mg/kg	-	mg/kg-day	2.4E-02	mg/kg-day		-	mg/kg-day	2.4E-02	mg/kg-day	
				Thallium (Soluble Salts)	0.173	mg/kg	-	mg/kg-day	1.0E-05	mg/kg-day		-	mg/kg-day	1.0E-05	mg/kg-day	
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	-	mg/kg-day	4.0E-03	mg/kg-day		-	mg/kg-day	4.0E-03	mg/kg-day	
				Vanadium and Compounds	17.4	mg/kg	-	mg/kg-day	5.0E-03	mg/kg-day		-	mg/kg-day	5.0E-03	mg/kg-day	
				Exp. Route Total							0.026					0.0043
			Inhalation **	Aluminum	9030	mg/kg	7.9E-07	mg/m³	5.0E-03	mg/m³	0.00016	7.9E-07	mg/m³	5.0E-03	mg/m³	0.00016
				Arsenic, Inorganic	8.44	mg/kg	7.4E-10	mg/m³	1.5E-05	mg/m³	0.000049	7.4E-10	mg/m³	1.5E-05	mg/m³	0.000049
				Benzo[a]pyrene	0.0119	mg/kg	1.0E-12	mg/m³	2.0E-06	mg/m³	0.0000005	1.0E-12	mg/m³	2.0E-06	mg/m³	0.00000052
				Cobalt	3.01	mg/kg	2.6E-10	mg/m³	6.0E-06	mg/m³	0.000044	2.6E-10	mg/m³	6.0E-06	mg/m³	0.000044
				Iron	8900	mg/kg	7.8E-07	mg/m³	-	mg/m³		7.8E-07	mg/m³	-	mg/m³	
				Manganese (Non-diet)	91.7	mg/kg	8.0E-09	mg/m³	5.0E-05	mg/m³	0.00016	8.0E-09	mg/m³	5.0E-05	mg/m³	0.00016
				Thallium (Soluble Salts)	0.173	mg/kg	1.5E-11	mg/m³	-	mg/m³		1.5E-11	mg/m³	-	mg/m³	
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	2.0E-04	mg/m³	3.0E-03	mg/m³	0.067	2.0E-04	mg/m³	3.0E-03	mg/m³	0.067
				Vanadium and Compounds	17.4	mg/kg	1.5E-09	mg/m³	1.0E-04	mg/m³	0.000015	1.5E-09	mg/m³	1.0E-04	mg/m³	0.000015
				Exp. Route Total							0.067					0.067
				Exposure Point Total							1.1					0.16
				Exposure Medium Total							1.1					0.16

\*\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.1C  
CALCULATION OF CHEMICAL NON-CANCER HAZARDS  
RESIDENTIAL USE  
200 Presidential Way, Woburn, MA

Scenario Timeframe Future
Receptor Population Resident
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations-Child				Non-Cancer Hazard Calculations-adult							
					Value	Units	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient		
							Value	Units	Value	Units		Value	Units	Value	Units			
Soil	Surface Soil (Site-Wide Disturbed Deep Soil Samples, 2'-4', 4-6', Soil Group 2B)	Outdoor Soil	Incidental Ingestion	Aluminum	8820	mg/kg	1.1E-01	mg/kg-day	1.0E+00	mg/kg-day	0.11	1.1E-02	mg/kg-day	1.0E+00	mg/kg-day	0.011		
				Arsenic, Inorganic	7.53	mg/kg	5.8E-05	mg/kg-day	3.0E-04	mg/kg-day	0.19	5.4E-06	mg/kg-day	3.0E-04	mg/kg-day	0.018		
				Benzo[a]pyrene	0.0078	mg/kg	1.0E-07	mg/kg-day	3.0E-04	mg/kg-day	0.00033	9.3E-09	mg/kg-day	3.0E-04	mg/kg-day	0.000031		
				Cobalt	7.5	mg/kg	9.6E-05	mg/kg-day	3.0E-04	mg/kg-day	0.32	9.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.030		
				Iron	12400	mg/kg	1.6E-01	mg/kg-day	7.0E-01	mg/kg-day	0.23	1.5E-02	mg/kg-day	7.0E-01	mg/kg-day	0.021		
				Manganese (Non-diet)	147	mg/kg	1.9E-03	mg/kg-day	2.40E-02	mg/kg-day	0.078	1.8E-04	mg/kg-day	2.40E-02	mg/kg-day	0.0073		
				Vanadium	20.7	mg/kg	2.6E-04	mg/kg-day	5.0E-03	mg/kg-day	0.053	2.5E-05	mg/kg-day	5.0E-03	mg/kg-day	0.0049		
			Exp. Route Total								0.98					0.092		
			Dermal Contact	Aluminum	8820	mg/kg	-	mg/kg-day	1.0E+00	mg/kg-day		-	mg/kg-day	1.0E+00	mg/kg-day			
				Arsenic, Inorganic	7.53	mg/kg	6.9E-06	mg/kg-day	3.0E-04	mg/kg-day	0.023	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	0.0038		
				Benzo[a]pyrene	0.0078	mg/kg	3.1E-08	mg/kg-day	3.0E-04	mg/kg-day	0.00010	5.1E-09	mg/kg-day	3.0E-04	mg/kg-day	0.000017		
				Cobalt	7.5	mg/kg	-	mg/kg-day	3.0E-04	mg/kg-day		-	mg/kg-day	3.0E-04	mg/kg-day			
				Iron	12400	mg/kg	-	mg/kg-day	7.0E-01	mg/kg-day		-	mg/kg-day	7.0E-01	mg/kg-day			
				Manganese (Non-diet)	147	mg/kg	-	mg/kg-day	2.40E-02	mg/kg-day		-	mg/kg-day	2.40E-02	mg/kg-day			
				Vanadium	20.7	mg/kg	-	mg/kg-day	4.0E-03	mg/kg-day		-	mg/kg-day	4.0E-03	mg/kg-day			
			Exp. Route Total								0.023					0.0038		
			Inhalation ***	Aluminum	8820	mg/kg	7.7E-07	mg/m³	5.0E-03	ug/m³	0.00015	7.7E-07	mg/m³	5.0E-03	ug/m³	0.15		
				Arsenic, Inorganic	7.53	mg/kg	6.6E-10	mg/m³	1.5E-05	ug/m³	0.000044	6.6E-10	mg/m³	1.5E-05	ug/m³	0.044		
				Benzo[a]pyrene	0.0078	mg/kg	6.8E-13	mg/m³	2.0E-06	ug/m³	0.00000034	6.8E-13	mg/m³	2.0E-06	ug/m³	0.000034		
				Cobalt	7.5	mg/kg	6.5E-10	mg/m³	6.0E-06	ug/m³	0.00011	6.5E-10	mg/m³	6.0E-06	ug/m³	0.11		
				Iron	12400	mg/kg	1.1E-06	-	-	ug/m³		1.1E-06	mg/m³	-	ug/m³			
				Manganese (Non-diet)	147	mg/kg	1.3E-08	mg/m³	5.0E-05	ug/m³	0.00026	1.3E-08	mg/m³	5.0E-05	ug/m³	0.26		
				Vanadium	20.7	mg/kg	1.8E-09	mg/m³	-	ug/m³		1.8E-09	mg/m³	-	ug/m³			
			Exp. Route Total								0.00056					0.56		
Exposure Point Total											1.0					0.66		
Exposure Medium Total											1.0					0.66		

\*\*\* Air concentrations for chemicals of potential concern reflect particulates only

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Non-Cancer Hazard Calculations-Child				Non-Cancer Hazard Calculations-adult						
					Value	Units	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient	
							Value	Units	Value	Units		Value	Units	Value	Units		
Groundwater	Groundwater	Swimming Pool	Incidental Ingestion	Manganese (Non-diet)	1006.3	µg/l	2.9E-03	mg/kg-day	2.4E-02	mg/kg-day	0.12	1.3E-04	mg/kg-day	2.40E-02	mg/kg-day	0.0053	
				Exp. Route Total							0.12					0.0053	
				Dermal Contact	Manganese (Non-diet)	1006.3	µg/l	3.8E-03	mg/kg-day	2.40E-02	mg/kg-day	0.16	8.8E-04	mg/kg-day	2.40E-02	mg/kg-day	0.037
				Exp. Route Total							0.16					0.037	
				Exposure Point Total							0.28					0.042	
				Exposure Medium Total							0.28					0.042	

TABLE 7.2.A  
CALCULATION OF CHEMICAL CANCER RISKS  
CONSTRUCTION WORKER  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

**Soil Group 2A + 2B**

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations				Cancer Risk			
					Value	Units	LADD/Air Concentration		CSF					
							Value	Units	Value	Units				
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4", 4-6' Soil Groups 2A +2B)	Outdoor Soil	Incidental Ingestion	Aluminum	8460	mg/kg	3.4E-04	mg/kg-day	-					
				Arsenic, Inorganic	7.18	mg/kg	1.7E-07	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	2.6E-07			
				Benzo[a]pyrene	0.00769	0E+00	3.1E-10	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>	3.1E-10			
				Cobalt	6.07	mg/kg	2.4E-07	mg/kg-day	-					
				Iron	10800	mg/kg	4.4E-04	mg/kg-day	-					
				Manganese (Non-diet)	123	mg/kg	5.0E-06	mg/kg-day	-					
				Thallium (Soluble Salts)	0.173	mg/kg	7.0E-09	mg/kg-day	-					
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	4.8E-07	mg/kg-day	-					
				Vanadium and Compounds	18.9	mg/kg	7.6E-07	mg/kg-day	-					
				Exp. Route Total							2.6E-07			
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4", 4-6' Soil Groups 2A +2B)	Outdoor Soil	Dermal Contact	Aluminum	8460	mg/kg	-	mg/kg-day	-					
				Arsenic, Inorganic	7.18	mg/kg	2.8E-08	mg/kg-day	1.5E+00	(mg/kg-day) <sup>-1</sup>	4.2E-08			
				Benzo[a]pyrene	0.00769	0E+00	1.3E-10	mg/kg-day	1.0E+00	(mg/kg-day) <sup>-1</sup>	1.3E-10			
				Cobalt	6.07	mg/kg	-	mg/kg-day	-					
				Iron	10800	mg/kg	-	mg/kg-day	-					
				Manganese (Non-diet)	123	mg/kg	-	mg/kg-day	-					
				Thallium (Soluble Salts)	0.173	mg/kg	-	mg/kg-day	-					
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	-	mg/kg-day	-					
				Vanadium and Compounds	18.9	mg/kg	-	mg/kg-day	-					
				Exp. Route Total							4.2E-08			
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4", 4-6' Soil Groups 2A +2B)	Outdoor Soil	Inhalation *	Aluminum	8460	mg/kg	2.0E-08	mg/m <sup>3</sup>	-					
				Arsenic, Inorganic	7.18	mg/kg	1.7E-11	mg/m <sup>3</sup>	4.3E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	7.2E-11			
				Benzo[a]pyrene	0.00769	0E+00	1.8E-14	mg/m <sup>3</sup>	6.0E-04	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.1E-14			
				Cobalt	6.07	mg/kg	1.4E-11	mg/m <sup>3</sup>	9.0E-03	(ug/m <sup>3</sup> ) <sup>-1</sup>	1.3E-10			
				Iron	10800	mg/kg	2.5E-08	mg/m <sup>3</sup>	-					
				Manganese (Non-diet)	123	mg/kg	2.9E-10	mg/m <sup>3</sup>	-					
				Thallium (Soluble Salts)	0.173	mg/kg	4.0E-13	mg/m <sup>3</sup>	-					
				Total Petroleum Hydrocarbons (Aromatic Medium)	11.9	mg/kg	3.4E-06	mg/m <sup>3</sup>	-					
				Vanadium and Compounds	18.9	mg/kg	4.4E-11	mg/m <sup>3</sup>	-					
				Exp. Route Total							2.0E-10			
Exposure Point Total											3.0E-07			
Exposure Medium Total											3.0E-07			
Total of Receptor Risks Across All Media (Soil Groups 2A + 2B)											3.0E-07			

\* Air concentrations for Total Petroleum Hydrocarbons are the sum of particulates and vapors, and for other chemicals of potential concern reflect particulates only

TABLE 7.2B  
CALCULATION OF CHEMICAL NON-CANCER HAZARDS  
CONSTRUCTION WORKER  
200 Presidential Way, Woburn, MA

Scenario Timeframe Future  
Receptor Population Construction Worker  
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern*	EPC		Non-Cancer Hazard Calculations				Hazard Quotient	
					Value	Units	Intake/Exposure Concentration		Subchronic RfD/RfC			
							Value	Units	Value	Units		
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4', 4-6' Soil Groups 2A +2B)	Outdoor Soil	Incidental Ingestion	Aluminum	8E+03	mg/kg	2.5E-02	mg/kg-day	1.0E+00	mg/kg-day	0.025	
				Arsenic, Inorganic	7E+00	mg/kg	1.3E-05	mg/kg-day	3.0E-04	mg/kg-day	0.042	
				Benzo[a]pyrene	8E-03	mg/kg	2.3E-08	mg/kg-day	3.0E-04	mg/kg-day	0.000076	
				Cobalt	6E+00	mg/kg	1.8E-05	mg/kg-day	3.0E-03	mg/kg-day	0.0060	
				Iron	1E+04	mg/kg	3.2E-02	mg/kg-day	7.0E-01	mg/kg-day	0.045	
				Manganese (Non-diet)	1E+02	mg/kg	3.6E-04	mg/kg-day	2.4E-02	mg/kg-day	0.015	
				Thallium (Soluble Salts)	2E-01	mg/kg	5.1E-07	mg/kg-day	4.0E-05	mg/kg-day	0.013	
				Total Petroleum Hydrocarbons (Aromatic Medium)	1E+01	mg/kg	3.5E-05	mg/kg-day	4.0E-03	mg/kg-day	0.0088	
				Vanadium and Compounds	2E+01	mg/kg	5.6E-05	mg/kg-day	1.0E-02	mg/kg-day	0.0056	
				Exp. Route Total							0.16	
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4', 4-6' Soil Groups 2A +2B)	Outdoor Soil	Dermal Contact	Dermal Contact	Aluminum	8E+03	mg/kg	-	mg/kg-day	1.0E+00	mg/kg-day	0.0068
				Arsenic, Inorganic	7E+00	mg/kg	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	0.00031	
				Benzo[a]pyrene	8E-03	mg/kg	9.4E-09	mg/kg-day	3.0E-04	mg/kg-day		
				Cobalt	6E+00	mg/kg	-	mg/kg-day	3.0E-03	mg/kg-day		
				Iron	1E+04	mg/kg	-	mg/kg-day	7.0E-01	mg/kg-day		
				Manganese (Non-diet)	1E+02	mg/kg	-	mg/kg-day	2.4E-02	mg/kg-day		
				Thallium (Soluble Salts)	2E-01	mg/kg	-	mg/kg-day	4.0E-05	mg/kg-day		
				Total Petroleum Hydrocarbons (Aromatic Medium)	1E+01	mg/kg	-	mg/kg-day	4.0E-03	mg/kg-day		
				Vanadium and Compounds	2E+01	mg/kg	-	mg/kg-day	1.0E-02	mg/kg-day		
				Exp. Route Total							0.0068	
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4', 4-6' Soil Groups 2A +2B)	Outdoor Soil	Inhalation *	Inhalation *	Aluminum	8E+03	mg/kg	1.4E-06	mg/m³	5.0E-03	mg/m³	0.00029
				Arsenic, Inorganic	7E+00	mg/kg	1.2E-09	mg/m³	1.5E-05	mg/m³	0.000081	
				Benzo[a]pyrene	8E-03	mg/kg	1.3E-12	mg/m³	2.0E-06	mg/m³	0.0000065	
				Cobalt	6E+00	mg/kg	1.0E-09	mg/m³	2.0E-05	mg/m³	0.000052	
				Iron	1E+04	mg/kg	1.8E-06	mg/m³	-	mg/m³		
				Manganese (Non-diet)	1E+02	mg/kg	2.1E-08	mg/m³	5.0E-05	mg/m³	0.00042	
				Thallium (Soluble Salts)	2E-01	mg/kg	2.9E-11	mg/m³	-	mg/m³		
				Total Petroleum Hydrocarbons (Aromatic Medium)	1E+01	mg/kg	2.5E-04	mg/m³	1.0E+00	mg/m³	0.00025	
				Vanadium and Compounds	2E+01	mg/kg	3.2E-09	mg/m³	1.0E-04	mg/m³	0.000032	
				Exp. Route Total							0.0011	
Soil	Surface and subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4', 4-6' Soil Groups 2A +2B)	Outdoor Soil	Exposure Point Total								0.17	
			Exposure Medium Total								0.17	

\* Inhalation results for Total Petroleum Hydrocarbons are for both the particulate and vapor exposure pathways, and for other chemicals of potential concern for particulate exposure only

TABLE 9.1.A  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs  
RESIDENT  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Receptor Population: Resident

**SOIL GROUP 1**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Child plus Adult					Non-Carcinogenic Hazard Quotient (HQ) Child				
				Ingestion	Dermal	Inhalation	External (Radiation)	Chemical Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Chemical Total
Soil	Surface Soil (Site-Wide Undisturbed Soil Samples, 0-6", Soil Group 1)	Outdoor Soil	Aluminum	0	0	0	N/A	0	Nervous system	0.143	0	0.00020	0.143
			Arsenic, Inorganic	1.14E-05	1.604E-06	1.23E-09	N/A	1.30E-05	Cardiovascular, dermal	0.225	0.0267	0.000051	0.252
			Benzo[a]pyrene	4.91E-07	1.639E-07	4.05E-12	N/A	6.55E-07	Developmental	0.00320	0.00099	0.0000033	0.00420
			Cobalt	0	0	2.47E-09	N/A	2.47E-09	Thyroid	0.362	0	0.00012	0.362
			Iron	0	0	0	N/A	0	Gastrointestinal	0.261	0	0	0.261
			Manganese (Non-diet)	0	0	0	N/A	0	Nervous system	0.0671	0	0.00022	0.0673
			Total Petroleum Hydrocarbons (Aromatic Medium)	0	0	0	N/A	0	Nasal (respiratory system)	0.0911	0	0.16	0.25
			Vanadium and Compounds	0	0	0	N/A	0	Dermal	0.0781	0	0.000027	0.0782
			Exposure Route Total	1.2E-05	1.768E-06	3.7E-09		1.4E-05		1.23	0.0277	0.16	1.42
			Exposure Point Total					1.4E-05					1.42
Exposure Medium Total								1.4E-05					1.42
Irrigation	Groundwater	Swimming Pool	Manganese	0	0	0	N/A	0	Nervous system	0.12	0.16		0.28
		Exposure Point Total											0.28
		Exposure Medium Total											0.28
		Receptor Total						Receptor Risk Total	1.4E-05			Receptor Hazard Index Total	1.70

Total Organ-Specific HQ:	
Nervous system	0.488
Dermal	0.330
Cardiovascular	0.252
Developmental	0.00420
Thyroid	0.362
Gastrointestinal	0.261
Nasal (respiratory system)	0.25

TABLE 9.1.A  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs  
RESIDENT  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident

**SOIL GROUP 2A**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient (HQ)				
				Child plus Adult					Child				
				Ingestion	Dermal	Inhalation	External (Radiation)	Chemical Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Chemical Total
Soil	Surface Soil (Site-Wide Disturbed Soil Samples, 0-6", Soil Group 2A)	Outdoor Soil	Aluminum, Arsenic, Inorganic, Benzo[a]pyrene, Cobalt, Iron, Manganese (Non-diet), Thallium (Soluble Salts), Total Petroleum Hydrocarbons (Aromatic Medium), Vanadium and Compounds	0	0	0	N/A	0	Nervous system	0.115	0	0.00016	0.116
				1.1E-05	1.5E-06	1.2E-09	N/A	1.2E-05	Cardiovascular, dermal	0.216	0.0256	0.000049	0.241
				7.8E-08	2.6E-08	6.4E-13	N/A	1.0E-07	Developmental	0.000507	0.000156	0.000001	0.000664
				0	0	8.8E-10	N/A	8.8E-10	Thyroid	0.128	0	0.000044	0.128
				0	0	0	N/A	0	Gastrointestinal	0.163	0	0	0.163
				0	0	0	N/A	0	Nervous system	0.0489	0	0.00016	0.0490
				0	0	0	N/A	0	Dermal	0.221	0	0	0.221
				0	0	0	N/A	0	Nasal (respiratory system)	0.0380	0	0.067	0.105
				0	0	0	N/A	0.0E+00	Dermal	0.0441	0	0.000015	0.0442
				1.1E-05	1.6E-06	2.1E-09		1.3E-05		0.975	0.0258	0.0673	1.07
				Exposure Route Total				1.3E-05					1.07
				Exposure Point Total				1.3E-05					1.07
				Exposure Medium Total				1.3E-05					1.07
Irrigation	Groundwater	Swimming Pool	Manganese	0	0	0	N/A	0	Nervous system	0.12	0.16		0.28
				Exposure Point Total									0.28
				Exposure Medium Total									0.28
Receptor Total				Receptor Risk Total				1.3E-05	Receptor Hazard Index Total				1.34

## Total Organ-Specific HQ:

Nervous system	0.442
Dermal	0.286
Cardiovascular	0.241
Developmental	0.000664
Thyroid	0.128
Gastrointestinal	0.163
Nasal (respiratory system)	0.105

TABLE 9.1.A  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs  
RESIDENT  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future
Receptor Population: Resident

**SOIL GROUP 2B**

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Child plus Adult					Non-Carcinogenic Hazard Quotient (HQ) Child				
				Ingestion	Dermal	Inhalation	External (Radiation)	Chemical Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Chemical Total
Soil	Surface Soil (Site-Wide Disturbed Deep Soil Samples, 2-4', 4-6', Soil Group 2B)	Outdoor Soil	Aluminum	0	0	0	N/A	0	Nervous system	0.113	0	0.00	0.11
			Arsenic, Inorganic	9.75E-06	1.37E-06	1.05E-09	N/A	1.1E-05	Cardiovascular, dermal	0.193	0.0228	0.000	0.215
			Benz[a]pyrene	5.09E-08	1.70E-08	4.20E-13	N/A	6.8E-08	Developmental	0.000332	0.000103	0.00000	0.00044
			Cobalt	0	0	2.19E-09	N/A	2.2E-09	Thyroid	0.320	0.00	0.00	0.32
			Iron	0	0	0	N/A	0	Gastrointestinal	0.226	0.00	0	0.226
			Manganese (Non-diet)	0	0	0	N/A	0	Nervous system	0.0783	0.00	0.00	0.08
			Vanadium	0	0	0	N/A	0	Dermal	0.0525	0.00	0	0.0525
			Exposure Route Total	9.8E-06	1.4E-06	3.2E-09		1.1E-05		0.983	0.0229	0.00	1.01
			Exposure Point Total					1.1E-05					1.01
Exposure Medium Total								1.1E-05					1.01
Irrigation	Groundwater	Swimming Pool	Manganese	0	0	0	N/A	0	Nervous system	0.12	0.16		0.28
		Exposure Point Total											0.28
		Exposure Medium Total											0.28
		Receptor Total						1.1E-05				Receptor Hazard Index Total	1.28

## Total Organ-Specific HQ:

Nervous system	0.47
Dermal	0.268
Cardiovascular	0.215
Developmental	0.00044
Thyroid	0.32
Gastrointestinal	0.226

TABLE 9.1.B  
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs  
CONSTRUCTION WORKER  
200 Presidential Way, Woburn, MA

Scenario Timeframe: Future  
Receptor Population: Construction Worker  
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient (HQ)						
				Ingestion	Dermal	Inhalation	External (Radiation)	Chemical Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Chemical Total		
Soil	Surface an subsurface soil (Site-Wide Disturbed Soil Samples, 0-6", 2-4', 4-6' Soil Groups 2A +2B)	Outdoor Soil	Aluminum	0	0	0	N/A	0	Nervous system	0.025	0	0.00029	0.025		
			Arsenic, Inorganic	2.6E-07	4.2E-08	7.2E-11	N/A	3.0E-07	Cardiovascular, dermal	0.042	0.0068	0.000081	0.049		
			Benzo[a]pyrene	3.1E-10	1.3E-10	1.1E-14	N/A	4.4E-10	Developmental	0.000076	0.000031	0.00000065	0.00011		
			Cobalt	0	0	1.3E-10	N/A	1.3E-10	Thyroid	0.0060	0	0.000052	0.0060		
			Iron	0	0	0	N/A	0	Gastrointestinal	0.045	0	0	0.045		
			Manganese (Non-diet)	0	0	0	N/A	0	Nervous system	0.015	0	0.00042	0.016		
			Thallium (Soluble Salts)	0	0	0	N/A	0	Dermal	0.013	0	0	0.013		
			Total Petroleum Hydrocarbons (Aromatic Medium)	0	0	0	N/A	0	Nasal (respiratory system)	0.0088	0	0.00025	0.0090		
			Vanadium and Compounds	0	0	0	N/A	0	Dermal	0.0056	0	0.000032	0.0056		
			Exposure Route Total	2.6E-07	4.2E-08	2.0E-10	0	3.0E-07		0.16	0.0068	0.0011	0.17		
Exposure Point Total								3.0E-07					0.17		
Medium Total								3.0E-07					0.17		
Receptor Total								3.0E-07				Receptor Hazard Index Total	0.17		
										Total Organ-Specific HQ:					
										Nervous system	0.041				
										Dermal	0.068				
										Cardiovascular	0.049				
										Developmental	0.00011				
										Thyroid	0.0060				
										Gastrointestinal	0.045				
										Nasal (respiratory system)	0.0090				