REPORT

Conceptual RD/RA Work Plan Addendum for Newell Street Area I

Volume V of V

General Electric Company
Pittsfield, Massachusetts

April 17, 2003

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BLASLAND, BOUCK & LEE, INC.
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Appendix

Appendix F

Risk Evaluation of Non-PCB Appendix IX+3 Constituents in Soils at Properties within Newell Street Area I

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APPENDIX F

Risk Evaluation of Non-PCB Appendix IX+3 Constituents in Soils at Properties within Newell Street Area I

1.0 Introduction

A number of non-PCB constituents have been detected in the existing soils of properties located at Newell Street Area I within the GE-Pittsfield/Housatonic River Site. These constituents have been evaluated in accordance with the multi-step process established for non-PCB Appendix IX+3 constituents in the *Statement of Work for Removal Actions Outside the River* (SOW) (BBL, 1999). The steps in this process are described in the text of this Conceptual RD/RA Work Plan Addendum. These steps included screening by comparison of the maximum detected concentrations of the constituents at each parcel to EPA's applicable Preliminary Remediation Goals (PRGs) for soil (or, in a few cases, screening based on other considerations, such as low frequency of detection). Following this screening, the average concentrations of the remaining constituents in each relevant depth increment at each parcel were compared to the applicable Method 1 soil standards set out in the Massachusetts Contingency Plan (MCP). These steps were applied first to existing conditions at each property, using the non-PCB data from all samples collected at that property. At several properties, where there were substantial exceedances of the applicable Method 1 soil standards, soil remediation was proposed that would address such constituents, and the comparison to Method 1 standards was then repeated after taking into account the proposed remediation.

As described in the text of this Work Plan Addendum, for eleven parcels at Newell Street Area I -- Parcels J9-23-12, J9-23-13, J9-23-16, J9-23-17, J9-23-18, J9-23-19, J9-23-20, J9-23-21, J9-23-22, J9-23-23, and J9-23-24 – one or more non-PCB constituents had existing average concentrations that exceeded the applicable Method 1 soil standards in at least one of the relevant depth increments. For six of these parcels (Parcels J9-23-17, J9-23-18, J9-23-20, J9-23-22, J9-23-23, and J9-23-24), GE requested AMEC Earth & Environmental (AMEC) to conduct parcel-specific risk evaluations of the non-PCB constituents under existing conditions. For the other five parcels, GE has proposed soil remediation that would address the non-PCB constituents, and it requested AMEC to

conduct parcel-specific risk evaluations of the non-PCB constituents under post-remediation conditions. In all cases, the risk evaluations were performed for all non-PCB constituents that were retained prior to the comparison to the Method 1 soil standards (except for dioxins/furans, which were evaluated separately in accordance with the SOW, as described in the text of this Work Plan Addendum), and they used the protocols for area-specific risk evaluations set forth in the SOW.

This Appendix describes and presents the results of the parcel-specific risk evaluations for the above-listed eleven parcels at Newell Street Area I. (As shown in the Work Plan Addendum, the average concentrations of the retained non-PCB constituents in soil at Parcels J9-23-25 and J9-23-26 under existing conditions did not exceed Method 1 standards at any depths, and thus those parcels are not evaluated in this Appendix.) Parcels J9-23-12 and J9-23-17 are considered recreational properties, while the other nine are commercial/industrial parcels. In accordance with the SOW, these risk evaluations were based on: (a) the arithmetic average concentrations of the retained non-PCB constituents for each parcel (under either existing or post-remediation conditions, as applicable); (b) the same exposure scenarios, soil depth increments, and exposure assumptions used by EPA in developing the PCB Performance Standards for such areas (as described in EPA, 1999a); and (c) standard EPA toxicity values. As discussed below, for the parcels and constituents evaluated, estimated cancer risks and non-cancer hazards fall below the acceptable benchmarks prescribed in the SOW.

2.0 Constituents and Depth Increments Evaluated

In accordance with the protocols set forth in the SOW, the risk evaluations presented herein have considered all chemicals of potential concern (COPCs) that were retained for evaluation after the initial screening steps described in this Work Plan but before the comparison to MCP Method 1 standards, and have used the average concentrations of those constituents at each of the parcels in question (under either existing or post-remediation conditions, as applicable). The constituents evaluated, which vary from parcel to parcel, are shown in Table 1 and discussed in detail in the parcel-specific risk evaluations presented in Section 5. For each relevant parcel and COPC, average concentrations have been calculated for the same depth increments evaluated by EPA

(1999a) in developing the PCB Performance Standards. For commercial/industrial properties, these increments are the 0-1 foot and the 1-6 foot depth increments, although average concentrations have also been calculated for the 0-3 foot depth increment for those commercial/industrial parcels that are subject to Conditional Solutions. For recreational properties, the depth increments evaluated by EPA (1999a) are the 0-1 foot and 1-3 foot depth increments, although EPA (1999a) did not present any specific risk calculations to support the PCB Performance Standard for the latter depth increment. (In addition, for recreational Parcel J9-23-17, at GE's request, average concentrations have also been calculated for the 0-3 foot depth increment.)

With the exception of lead, parcel-specific COPCs have been included in risk calculations for each parcel to determine whether cancer risks and non-cancer hazards fall within acceptable limits. (In accordance with the SOW, PCBs and dioxins/furans have not been included in these evaluations.) Since EPA has not developed standard toxicity values for lead, that constituent has been evaluated through the application of EPA lead models and/or default lead values, as discussed below.

3.0 Risk Evaluation Assumptions and Procedures (for All COPCs Except Lead)

In accordance with the SOW, the exposure scenarios that have been evaluated are the same exposure scenarios utilized by EPA (1999a) in supporting the PCB Performance Standards. For commercial/industrial properties, these are the Commercial Groundskeeper scenario for surface soil (0-1 foot depth) and the Utility Worker scenario for subsurface soil (1-6 foot depth). In addition, for commercial/industrial parcels subject to Conditional Solutions, the Commercial Groundskeeper scenario has also been applied to the 0-3 foot depth increment. For the recreational properties, the exposure scenario evaluated by EPA (1999a) for surface soil (0-1 foot depth) is the Child Recreational User scenario. For the 1-3 foot depth increment at recreational properties, although EPA (1999a) discussed the applicable PCB Performance Standard (15 mg/kg), it did not present any specific risk calculations to support that standard. Accordingly, as a conservative measure, the 1-3 foot depth increment at the recreational properties at Newell Street Area I has been evaluated using the same Child Recreational User

scenario used by EPA (1999a) for the top foot of soil. That scenario has also been applied to the 0-3 foot depth increment at recreational properties where applicable.

The Commercial Groundskeeper scenario assumes that an adult is exposed to constituents in surficial soils 84 days per year for a period of 25 years. With the exception of chemical-specific absorption criteria, all exposure assumptions used to evaluate this scenario were the same as those used by EPA (1999a). Exposure assumptions used in the evaluation of this scenario are provided in Table 2.

The Utility Worker scenario assumes that an adult is in contact with subsurface soils 5 days per year for 25 years. As with the Groundskeeper scenario, all exposure assumptions used in this scenario were the same as the assumptions used by EPA (1999a). These assumptions are presented in Table 2.

The Child Recreational User scenario assumes, for the assessment of carcinogenic risks, that a 1- to 13-year-old child is exposed to constituents in surface soil 84 days per year for a period of 12 years. For the assessment of non-cancer hazards, it is assumed that a 1- to 6-year-old child is exposed 84 days per year for a period of 6 years. Again, all exposure assumptions used in this scenario were the same as those used by EPA (1999a). The specific exposure assumptions used for the Child Recreational User scenario are also listed in Table 2.

With respect to absorption factors, EPA's dermal guidance document (EPA, 2001b) specifies oral absorption factors less than 100 percent for certain of the constituents evaluated (e.g., 89 percent for the carcinogenic polycyclic aromatic hydrocarbons [PAHs]), and notes that where such factors are greater than 50 percent, the toxicity factors do not need to be modified to represent the absorbed dose. Nevertheless, for purposes of the evaluations at these properties, we have conservatively assumed that the oral absorption of all chemicals evaluated is 100 percent. The dermal absorption factors used were taken from EPA's dermal guidance (EPA, 2001b), where available, or otherwise from Massachusetts DEP sources (MDEP, 1994, 1995). The specific absorption factors used in these evaluations are shown in Table 3.

The carcinogenic COPCs have been evaluated for potential carcinogenic risks, while the non-carcinogenic COPCs have been evaluated for potential non-cancer hazards. The toxicity values – i.e., Cancer Slope Factors (CSFs) and/or Reference Doses (RfDs) -- used in the evaluations were those set forth on EPA's (2003) Integrated Risk Information System (IRIS), when available. When toxicity values for individual constituents were not available in IRIS, toxicity values presented in EPA's (1997) *Health Effects Summary Tables* (HEAST) or EPA's National Center for Environmental Assessment (NCEA) provisional values, which were utilized in the development of EPA Region 9 PRGs, were used. For one non-carcinogenic constituent (phenanthrene) for which no toxicity values are available in any of these EPA sources, the RfD value used by the Massachusetts DEP in developing its Method 1 standards (MDEP, 1994) was used. For the carcinogenic PAHs, relative potency factors (RPFs) recommended by EPA (1993) have been used to adjust the CSF values for these PAHs based on their assumed potency relative to benzo(a)pyrene. The specific toxicity values used in these evaluations are included in Table 3.

Based on these input values, predicted cancer risks and non-cancer hazards have been calculated for the COPCs at each parcel using standard risk assessment procedures. The results have been compared to the benchmarks set forth in the SOW (for constituents other than PCBs and dioxins/furans) of an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-5} and a Hazard Index (HI) of 1.0 for non-cancer effects.

4.0 Evaluation of Lead Exposures and Risks

Lead has been retained as a COPC at most of the parcels evaluated. However, EPA has not developed toxicity criteria for lead (EPA, 2003). Consequently, it is not possible to evaluate potential hazards associated with lead exposure in the same way that other COPCs are evaluated. Instead, EPA has established a "safe" fetal blood lead level of 10 µg/dL and has developed models to evaluate both adult and childhood exposures to lead, considering fetal or childhood blood levels as the critical endpoint.

For the adult who may be exposed to lead in a non-residential setting, EPA has developed the Adult Lead Methodology (ALM) (EPA, 1996, 1999b, 2001a). This

methodology predicts the blood levels of lead that would likely occur in a pregnant woman and in her fetus after non-residential exposure to lead-contaminated soil and dust. The biokinetic ALM incorporates background blood lead levels as a starting concentration and predicts blood levels that will likely result after additional exposure to lead-contaminated soil occurs. The model also incorporates a geometric standard deviation (GSD) for background blood lead levels to account for variability within an exposed population. The model then considers the ingestion of lead by adults in a non-residential setting, using a soil ingestion rate of 50 mg/day and an assumed exposure frequency of 219 days/year, based on occupational exposure. The oral absorption of lead after ingestion is assumed to be 12 percent. Using a starting soil concentration, the model is able to predict the 95th percentile blood lead concentration in the fetus of an exposed pregnant woman. If this concentration does not exceed the maximum allowable concentration of 10 µg/dL, it is concluded that exposures result in no risk of harm.

The model assumes that there is adequate exposure to result in a steady-state blood lead concentration (EPA, 2001a) and assumes that exposure continues regularly and for an indefinite period of time. Thus, there is no exposure duration factor in the model. Instead, it assumes that exposure occurs 219 out of 365 days per year, for every year of exposure, and that steady state is reached.

To evaluate potential hazards associated with the presence of lead in soil at the commercial/industrial parcels at Newell Street Area I, the ALM has been applied to "back-calculate" a soil lead concentration that could result in a 95th percentile fetal blood level of 10 µg/dL. Based on discussions with EPA Region I risk assessors (McDonough, personal communication, 2/20/03), AMEC has used the higher end of the default range recommended by EPA for background blood lead level (1.8 µg/dL) and the low estimate of the GSD (1.9), as shown in Table 4. In addition, at EPA's request, we have used an exposure frequency of 3 days and an averaging time of 7 days to represent that individuals are expected to be exposed three days per week throughout the exposure period, as was assumed by EPA (1999a) for the Groundskeeper scenario. These calculations result in a back-calculated PRG of 2,008 mg/kg (as shown in Table 4), which, for purposes of this evaluation, will be used as a Risk-Based Concentration

(RBC) for lead under this scenario. This RBC has been applied to evaluate lead exposures at the commercial/industrial properties and depth increments where lead is a COPC and the Groundskeeper scenario applies – i.e. the 0-1 foot and (where applicable) 0-3 foot depth increments at these properties. Where the average parcel-specific lead concentrations at those depth intervals are below the RBC, it is assumed that lead exposures will not result in adverse effects.

Because the ALM assumes that a steady-state blood lead concentration is reached, short-term or intermittent exposures (such as those assumed to be experienced by the Utility Worker) would not be well represented by the model (EPA, 2001a). Accordingly, for the Utility Worker scenario, which is based on exposure only five days per year at a given parcel (see EPA, 1999a), the ALM has not been used. Instead, based on agreement between GE and EPA, lead concentrations in the depth interval where the Utility Worker scenario would apply – i.e., the 1-6 foot depth interval at commercial/industrial properties – have been evaluated by comparing the average parcel-specific lead concentration for that depth interval to a default level equivalent to the Upper Concentration Limit (UCL) set forth in the MCP for lead, which is 6,000 mg/kg.

To evaluate potential hazards due to lead exposures at recreational parcels J9-23-12 and J9-23-17, an allowable lead concentration has been back calculated using EPA's Integrated Exposure Uptake Biokinetic Model (IEUBK) for lead exposures in children (EPA, 2002). Like the ALM, the IEUBK model is a biokinetic model that allows one to calculate blood levels in children who have been exposed to lead in a variety of media. It includes exposures of 0 to 7 year old children (0 to 84 months); and for the soil exposure compartment, it uses soil ingestion rates for each year of age and assumes that exposure comes from a combination of indoor dust and outdoor soil. This model does not allow the exposure frequency and averaging time to be modified for intermittent exposures. Thus, to reflect the more intermittent exposures associated with recreational use (three out of seven days per week during the seven-month exposure period), the daily soil ingestion rates have been adjusted by 3/7 or 43 percent, so that total weekly ingestion is correct, and the model has then been run. When the model is run using these adjusted total soil ingestion rates and other default assumptions (including additional background exposures to lead from other sources and fixed dust

concentrations), the result is a lead concentration of 1,313 mg/kg that is protective of 95 percent of the population at a benchmark blood lead concentration of 10 µg/dL, as shown in Figure 1 and Table 5. This concentration has been used as an RBC to evaluate the average lead concentrations in the 0-1 foot and 1-3 foot soil depths (and, where applicable, the 0-3 foot depth) at each of the recreational parcels at Newell Street Area I.

5.0 Parcel-Specific Risk Evaluations

Parcel-specific risk evaluations were conducted for the eleven parcels at which there were exceedances of the Method 1 soil standards after the screening process. As noted above, the risk evaluations for six of these parcels (Parcels J9-23-17, J9-23-18, J9-23-20, J9-23-22, J9-23-23, and J9-23-24) were based on existing conditions, while the risk evaluations for the other five parcels (Parcels J9-23-12, J9-23-13, J9-23-16, J9-23-19, and J9-23-21) were based on post-remediation conditions. Specific COPCs and depth increments evaluated for each parcel are described below along with the results of each risk evaluation. Spreadsheets showing pathway-specific and COPC-specific calculations are provided in Attachment 1 of this Appendix.

5.1 Parcel J9-23-12

Parcel J9-23-12 is a GE-owned recreational property at which GE will execute a Grant of Environmental Restriction and Easement (ERE). A property-specific risk evaluation has been performed for this parcel based on the average post-remediation concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot and 1-3 foot depth increments. The COPCs evaluated and their average post-remediation concentrations are as follows:

COPCs	Ave. Conc. Per Depth Increment (mg/kg) 0-1 foot	1-3 foot
Benzo(a)anthracene	1.99	0.40
Benzo(a)pyrene	1.68	0.44
Benzo(b)fluoranthene	2.13	0.61
Benzo(k)fluoranthene	1.57	0.36
Dibenzo(a,h)anthracene	0.74	0.18
Indeno(1,2,3-cd)pyrene	1.29	0.23
Arsenic	7.98	6.2
Lead	55	61

Consistent with the approach used by EPA in supporting the Performance Standards for PCBs, the Child Recreational User scenario has been used to evaluate risks for the 0-1 foot depth increment. Further, as a conservative measure, that same scenario has been applied to evaluate risks for the 1-3 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-12 are as follows:

Scenario	ECLR	HI
Child Recreational User (0-1 foot)	9.3×10^{-6}	0.048
Child Recreational User (1-3 foot)	3.6×10^{-6}	0.037

All these estimated risks and hazards are below the levels of concern specified in the SOW.

The average lead concentrations in the 0-1 and 1-3 foot soil increments, 55 and 61 mg/kg, respectively, are far below the calculated RBC of 1,313 mg/kg for lead in soil at recreational properties. Thus, the lead remaining in the post-remediation soils of this parcel would not present a risk of harm to Child Recreational Users who may be present there.

5.2 Parcel J9-23-13

Parcel J9-23-13 is a commercial/industrial property for which the owner has declined to execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average post-remediation concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The soil depths subject to risk evaluation for this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot

increments. The COPCs evaluated and their post-remediation average concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	0-1 foot	0-3 foot	1-6 foot
Benzo(a)anthracene	0.303	0.27	2.74
Benzo(a)pyrene	0.301	0.27	3.33
Benzo(b)fluoranthene	0.237	0.22	3.93
Dibenzo(a,h)anthracene	0.217	0.22	0.69
Indeno(1,2,3-cd)pyrene	0.231	0.22	1.53
Arsenic	6.57	6.46	12.6
Lead	66	65	3,343

Consistent with the approach used by EPA in supporting the Performance Standards for PCBs, the Groundskeeper scenario has been used to evaluate risks for the 0-1 and 0-3 foot depth increments, while the Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-13 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	1.2×10^{-6}	0.0043
Groundskeeper (0-3 foot)	1.1×10^{-6}	0.0042
Utility Worker (1-6 foot)	1.5×10^{-6}	0.0018

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average lead concentrations in the 0-1 and 0-3 foot soil increments, 66 and 65 mg/kg, respectively, are far below the calculated RBC of 2,008 mg/kg for lead in soil in such depths at commercial/industrial properties. The average concentration in the 1-6 foot increment, 3,343 mg/kg, is below the UCL of 6,000 mg/kg. Thus, post-remediation lead concentrations in the surface and subsurface soils of this parcel are below the benchmark levels of concern.

5.3 Parcel J9-23-16

Parcel J9-23-16 is a commercial/industrial property owned by GE, which will execute an ERE for the property. A property-specific risk evaluation has been performed for this

parcel based on the average post-remediation concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot and 1-6 foot depth increments. The COPCs evaluated and their average post-remediation concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)	
COPCs	**0-1 foot**	**1-6 foot**
Benzene	0.0037	0.004
Benzo(a)anthracene	0.21	3.08
Benzo(a)pyrene	0.23	3.08
Benzo(b)fluoranthene	0.24	3.08
Dibenzo(a,h)anthracene	0.21	3.12
Indeno(1,2,3-cd)pyrene	0.22	3.10
Arsenic	5.8	19
Chromium	21	87
Lead	52	1,670

Consistent with the approach used by EPA in supporting the Performance Standards for PCBs, the Groundskeeper scenario has been used to evaluate risks for the 0-1 foot depth increment, while the Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-16 are as follows:

Scenario	**ECLR**	**HI**
Groundskeeper (0-1 foot)	1.0×10^{-6}	0.0038
Utility Worker (1-6 foot)	2.2×10^{-6}	0.0027

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average lead concentration in the 0-1 foot soil increment, 52 mg/kg, is far below the calculated Groundskeeper RBC of 2,008 mg/kg. The average concentration in the 1-6 foot increment, 1,670 mg/kg, is well below the UCL of 6,000 mg/kg. Thus, the post-remediation lead concentrations in the soils of this parcel are below the benchmark levels of concern.

5.4 Parcel J9-23-17

Parcel J9-23-17 is a recreational property for which the property owner has agreed to execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot and 1-3 foot depth increments. However, in light of ongoing discussions between GE and the City of Pittsfield about a subordination agreement for the ERE, the 0-3 foot depth increment has also been evaluated at this parcel. The COPCs evaluated and their average existing concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	**0-1 foot**	**0-3 foot**	**1-3 foot**
1,4-Dichlorobenzene	0.2	0.2	0.2
Vinyl chloride	0.0079	0.0087	0.0101
Benzo(a)anthracene	0.36	0.61	1.12
Benzo(a)pyrene	0.35	0.66	1.28
Benzo(b)fluoranthene	0.50	0.80	1.4
Benzo(k)fluoranthene	0.25	0.37	0.62
Dibenzo(a,h)anthracene	0.33	0.34	0.36
Indeno(1,2,3-cd)pyrene	0.4	0.56	0.90
Antimony	7.55	8.16	9.48
Arsenic	14.64	13.03	9.50
Chromium	42.59	34.44	16.52
Copper	1,406.55	286.33	420.00
Lead	934.35	683.61	140.33

Consistent with the approach used by EPA in supporting the Performance Standards for PCBs, the Child Recreational User scenario has been used to evaluate risks for the 0-1 foot depth increment. Further, as a conservative measure, that same scenario has been applied to evaluate risks for the 1-3 foot and 0-3 foot depth increments. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-17 are as follows:

Scenario	**ECLR**	**HI**
Child Recreational User (0-1 foot)	6.2×10^{-6}	0.19
Child Recreational User (0-3 foot)	6.7×10^{-6}	0.14
Child Recreational User (1-3 foot)	7.5×10^{-6}	0.13

All these estimated risks and hazards are below the levels of concern specified in the SOW.

The average lead concentrations in the 0-1, 0-3, and 1-3 foot soil increments, 934, 684, and 140 mg/kg, respectively, are below the calculated RBC of 1,313 mg/kg for lead in soil under the Child Recreational scenario. Thus, the existing lead concentrations in the soils of this parcel do not present a risk of harm to Child Recreational Users who may be present there.

5.5 Parcel J9-23-18

Parcel J9-23-18 is a commercial/industrial parcel for which the property owner has declined to execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot depth increments. The COPCs evaluated and their average existing concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	**0-1 foot**	**0-3 foot**	**1-6 foot**
Benzo(a)anthracene	1.46	1.33	3.02
Benzo(a)pyrene	1.60	1.41	2.91
Benzo(b)fluoranthene	1.45	1.39	3.15
Dibenzo(a,h)anthracene	0.37	0.32	0.52
Indeno(1,2,3-cd)pyrene	1.02	0.88	1.37
Arsenic	6.80	6.88	6.37
Lead	204.26	167.91	362.65

The Groundskeeper scenario has been used to evaluate risks for the 0-1 and 0-3 foot depth increments, while the Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated cancer risk and non-cancer hazard for all COPCs evaluated at Parcel J9-23-18 are:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	2.6×10^{-6}	0.0045
Groundskeeper (0-3 foot)	2.4×10^{-6}	0.0045
Utility Worker (1-6 foot)	1.2×10^{-6}	0.00090

These values are well below the levels of concern specified in the SOW.

The average lead concentrations in the 0-1 foot and 1-3 foot soil increments, 204 and 168 mg/kg, respectively, are well below the calculated Groundskeeper RBC of 2,008 mg/kg. Thus, lead levels in surface soils present no hazard to Groundskeepers who may work there. The lead concentration in the 1-6 foot increment, 363 mg/kg, is well below the UCL concentration of 6,000 mg/kg for the Utility Worker.

5.6 Parcel J9-23-19

Parcel J9-23-19 is one of three adjacent commercial/industrial parcels that are owned by the same owner and for which the owner has declined to agree to an ERE. A parcel-specific risk evaluation has been performed for this parcel based on the average post-remediation concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The soil depths subject to evaluation at this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot depth increments. The COPCs evaluated at this parcel and their average post-remediation concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	0-1 foot	0-3 foot	1-6 foot
Benzene	0.003	0.01	0.01
Vinyl chloride	0.003	0.01	0.02
1,4-Dichlorobenzene	0.58	0.54	0.35
Benzo(a)anthracene	1.79	3.07	3.57
Benzo(a)pyrene	1.51	2.42	2.75
Benzo(b)fluoranthene	1.53	2.39	2.60
Benzo(k)fluoranthene	1.24	2.04	2.39
Dibenzo(a,h)anthracene	0.39	0.61	0.68
Indeno(1,2,3-cd)pyrene	0.78	1.33	1.53
Phenanthrene	2.88	5.13	6.11
Arsenic	5.67	10.77	16.44
Lead	46.06	51.76	50.16

For this parcel, the EPA Groundskeeper scenario has been used to evaluate risks for the 0-1 foot and 0-3 foot depth increments, while the EPA Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-19 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	2.4×10^{-6}	0.0037
Groundskeeper (0-3 foot)	4.1×10^{-6}	0.0071
Utility Worker (1-6 foot)	1.4×10^{-6}	0.0023

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average post-remediation lead concentrations in the 0-1 foot and 0-3 foot depth increments, 46 and 52 mg/kg, respectively, are far below the calculated Groundskeeper RBC of 2,008 mg/kg. Similarly, the average post-remediation lead concentration in the 1-6 foot depth increment, 50 mg/kg, is well below the UCL of 6,000 mg/kg. Thus, those lead concentrations would present no hazard to workers at this parcel.

5.7 Parcel J9-23-20

Parcel J9-23-20 is the second of the three parcels owned by the same owner who has declined to agree to an ERE. A parcel-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The soil depths subject to evaluation at this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot depth increments. The COPCs evaluated at this parcel and their average existing concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	0-1 foot	0-3 foot	1-6 foot
Vinyl chloride	0.0027	0.06	0.05
Benzo(a)anthracene	0.38	0.68	1.98
Benzo(a)pyrene	0.31	3.24	4.48
Benzo(b)fluoranthene	0.52	3.34	4.48
Dibenzo(a,h)anthracene	0.10	3.14	3.46
Indeno(1,2,3-cd)pyrene	0.16	3.16	4.00
Arsenic	4.43	5.27	5.58
Lead	23.97	56.67	130.55

Again, for this parcel, the EPA Groundskeeper scenario has been used to evaluate risks for the 0-1 foot and 0-3 foot depth increments, while the EPA Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-20 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	8.8×10^{-7}	0.0029
Groundskeeper (0-3 foot)	6.2×10^{-6}	0.0035
Utility Worker (1-6 foot)	2.3×10^{-6}	0.00079

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average existing lead concentrations in the 0-1 foot and 0-3 foot depth increments, 24 and 57 mg/kg, respectively, are far below the calculated Groundskeeper RBC of 2,008 mg/kg. Similarly, the average lead concentration in the 1-6 foot depth increment, 131 mg/kg, is well below the UCL of 6,000 mg/kg. Thus, those lead concentrations present no hazard to workers at this parcel.

5.8 Parcel J9-23-21

Parcel J9-23-21 is the third of three commercial/industrial parcels owned by the same owner who has declined to agree to an ERE. A parcel-specific risk evaluation has been performed for this parcel based on the average post-remediation concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot depth increments. The COPCs evaluated and their average post-remediation concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	0-1 foot	0-3 foot	1-6 foot
Benzo(a)anthracene	0.60	1.05	1.30
Benzo(a)pyrene	0.57	0.74	0.78
Benzo(b)fluoranthene	0.46	0.66	0.82
Dibenzo(a,h)anthracene	0.28	0.37	0.34
Indeno(1,2,3-cd)pyrene	0.43	0.47	0.44
Arsenic	7.94	6.96	4.98

The calculated total cancer risk and non-cancer hazard for all COPCs evaluated at Parcel J9-23-21 are:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	1.6×10^{-6}	0.0052
Groundskeeper (0-3 foot)	1.8×10^{-6}	0.0046
Utility Worker (1-6 foot)	4.5×10^{-7}	0.00070

These values are well below the levels of concern specified in the SOW. Lead is not a COPC for this parcel and thus has not been evaluated.

5.9 Parcel J9-23-22

Parcel J9-23-22 is a commercial/industrial property for which the owner has declined to execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The soil depths subject to risk evaluation for this parcel are the 0-1 foot, 0-3 foot, and 1-6 foot increments. The COPCs evaluated and their average existing concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)		
COPCs	0-1 foot	0-3 foot	1-6 foot
Benzo(a)anthracene	0.21	1.70	1.98
Benzo(a)pyrene	0.23	1.06	1.22
Benzo(b)fluoranthene	0.22	1.62	1.93
Dibenzo(a,h)anthracene	0.14	0.34	0.38
Arsenic	5.53	5.75	9.92
Lead	136.4	179.14	1,119.32

The Groundskeeper scenario has been used to evaluate risks for the 0-1 and 0-3 foot depth increments, while the Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-22 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	9.1×10^{-7}	0.0036
Groundskeeper (0-3 foot)	2.0×10^{-6}	0.0038
Utility Worker (1-6 foot)	7.1×10^{-7}	0.0014

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average lead concentrations in the 0-1 and 0-3 foot soil increments, 136 and 179 mg/kg, respectively, are well below the calculated Groundskeeper RBC of 2,008 mg/kg for lead in soil. The average concentration in the 1-6 foot increment, 1,119 mg/kg, is well below the UCL of 6,000 mg/kg. Thus, the existing lead concentrations in the soils of this parcel are below the benchmark levels of concern.

5.10 Parcel J9-23-23

Parcel J9-23-23 is a commercial/industrial property owned by GE, which will execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to risk evaluation for this parcel are the 0-1 foot and 1-6 foot depth increments. The COPCs evaluated and their average existing concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)	
COPCs	0-1 foot	1-6 foot
Benzo(a)pyrene	0.92	0.32
Dibenzo(a,h)anthracene	0.24	0.17
Arsenic	3.58	6.04
Lead	81.46	402.25

Consistent with the approach used by EPA in supporting the Performance Standards for PCBs, the Groundskeeper scenario has been used to evaluate risks for the 0-1 foot depth increment, while the Utility Worker scenario has been used to evaluate risks for the 1-6 foot depth increment. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-23 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	1.3×10^{-6}	0.0024
Utility Worker (1-6 foot)	2.6×10^{-7}	0.00085

All these estimated risks and hazards are well below the levels of concern specified in the SOW.

The average lead concentration in the 0-1 foot soil increment, 81 mg/kg, is far below the calculated Groundskeeper RBC of 2,008 mg/kg. The average concentration in the 1-6 foot increment, 402 mg/kg, is well below the UCL of 6,000 mg/kg. Thus, the existing lead concentrations at this parcel are below the benchmark levels of concern.

5.11 Parcel J9-23-24

Parcel J9-23-24 is a commercial/industrial property for which the property owner has agreed to execute an ERE. A property-specific risk evaluation has been performed for this parcel based on the average existing concentrations of all constituents that were retained for evaluation prior to the comparison to the MCP Method 1 soil standards. The depth increments subject to evaluation at this parcel are the 0-1 foot and 1-6 foot increments. The constituents evaluated and their average concentrations are as follows:

	Ave. Conc. Per Depth Increment (mg/kg)	
COPCs	0-1 foot	1-6 foot
Benzo(a)anthracene	1.95	0.35
Benzo(a)pyrene	2.05	0.29
Dibenzo(a,h)anthracene	0.57	0.17
Arsenic	6.07	6.28

Consistent with the approach used by EPA in supporting the PCB Performance Standards, the Groundskeeper scenario has been used to evaluate risks for the 0-1 foot depth increment, while the 1-6 foot depth increment has been evaluated using the Utility Worker scenario. The calculated total cancer risks and non-cancer hazards for all COPCs evaluated at Parcel J9-23-24 are as follows:

Scenario	ECLR	HI
Groundskeeper (0-1 foot)	2.9×10^{-6}	0.0040
Utility Worker (1-6 foot)	2.6×10^{-7}	0.00089

All these estimated risks and hazards are well below the levels of concern specified in the SOW. Lead is not a COPC for this parcel and thus has not been evaluated.

6.0 Summary of Results of Parcel-Specific Risk Evaluations

The predicted cancer risks and non-cancer hazards for the non-PCB COPCs at each of the Newell Street Area I parcels evaluated are summarized in Table 6. That table shows the cancer risk and non-cancer hazard results for each exposure pathway and depth increment evaluated at these parcels. (Backup COPC-specific calculations are provided in Attachment A.) As shown in Table 6, total estimated cancer risks do not exceed the identified cancer risk benchmark of 1×10^{-5} for any depth increment at any of the parcels evaluated. Similarly, non-cancer hazards resulting from exposures to surficial and subsurface soils do not exceed the target Hazard Index of 1.0 at any of the parcels. Finally, as discussed above, none of the average lead concentrations exceeds the relevant RBC (for the Groundskeeper and Child Recreation scenarios) or the UCL (for the Utility Worker scenario). Thus, it can be concluded that, following the soil remediation proposed by GE, the soil concentrations for all such COPCs at the Newell Street Area 1 parcels would not present a risk of harm under the exposure scenarios evaluated.

References

BBL. 1999. *Statement of Work for Removal Actions Outside the River.* Appendix E to Consent Decree, Volume 1, *United States et al. v. General Electric Company* (D. Mass.). Blasland, Bouck & Lee, Syracuse, NY. October.

EPA. 1993. *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.* U.S. EPA, Office of Research and Development. EPA/600/R-93/089.

EPA. 1996. *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil.* U.S. Environmental Protection Agency, Technical Review Workgroup for Lead. December.

EPA. 1997. *Health Effects Assessment Summary Tables, FY 1997 Update.* U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA-540-R-97-036. July.

EPA. 1999a. *Protectiveness of Cleanup Levels for Removal Actions Outside the River – Protection of Human Health.* Memorandum from Ann-Marie Burke, EPA Region 1 to Richard Cavagnero, EPA Region 1. U.S. Environmental Protection Agency, Region I. Attachment A to Appendix D to Consent Decree in *United States et al. v. General Electric Company* (D. Mass.). August 4.

EPA. 1999b. *Use of the TRW Interim Adult Lead Methodology in Risk Assessment.* Memorandum from P. Van Leeuwen, Region 5 Superfund Program to M. Maddaloni, TRW Adult Lead Subgroup. April 7.

EPA. 1999c. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance (Final Draft).* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington. March 14.

EPA. 2001a. *Review of Adult Lead Models - Evaluation of Models for Assessing Human Health Risks Associated with Lead Exposures at Non-Residential Areas of Superfund and Other Hazardous Waste Sites.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA 9285.7-46. August.

EPA. 2001b. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E Supplemental Guidance for Dermal Risk Assessment) Interim (Review Draft).* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington. September.

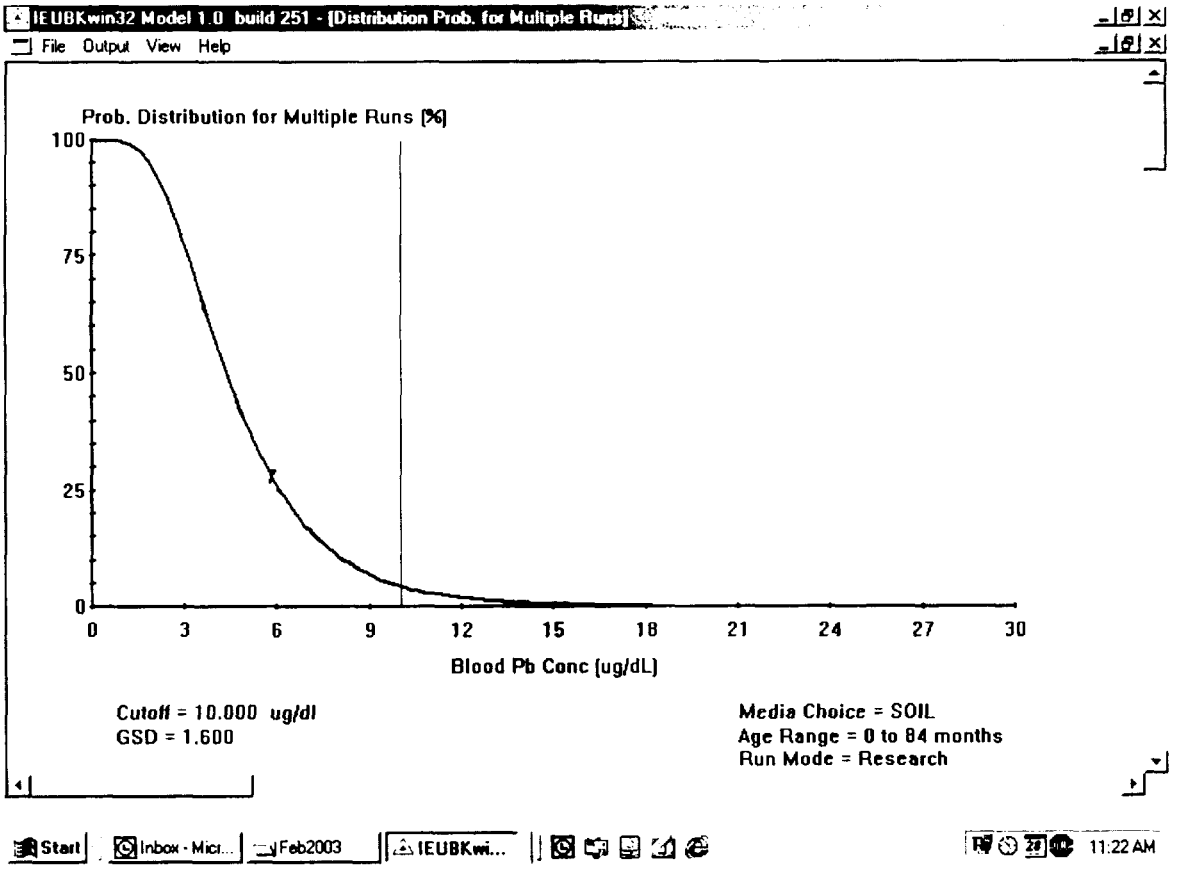
EPA. 2002. *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK).* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. EPA 9285.7-42. 540-K-01-005. May.

EPA. 2003. U.S. EPA Integrated Risk Information System (IRIS). http://www.epa.gov/iriswebp/iris/index.html

MDEP. 1994. *Background Documentation for the Development of the MCP Numerical Standards.* Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. April.

MDEP. 1995. *Guidance for Disposal Site Risk Characterization – In Support of the Massachusetts Contingency Plan.* Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards. Interim Policy WSC/ORS-95-141. July.

Figure 1. Output for Multiple Runs of the IEUBK Model for the Child Recreational Use Scenario



Run #	% Above	Concentration
1	4.964	1310.000
2	4.971	1310.830
3	4.979	1311.670
4	4.986	1312.500
5	4.994	1313.330
6	5.002	1314.170
7	5.009	1315.000

Table 1. Parcel-Specific Arithmetic Mean Exposure Point Concentrations

Constituent	J9-23-12		J9-23-13			J9-23-16		J9-23-17			J9-23-18			J9-23-19		
	0 to 1	1 to 3	0 to 1	0 to 3	1 to 6	0 to 1	1 to 6	0 to 1	0 to 3	1 to 3	0 to 1	0 to 3	1 to 6	0 to 1	0 to 3	1 to 6
1,4-Dichlorobenzene	-	-	-	-	-	-	-	0.2	0.2	0.2	-	-	-	0.58	0.54	0.35
Benzene	-	-	-	-	-	0.0037	0.004	-		-	-	-	-	0.003	0.01	0.01
Vinyl Chloride	-	-	-	-	-	-	-	0.0079	0.0087	0.0101	-	-	-	0.003	0.01	0.02
Benzo(a)anthracene	1.99	0.40	0.303	0.27	2.74	0.21	3.08	0.36	0.61	1.12	1.46	1.33	3.02	1.79	3.07	3.57
Benzo(a)pyrene	1.68	0.44	0.301	0.27	3.33	0.23	3.08	0.35	0.66	1.28	1.60	1.41	2.91	1.51	2.42	2.75
Benzo(b)fluoranthene	2.13	0.61	0.237	0.22	3.93	0.24	3.08	0.50	0.80	1.4	1.45	1.39	3.15	1.53	2.39	2.60
Benzo(k)fluoranthene	1.57	0.36	-	-	-	-	-	0.25	0.37	0.62	-	-	-	1.24	2.04	2.39
Dibenzo(a,h)anthracene	0.74	0.18	0.217	0.22	0.69	0.21	3.12	0.33	0.34	0.36	0.37	0.32	0.52	0.39	0.61	0.68
Indeno(1,2,3-cd)pyrene	1.29	0.23	0.231	0.22	1.53	0.22	3.10	0.4	0.56	0.90	1.02	0.88	1.37	0.78	1.33	1.53
Phenanthrene	-	-	-	-	-	-	-	-		-	-	-	-	2.88	5.13	6.11
Antimony	-	-	-	-	-	-	-	7.55	8.16	9.48	-	-	-	-	-	-
Arsenic	7.98	6.2	6.57	6.46	12.6	5.8	19	14.64	13.03	9.50	6.8	6.88	6.37	5.67	10.77	16.44
Chromium	-	-	-	-	-	21	87	42.59	34.44	16.52	-	-	-	-	-	-
Copper	-	-	-	-	-	-	-	1,406.55	286.33	420.0	-	-	-	-	-	-
Lead	55	61	66	65	3,343	52	1,670	934.35	683.61	140.33	204.26	167.91	362.65	46.06	51.76	50.16

Constituent	J9-23-20			J9-23-21			J9-23-22			J9-23-23		J9-23-24	
	0 to 1	0 to 3	1 to 6	0 to 1	0 to 3	1 to 6	0 to 1	0 to 3	1 to 6	0 to1	1 to 6	0 to 1	1 to 6
1,4-Dichlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	0.0027	0.06	0.05	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	0.38	0.68	1.98	0.60	1.05	1.30	0.21	1.70	1.98	-	-	1.95	0.35
Benzo(a)pyrene	0.31	3.24	4.48	0.57	0.74	0.78	0.23	1.06	1.22	0.92	0.32	2.05	0.29
Benzo(b)fluoranthene	0.52	3.34	4.48	0.46	0.66	0.82	0.22	1.62	1.93	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	0.10	3.14	3.46	0.28	0.37	0.34	0.14	0.34	0.38	0.24	0.17	0.57	0.17
Indeno(1,2,3-cd)pyrene	0.16	3.16	4.00	0.43	0.47	0.44	-	-	-	-	-	-	-
Phenanthrene	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	4.43	5.27	5.58	7.94	6.96	4.98	5.53	5.75	9.92	3.58	6.04	6.07	6.28
Chromium	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	23.97	56.67	130.55	-	-	-	136.4	179.14	1,119.32	81.46	402.25	-	-

Table 2. Summary of Exposure Parameters for the Groundskeeper, Utility Worker and Child Recreational Use Scenarios

Parameter	Values				Basis
			Child Recreational Use		
	Groundskeeper	Utility Worker	1-6 years	7-13 years[a]	
Soil Ingestion Rate	50 mg/day	137 mg/day	200 mg/day	100 mg/day	EPA, 1999a
Fraction from the Site[b]	1.0	1.0	0.5	0.5	EPA, 1999a
Dermal Adherence Factor	0.1 mg/cm^2	0.8 mg/cm^2			
May through September	-	-	0.24 mg/cm^2	0.26 mg/cm^2	EPA, 1999a
October and November	-	-	0.23 mg/cm^2	0.26 mg/cm^2	EPA, 1999a
Seasonal Time-weighted Ave.[c]	-	-	0.237 mg/cm^2	0.26 mg/cm^2	Calculated
Skin Surface Area Exposed	3300 cm^2	3300 cm^2			
May through September	-	-	2900 cm^2	4276 cm^2	EPA, 1999a
October and November	-	-	1340 cm^2	1733 cm^2	EPA, 1999a
Seasonal Time-weighted Ave.[c]	-	-	2454 cm^2	3549 cm^2	Calculated
Exposure Frequency	84 days/year	5 days/year	84 days/year	84 days/year	EPA, 1999a
Exposure Duration	25 years	25 years	6 years	6 years	EPA, 1999a
Body Weight	70 kg	70 kg	15 kg	36.8 kg	EPA, 1999a
Carcinogenic Averaging Time	25,550 days	25,550 days	25,550 days	25,550 days	EPA, 1999a
Non-Carcinogenic Averaging Time	9125 days	9125 days	2190 days	2190 days	EPA, 1999a

[a] Only used for the evaluation of carcinogenic risks. The noncancer hazards are evaluated for the 1 to 6 year age group only.

[b] Fraction from site only used for the soil ingestion pathway.

[c] Seasonal time-weighted average calculated using the following method: ((May-September*5)+(October-November*2))/7

Table 3. Summary of Chemical-Specific Exposure Point Concentrations, Absorption Factors, and Toxicity Values

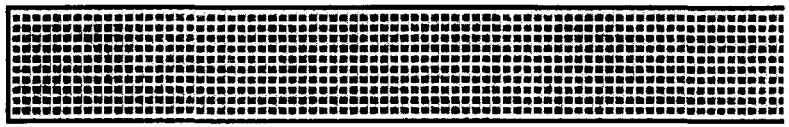
Constituent	Oral Absorption Factor[1]	Dermal Absorption Factor [2]	Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Reference Dose (mg/kg-day)
1,4-Dichlorobenzene	1	0.1	0.024 [3]	0.03 [4]
Benzene	1	0	0.055 [5]	0.003 [4]
Vinyl Chloride	1	0	0.75 or 1.5 [5,6]	0.003 [5]
Benz(a)anthracene	1	0.13	0.73 [7]	
Benzo(a)pyrene	1	0.13	7.3 [5]	
Benzo(b)fluoranthene	1	0.13	0.73 [7]	
Benzo(k)fluoranthene	1	0.13	0.073 [7]	
Dibenz(a,h)anthracene	1	0.13	7.3 [7]	
Indeno(1,2,3-cd)pyrene	1	0.13	0.73 [7]	
Phenanthrene	1	0.13		0.04 [8]
Antimony	1	0.1 [8]		0.0004 [5]
Arsenic	1	0.03 [8]	1.5 [5]	0.0003 [5]
Chromium[9]	1	0.04 [8]		1.5 [5]
Copper	1	0.03 [10]		0.04 [3,11]
Lead[12]	NA	NA	NA	NA

Notes:

1. Conservative default
2. From EPA Dermal Guidance Document (EPA, 2001b), except where noted.
3. EPA (1997) Health Effects Summary Tables
4. NCEA provisional as reported in documentation for EPA Region 9 PRGs
5. From IRIS (EPA, 2003)
6. IRIS presents two CSFs: 1.5 $(mg/kg\text{-}day)^{-1}$ for child exposures; 0.75 $(mg/kg\text{-}day)^{-1}$ for adult exposures
7. Derived through application of RPFs (EPA, 1993) to CSF for benzo(a)pyrene.
8. MDEP (1994)
9. Evaluated as trivalent chromium
10. From MDEP (1995)
11. EPA (1997) lists a reference dose of 1.3 mg/L for drinking water. This has been converted to an oral RfD in the EPA Region 9 PRGs.
12. Lead evaluated using EPA's IEUBK model for children and the Adult Lead Methodology for Adults (see text).

Table 4. Calculation of Preliminary Remediation Goal (PRG) for Lead at Newell Street I for the Groundskeeper Scenario

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee



Version date 2/19/03

Exposure Variable	PRG Equation[1] 1*	PRG Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario Using Equation 1 GSDi = Hom
$PbB_{fetal,\ 0.95}$	X	X	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	1.9
PbB_0	X	X	Baseline PbB	ug/dL	1.8
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	3
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	7
PRG	Preliminary Remediation Goal			ppm	2,008

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same PRG.

***Equation 1, based on Eq. 4 in USEPA (1996).**

$$PRG = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645})])-PbB_0)*AT_{S,D}}{BKSF*(IR_{S+D}*AF_{S,D}*EF_{S,D})}$$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table 5. Evaluation of Lead Model for the Child Recreational User

LEAD MODEL FOR WINDOWS Version 1.0 Build 251

==========

Model Version: 1.0 Build 251
User Name: AMEC E&E
Date: February 28, 2003
Site Name: Newell St. Recreational Properties
Run Mode: Research

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******
Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******
Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 ug Pb/L

Table 5. Evaluation of Lead Model for the Child Recreational User (cont.)

****** Soil & Dust ******

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	200.000	150.000
1-2	200.000	150.000
2-3	200.000	150.000
3-4	200.000	150.000
4-5	200.000	150.000
5-6	200.000	150.000
6-7	200.000	150.000

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******
Maternal Blood Concentration: 2.500 ug Pb/dL
****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/dL)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.618	0.000	0.379
1-2	0.034	2.730	0.000	0.945
2-3	0.062	3.082	0.000	0.988
3-4	0.067	2.987	0.000	1.015
4-5	0.067	2.906	0.000	1.064
5-6	0.093	3.077	0.000	1.126
6-7	0.093	3.402	0.000	1.147

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.813	4.830	2.6
1-2	2.835	6.544	2.8
2-3	2.851	6.983	2.6
3-4	2.873	6.942	2.4
4-5	2.152	6.189	2.1
5-6	1.959	6.255	1.9
6-7	1.861	6.503	1.8

Table 6. Summary of Risks and Hazards at Newell Street I Properties

Parcel Number	Exposure Pathway	Cancer Risk				Hazard Index			
		0- to 1-foot	0- to 3-foot	1- to 3-foot	1- to 6-foot	0- to 1-foot	0- to 3-foot	1- to 3-foot	1- to 6-foot
J9-23-12	Soil Ingestion	5.3E-06	NR	2.3E-06	NR	0.041	NR	0.032	NR
Recreational	Dermal Exposure	4.0E-06	NR	1.2E-06	NR	0.007	NR	0.0055	NR
	Total	**9.3E-06**	NR	**3.6E-06**	NR	**0.048**	NR	**0.037**	NR
J9-23-13	Soil Ingestion	8.3E-07	8.1E-07	NR	5.2E-07	0.0036	0.0035	NR	0.0011
Commercial	Dermal Exposure	3.3E-07	3.2E-07	NR	9.5E-07	0.00071	0.00070	NR	0.00065
	Total	**1.2E-06**	**1.1E-06**	NR	**1.5E-06**	**0.0043**	**0.0042**	NR	**0.0018**
J9-23-16	Soil Ingestion	7.3E-07	NR	NR	7.7E-07	0.0032	NR	NR	0.0017
Commercial	Dermal Exposure	2.9E-07	NR	NR	1.4E-06	0.00063	NR	NR	0.00098
	Total	**1.0E-06**	NR	NR	**2.2E-06**	**0.0038**	NR	NR	**0.0027**
J9-23-17	Soil Ingestion	4.4E-06	4.5E-06	4.6E-06	NR	0.16	0.11	0.101	NR
Recreational	Dermal Exposure	1.8E-06	2.2E-06	2.9E-06	NR	0.030	0.030	0.030	NR
	Total	**6.2E-06**	**6.7E-06**	**7.5E-06**	NR	**0.19**	**0.14**	**0.13**	NR
J9-23-18	Soil Ingestion	1.6E-06	1.5E-06	NR	3.8E-07	0.0037	0.0038	NR	0.00057
Commercial	Dermal Exposure	9.9E-07	8.9E-07	NR	7.9E-07	0.00074	0.00075	NR	0.00033
	Total	**2.6E-06**	**2.4E-06**	NR	**1.2E-06**	**0.0045**	**0.0045**	NR	**0.00090**
J9-23-19	**Soil Ingestion**	**1.5E-06**	**3.0E-06**	NR	**5.3E-07**	**0.0031**	**0.0059**	NR	**0.0015**
Commercial	Dermal Exposure	9.5E-07	1.9E-06	NR	8.8E-07	0.0006	0.0012	NR	0.00086
	Total	**2.4E-06**	**4.1E-06**	NR	**1.4E-06**	**0.0037**	**0.0071**	NR	**0.0023**
J9-23-20	Soil Ingestion	6.1E-07	3.5E-06	NR	7.1E-07	0.0024	0.0029	NR	0.00050
Commercial	Dermal Exposure	2.7E-07	2.7E-06	NR	1.6E-06	0.0005	0.00057	NR	0.00029
	Total	**8.8E-07**	**6.2E-06**	NR	**2.3E-06**	**0.0029**	**0.0035**	NR	**0.00079**
J9-23-21	Soil Ingestion	1.1E-06	1.2E-06	NR	1.7E-07	0.0044	0.0038	NR	0.00045
Commercial	Dermal Exposure	5.1E-07	6.1E-07	NR	2.8E-07	0.0009	0.0008	NR	0.00026
	Total	**1.6E-06**	**1.8E-06**	NR	**4.5E-07**	**0.0052**	**0.0046**	NR	**0.00070**
J9-23-22	Soil Ingestion	6.6E-07	1.2E-06	NR	2.8E-07	0.0030	0.0032	NR	0.00089
Commercial	Dermal Exposure	2.5E-07	7.4E-07	NR	4.3E-07	0.0006	0.0006	NR	0.00051
	Total	**9.1E-07**	**2.0E-06**	NR	**7.1E-07**	**0.0036**	**0.0038**	NR	**0.0014**
J9-23-23	Soil Ingestion	8.1E-07	NR	NR	1.2E-07	0.0020	NR	NR	0.00054
Commercial	Dermal Exposure	4.9E-07	NR	NR	1.4E-07	0.0004	NR	NR	0.00031
	Total	**1.3E-06**	NR	NR	**2.6E-07**	**0.0024**	NR	NR	**0.00085**
J9-23-24	Soil Ingestion	1.7E-06	NR	NR	1.2E-07	0.0033	NR	NR	0.00056
Commercial	Dermal Exposure	1.1E-06	NR	NR	1.4E-07	0.00066	NR	NR	0.00032
	Total	**2.9E-06**	NR	NR	**2.6E-07**	**0.0040**	NR	NR	**0.00089**

NR = Not relevant for this property

amec

Attachment 1

Risk Calculations for the Newell Street Area I Properties

Parcel J9-23-12

Table A1a - Parcel J9-23-12: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benz(a)anthracene	1.99	200	1.0	0.5	84	6	1E-06	15	25550	2.6E-07	0.73	1.9E-07
Benzo(a)pyrene	1.68	200	1.0	0.5	84	6	1E-06	15	25550	2.2E-07	7.3	1.6E-06
Benzo(b)fluoranthene	2.13	200	1.0	0.5	84	6	1E-06	15	25550	2.8E-07	0.73	2.0E-07
Benzo(k)fluoranthene	1.57	200	1.0	0.5	84	6	1E-06	15	25550	2.1E-07	0.073	1.5E-08
Dibenzo(a,h)anthracene	0.74	200	1.0	0.5	84	6	1E-06	15	25550	9.7E-08	7.3	7.1E-07
Indeno(1,2,3-cd)pyrene	1.29	200	1.0	0.5	84	6	1E-06	15	25550	1.7E-07	0.73	1.2E-07
Arsenic	7.98	200	1.0	0.5	84	6	1E-06	15	25550	1.0E-06	1.5	1.6E-06
											Total	**4.4E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	7.98	200	1.0	0.5	84	6	1E-06	15	2,190	1.2E-05	0.0003	4.1E-02
											Total	**4.1E-02**

Table A1b - Parcel J9-23-12: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)	Risk
Benz(a)anthracene	1.99	0.237	2,454	0.13	84	6	1E-06	15	25,550	2.0E-07	0.73	1.4E-07
Benzo(a)pyrene	1.68	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.7E-07	7.3	1.2E-06
Benzo(b)fluoranthene	2.13	0.237	2,454	0.13	84	6	1E-06	15	25,550	2.1E-07	0.73	1.5E-07
Benzo(k)fluoranthene	1.57	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.6E-07	0.073	1.1E-08
Dibenzo(a,h)anthracene	0.74	0.237	2,454	0.13	84	6	1E-06	15	25,550	7.4E-08	7.3	5.4E-07
Indeno(1,2,3-cd)pyrene	1.29	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.3E-07	0.73	9.4E-08
Arsenic	7.98	0.237	2,454	0.03	84	6	1E-06	15	25,550	1.8E-07	1.5	2.7E-07
											Total	**2.4E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	7.98	0.237	2,454	0.03	84	6	1E-06	15	2,190	2.1E-06	0.0003	7.1E-03
											Total	**7.1E-03**

Table A1c - Parcel J9-23-12: Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benz(a)anthracene	1.99	100	1.0	0.5	84	6	1E-06	36.8	25550	5.3E-08	0.73	3.9E-08
Benzo(a)pyrene	1.68	100	1.0	0.5	84	6	1E-06	36.8	25550	4.5E-08	7.3	3.3E-07
Benzo(b)fluoranthene	2.13	100	1.0	0.5	84	6	1E-06	36.8	25550	5.7E-08	0.73	4.2E-08
Benzo(k)fluoranthene	1.57	100	1.0	0.5	84	6	1E-06	36.8	25550	4.2E-08	0.073	3.1E-09
Dibenzo(a,h)anthracene	0.74	100	1.0	0.5	84	6	1E-06	36.8	25550	2.0E-08	7.3	1.4E-07
Indeno(1,2,3-cd)pyrene	1.29	100	1.0	0.5	84	6	1E-06	36.8	25550	3.5E-08	0.73	2.5E-08
Arsenic	7.98	100	1.0	0.5	84	6	1E-06	36.8	25550	2.1E-07	1.5	3.2E-07
											Total	**9.0E-07**

Table A1d - Parcel J9-23-12: Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 7-13 Years
CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benz(a)anthracene	1.99	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.3E-07	0.73	9.3E-08
Benzo(a)pyrene	1.68	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.1E-07	7.3	7.9E-07
Benzo(b)fluoranthene	2.13	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.4E-07	0.73	1.0E-07
Benzo(k)fluoranthene	1.57	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.0E-07	0.073	7.4E-09
Dibenzo(a,h)anthracene	0.74	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	4.8E-08	7.3	3.5E-07
Indeno(1,2,3-cd)pyrene	1.29	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	8.3E-08	0.73	6.1E-08
Arsenic	7.98	0.26	3,549	0.03	84	6	1E-06	36.8	25,550	1.2E-07	1.5	1.8E-07
											Total	**1.6E-06**

Total Carcinogenic Risk		**Ingestion**		**Dermal**		**Total**
		1-6 Years	7-13 Years	1-6 Years	7-13 Years	1-13 Years
	Benzo(a)anthracene	**1.9E-07**	**3.9E-08**	**1.4E-07**	**9.3E-08**	**4.7E-07**
	Benzo(a)pyrene	**1.6E-06**	**3.3E-07**	**1.2E-06**	**7.9E-07**	**3.9E-06**
	Benzo(b)fluoranthene	**2.0E-07**	**4.2E-08**	**1.5E-07**	**1.0E-07**	**5.0E-07**
	Benzo(k)fluoranthene	1.5E-08	3.1E-09	1.1E-08	7.4E-09	3.7E-08
	Dibenzo(a,h)anthracene	7.1E-07	1.4E-07	5.4E-07	3.5E-07	1.7E-06
	Indeno(1,2,3-cd)pyrene	1.2E-07	2.5E-08	9.4E-08	6.1E-08	3.0E-07
	Arsenic	1.6E-06	3.2E-07	2.7E-07	1.8E-07	2.3E-06
	Total	**4.4E-06**	**9.0E-07**	**2.4E-06**	**1.6E-06**	**9.3E-06**

Total Noncarcinogenic Hazard		**Ingestion**	**Dermal**	**Total**
		1-6 Years	1-6 Years	1-6 Years
	Arsenic	4.1E-02	7.1E-03	4.8E-02
	Total	**0.041**	**0.0071**	**0.048**

Table A2a - Parcel J9-23-12: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benz(a)anthracene	0.4	200	1.0	0.5	84	6	1E-06	15	25550	5.3E-08	0.73	3.8E-08
Benzo(a)pyrene	0.44	200	1.0	0.5	84	6	1E-06	15	25550	5.8E-08	7.3	4.2E-07
Benzo(b)fluoranthene	0.61	200	1.0	0.5	84	6	1E-06	15	25550	8.0E-08	0.73	5.9E-08
Benzo(k)fluoranthene	0.36	200	1.0	0.5	84	6	1E-06	15	25550	4.7E-08	0.073	3.5E-09
Dibenzo(a,h)anthracene	0.18	200	1.0	0.5	84	6	1E-06	15	25550	2.4E-08	7.3	1.7E-07
Indeno(1,2,3-cd)pyrene	0.23	200	1.0	0.5	84	6	1E-06	15	25550	3.0E-08	0.73	2.2E-08
Arsenic	6.2	200	1.0	0.5	84	6	1E-06	15	25550	8.2E-07	1.5	1.2E-06
											Total	**1.9E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.2	200	1.0	0.5	84	6	1E-06	15	2,190	9.5E-06	0.0003	3.2E-02
											Total	3.2E-02

Table A2b - Parcel J9-23-12: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benz(a)anthracene	0.4	0.237	2,454	0.13	84	6	1E-06	15	25,550	4.0E-08	0.73	2.9E-08
Benzo(a)pyrene	0.44	0.237	2,454	0.13	84	6	1E-06	15	25,550	4.4E-08	7.3	3.2E-07
Benzo(b)fluoranthene	0.61	0.237	2,454	0.13	84	6	1E-06	15	25,550	6.1E-08	0.73	4.4E-08
Benzo(k)fluoranthene	0.36	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.6E-08	0.073	2.6E-09
Dibenzo(a,h)anthracene	0.18	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.8E-08	7.3	1.3E-07
Indeno(1,2,3-cd)pyrene	0.23	0.237	2,454	0.13	84	6	1E-06	15	25,550	2.3E-08	0.73	1.7E-08
Arsenic	6.2	0.237	2,454	0.03	84	6	1E-06	15	25,550	1.4E-07	1.5	2.1E-07
											Total	7.6E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.2	0.237	2,454	0.03	84	6	1E-06	15	2,190	1.7E-06	0.0003	5.5E-03
											Total	5.5E-03

Table A2c - Parcel J9-23-12: Cancer Risks from Ingestion Exposure to 1- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benz(a)anthracene	0.4	100	1.0	0.5	84	6	1E-06	36.8	25550	1.1E-08	0.73	7.8E-09
Benzo(a)pyrene	0.44	100	1.0	0.5	84	6	1E-06	36.8	25550	1.2E-08	7.3	8.6E-08
Benzo(b)fluoranthene	0.61	100	1.0	0.5	84	6	1E-06	36.8	25550	1.6E-08	0.73	1.2E-08
Benzo(k)fluoranthene	0.36	100	1.0	0.5	84	6	1E-06	36.8	25550	9.6E-09	0.073	7.0E-10
Dibenzo(a,h)anthracene	0.18	100	1.0	0.5	84	6	1E-06	36.8	25550	4.8E-09	7.3	3.5E-08
Indeno(1,2,3-cd)pyrene	0.23	100	1.0	0.5	84	6	1E-06	36.8	25550	6.2E-09	0.73	4.5E-09
Arsenic	6.2	100	1.0	0.5	84	6	1E-06	36.8	25550	1.7E-07	1.5	2.5E-07
											Total	**4.0E-07**

Table A2d - Parcel J9-23-12: Cancer Risks from Dermal Exposure to 1- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 7-13 Years
CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benz(a)anthracene	0.4	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.6E-08	0.73	1.9E-08
Benzo(a)pyrene	0.44	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.8E-08	7.3	2.1E-07
Benzo(b)fluoranthene	0.61	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	3.9E-08	0.73	2.9E-08
Benzo(k)fluoranthene	0.36	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.3E-08	0.073	1.7E-09
Dibenzo(a,h)anthracene	0.18	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.2E-08	7.3	8.4E-08
Indeno(1,2,3-cd)pyrene	0.23	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.5E-08	0.73	1.1E-08
Arsenic	6.2	0.26	3,549	0.03	84	6	1E-06	36.8	25,550	9.2E-08	1.5	1.4E-07
											Total	**4.9E-07**

Total Carcinogenic Risk		**Ingestion**		**Dermal**		**Total**
		1-6 Years	**7-13 Years**	**1-6 Years**	**7-13 Years**	
	Benzo(a)anthracene	**3.8E-08**	**7.8E-09**	**2.9E-08**	**1.9E-08**	**9.4E-08**
	Benzo(a)pyrene	**4.2E-07**	**8.6E-08**	**3.2E-07**	**2.1E-07**	**1.0E-06**
	Benzo(b)fluoranthene	**5.9E-08**	**1.2E-08**	**4.4E-08**	**2.9E-08**	**1.4E-07**
	Benzo(k)fluoranthene	3.5E-09	7.0E-10	2.6E-09	1.7E-09	8.5E-09
	Dibenzo(a,h)anthracene	1.7E-07	3.5E-08	1.3E-07	8.4E-08	4.2E-07
	Indeno(1,2,3-cd)pyrene	2.2E-08	4.5E-09	1.7E-08	1.1E-08	5.4E-08
	Arsenic	1.2E-06	2.5E-07	2.1E-07	1.4E-07	1.8E-06
	Total	**1.9E-06**	**4.0E-07**	**7.6E-07**	**4.9E-07**	**3.6E-06**

Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
		1-6 Years	1-6 Years	
	Arsenic	3.2E-02	5.5E-03	3.7E-02
	Total	**0.032**	**0.0055**	**0.037**

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Parcel J9-23-13

Table A3a - Parcel J9-23-13: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benzo(a)anthracene	0.303	50	1.0	84	25	1E-06	70	25550	1.8E-08	0.73	1.3E-08
Benzo(a)pyrene	0.301	50	1.0	84	25	1E-06	70	25550	1.8E-08	7.3	1.3E-07
Benzo(b)fluoranthene	0.237	50	1.0	84	25	1E-06	70	25550	1.4E-08	0.73	1.0E-08
Dibenzo(a,h)anthracene	0.217	50	1.0	84	25	1E-06	70	25550	1.3E-08	7.3	9.3E-08
Indeno(1,2,3-cd)pyrene	0.231	50	1.0	84	25	1E-06	70	25550	1.4E-08	0.73	9.9E-09
Arsenic	6.57	50	1.0	84	25	1E-06	70	25550	3.9E-07	1.5	5.8E-07
										Total	8.3E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.57	50	1.0	84	25	1E-06	70	9,125	1.1E-06	0.0003	3.6E-03
										Total	3.6E-03

Table A3b - Parcel J9-23-13: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.303	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.5E-08	0.73	1.1E-08
Benzo(a)pyrene	0.301	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.5E-08	7.3	1.1E-07
Benzo(b)fluoranthene	0.237	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	0.73	8.7E-09
Dibenzo(a,h)anthracene	0.217	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	7.3	8.0E-08
Indeno(1,2,3-cd)pyrene	0.231	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	0.73	8.5E-09
Arsenic	6.57	0.1	3,300	0.03	84	25	1E-06	70	25,550	7.6E-08	1.5	1.1E-07
											Total	**3.3E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.57	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.1E-07	0.0003	7.1E-04
											Total	**7.1E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	1.3E-08	1.1E-08	2.4E-08
	Benzo(a)pyrene	1.3E-07	1.1E-07	2.4E-07
	Benzo(b)fluoranthene	1.0E-08	8.7E-09	1.9E-08
	Dibenzo(a,h)anthracene	9.3E-08	8.0E-08	1.7E-07
	Indeno(1,2,3-cd)pyrene	9.9E-09	8.5E-09	1.8E-08
	Arsenic	5.8E-07	1.1E-07	6.9E-07
	Total	**8.3E-07**	**3.3E-07**	**1.2E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.6E-03	7.1E-04	4.3E-03
	Total	*0.00360*	*0.00071*	*0.00431*

Table A4a - Parcel J9-23-13: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.27	50	1.0	84	25	1E-06	70	25550	1.6E-08	0.73	1.2E-08
Benzo(a)pyrene	0.27	50	1.0	84	25	1E-06	70	25550	1.6E-08	7.3	1.2E-07
Benzo(b)fluoranthene	0.22	50	1.0	84	25	1E-06	70	25550	1.3E-08	0.73	9.4E-09
Dibenzo(a,h)anthracene	0.22	50	1.0	84	25	1E-06	70	25550	1.3E-08	7.3	9.4E-08
Indeno(1,2,3-cd)pyrene	0.22	50	1.0	84	25	1E-06	70	25550	1.3E-08	0.73	9.4E-09
Arsenic	6.46	50	1.0	84	25	1E-06	70	25550	3.8E-07	1.5	5.7E-07
										Total	**8.1E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.46	50	1.0	84	25	1E-06	70	9,125	1.1E-06	0.0003	3.5E-03
										Total	**3.5E-03**

Table A4b - Parcel J9-23-13: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.27	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.4E-08	0.73	9.9E-09
Benzo(a)pyrene	0.27	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.4E-08	7.3	9.9E-08
Benzo(b)fluoranthene	0.22	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	8.1E-09
Dibenzo(a,h)anthracene	0.22	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	7.3	8.1E-08
Indeno(1,2,3-cd)pyrene	0.22	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	8.1E-09
Arsenic	6.46	0.1	3,300	0.03	84	25	1E-06	70	25,550	7.5E-08	1.5	1.1E-07
											Total	3.2E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.46	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.1E-07	0.0003	7.0E-04
											Total	7.0E-04

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	1.2E-08	9.9E-09	2.1E-08
	Benzo(a)pyrene	1.2E-07	9.9E-08	2.1E-07
	Benzo(b)fluoranthene	9.4E-09	8.1E-09	1.8E-08
	Dibenzo(a,h)anthracene	9.4E-08	8.1E-08	1.8E-07
	Indeno(1,2,3-cd)pyrene	9.4E-09	8.1E-09	1.8E-08
	Arsenic	5.7E-07	1.1E-07	6.8E-07
	Total	**8.1E-07**	**3.2E-07**	**1.1E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.5E-03	7.0E-04	4.2E-03
	Total	**0.00354**	**0.00070**	**0.00424**

Table A5a - Parcel J9-23-13: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	2.74	137	1.0	5	25	1E-06	70	25550	2.6E-08	0.73	1.9E-08
Benzo(a)pyrene	3.33	137	1.0	5	25	1E-06	70	25550	3.2E-08	7.3	2.3E-07
Benzo(b)fluoranthene	3.93	137	1.0	5	25	1E-06	70	25550	3.8E-08	0.73	2.7E-08
Dibenzo(a,h)anthracene	0.69	137	1.0	5	25	1E-06	70	25550	6.6E-09	7.3	4.8E-08
Indeno(1,2,3-cd)pyrene	1.53	137	1.0	5	25	1E-06	70	25550	1.5E-08	0.73	1.1E-08
Arsenic	12.6	137	1.0	5	25	1E-06	70	25550	1.2E-07	1.5	1.8E-07
										Total	**5.2E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	12.6	137	1.0	5	25	1E-06	70	9.125	3.4E-07	0.0003	1.1E-03
										Total	**1.1E-03**

Table A5b - Parcel J9-23-13: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	2.74	0.8	3,300	0.13	5	25	1E-06	70	25,550	6.6E-08	0.73	4.8E-08
Benzo(a)pyrene	3.33	0.8	3,300	0.13	5	25	1E-06	70	25,550	8.0E-08	7.3	5.8E-07
Benzo(b)fluoranthene	3.93	0.8	3,300	0.13	5	25	1E-06	70	25,550	9.4E-08	0.73	6.9E-08
Dibenzo(a,h)anthracene	0.69	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.7E-08	7.3	1.2E-07
Indeno(1,2,3-cd)pyrene	1.53	0.8	3,300	0.13	5	25	1E-06	70	25,550	3.7E-08	0.73	2.7E-08
Arsenic	12.6	0.8	3,300	0.03	5	25	1E-06	70	25,550	7.0E-08	1.5	1.0E-07
											Total	**9.5E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	12.6	0.8	3,300	0.03	5	25	1E-06	70	9,125	2.0E-07	0.0003	6.5E-04
											Total	**6.5E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	1.9E-08	4.8E-08	6.7E-08
	Benzo(a)pyrene	2.3E-07	5.8E-07	8.2E-07
	Benzo(b)fluoranthene	2.7E-08	6.9E-08	9.6E-08
	Dibenzo(a,h)anthracene	4.8E-08	1.2E-07	1.7E-07
	Indeno(1,2,3-cd)pyrene	1.1E-08	2.7E-08	3.7E-08
	Arsenic	1.8E-07	1.0E-07	2.9E-07
	Total	**5.2E-07**	**9.5E-07**	**1.5E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	1.1E-03	6.5E-04	1.8E-03
	Total	**0.00113**	**0.00065**	**0.00178**

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Parcel J9-23-16

Table A6a - Parcel J9-23-16: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzene	0.0037	50	1.0	84	25	1E-06	70	25550	2.2E-10	0.055	1.2E-11
Benzo(a)anthracene	0.21	50	1.0	84	25	1E-06	70	25550	1.2E-08	0.73	9.0E-09
Benzo(a)pyrene	0.23	50	1.0	84	25	1E-06	70	25550	1.4E-08	7.3	9.9E-08
Benzo(b)fluoranthene	0.24	50	1.0	84	25	1E-06	70	25550	1.4E-08	0.73	1.0E-08
Dibenzo(a,h)anthracene	0.21	50	1.0	84	25	1E-06	70	25550	1.2E-08	7.3	9.0E-08
Indeno(1,2,3-cd)pyrene	0.22	50	1.0	84	25	1E-06	70	25550	1.3E-08	0.73	9.4E-09
Arsenic	5.8	50	1.0	84	25	1E-06	70	25550	3.4E-07	1.5	5.1E-07
										Total	7.3E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Benzene	0.0037	50	1.0	84	25	1E-06	70	9,125	6.1E-10	0.003	2.0E-07
Arsenic	5.8	50	1.0	84	25	1E-06	70	9,125	9.5E-07	0.0003	3.2E-03
Chromium	21	50	1.0	84	25	1E-06	70	9,125	3.5E-06	1.5	2.3E-06
										Total	3.2E-03

Table A6b - Parcel J9-23-16: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzene	0.0037	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.055	0.0E+00
Benzo(a)anthracene	0.21	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	7.7E-09
Benzo(a)pyrene	0.23	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	7.3	8.5E-08
Benzo(b)fluoranthene	0.24	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	0.73	8.8E-09
Dibenzo(a,h)anthracene	0.21	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	7.3	7.7E-08
Indeno(1,2,3-cd)pyrene	0.22	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	8.1E-09
Arsenic	5.8	0.1	3,300	0.03	84	25	1E-06	70	25,550	6.7E-08	1.5	1.0E-07
											Total	**2.9E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Benzene	0.0037	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Arsenic	5.8	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.9E-07	0.0003	6.3E-04
Chromium	21	0.1	3,300	0.04	84	25	1E-06	70	9,125	9.1E-07	1.5	6.1E-07
											Total	**6.3E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzene	1.2E-11	0.0E+00	1.2E-11
	Benzo(a)anthracene	9.0E-09	7.7E-09	1.7E-08
	Benzo(a)pyrene	9.9E-08	8.5E-08	1.8E-07
	Benzo(b)fluoranthene	1.0E-08	8.8E-09	1.9E-08
	Dibenzo(a,h)anthracene	9.0E-08	7.7E-08	1.7E-07
	Indeno(1,2,3-cd)pyrene	9.4E-09	8.1E-09	1.8E-08
	Arsenic	5.1E-07	1.0E-07	6.1E-07
	Total	**7.3E-07**	**2.9E-07**	**1.0E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Benzene	2.0E-07	0.0E+00	2.0E-07
	Arsenic	3.2E-03	6.3E-04	3.8E-03
	Chromium	2.3E-06	6.1E-07	2.9E-06
	Total	**0.00318**	**0.00063**	**0.00381**

Table A7a - Parcel J9-23-16: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzene	0.004	137	1.0	5	25	1E-06	70	25550	3.8E-11	0.055	2.1E-12
Benzo(a)anthracene	3.08	137	1.0	5	25	1E-06	70	25550	2.9E-08	0.73	2.2E-08
Benzo(a)pyrene	3.08	137	1.0	5	25	1E-06	70	25550	2.9E-08	7.3	2.2E-07
Benzo(b)fluoranthene	3.08	137	1.0	5	25	1E-06	70	25550	2.9E-08	0.73	2.2E-08
Dibenzo(a,h)anthracene	3.12	137	1.0	5	25	1E-06	70	25550	3.0E-08	7.3	2.2E-07
Indeno(1,2,3-cd)pyrene	3.1	137	1.0	5	25	1E-06	70	25550	3.0E-08	0.73	2.2E-08
Arsenic	19	137	1.0	5	25	1E-06	70	25550	1.8E-07	1.5	2.7E-07
										Total	7.7E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Benzene	0.004	137	1.0	5	25	1E-06	70	9,125	1.1E-10	0.003	3.6E-08
Arsenic	19	137	1.0	5	25	1E-06	70	9,125	5.1E-07	0.0003	1.7E-03
Chromium	87	137	1.0	5	25	1E-06	70	9,125	2.3E-06	1.5	1.6E-06
										Total	1.7E-03

Table A7b - Parcel J9-23-16: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] $(mg/kg\text{-}d)^{-1}$	Risk
Benzene	0.004	0.8	3,300	0	5	25	1E-06	70	25,550	0.0E+00	0.055	0.0E+00
Benzo(a)anthracene	3.08	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.4E-08	0.73	5.4E-08
Benzo(a)pyrene	3.08	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.4E-08	7.3	5.4E-07
Benzo(b)fluoranthene	3.08	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.4E-08	0.73	5.4E-08
Dibenzo(a,h)anthracene	3.12	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.5E-08	7.3	5.5E-07
Indeno(1,2,3-cd)pyrene	3.1	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.4E-08	0.73	5.4E-08
Arsenic	19	0.8	3,300	0.03	5	25	1E-06	70	25,550	1.1E-07	1.5	1.6E-07
											Total	**1.4E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Benzene	0.004	0.8	3,300	0	5	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Arsenic	19	0.8	3,300	0.03	5	25	1E-06	70	9,125	2.9E-07	0.0003	9.8E-04
Chromium	87	0.8	3,300	0.04	5	25	1E-06	70	9,125	1.8E-06	1.5	1.2E-06
											Total	**9.8E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzene	2.1E-12	0.0E+00	2.1E-12
	Benzo(a)anthracene	2.2E-08	5.4E-08	7.5E-08
	Benzo(a)pyrene	2.2E-07	5.4E-07	7.5E-07
	Benzo(b)fluoranthene	2.2E-08	5.4E-08	7.5E-08
	Dibenzo(a,h)anthracene	2.2E-07	5.5E-07	7.6E-07
	Indeno(1,2,3-cd)pyrene	2.2E-08	5.4E-08	7.6E-08
	Arsenic	2.7E-07	1.6E-07	4.3E-07
	Total	**7.7E-07**	**1.4E-06**	**2.2E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Benzene	3.6E-08	0.0E+00	3.6E-08
	Arsenic	1.7E-03	9.8E-04	2.7E-03
	Chromium	1.6E-06	1.2E-06	2.8E-06
	Total	**0.00170**	**0.00098**	**0.00268**

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Parcel J9-23-17

Table A8a - Parcel J9-23-17: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	25550	2.6E-08	0.024	6.3E-10
Vinyl chloride	0.0079	200	1.0	0.5	84	6	1E-06	15	25550	1.0E-09	1.5	1.6E-09
Benz(a)anthracene	0.36	200	1.0	0.5	84	6	1E-06	15	25550	4.7E-08	0.73	3.5E-08
Benzo(a)pyrene	0.35	200	1.0	0.5	84	6	1E-06	15	25550	4.6E-08	7.3	3.4E-07
Benzo(b)fluoranthene	0.50	200	1.0	0.5	84	6	1E-06	15	25550	6.6E-08	0.73	4.8E-08
Benzo(k)fluoranthene	0.25	200	1.0	0.5	84	6	1E-06	15	25550	3.3E-08	0.073	2.4E-09
Dibenzo(a,h)anthracene	0.33	200	1.0	0.5	84	6	1E-06	15	25550	4.3E-08	7.3	3.2E-07
Indeno(1,2,3-cd)pyrene	0.4	200	1.0	0.5	84	6	1E-06	15	25550	5.3E-08	0.73	3.8E-08
Arsenic	14.64	200	1.0	0.5	84	6	1E-06	15	25550	1.9E-06	1.5	2.9E-06
											Total	**3.7E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	2,190	3.1E-07	0.03	1.0E-05
Vinyl chloride	0.0079	200	1.0	0.5	84	6	1E-06	15	2,190	1.2E-08	0.003	4.0E-06
Antimony	7.55	200	1.0	0.5	84	6	1E-06	15	2,190	1.2E-05	0.0004	2.9E-02
Arsenic	14.64	200	1.0	0.5	84	6	1E-06	15	2,190	2.2E-05	0.0003	7.5E-02
Chromium	42.59	200	1.0	0.5	84	6	1E-06	15	2,190	6.5E-05	1.5	4.4E-05
Copper	1406.55	200	1.0	0.5	84	6	1E-06	15	2,190	2.2E-03	0.04	5.4E-02
											Total	1.6E-01

Table A8b - Parcel J9-23-17: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^4)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	0.237	2,454	0.1	84	6	1E-06	15	25,550	1.5E-08	0.024	3.7E-10
Vinyl chloride	0.0079	0.237	2,454	0	84	6	1E-06	15	25,550	0.0E+00	1.5	0.0E+00
Benz(a)anthracene	0.36	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.6E-08	0.73	2.6E-08
Benzo(a)pyrene	0.35	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.5E-08	7.3	2.5E-07
Benzo(b)fluoranthene	0.50	0.237	2,454	0.13	84	6	1E-06	15	25,550	5.0E-08	0.73	3.6E-08
Benzo(k)fluoranthene	0.25	0.237	2,454	0.13	84	6	1E-06	15	25,550	2.5E-08	0.073	1.8E-09
Dibenzo(a,h)anthracene	0.33	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.3E-08	7.3	2.4E-07
Indeno(1,2,3-cd)pyrene	0.4	0.237	2,454	0.13	84	6	1E-06	15	25,550	4.0E-08	0.73	2.9E-08
Arsenic	14.64	0.237	2,454	0.03	84	6	1E-06	15	25,550	3.4E-07	1.5	5.0E-07
											Total	1.1E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.2	0.237	2,454	0.1	84	6	1E-06	15	2,190	1.8E-07	0.03	5.9E-06
Vinyl chloride	0.0079	0.237	2,454	0	84	6	1E-06	15	2,190	0.0E+00	0.003	0.0E+00
Antimony	7.55	0.237	2,454	0.1	84	6	1E-06	15	2,190	6.7E-06	0.0004	1.7E-02
Arsenic	14.64	0.237	2,454	0.03	84	6	1E-06	15	2,190	3.9E-06	0.0003	1.3E-02
Chromium	42.59	0.237	2,454	0.04	84	6	1E-06	15	2,190	1.5E-05	1.5	1.0E-05
Copper	1406.55	0.237	0	0.03	84	6	1E-06	15	2,190	4.6E-09	0.04	1.2E-07
											Total	3.0E-02

Table A8c - Parcel J9-23-17: Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
1,4-Dichlorobenzene	0.2	100	1.0	0.5	84	6	1E-06	36.8	25550	5.4E-09	0.024	1.3E-10
Vinyl chloride	0.0079	100	1.0	0.5	84	6	1E-06	36.8	25550	2.1E-10	1.5	3.2E-10
Benzo(a)anthracene	0.36	100	1.0	0.5	84	6	1E-06	36.8	25550	9.6E-09	0.73	7.0E-09
Benzo(a)pyrene	0.35	100	1.0	0.5	84	6	1E-06	36.8	25550	9.4E-09	7.3	6.8E-08
Benzo(b)fluoranthene	0.50	100	1.0	0.5	84	6	1E-06	36.8	25550	1.3E-08	0.73	9.8E-09
Benzo(k)fluoranthene	0.25	100	1.0	0.5	84	6	1E-06	36.8	25550	6.7E-09	0.073	4.9E-10
Dibenzo(a,h)anthracene	0.33	100	1.0	0.5	84	6	1E-06	36.8	25550	8.8E-09	7.3	6.5E-08
Indeno(1,2,3-cd)pyrene	0.4	100	1.0	0.5	84	6	1E-06	36.8	25550	1.1E-08	0.73	7.8E-09
Arsenic	14.64	100	1.0	0.5	84	6	1E-06	36.8	25550	3.9E-07	1.5	5.9E-07
											Total	7.5E-07

Table A8d - Parcel J9-23-17: Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor* (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	0.26	3,549	0.1	84	6	1E-06	36.8	25,550	9.9E-09	0.024	2.4E-10
Vinyl chloride	0.0079	0.26	3,549	0	84	6	1E-06	36.8	25,550	0.0E+00	1.5	0.0E+00
Benzo(a)anthracene	0.36	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.3E-08	0.73	1.7E-08
Benzo(a)pyrene	0.35	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.3E-08	7.3	1.6E-07
Benzo(b)fluoranthene	0.50	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	3.2E-08	0.73	2.3E-08
Benzo(k)fluoranthene	0.25	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	1.6E-08	0.073	1.2E-09
Dibenzo(a,h)anthracene	0.33	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.1E-08	7.3	1.5E-07
Indeno(1,2,3-cd)pyrene	0.4	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.6E-08	0.73	1.9E-08
Arsenic	14.64	0.26	3,549	0.03	84	6	1E-06	36.8	25,550	2.2E-07	1.5	3.3E-07
											Total	7.1E-07

Total Carcinogenic Risk		Ingestion		Dermal		Total
		1-6 Years	7-13 Years	1-6 Years	7-13 Years	
	1,4-Dichlorobenzene	6.3E-10	1.3E-10	3.7E-10	2.4E-10	1.4E-09
	Vinyl chloride	1.6E-09	3.2E-10	0.0E+00	0.0E+00	1.9E-09
	Benzo(a)anthracene	3.5E-08	7.0E-09	2.6E-08	1.7E-08	8.5E-08
	Benzo(a)pyrene	3.4E-07	6.8E-08	2.5E-07	1.6E-07	8.2E-07
	Benzo(b)fluoranthene	4.8E-08	9.8E-09	3.6E-08	2.3E-08	1.2E-07
	Benzo(k)fluoranthene	2.4E-09	4.9E-10	1.8E-09	1.2E-09	5.9E-09
	Dibenzo(a,h)anthracene	3.2E-07	6.5E-08	2.4E-07	1.5E-07	7.8E-07
	Indeno(1,2,3-cd)pyrene	3.8E-08	7.8E-09	2.9E-08	1.9E-08	9.4E-08
	Arsenic	2.9E-06	5.9E-07	5.0E-07	3.3E-07	4.3E-06
	Total	**3.7E-06**	**7.5E-07**	**1.1E-06**	**7.1E-07**	**6.2E-06**

Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
		1-6 Years	1-6 Years	
	1,4-Dichlorobenzene	1.0E-05	5.9E-06	1.6E-05
	Vinyl chloride	4.0E-06	0.0E+00	4.0E-06
	Antimony	2.9E-02	1.7E-02	4.6E-02
	Arsenic	7.5E-02	1.3E-02	8.8E-02
	Chromium	4.4E-05	1.0E-05	5.4E-05
	Copper	5.4E-02	1.2E-07	5.4E-02
	Total	**0.16**	**0.030**	**0.19**

Table A9a - Parcel J9-23-17: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	25550	2.6E-08	0.024	6.3E-10
Vinyl chloride	0.0087	200	1.0	0.5	84	6	1E-06	15	25550	1.1E-09	1.5	1.7E-09
Benzo(a)anthracene	0.61	200	1.0	0.5	84	6	1E-06	15	25550	8.0E-08	0.73	5.9E-08
Benzo(a)pyrene	0.66	200	1.0	0.5	84	6	1E-06	15	25550	8.7E-08	7.3	6.3E-07
Benzo(b)fluoranthene	0.8	200	1.0	0.5	84	6	1E-06	15	25550	1.1E-07	0.73	7.7E-08
Benzo(k)fluoranthene	0.37	200	1.0	0.5	84	6	1E-06	15	25550	4.9E-08	0.073	3.6E-09
Dibenzo(a,h)anthracene	0.34	200	1.0	0.5	84	6	1E-06	15	25550	4.5E-08	7.3	3.3E-07
Indeno(1,2,3-cd)pyrene	0.56	200	1.0	0.5	84	6	1E-06	15	25550	7.4E-08	0.73	5.4E-08
Arsenic	13.03	200	1.0	0.5	84	6	1E-06	15	25550	1.7E-06	1.5	2.6E-06
											Total	3.7E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	2,190	3.1E-07	0.03	1.0E-05
Vinyl chloride	0.0087	200	1.0	0.5	84	6	1E-06	15	2,190	1.3E-08	0.003	4.4E-06
Antimony	8.16	200	1.0	0.5	84	6	1E-06	15	2,190	1.3E-05	0.0004	3.1E-02
Arsenic	13.03	200	1.0	0.5	84	6	1E-06	15	2,190	2.0E-05	0.0003	6.7E-02
Chromium	34.44	200	1.0	0.5	84	6	1E-06	15	2,190	5.3E-05	1.5	3.5E-05
Copper	286.33	200	1.0	0.5	84	6	1E-06	15	2,190	4.4E-04	0.04	1.1E-02
											Total	1.1E-01

Table A9b - Parcel J9-23-17: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	0.237	2,454	0.1	84	6	1E-06	15	25,550	1.5E-08	0.024	3.7E-10
Vinyl chloride	0.0087	0.237	2,454	0	84	6	1E-06	15	25,550	0.0E+00	1.5	0.0E+00
Benzo(a)anthracene	0.61	0.237	2,454	0.13	84	6	1E-06	15	25,550	6.1E-08	0.73	4.4E-08
Benzo(a)pyrene	0.66	0.237	2,454	0.13	84	6	1E-06	15	25,550	6.6E-08	7.3	4.8E-07
Benzo(b)fluoranthene	0.8	0.237	2,454	0.13	84	6	1E-06	15	25,550	8.0E-08	0.73	5.8E-08
Benzo(k)fluoranthene	0.37	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.7E-08	0.073	2.7E-09
Dibenzo(a,h)anthracene	0.34	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.4E-08	7.3	2.5E-07
Indeno(1,2,3-cd)pyrene	0.56	0.237	2,454	0.13	84	6	1E-06	15	25,550	5.6E-08	0.73	4.1E-08
Arsenic	13.03	0.237	2,454	0.03	84	6	1E-06	15	25,550	3.0E-07	1.5	4.5E-07
											Total	1.3E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.2	0.237	2,454	0.1	84	6	1E-06	15	2,190	1.8E-07	0.03	5.9E-06
Vinyl chloride	0.0087	0.237	2,454	0	84	6	1E-06	15	2,190	0.0E+00	0.003	0.0E+00
Antimony	8.16	0.237	2,454	0.1	84	6	1E-06	15	2,190	7.3E-06	0.0004	1.8E-02
Arsenic	13.03	0.237	2,454	0.03	84	6	1E-06	15	2,190	3.5E-06	0.0003	1.2E-02
Chromium	34.44	0.237	2,454	0.04	84	6	1E-06	15	2,190	1.2E-05	1.5	8.2E-06
Copper	286.33	0.237	0	0.03	84	6	1E-06	15	2,190	9.4E-10	0.04	2.3E-08
											Total	3.0E-02

Table A9c - Parcel J9-23-17: Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	100	1.0	0.5	84	6	1E-06	36.8	25550	5.4E-09	0.024	1.3E-10
Vinyl chloride	0.0087	100	1.0	0.5	84	6	1E-06	36.8	25550	2.3E-10	1.5	3.5E-10
Benzo(a)anthracene	0.61	100	1.0	0.5	84	6	1E-06	36.8	25550	1.6E-08	0.73	1.2E-08
Benzo(a)pyrene	0.66	100	1.0	0.5	84	6	1E-06	36.8	25550	1.8E-08	7.3	1.3E-07
Benzo(b)fluoranthene	0.8	100	1.0	0.5	84	6	1E-06	36.8	25550	2.1E-08	0.73	1.6E-08
Benzo(k)fluoranthene	0.37	100	1.0	0.5	84	6	1E-06	36.8	25550	9.9E-09	0.073	7.2E-10
Dibenzo(a,h)anthracene	0.34	100	1.0	0.5	84	6	1E-06	36.8	25550	9.1E-09	7.3	6.7E-08
Indeno(1,2,3-cd)pyrene	0.56	100	1.0	0.5	84	6	1E-06	36.8	25550	1.5E-08	0.73	1.1E-08
Arsenic	13.03	100	1.0	0.5	84	6	1E-06	36.8	25550	3.5E-07	1.5	5.2E-07
											Total	7.6E-07

Table A9d - Parcel J9-23-17: Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor* (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.2	0.26	3,549	0.1	84	6	1E-06	36.8	25,550	9.9E-09	0.024	2.4E-10
Vinyl chloride	0.0087	0.26	3,549	0	84	6	1E-06	36.8	25,550	0.0E+00	1.5	0.0E+00
Benzo(a)anthracene	0.61	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	3.9E-08	0.73	2.9E-08
Benzo(a)pyrene	0.66	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	4.2E-08	7.3	3.1E-07
Benzo(b)fluoranthene	0.8	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	5.1E-08	0.73	3.8E-08
Benzo(k)fluoranthene	0.37	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.4E-08	0.073	1.7E-09
Dibenzo(a,h)anthracene	0.34	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.2E-08	7.3	1.6E-07
Indeno(1,2,3-cd)pyrene	0.56	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	3.6E-08	0.73	2.6E-08
Arsenic	13.03	0.26	3,549	0.03	84	6	1E-06	36.8	25,550	1.9E-07	1.5	2.9E-07
											Total	8.5E-07

Total Carcinogenic Risk		Ingestion		Dermal		Total
		1-6 Years	7-13 Years	1-6 Years	7-13 Years	
	1,4-Dichlorobenzene	6.3E-10	1.3E-10	3.7E-10	2.4E-10	1.4E-09
	Vinyl chloride	1.7E-09	3.5E-10	0.0E+00	0.0E+00	2.1E-09
	Benzo(a)anthracene	5.9E-08	1.2E-08	4.4E-08	2.9E-08	1.4E-07
	Benzo(a)pyrene	6.3E-07	1.3E-07	4.8E-07	3.1E-07	1.6E-06
	Benzo(b)fluoranthene	7.7E-08	1.6E-08	5.8E-08	3.8E-08	1.9E-07
	Benzo(k)fluoranthene	3.6E-09	7.2E-10	2.7E-09	1.7E-09	8.7E-09
	Dibenzo(a,h)anthracene	3.3E-07	6.7E-08	2.5E-07	1.6E-07	8.0E-07
	Indeno(1,2,3-cd)pyrene	5.4E-08	1.1E-08	4.1E-08	2.6E-08	1.3E-07
	Arsenic	2.6E-06	5.2E-07	4.5E-07	2.9E-07	3.8E-06
	Total	3.7E-06	7.6E-07	1.3E-06	8.5E-07	6.7E-06

Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
		1-6 Years	1-6 Years	
	1,4-Dichlorobenzene	1.0E-05	5.9E-06	1.6E-05
	Vinyl chloride	4.4E-06	0.0E+00	4.4E-06
	Antimony	3.1E-02	1.8E-02	5.0E-02
	Arsenic	6.7E-02	1.2E-02	7.8E-02
	Chromium	3.5E-05	8.2E-06	4.3E-05
	Copper	1.1E-02	2.3E-08	1.1E-02
	Total	0.11	0.030	0.14

Table A10a - Parcel J9-23-17: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	25550	2.6E-08	0.024	6.3E-10
Vinyl chloride	0.0101	200	1.0	0.5	84	6	1E-06	15	25550	1.3E-09	1.5	2.0E-09
Benzo(a)anthracene	1.12	200	1.0	0.5	84	6	1E-06	15	25550	1.5E-07	0.73	1.1E-07
Benzo(a)pyrene	1.28	200	1.0	0.5	84	6	1E-06	15	25550	1.7E-07	7.3	1.2E-06
Benzo(b)fluoranthene	1.4	200	1.0	0.5	84	6	1E-06	15	25550	1.8E-07	0.73	1.3E-07
Benzo(k)fluoranthene	0.62	200	1.0	0.5	84	6	1E-06	15	25550	8.2E-08	0.073	6.0E-09
Dibenzo(a,h)anthracene	0.36	200	1.0	0.5	84	6	1E-06	15	25550	4.7E-08	7.3	3.5E-07
Indeno(1,2,3-cd)pyrene	0.9	200	1.0	0.5	84	6	1E-06	15	25550	1.2E-07	0.73	8.6E-08
Arsenic	9.5	200	1.0	0.5	84	6	1E-06	15	25550	1.2E-06	1.5	1.9E-06
											Total	**3.8E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.2	200	1.0	0.5	84	6	1E-06	15	2,190	3.1E-07	0.03	1.0E-05
Vinyl chloride	0.0101	200	1.0	0.5	84	6	1E-06	15	2,190	1.5E-08	0.003	5.2E-06
Antimony	9.48	200	1.0	0.5	84	6	1E-06	15	2,190	1.5E-05	0.0004	3.6E-02
Arsenic	9.50	200	1.0	0.5	84	6	1E-06	15	2,190	1.5E-05	0.0003	4.9E-02
Chromium	16.52	200	1.0	0.5	84	6	1E-06	15	2,190	2.5E-05	1.5	1.7E-05
Copper	420	200	1.0	0.5	84	6	1E-06	15	2,190	6.4E-04	0.04	1.6E-02
											Total	1.0E-01

Table A10b - Parcel J9-23-17: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 1-6 Years

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	0.237	2,454	0.1	84	6	1E-06	15	25,550	1.5E-08	0.024	3.7E-10
Vinyl chloride	0.0101	0.237	2,454	0	84	6	1E-06	15	25,550	0.0E+00	1.5	0.0E+00
Benzo(a)anthracene	1.12	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.1E-07	0.73	8.1E-08
Benzo(a)pyrene	1.28	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.3E-07	7.3	9.3E-07
Benzo(b)fluoranthene	1.4	0.237	2,454	0.13	84	6	1E-06	15	25,550	1.4E-07	0.73	1.0E-07
Benzo(k)fluoranthene	0.62	0.237	2,454	0.13	84	6	1E-06	15	25,550	6.2E-08	0.073	4.5E-09
Dibenzo(a,h)anthracene	0.36	0.237	2,454	0.13	84	6	1E-06	15	25,550	3.6E-08	7.3	2.6E-07
Indeno(1,2,3-cd)pyrene	0.9	0.237	2,454	0.13	84	6	1E-06	15	25,550	8.9E-08	0.73	6.5E-08
Arsenic	9.5	0.237	2,454	0.03	84	6	1E-06	15	25,550	2.2E-07	1.5	3.3E-07
											Total	**1.8E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	**0.2**	**0.237**	**2,454**	**0.1**	**84**	**6**	**1E-06**	**15**	**2,190**	**1.8E-07**	**0.03**	**5.9E-06**
Vinyl chloride	**0.0101**	**0.237**	**2,454**	**0**	**84**	**6**	**1E-06**	**15**	**2,190**	**0.0E+00**	**0.003**	**0.0E+00**
Antimony	9.48	0.237	2,454	0.1	84	6	1E-06	15	2,190	8.5E-06	0.0004	2.1E-02
Arsenic	9.50	0.237	2,454	0.03	84	6	1E-06	15	2,190	2.5E-06	0.0003	8.5E-03
Chromium	16.52	0.237	2,454	0.04	84	6	1E-06	15	2,190	5.9E-06	1.5	3.9E-06
Copper	420	0.237	0	0.03	84	6	1E-06	15	2,190	1.4E-09	0.04	3.4E-08
											Total	**3.0E-02**

Table A10c - Parcel J9-23-17: Cancer Risks from Ingestion Exposure to 1- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Child Recreational User - 7-13 Years

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	FR Fraction from Site (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.2	100	1.0	0.5	84	6	1E-06	36.8	25550	5.4E-09	0.024	1.3E-10
Vinyl chloride	0.0101	100	1.0	0.5	84	6	1E-06	36.8	25550	2.7E-10	1.5	4.1E-10
Benzo(a)anthracene	1.12	100	1.0	0.5	84	6	1E-06	36.8	25550	3.0E-08	0.73	2.2E-08
Benzo(a)pyrene	1.28	100	1.0	0.5	84	6	1E-06	36.8	25550	3.4E-08	7.3	2.5E-07
Benzo(b)fluoranthene	1.4	100	1.0	0.5	84	6	1E-06	36.8	25550	3.8E-08	0.73	2.7E-08
Benzo(k)fluoranthene	0.62	100	1.0	0.5	84	6	1E-06	36.8	25550	1.7E-08	0.073	1.2E-09
Dibenzo(a,h)anthracene	0.36	100	1.0	0.5	84	6	1E-06	36.8	25550	9.6E-09	7.3	7.0E-08
Indeno(1,2,3-cd)pyrene	0.90	100	1.0	0.5	84	6	1E-06	36.8	25550	2.4E-08	0.73	1.8E-08
Arsenic	9.5	100	1.0	0.5	84	6	1E-06	36.8	25550	2.5E-07	1.5	3.8E-07
											Total	7.7E-07

Table A10d - Parcel J9-23-17: Cancer Risks from Dermal Exposure to 1- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Child Recreational User - 7-13 Years
CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor* (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.2	0.26	3,549	0.1	84	6	1E-06	36.8	25,550	9.9E-09	0.024	2.4E-10
Vinyl chloride	0.0101	0.26	3,549	0	84	6	1E-06	36.8	25,550	0.0E+00	1.5	0.0E+00
Benzo(a)anthracene	1.12	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	7.2E-08	0.73	5.3E-08
Benzo(a)pyrene	1.28	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	8.2E-08	7.3	6.0E-07
Benzo(b)fluoranthene	1.4	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	9.0E-08	0.73	6.6E-08
Benzo(k)fluoranthene	0.62	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	4.0E-08	0.073	2.9E-09
Dibenzo(a,h)anthracene	0.36	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	2.3E-08	7.3	1.7E-07
Indeno(1,2,3-cd)pyrene	0.90	0.26	3,549	0.13	84	6	1E-06	36.8	25,550	5.8E-08	0.73	4.2E-08
Arsenic	9.5	0.26	3,549	0.03	84	6	1E-06	36.8	25,550	1.4E-07	1.5	2.1E-07
											Total	**1.1E-06**

Total Carcinogenic Risk		Ingestion		Dermal		Total
		1-6 Years	7-13 Years	1-6 Years	7-13 Years	
	1,4-Dichlorobenzene	**6.3E-10**	**1.3E-10**	**3.7E-10**	**2.4E-10**	**1.4E-09**
	Vinyl chloride	**2.0E-09**	**4.1E-10**	**0.0E+00**	**0.0E+00**	**2.4E-09**
	Benzo(a)anthracene	**1.1E-07**	**2.2E-08**	**6.1E-08**	**5.3E-08**	**2.6E-07**
	Benzo(a)pyrene	**1.2E-06**	**2.5E-07**	**9.3E-07**	**6.0E-07**	**3.0E-06**
	Benzo(b)fluoranthene	**1.3E-07**	**2.7E-08**	**1.0E-07**	**6.6E-08**	**3.3E-07**
	Benzo(k)fluoranthene	**6.0E-09**	**1.2E-09**	**4.5E-09**	**2.9E-09**	**1.5E-08**
	Dibenzo(a,h)anthracene	3.5E-07	7.0E-08	2.6E-07	1.7E-07	8.5E-07
	Indeno(1,2,3-cd)pyrene	8.6E-08	1.8E-08	6.5E-08	4.2E-08	2.1E-07
	Arsenic	1.9E-06	3.8E-07	3.3E-07	2.1E-07	2.8E-06
	Total	**3.8E-06**	**7.7E-07**	**1.8E-06**	**1.1E-06**	**7.5E-06**

Total Noncarcinogenic Hazard	Ingestion	Dermal	Total
	1-6 Years	1-6 Years	
1,4-Dichlorobenzene	1.0E-05	5.9E-06	1.6E-05
Vinyl chloride	5.2E-06	0.0E+00	5.2E-06
Antimony	3.6E-02	2.1E-02	5.8E-02
Arsenic	4.9E-02	8.5E-03	5.7E-02
Chromium	1.7E-05	3.9E-06	2.1E-05
Copper	1.6E-02	3.4E-08	1.6E-02
Total	**0.10**	**0.030**	**0.13**

Parcel J9-23-18

Table A11a - Parcel J9-23-18: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$	Risk
Benzo(a)anthracene	1.46	50	1.0	84	25	1E-06	70	25550	8.6E-08	0.73	6.3E-08
Benzo(a)pyrene	1.60	50	1.0	84	25	1E-06	70	25550	9.4E-08	7.3	6.9E-07
Benzo(b)fluoranthene	1.45	50	1.0	84	25	1E-06	70	25550	8.5E-08	0.73	6.2E-08
Dibenzo(a,h)anthracene	0.37	50	1.0	84	25	1E-06	70	25550	2.2E-08	7.3	1.6E-07
Indeno(1,2,3-cd)pyrene	1.02	50	1.0	84	25	1E-06	70	25550	6.0E-08	0.73	4.4E-08
Arsenic	6.80	50	1.0	84	25	1E-06	70	25550	4.0E-07	1.5	6.0E-07
										Total	**1.6E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.80	50	1.0	84	25	1E-06	70	9,125	1.1E-06	0.0003	3.7E-03
										Total	**3.7E-03**

Table A11b - Parcel J9-23-18: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.46	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.4E-08	0.73	5.4E-08
Benzo(a)pyrene	1.60	0.1	3,300	0.13	84	25	1E-06	70	25,550	8.1E-08	7.3	5.9E-07
Benzo(b)fluoranthene	1.45	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.3E-08	0.73	5.3E-08
Dibenzo(a,h)anthracene	0.37	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.9E-08	7.3	1.4E-07
Indeno(1,2,3-cd)pyrene	1.02	0.1	3,300	0.13	84	25	1E-06	70	25,550	5.1E-08	0.73	3.8E-08
Arsenic	6.80	0.1	3,300	0.03	84	25	1E-06	70	25,550	7.9E-08	1.5	1.2E-07
											Total	**9.9E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.80	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.2E-07	0.0003	7.4E-04
											Total	**7.4E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	6.3E-08	5.4E-08	1.2E-07
	Benzo(a)pyrene	6.9E-07	5.9E-07	1.3E-06
	Benzo(b)fluoranthene	6.2E-08	5.3E-08	1.2E-07
	Dibenzo(a,h)anthracene	1.6E-07	1.4E-07	2.9E-07
	Indeno(1,2,3-cd)pyrene	4.4E-08	3.8E-08	8.1E-08
	Arsenic	6.0E-07	1.2E-07	7.2E-07
	Total	**1.6E-06**	**9.9E-07**	**2.6E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.7E-03	7.4E-04	4.5E-03
	Total	**0.00373**	**0.00074**	**0.00446**

Table A12a - Parcel J9-23-18: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.33	50	1.0	84	25	1E-06	70	25550	7.8E-08	0.73	5.7E-08
Benzo(a)pyrene	1.41	50	1.0	84	25	1E-06	70	25550	8.3E-08	7.3	6.0E-07
Benzo(b)fluoranthene	1.39	50	1.0	84	25	1E-06	70	25550	8.2E-08	0.73	6.0E-08
Dibenzo(a,h)anthracene	0.32	50	1.0	84	25	1E-06	70	25550	1.9E-08	7.3	1.4E-07
Indeno(1,2,3-cd)pyrene	0.88	50	1.0	84	25	1E-06	70	25550	5.2E-08	0.73	3.8E-08
Arsenic	6.88	50	1.0	84	25	1E-06	70	25550	4.0E-07	1.5	6.1E-07
										Total	1.5E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.88	50	1.0	84	25	1E-06	70	9,125	1.1E-06	0.0003	3.8E-03
										Total	3.8E-03

Table A12b - Parcel J9-23-18: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)	Risk
Benzo(a)anthracene	1.33	0.1	3,300	0.13	84	25	1E-06	70	25,550	6.7E-08	0.73	4.9E-08
Benzo(a)pyrene	1.41	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.1E-08	7.3	5.2E-07
Benzo(b)fluoranthene	1.39	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.0E-08	0.73	5.1E-08
Dibenzo(a,h)anthracene	0.32	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.6E-08	7.3	1.2E-07
Indeno(1,2,3-cd)pyrene	0.88	0.1	3,300	0.13	84	25	1E-06	70	25,550	4.4E-08	0.73	3.2E-08
Arsenic	6.88	0.1	3,300	0.03	84	25	1E-06	70	25,550	8.0E-08	1.5	1.2E-07
											Total	**8.9E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.88	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.2E-07	0.0003	7.5E-04
											Total	**7.5E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	5.7E-08	4.9E-08	1.1E-07
	Benzo(a)pyrene	6.0E-07	5.2E-07	1.1E-06
	Benzo(b)fluoranthene	6.0E-08	5.1E-08	1.1E-07
	Dibenzo(a,h)anthracene	1.4E-07	1.2E-07	2.5E-07
	Indeno(1,2,3-cd)pyrene	3.8E-08	3.2E-08	7.0E-08
	Arsenic	6.1E-07	1.2E-07	7.3E-07
	Total	**1.5E-06**	**8.9E-07**	**2.4E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.8E-03	7.5E-04	4.5E-03
	Total	**0.00377**	**0.00075**	**0.00452**

Table A13a - Parcel J9-23-18: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benzo(a)anthracene	3.02	137	1.0	5	25	1E-06	70	25550	2.9E-08	0.73	2.1E-08
Benzo(a)pyrene	2.91	137	1.0	5	25	1E-06	70	25550	2.8E-08	7.3	2.0E-07
Benzo(b)fluoranthene	3.15	137	1.0	5	25	1E-06	70	25550	3.0E-08	0.73	2.2E-08
Dibenzo(a,h)anthracene	0.52	137	1.0	5	25	1E-06	70	25550	5.0E-09	7.3	3.6E-08
Indeno(1,2,3-cd)pyrene	1.37	137	1.0	5	25	1E-06	70	25550	1.3E-08	0.73	9.6E-09
Arsenic	6.37	137	1.0	5	25	1E-06	70	25550	6.1E-08	1.5	9.1E-08
										Total	3.8E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.37	137	1.0	5	25	1E-06	70	9,125	1.7E-07	0.0003	5.7E-04
										Total	5.7E-04

Table A13b - Parcel J9-23-18: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	3.02	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.2E-08	0.73	5.3E-08
Benzo(a)pyrene	2.91	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.0E-08	7.3	5.1E-07
Benzo(b)fluoranthene	3.15	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.6E-08	0.73	5.5E-08
Dibenzo(a,h)anthracene	0.52	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.2E-08	7.3	9.1E-08
Indeno(1,2,3-cd)pyrene	1.37	0.8	3,300	0.13	5	25	1E-06	70	25,550	3.3E-08	0.73	2.4E-08
Arsenic	6.37	0.8	3,300	0.03	5	25	1E-06	70	25,550	3.5E-08	1.5	5.3E-08
											Total	7.9E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.37	0.8	3,300	0.03	5	25	1E-06	70	9,125	9.9E-08	0.0003	3.3E-04
											Total	3.3E-04

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	2.1E-08	5.3E-08	7.4E-08
	Benzo(a)pyrene	2.0E-07	5.1E-07	7.1E-07
	Benzo(b)fluoranthene	2.2E-08	5.5E-08	7.7E-08
	Dibenzo(a,h)anthracene	3.6E-08	9.1E-08	1.3E-07
	Indeno(1,2,3-cd)pyrene	9.6E-09	2.4E-08	3.4E-08
	Arsenic	9.1E-08	5.3E-08	1.4E-07
	Total	**3.8E-07**	**7.9E-07**	**1.2E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	5.7E-04	3.3E-04	9.0E-04
	Total	**0.00057**	**0.00033**	**0.00090**

Parcel J9-23-19

Table A14a - Parcel J9-23-19: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

	Cs	IgR	OA	EF	ED	CF	BW	ATc	CDI	CSF	Risk
Chemical	Soil Concentration (mg/kg)	Ingestion Rate (mg/d)	Oral Absorption (unitless)	Exposure Frequency (d/yr)	Exposure Duration (yrs)	Conversion Factor (kg/mg)	Body Weight (kg)	Averaging Time Carcinogenic (days)	Chronic Daily Intake (mg/kg-d)	Cancer Slope Factor (mg/kg-d)$^{-1}$	
1,4-Dichlorobenzene	0.58	50	1.0	84	25	1E-06	70	25550	3.4E-08	0.024	8.2E-10
Benzene	0.003	50	1.0	84	25	1E-06	70	25550	1.8E-10	0.055	9.7E-12
Vinyl chloride	0.003	50	1.0	84	25	1E-06	70	25550	1.8E-10	0.75	1.3E-10
Benzo(a)anthracene	1.79	50	1.0	84	25	1E-06	70	25550	1.1E-07	0.73	7.7E-08
Benzo(a)pyrene	1.51	50	1.0	84	25	1E-06	70	25550	8.9E-08	7.3	6.5E-07
Benzo(b)fluoranthene	1.53	50	1.0	84	25	1E-06	70	25550	9.0E-08	0.73	6.6E-08
Benzo(k)fluoranthene	1.24	50	1.0	84	25	1E-06	70	25550	7.3E-08	0.073	5.3E-09
Dibenzo(a,h)anthracene	0.39	50	1.0	84	25	1E-06	70	25550	2.3E-08	7.3	1.7E-07
Indeno(1,2,3-cd)pyrene	0.78	50	1.0	84	25	1E-06	70	25550	4.6E-08	0.73	3.3E-08
Arsenic	5.67	50	1.0	84	25	1E-06	70	25550	3.3E-07	1.5	5.0E-07
										Total	**1.5E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

	Cs	IgR	OA	EF	ED	CF	BW	ATnc	CDI	RfD	HQ
Chemical	Soil Concentration (mg/kg)	Ingestion Rate (mg/d)	Oral Absorption (unitless)	Exposure Frequency (d/yr)	Exposure Duration (yrs)	Conversion Factor (kg/mg)	Body Weight (kg)	Averaging Time Noncarcinogenic (days)	Chronic Daily Intake (mg/kg-d)	Reference Dose (mg/kg-d)	Hazard Quotient
1,4-Dichlorobenzene	0.58	50	1.0	84	25	1E-06	70	9,125	9.5E-08	0.03	3.2E-06
Benzene	0.003	50	1.0	84	25	1E-06	70	9,125	4.9E-10	0.003	1.6E-07
Vinyl chloride	0.003	50	1.0	84	25	1E-06	70	9,125	4.9E-10	0.003	1.6E-07
Phenanthrene	2.88	50	1.0	84	25	1E-06	70	9,125	4.7E-07	0.04	1.2E-05
Arsenic	5.67	50	1.0	84	25	1E-06	70	9,125	9.3E-07	0.0003	3.1E-03
										Total	3.1E-03

Table A14b - Parcel J9-23-19: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)	Risk
1,4-Dichlorobenzene	0.58	0.1	3,300	0.1	84	25	1E-06	70	25,550	2.2E-08	0.024	5.4E-10
Benzene	0.003	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.055	0.0E+00
Vinyl chloride	0.003	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	1.79	0.1	3,300	0.13	84	25	1E-06	70	25,550	9.0E-08	0.73	6.6E-08
Benzo(a)pyrene	1.51	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.6E-08	7.3	5.6E-07
Benzo(b)fluoranthene	1.53	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.7E-08	0.73	5.6E-08
Benzo(k)fluoranthene	1.24	0.1	3,300	0.13	84	25	1E-06	70	25,550	6.2E-08	0.073	4.6E-09
Dibenzo(a,h)anthracene	0.39	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.0E-08	7.3	1.4E-07
Indeno(1,2,3-cd)pyrene	0.78	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.9E-08	0.73	2.9E-08
Arsenic	5.67	0.1	3,300	0.03	84	25	1E-06	70	25,550	6.6E-08	1.5	9.9E-08
											Total	**9.5E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.58	0.1	3,300	0.1	84	25	1E-06	70	9,125	6.3E-08	0.03	2.1E-06
Benzene	0.003	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Vinyl chloride	0.003	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Phenanthrene	2.88	0.1	3,300	0.13	84	25	1E-06	70	9,125	4.1E-07	0.04	1.0E-05
Arsenic	5.67	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.8E-07	0.0003	6.2E-04
											Total	**6.3E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	8.2E-10	5.4E-10	1.4E-09
	Benzene	9.7E-12	0.0E+00	9.7E-12
	Vinyl chloride	1.3E-10	0.0E+00	1.3E-10
	Benzo(a)anthracene	7.7E-08	6.6E-08	1.4E-07
	Benzo(a)pyrene	6.5E-07	5.6E-07	1.2E-06
	Benzo(b)fluoranthene	6.6E-08	5.6E-08	1.2E-07
	Benzo(k)fluoranthene	5.3E-09	4.6E-09	9.9E-09
	Dibenzo(a,h)anthracene	1.7E-07	1.4E-07	3.1E-07
	Indeno(1,2,3-cd)pyrene	3.3E-08	2.9E-08	6.2E-08
	Arsenic	5.0E-07	9.9E-08	6.0E-07
	Total	**1.5E-06**	**9.5E-07**	**2.4E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	3.2E-06	2.1E-06	5.3E-06
	Benzene	1.6E-07	0.0E+00	1.6E-07
	Vinyl chloride	1.6E-07	0.0E+00	1.6E-07
	Phenanthrene	1.2E-05	1.0E-05	2.2E-05
	Arsenic	3.1E-03	6.2E-04	3.7E-03
	Total	**0.00312**	**0.00063**	**0.00375**

Table A15a - Parcel J9-23-19: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.54	50	1.0	84	25	1E-06	70	25550	3.2E-08	0.024	7.6E-10
Benzene	0.01	50	1.0	84	25	1E-06	70	25550	5.9E-10	0.055	3.2E-11
Vinyl chloride	0.01	50	1.0	84	25	1E-06	70	25550	5.9E-10	0.75	4.4E-10
Benzo(a)anthracene	3.07	50	1.0	84	25	1E-06	70	25550	1.8E-07	0.73	1.3E-07
Benzo(a)pyrene	2.42	50	1.0	84	25	1E-06	70	25550	1.4E-07	7.3	1.0E-06
Benzo(b)fluoranthene	2.39	50	1.0	84	25	1E-06	70	25550	1.4E-07	0.73	1.0E-07
Benzo(k)fluoranthene	2.04	50	1.0	84	25	1E-06	70	25550	1.2E-07	0.073	8.7E-09
Dibenzo(a,h)anthracene	0.61	50	1.0	84	25	1E-06	70	25550	3.6E-08	7.3	2.6E-07
Indeno(1,2,3-cd)pyrene	1.33	50	1.0	84	25	1E-06	70	25550	7.8E-08	0.73	5.7E-08
Arsenic	10.77	50	1.0	84	25	1E-06	70	25550	6.3E-07	1.5	9.5E-07
										Total	2.5E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.54	50	1.0	84	25	1E-06	70	9,125	8.9E-08	0.03	3.0E-06
Benzene	0.01	50	1.0	84	25	1E-06	70	9,125	1.6E-09	0.003	5.5E-07
Vinyl chloride	0.01	50	1.0	84	25	1E-06	70	9,125	1.6E-09	0.003	5.5E-07
Phenanthrene	5.13	50	1.0	84	25	1E-06	70	9,125	8.4E-07	0.04	2.1E-05
Arsenic	10.77	50	1.0	84	25	1E-06	70	9,125	1.8E-06	0.0003	5.9E-03
										Total	5.9E-03

Table A15b - Parcel J9-23-19: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
1,4-Dichlorobenzene	0.54	0.1	3,300	0.1	84	25	1E-06	70	25,550	2.1E-08	0.024	5.0E-10
Benzene	0.01	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.055	0.0E+00
Vinyl chloride	0.01	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	3.07	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.5E-07	0.73	1.1E-07
Benzo(a)pyrene	2.42	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-07	7.3	8.9E-07
Benzo(b)fluoranthene	2.39	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-07	0.73	8.8E-08
Benzo(k)fluoranthene	2.04	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.0E-07	0.073	7.5E-09
Dibenzo(a,h)anthracene	0.61	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.1E-08	7.3	2.2E-07
Indeno(1,2,3-cd)pyrene	1.33	0.1	3,300	0.13	84	25	1E-06	70	25,550	6.7E-08	0.73	4.9E-08
Arsenic	10.77	0.1	3,300	0.03	84	25	1E-06	70	25,550	1.3E-07	1.5	1.9E-07
											Total	**1.6E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.54	0.1	3,300	0.1	84	25	1E-06	70	9,125	5.9E-08	0.03	2.0E-06
Benzene	0.01	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Vinyl chloride	0.01	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Phenanthrene	5.13	0.1	3,300	0.13	84	25	1E-06	70	9,125	7.2E-07	0.04	1.8E-05
Arsenic	10.77	0.1	3,300	0.03	84	25	1E-06	70	9,125	3.5E-07	0.0003	1.2E-03
											Total	1.2E-03

Total Carcinogenic Risk		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	7.6E-10	5.0E-10	1.3E-09
	Benzene	3.2E-11	0.0E+00	3.2E-11
	Vinyl chloride	4.4E-10	0.0E+00	4.4E-10
	Benzo(a)anthracene	1.3E-07	1.1E-07	2.4E-07
	Benzo(a)pyrene	1.0E-06	8.9E-07	1.9E-06
	Benzo(b)fluoranthene	1.0E-07	8.8E-08	1.9E-07
	Benzo(k)fluoranthene	8.7E-09	7.5E-09	1.6E-08
	Dibenzo(a,h)anthracene	2.6E-07	2.2E-07	4.9E-07
	Indeno(1,2,3-cd)pyrene	5.7E-08	4.9E-08	1.1E-07
	Arsenic	9.5E-07	1.9E-07	1.1E-06
	Total	**2.5E-06**	**1.6E-06**	**4.1E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	3.0E-06	2.0E-06	4.9E-06
	Benzene	5.5E-07	0.0E+00	5.5E-07
	Vinyl chloride	5.5E-07	0.0E+00	5.5E-07
	Phenanthrene	2.1E-05	1.8E-05	3.9E-05
	Arsenic	5.9E-03	1.2E-03	7.1E-03
	Total	**0.00593**	**0.00119**	**0.00712**

Table A16a - Parcel J9-23-19: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.35	137	1.0	5	25	1E-06	70	25550	3.4E-09	0.024	8.0E-11
Benzene	0.01	137	1.0	5	25	1E-06	70	25550	9.6E-11	0.055	5.3E-12
Vinyl chloride	0.02	137	1.0	5	25	1E-06	70	25550	1.9E-10	0.75	1.4E-10
Benzo(a)anthracene	3.57	137	1.0	5	25	1E-06	70	25550	3.4E-08	0.73	2.5E-08
Benzo(a)pyrene	2.75	137	1.0	5	25	1E-06	70	25550	2.6E-08	7.3	1.9E-07
Benzo(b)fluoranthene	2.60	137	1.0	5	25	1E-06	70	25550	2.5E-08	0.73	1.8E-08
Benzo(k)fluoranthene	2.39	137	1.0	5	25	1E-06	70	25550	2.3E-08	0.073	1.7E-09
Dibenzo(a,h)anthracene	0.68	137	1.0	5	25	1E-06	70	25550	6.5E-09	7.3	4.8E-08
Indeno(1,2,3-cd)pyrene	1.53	137	1.0	5	25	1E-06	70	25550	1.5E-08	0.73	1.1E-08
Arsenic	16.44	137	1.0	5	25	1E-06	70	25550	1.6E-07	1.5	2.4E-07
										Total	**5.3E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	**Cs** **Soil Concentration (mg/kg)**	**IgR** **Ingestion Rate (mg/d)**	**OA** **Oral Absorption (unitless)**	**EF** **Exposure Frequency (d/yr)**	**ED** **Exposure Duration (yrs)**	**CF** **Conversion Factor (kg/mg)**	**BW** **Body Weight (kg)**	**ATnc** **Averaging Time Noncarcinogenic (days)**	**CDI** **Chronic Daily Intake (mg/kg-d)**	**RfD** **Reference Dose (mg/kg-d)**	**HQ** **Hazard Quotient**
1,4-Dichlorobenzene	0.35	137	1.0	5	25	1E-06	70	9,125	9.4E-09	0.03	3.1E-07
Benzene	0.01	137	1.0	5	25	1E-06	70	9,125	2.7E-10	0.003	8.9E-08
Vinyl chloride	0.02	137	1.0	5	25	1E-06	70	9,125	5.4E-10	0.003	1.8E-07
Phenanthrene	6.11	137	1.0	5	25	1E-06	70	9,125	1.6E-07	0.04	4.1E-06
Arsenic	16.44	137	1.0	5	25	1E-06	70	9,125	4.4E-07	0.0003	1.5E-03
										Total	**1.5E-03**

Table A16b - Parcel J9-23-19: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)⁻¹	Risk
1,4-Dichlorobenzene	0.35	0.8	3,300	0.1	5	25	1E-06	70	25,550	6.5E-09	0.024	1.5E-10
Benzene	0.01	0.8	3,300	0	5	25	1E-06	70	25,550	0.0E+00	0.055	0.0E+00
Vinyl chloride	0.02	0.8	3,300	0	5	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	3.57	0.8	3,300	0.13	5	25	1E-06	70	25,550	8.6E-08	0.73	6.3E-08
Benzo(a)pyrene	2.75	0.8	3,300	0.13	5	25	1E-06	70	25,550	6.6E-08	7.3	4.8E-07
Benzo(b)fluoranthene	2.60	0.8	3,300	0.13	5	25	1E-06	70	25,550	6.2E-08	0.73	4.6E-08
Benzo(k)fluoranthene	2.39	0.8	3,300	0.13	5	25	1E-06	70	25,550	5.7E-08	0.073	4.2E-09
Dibenzo(a,h)anthracene	0.68	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.6E-08	7.3	1.2E-07
Indeno(1,2,3-cd)pyrene	1.53	0.8	3,300	0.13	5	25	1E-06	70	25,550	3.7E-08	0.73	2.7E-08
Arsenic	16.44	0.8	3,300	0.03	5	25	1E-06	70	25,550	9.1E-08	1.5	1.4E-07
											Total	8.8E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
1,4-Dichlorobenzene	0.35	0.8	3,300	0.1	5	25	1E-06	70	9,125	1.8E-08	0.03	6.0E-07
Benzene	0.01	0.8	3,300	0	5	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Vinyl chloride	0.02	0.8	3,300	0	5	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Phenanthrene	6.11	0.8	3,300	0.13	5	25	1E-06	70	9,125	4.1E-07	0.04	1.0E-05
Arsenic	16.44	0.8	3,300	0.03	5	25	1E-06	70	9,125	2.5E-07	0.0003	8.5E-04
											Total	8.6E-04

Total Carcinogenic Risk		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	8.0E-11	1.5E-10	2.4E-10
	Benzene	5.3E-12	0.0E+00	5.3E-12
	Vinyl chloride	1.4E-10	0.0E+00	1.4E-10
	Benzo(a)anthracene	2.5E-08	6.3E-08	8.7E-08
	Benzo(a)pyrene	1.9E-07	4.8E-07	6.7E-07
	Benzo(b)fluoranthene	1.8E-08	4.6E-08	6.4E-08
	Benzo(k)fluoranthene	1.7E-09	4.2E-09	5.9E-09
	Dibenzo(a,h)anthracene	4.8E-08	1.2E-07	1.7E-07
	Indeno(1,2,3-cd)pyrene	1.1E-08	2.7E-08	3.7E-08
	Arsenic	2.4E-07	1.4E-07	3.7E-07
	Total	**5.3E-07**	**8.8E-07**	**1.4E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	1,4-Dichlorobenzene	3.1E-07	6.0E-07	9.2E-07
	Benzene	8.9E-08	0.0E+00	8.9E-08
	Vinyl chloride	1.8E-07	0.0E+00	1.8E-07
	Phenanthrene	4.1E-06	1.0E-05	1.4E-05
	Arsenic	1.5E-03	8.5E-04	2.3E-03
	Total	0.00147	0.00086	0.00233

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Parcel J9-23-20

Table A17a - Parcel J9-23-20: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.0027	50	1.0	84	25	1E-06	70	25550	1.6E-10	0.75	1.2E-10
Benzo(a)anthracene	0.38	50	1.0	84	25	1E-06	70	25550	2.2E-08	0.73	1.6E-08
Benzo(a)pyrene	0.31	50	1.0	84	25	1E-06	70	25550	1.8E-08	7.3	1.3E-07
Benzo(b)fluoranthene	0.52	50	1.0	84	25	1E-06	70	25550	3.1E-08	0.73	2.2E-08
Dibenzo(a,h)anthracene	0.10	50	1.0	84	25	1E-06	70	25550	5.9E-09	7.3	4.3E-08
Indeno(1,2,3-cd)pyrene	0.16	50	1.0	84	25	1E-06	70	25550	9.4E-09	0.73	6.9E-09
Arsenic	4.43	50	1.0	84	25	1E-06	70	25550	2.6E-07	1.5	3.9E-07
										Total	**6.1E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.0027	50	1.0	84	25	1E-06	70	9,125	4.4E-10	0.003	1.5E-07
Arsenic	4.43	50	1.0	84	25	1E-06	70	9,125	7.3E-07	0.0003	2.4E-03
										Total	**2.4E-03**

Table A17b - Parcel J9-23-20: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.0027	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	0.38	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.9E-08	0.73	1.4E-08
Benzo(a)pyrene	0.31	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.6E-08	7.3	1.1E-07
Benzo(b)fluoranthene	0.52	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.6E-08	0.73	1.9E-08
Dibenzo(a,h)anthracene	0.10	0.1	3,300	0.13	84	25	1E-06	70	25,550	5.0E-09	7.3	3.7E-08
Indeno(1,2,3-cd)pyrene	0.16	0.1	3,300	0.13	84	25	1E-06	70	25,550	8.1E-09	0.73	5.9E-09
Arsenic	4.43	0.1	3,300	0.03	84	25	1E-06	70	25,550	5.1E-08	1.5	7.7E-08
											Total	**2.7E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.0027	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Arsenic	4.43	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.4E-07	0.0003	4.8E-04
											Total	**4.8E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Vinyl chloride	1.2E-10	0.0E+00	1.2E-10
	Benzo(a)anthracene	1.6E-08	1.4E-08	3.0E-08
	Benzo(a)pyrene	1.3E-07	1.1E-07	2.5E-07
	Benzo(b)fluoranthene	2.2E-08	1.9E-08	4.1E-08
	Dibenzo(a,h)anthracene	4.3E-08	3.7E-08	8.0E-08
	Indeno(1,2,3-cd)pyrene	6.9E-09	5.9E-09	1.3E-08
	Arsenic	3.9E-07	7.7E-08	4.7E-07
	Total	**6.1E-07**	**2.7E-07**	**8.8E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Vinyl chloride	1.5E-07	0.0E+00	1.5E-07
	Arsenic	2.4E-03	4.8E-04	2.9E-03
	Total	**0.00243**	**0.00048**	**0.00291**

Table A18a - Parcel J9-23-20: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.06	50	1.0	84	25	1E-06	70	25550	3.5E-09	0.75	2.6E-09
Benzo(a)anthracene	0.68	50	1.0	84	25	1E-06	70	25550	4.0E-08	0.73	2.9E-08
Benzo(a)pyrene	3.24	50	1.0	84	25	1E-06	70	25550	1.9E-07	7.3	1.4E-06
Benzo(b)fluoranthene	3.34	50	1.0	84	25	1E-06	70	25550	2.0E-07	0.73	1.4E-07
Dibenzo(a,h)anthracene	3.14	50	1.0	84	25	1E-06	70	25550	1.8E-07	7.3	1.3E-06
Indeno(1,2,3-cd)pyrene	3.16	50	1.0	84	25	1E-06	70	25550	1.9E-07	0.73	1.4E-07
Arsenic	5.27	50	1.0	84	25	1E-06	70	25550	3.1E-07	1.5	4.6E-07
										Total	3.5E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.06	50	1.0	84	25	1E-06	70	9,125	9.9E-09	0.003	3.3E-06
Arsenic	5.27	50	1.0	84	25	1E-06	70	9,125	8.7E-07	0.0003	2.9E-03
										Total	2.9E-03

Table A18b - Parcel J9-23-20: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.06	0.1	3,300	0	84	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	0.68	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.4E-08	0.73	2.5E-08
Benzo(a)pyrene	3.24	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.6E-07	7.3	1.2E-06
Benzo(b)fluoranthene	3.34	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.7E-07	0.73	1.2E-07
Dibenzo(a,h)anthracene	3.14	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.6E-07	7.3	1.2E-06
Indeno(1,2,3-cd)pyrene	3.16	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.6E-07	0.73	1.2E-07
Arsenic	5.27	0.1	3,300	0.03	84	25	1E-06	70	25,550	6.1E-08	1.5	9.2E-08
											Total	**2.7E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.06	0.1	3,300	0	84	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Arsenic	5.27	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.7E-07	0.0003	5.7E-04
											Total	**5.7E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Vinyl chloride	2.6E-09	0.0E+00	2.6E-09
	Benzo(a)anthracene	2.9E-08	2.5E-08	5.4E-08
	Benzo(a)pyrene	1.4E-06	1.2E-06	2.6E-06
	Benzo(b)fluoranthene	1.4E-07	1.2E-07	2.7E-07
	Dibenzo(a,h)anthracene	1.3E-06	1.2E-06	2.5E-06
	Indeno(1,2,3-cd)pyrene	1.4E-07	1.2E-07	2.5E-07
	Arsenic	4.6E-07	9.2E-08	5.6E-07
	Total	**3.5E-06**	**2.7E-06**	**6.2E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Vinyl chloride	3.3E-06	0.0E+00	3.3E-06
	Arsenic	2.9E-03	5.7E-04	3.5E-03
	Total	**0.00289**	**0.00057**	**0.00346**

Table A19a - Parcel J9-23-20: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.05	137	1.0	5	25	1E-06	70	25550	4.8E-10	0.75	3.6E-10
Benzo(a)anthracene	1.98	137	1.0	5	25	1E-06	70	25550	1.9E-08	0.73	1.4E-08
Benzo(a)pyrene	4.48	137	1.0	5	25	1E-06	70	25550	4.3E-08	7.3	3.1E-07
Benzo(b)fluoranthene	4.48	137	1.0	5	25	1E-06	70	25550	4.3E-08	0.73	3.1E-08
Dibenzo(a,h)anthracene	3.46	137	1.0	5	25	1E-06	70	25550	3.3E-08	7.3	2.4E-07
Indeno(1,2,3-cd)pyrene	4.00	137	1.0	5	25	1E-06	70	25550	3.8E-08	0.73	2.8E-08
Arsenic	5.58	137	1.0	5	25	1E-06	70	25550	5.3E-08	1.5	8.0E-08
										Total	7.1E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.05	137	1.0	5	25	1E-06	70	9,125	1.3E-09	0.003	4.5E-07
Arsenic	5.58	137	1.0	5	25	1E-06	70	9,125	1.5E-07	0.0003	5.0E-04
										Total	5.0E-04

Table A19b - Parcel J9-23-20: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Vinyl chloride	0.05	0.8	3,300	0	5	25	1E-06	70	25,550	0.0E+00	0.75	0.0E+00
Benzo(a)anthracene	1.98	0.8	3,300	0.13	5	25	1E-06	70	25,550	4.7E-08	0.73	3.5E-08
Benzo(a)pyrene	4.48	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.1E-07	7.3	7.8E-07
Benzo(b)fluoranthene	4.48	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.1E-07	0.73	7.8E-08
Dibenzo(a,h)anthracene	3.46	0.8	3,300	0.13	5	25	1E-06	70	25,550	8.3E-08	7.3	6.1E-07
Indeno(1,2,3-cd)pyrene	4.00	0.8	3,300	0.13	5	25	1E-06	70	25,550	9.6E-08	0.73	7.0E-08
Arsenic	5.58	0.8	3,300	0.03	5	25	1E-06	70	25,550	3.1E-08	1.5	4.6E-08
											Total	**1.6E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Vinyl chloride	0.05	0.8	3,300	0	5	25	1E-06	70	9,125	0.0E+00	0.003	0.0E+00
Arsenic	5.58	0.8	3,300	0.03	5	25	1E-06	70	9,125	8.6E-08	0.0003	2.9E-04
											Total	**2.9E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Vinyl chloride	3.6E-10	0.0E+00	3.6E-10
	Benzo(a)anthracene	1.4E-08	3.5E-08	4.9E-08
	Benzo(a)pyrene	3.1E-07	7.8E-07	1.1E-06
	Benzo(b)fluoranthene	3.1E-08	7.8E-08	1.1E-07
	Dibenzo(a,h)anthracene	2.4E-07	6.1E-07	8.5E-07
	Indeno(1,2,3-cd)pyrene	2.8E-08	7.0E-08	9.8E-08
	Arsenic	8.0E-08	4.6E-08	1.3E-07
	Total	**7.1E-07**	**1.6E-06**	**2.3E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Vinyl chloride	4.5E-07	0.0E+00	4.5E-07
	Arsenic	5.0E-04	2.9E-04	7.9E-04
	Total	**0.00050**	**0.00029**	**0.00079**

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Parcel J9-23-21

Table A20a - J9-23-21: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.60	50	1.0	84	25	1E-06	70	25550	3.5E-08	0.73	2.6E-08
Benzo(a)pyrene	0.57	50	1.0	84	25	1E-06	70	25550	3.3E-08	7.3	2.4E-07
Benzo(b)fluoranthene	0.46	50	1.0	84	25	1E-06	70	25550	2.7E-08	0.73	2.0E-08
Dibenzo(a,h)anthracene	0.28	50	1.0	84	25	1E-06	70	25550	1.6E-08	7.3	1.2E-07
Indeno(1,2,3-cd)pyrene	0.43	50	1.0	84	25	1E-06	70	25550	2.5E-08	0.73	1.8E-08
Arsenic	7.94	50	1.0	84	25	1E-06	70	25550	4.7E-07	1.5	7.0E-07
										Total	1.1E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	7.94	50	1.0	84	25	1E-06	70	9,125	1.3E-06	0.0003	4.4E-03
										Total	4.4E-03

Table A20b - Parcel J9-23-21: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.6	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.0E-08	0.73	2.2E-08
Benzo(a)pyrene	0.57	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.9E-08	7.3	2.1E-07
Benzo(b)fluoranthene	0.46	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.3E-08	0.73	1.7E-08
Dibenzo(a,h)anthracene	0.28	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.4E-08	7.3	1.0E-07
Indeno(1,2,3-cd)pyrene	0.43	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.2E-08	0.73	1.6E-08
Arsenic	7.94	0.1	3,300	0.03	84	25	1E-06	70	25,550	9.2E-08	1.5	1.4E-07
											Total	**5.1E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	7.94	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.6E-07	0.0003	8.6E-04
											Total	**8.6E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	2.6E-08	2.2E-08	4.8E-08
	Benzo(a)pyrene	2.4E-07	2.1E-07	4.5E-07
	Benzo(b)fluoranthene	2.0E-08	1.7E-08	3.7E-08
	Dibenzo(a,h)anthracene	1.2E-07	1.0E-07	2.2E-07
	Indeno(1,2,3-cd)pyrene	1.8E-08	1.6E-08	3.4E-08
	Arsenic	7.0E-07	1.4E-07	8.4E-07
	Total	**1.1E-06**	**5.1E-07**	**1.6E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	4.4E-03	8.6E-04	5.2E-03
	Total	**0.00435**	**0.00086**	0.00521

TableA21a - Parcel J9-23-21: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.05	50	1.0	84	25	1E-06	70	25550	6.2E-08	0.73	4.5E-08
Benzo(a)pyrene	0.74	50	1.0	84	25	1E-06	70	25550	4.3E-08	7.3	3.2E-07
Benzo(b)fluoranthene	0.66	50	1.0	84	25	1E-06	70	25550	3.9E-08	0.73	2.8E-08
Dibenzo(a,h)anthracene	0.37	50	1.0	84	25	1E-06	70	25550	2.2E-08	7.3	1.6E-07
Indeno(1,2,3-cd)pyrene	0.47	50	1.0	84	25	1E-06	70	25550	2.8E-08	0.73	2.0E-08
Arsenic	6.96	50	1.0	84	25	1E-06	70	25550	4.1E-07	1.5	6.1E-07
										Total	1.2E-06

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.96	50	1.0	84	25	1E-06	70	9,125	1.1E-06	0.0003	3.8E-03
										Total	3.8E-03

Table A21b - Parcel J9-23-21: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.05	0.1	3,300	0.13	84	25	1E-06	70	25,550	5.3E-08	0.73	3.9E-08
Benzo(a)pyrene	0.74	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.7E-08	7.3	2.7E-07
Benzo(b)fluoranthene	0.66	0.1	3,300	0.13	84	25	1E-06	70	25,550	3.3E-08	0.73	2.4E-08
Dibenzo(a,h)anthracene	0.37	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.9E-08	7.3	1.4E-07
Indeno(1,2,3-cd)pyrene	0.47	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.4E-08	0.73	1.7E-08
Arsenic	6.96	0.1	3,300	0.03	84	25	1E-06	70	25,550	8.1E-08	1.5	1.2E-07
											Total	**6.1E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.96	0.1	3,300	0.03	84	25	1E-06	70	9,125	2.3E-07	0.0003	7.6E-04
											Total	**7.6E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	4.5E-08	3.9E-08	8.4E-08
	Benzo(a)pyrene	3.2E-07	2.7E-07	5.9E-07
	Benzo(b)fluoranthene	2.8E-08	2.4E-08	5.3E-08
	Dibenzo(a,h)anthracene	1.6E-07	1.4E-07	2.9E-07
	Indeno(1,2,3-cd)pyrene	2.0E-08	1.7E-08	3.7E-08
	Arsenic	6.1E-07	1.2E-07	7.3E-07
	Total	**1.2E-06**	**6.1E-07**	**1.8E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.8E-03	7.6E-04	4.6E-03
	Total	**0.00381**	**0.00076**	**0.00457**

Table A22a - Parcel J9-23-21: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.30	137	1.0	5	25	1E-06	70	25550	1.2E-08	0.73	9.1E-09
Benzo(a)pyrene	0.78	137	1.0	5	25	1E-06	70	25550	7.5E-09	7.3	5.5E-08
Benzo(b)fluoranthene	0.82	137	1.0	5	25	1E-06	70	25550	7.9E-09	0.73	5.7E-09
Dibenzo(a,h)anthracene	0.34	137	1.0	5	25	1E-06	70	25550	3.3E-09	7.3	2.4E-08
Indeno(1,2,3-cd)pyrene	0.44	137	1.0	5	25	1E-06	70	25550	4.2E-09	0.73	3.1E-09
Arsenic	4.98	137	1.0	5	25	1E-06	70	25550	4.8E-08	1.5	7.2E-08
										Total	1.7E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	4.98	137	1.0	5	25	1E-06	70	9,125	1.3E-07	0.0003	4.5E-04
										Total	4.5E-04

Table A22b - Parcel J9-23-21: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] $(mg/kg-d)^{-1}$	Risk
Benzo(a)anthracene	1.30	0.8	3,300	0.13	5	25	1E-06	70	25,550	3.1E-08	0.73	2.3E-08
Benzo(a)pyrene	0.78	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.9E-08	7.3	1.4E-07
Benzo(b)fluoranthene	0.82	0.8	3,300	0.13	5	25	1E-06	70	25,550	2.0E-08	0.73	1.4E-08
Dibenzo(a,h)anthracene	0.34	0.8	3,300	0.13	5	25	1E-06	70	25,550	8.2E-09	7.3	6.0E-08
Indeno(1,2,3-cd)pyrene	0.44	0.8	3,300	0.13	5	25	1E-06	70	25,550	1.1E-08	0.73	7.7E-09
Arsenic	4.98	0.8	3,300	0.03	5	25	1E-06	70	25,550	2.8E-08	1.5	4.1E-08
											Total	2.8E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	4.98	0.8	3,300	0.03	5	25	1E-06	70	9,125	7.7E-08	0.0003	2.6E-04
											Total	2.6E-04

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	9.1E-09	2.3E-08	3.2E-08
	Benzo(a)pyrene	5.5E-08	1.4E-07	1.9E-07
	Benzo(b)fluoranthene	5.7E-09	1.4E-08	2.0E-08
	Dibenzo(a,h)anthracene	2.4E-08	6.0E-08	8.3E-08
	Indeno(1,2,3-cd)pyrene	3.1E-09	7.7E-09	1.1E-08
	Arsenic	7.2E-08	4.1E-08	1.1E-07
	Total	**1.7E-07**	**2.8E-07**	**4.5E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	4.5E-04	2.6E-04	7.0E-04
	Total	**0.00045**	**0.00026**	**0.00070**

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Parcel J9-23-22

Table A23a - Parcel J9-23-22: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.21	50	1.0	84	25	1E-06	70	25550	1.2E-08	0.73	9.0E-09
Benzo(a)pyrene	0.23	50	1.0	84	25	1E-06	70	25550	1.4E-08	7.3	9.9E-08
Benzo(b)fluoranthene	0.22	50	1.0	84	25	1E-06	70	25550	1.3E-08	0.73	9.4E-09
Dibenzo(a,h)anthracene	0.14	50	1.0	84	25	1E-06	70	25550	8.2E-09	7.3	6.0E-08
Arsenic	5.53	50	1.0	84	25	1E-06	70	25550	3.2E-07	1.5	4.9E-07
										Total	**6.6E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	5.53	50	1.0	84	25	1E-06	70	9,125	9.1E-07	0.0003	3.0E-03
										Total	**3.0E-03**

Table A23b - Parcel J9-23-22: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.21	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	7.7E-09
Benzo(a)pyrene	0.23	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	7.3	8.5E-08
Benzo(b)fluoranthene	0.22	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.1E-08	0.73	8.1E-09
Dibenzo(a,h)anthracene	0.14	0.1	3,300	0.13	84	25	1E-06	70	25,550	7.1E-09	7.3	5.1E-08
Arsenic	5.53	0.1	3,300	0.03	84	25	1E-06	70	25,550	6.4E-08	1.5	9.6E-08
											Total	2.5E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	5.53	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.8E-07	0.0003	6.0E-04
											Total	**6.0E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	9.0E-09	7.7E-09	1.7E-08
	Benzo(a)pyrene	9.9E-08	8.5E-08	1.8E-07
	Benzo(b)fluoranthene	9.4E-09	8.1E-09	1.8E-08
	Dibenzo(a,h)anthracene	6.0E-08	5.1E-08	1.1E-07
	Arsenic	4.9E-07	9.6E-08	5.8E-07
	Total	**6.6E-07**	**2.5E-07**	**9.1E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.0E-03	6.0E-04	3.6E-03
	Total	**0.00303**	**0.00060**	0.00363

TableA24a - Parcel J9-23-22: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 3-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benzo(a)anthracene	1.70	50	1.0	84	25	1E-06	70	25550	1.0E-07	0.73	7.3E-08
Benzo(a)pyrene	1.06	50	1.0	84	25	1E-06	70	25550	6.2E-08	7.3	4.5E-07
Benzo(b)fluoranthene	1.62	50	1.0	84	25	1E-06	70	25550	9.5E-08	0.73	6.9E-08
Dibenzo(a,h)anthracene	0.34	50	1.0	84	25	1E-06	70	25550	2.0E-08	7.3	1.5E-07
Arsenic	5.75	50	1.0	84	25	1E-06	70	25550	3.4E-07	1.5	5.1E-07
										Total	**1.2E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	5.75	50	1.0	84	25	1E-06	70	9,125	9.5E-07	0.0003	3.2E-03
										Total	**3.2E-03**

Table A24b - Parcel J9-23-22: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 3-Foot
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.70	0.1	3,300	0.13	84	25	1E-06	70	25,550	8.6E-08	0.73	6.3E-08
Benzo(a)pyrene	1.06	0.1	3,300	0.13	84	25	1E-06	70	25,550	5.3E-08	7.3	3.9E-07
Benzo(b)fluoranthene	1.62	0.1	3,300	0.13	84	25	1E-06	70	25,550	8.2E-08	0.73	6.0E-08
Dibenzo(a,h)anthracene	0.34	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.7E-08	7.3	1.3E-07
Arsenic	5.75	0.1	3,300	0.03	84	25	1E-06	70	25,550	6.7E-08	1.5	1.0E-07
											Total	**7.4E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	5.75	0.1	3,300	0.03	84	25	1E-06	70	9,125	1.9E-07	0.0003	6.2E-04
											Total	**6.2E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	7.3E-08	6.3E-08	1.4E-07
	Benzo(a)pyrene	4.5E-07	3.9E-07	8.4E-07
	Benzo(b)fluoranthene	6.9E-08	6.0E-08	1.3E-07
	Dibenzo(a,h)anthracene	1.5E-07	1.3E-07	2.7E-07
	Arsenic	5.1E-07	1.0E-07	6.1E-07
	Total	**1.2E-06**	**7.4E-07**	**2.0E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.2E-03	6.2E-04	3.8E-03
	Total	**0.00315**	**0.00062**	**0.00377**

Table A25a - Parcel J9-23-22: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)	Risk
Benzo(a)anthracene	1.98	137	1.0	5	25	1E-06	70	25550	1.9E-08	0.73	1.4E-08
Benzo(a)pyrene	1.22	137	1.0	5	25	1E-06	70	25550	1.2E-08	7.3	8.5E-08
Benzo(b)fluoranthene	1.93	137	1.0	5	25	1E-06	70	25550	1.8E-08	0.73	1.3E-08
Dibenzo(a,h)anthracene	0.38	137	1.0	5	25	1E-06	70	25550	3.6E-09	7.3	2.7E-08
Arsenic	9.92	137	1.0	5	25	1E-06	70	25550	9.5E-08	1.5	1.4E-07
										Total	2.8E-07

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	9.92	137	1.0	5	25	1E-06	70	9,125	2.7E-07	0.0003	8.9E-04
										Total	8.9E-04

Table A25b - Parcel J9-23-22: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.98	0.8	3,300	0.13	5	25	1E-06	70	25,550	4.7E-08	0.73	3.5E-08
Benzo(a)pyrene	1.22	0.8	3,300	0.13	5	25	1E-06	70	25,550	2.9E-08	7.3	2.1E-07
Benzo(b)fluoranthene	1.93	0.8	3,300	0.13	5	25	1E-06	70	25,550	4.6E-08	0.73	3.4E-08
Dibenzo(a,h)anthracene	0.38	0.8	3,300	0.13	5	25	1E-06	70	25,550	9.1E-09	7.3	6.7E-08
Arsenic	9.92	0.8	3,300	0.03	5	25	1E-06	70	25,550	5.5E-08	1.5	8.2E-08
											Total	**4.3E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	**9.92**	**0.8**	**3,300**	**0.03**	**5**	**25**	**1E-06**	**70**	**9,125**	**1.5E-07**	**0.0003**	**5.1E-04**
											Total	**5.1E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	1.4E-08	3.5E-08	4.9E-08
	Benzo(a)pyrene	8.5E-08	2.1E-07	3.0E-07
	Benzo(b)fluoranthene	1.3E-08	3.4E-08	4.7E-08
	Dibenzo(a,h)anthracene	2.7E-08	6.7E-08	9.3E-08
	Arsenic	1.4E-07	8.2E-08	2.2E-07
	Total	**2.8E-07**	**4.3E-07**	**7.1E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	8.9E-04	5.1E-04	1.4E-03
	Total	**0.00089**	**0.00051**	**0.00140**

Parcel J9-23-23

Table A26a - Parcel J9-23-23: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)pyrene	0.92	50	1.0	84	25	1E-06	70	25550	5.4E-08	7.3	3.9E-07
Dibenzo(a,h)anthracene	0.24	50	1.0	84	25	1E-06	70	25550	1.4E-08	7.3	1.0E-07
Arsenic	3.58	50	1.0	84	25	1E-06	70	25550	2.1E-07	1.5	3.2E-07
										Total	**8.1E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	3.58	50	1.0	84	25	1E-06	70	9,125	5.9E-07	0.0003	2.0E-03
										Total	**2.0E-03**

Table A26b - Parcel J9-23-23: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)⁻¹	Risk
Benzo(a)pyrene	0.92	0.1	3,300	0.13	84	25	1E-06	70	25,550	4.6E-08	7.3	3.4E-07
Dibenzo(a,h)anthracene	0.24	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.2E-08	7.3	8.8E-08
Arsenic	3.58	0.1	3,300	0.03	84	25	1E-06	70	25,550	4.2E-08	1.5	6.2E-08
											Total	**4.9E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm²)	SA Surface Area Exposed (cm²/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	**3.58**	**0.1**	**3,300**	**0.03**	**84**	**25**	**1E-06**	**70**	**9,125**	**1.2E-07**	**0.0003**	**3.9E-04**
											Total	**3.9E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)pyrene	3.9E-07	3.4E-07	7.3E-07
	Dibenzo(a,h)anthracene	1.0E-07	8.8E-08	1.9E-07
	Arsenic	3.2E-07	6.2E-08	3.8E-07
	Total	8.1E-07	4.9E-07	1.3E-06
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	2.0E-03	3.9E-04	2.4E-03
	Total	**0.00196**	**0.00039**	**0.00235**

Table A27a - Parcel J9-23-23: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)pyrene	0.32	137	1.0	5	25	1E-06	70	25550	3.1E-09	7.3	2.2E-08
Dibenzo(a,h)anthracene	0.17	137	1.0	5	25	1E-06	70	25550	1.6E-09	7.3	1.2E-08
Arsenic	6.04	137	1.0	5	25	1E-06	70	25550	5.8E-08	1.5	8.7E-08
										Total	**1.2E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.04	137	1.0	5	25	1E-06	70	9,125	1.6E-07	0.0003	5.4E-04
										Total	**5.4E-04**

Table A27b - Parcel J9-23-23: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^4)	SA Surface Area Exposed (cm^4/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)pyrene	0.32	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.7E-09	7.3	5.6E-08
Dibenzo(a,h)anthracene	0.17	0.8	3,300	0.13	5	25	1E-06	70	25,550	4.1E-09	7.3	3.0E-08
Arsenic	6.04	0.8	3,300	0.03	5	25	1E-06	70	25,550	3.3E-08	1.5	5.0E-08
											Total	**1.4E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.04	0.8	3,300	0.03	5	25	1E-06	70	9,125	9.4E-08	0.0003	3.1E-04
											Total	**3.1E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)pyrene	2.2E-08	5.6E-08	7.8E-08
	Dibenzo(a,h)anthracene	1.2E-08	3.0E-08	4.2E-08
	Arsenic	8.7E-08	5.0E-08	1.4E-07
	Total	**1.2E-07**	**1.4E-07**	**2.6E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	5.4E-04	3.1E-04	8.5E-04
	Total	**0.00054**	**0.00031**	**0.00085**

Parcel J9-23-24

Table A28a - Parcel J9-23-24: Cancer and Non-Cancer Risks from Ingestion Exposure to 0- to 1-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Groundskeeper

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.95	50	1.0	84	25	1E-06	70	25550	1.1E-07	0.73	8.4E-08
Benzo(a)pyrene	2.05	50	1.0	84	25	1E-06	70	25550	1.2E-07	7.3	8.8E-07
Dibenzo(a,h)anthracene	0.57	50	1.0	84	25	1E-06	70	25550	3.3E-08	7.3	2.4E-07
Arsenic	6.07	50	1.0	84	25	1E-06	70	25550	3.6E-07	1.5	5.3E-07
										Total	**1.7E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	6.07	50	1.0	84	25	1E-06	70	9,125	1.0E-06	0.0003	3.3E-03
										Total	**3.3E-03**

Table A28b - Parcel J9-23-24: Cancer and Non-Cancer Risks from Dermal Exposure to 0- to 1-Foot Soil
Pathway: Dermal Contact
Receptor: Groundskeeper

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^c)	SA Surface Area Exposed (cm^c/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	1.95	0.1	3,300	0.13	84	25	1E-06	70	25,550	9.8E-08	0.73	7.2E-08
Benzo(a)pyrene	2.05	0.1	3,300	0.13	84	25	1E-06	70	25,550	1.0E-07	7.3	7.5E-07
Dibenzo(a,h)anthracene	0.57	0.1	3,300	0.13	84	25	1E-06	70	25,550	2.9E-08	7.3	2.1E-07
Arsenic	6.07	0.1	3,300	0.03	84	25	1E-06	70	25,550	7.1E-08	1.5	1.1E-07
											Total	**1.1E-06**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	**6.07**	**0.1**	**3,300**	**0.03**	**84**	**25**	**1E-06**	**70**	**9,125**	**2.0E-07**	**0.0003**	**6.6E-04**
											Total	**6.6E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	8.4E-08	7.2E-08	1.6E-07
	Benzo(a)pyrene	8.8E-07	7.5E-07	1.6E-06
	Dibenzo(a,h)anthracene	2.4E-07	2.1E-07	4.5E-07
	Arsenic	5.3E-07	1.1E-07	6.4E-07
	Total	**1.7E-06**	**1.1E-06**	**2.9E-06**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	3.3E-03	6.6E-04	4.0E-03
	Total	**0.00333**	**0.00066**	**0.00398**

Table A29a - Parcel J9-23-24: Cancer and Non-Cancer Risks from Ingestion Exposure to 1- to 6-Foot Soil
Pathway: Incidental Soil Ingestion
Receptor: Utility Worker

CARCINOGENIC
CSF = CDI x CSF
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.35	137	1.0	5	25	1E-06	70	25550	3.4E-09	0.73	2.4E-09
Benzo(a)pyrene	0.29	137	1.0	5	25	1E-06	70	25550	2.8E-09	7.3	2.0E-08
Dibenzo(a,h)anthracene	0.17	137	1.0	5	25	1E-06	70	25550	1.6E-09	7.3	1.2E-08
Arsenic	6.28	137	1.0	5	25	1E-06	70	25550	6.0E-08	1.5	9.0E-08
										Total	**1.2E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI = Cs x IgR x OA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	IgR Ingestion Rate (mg/d)	OA Oral Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose (mg/kg-d)	HQ Hazard Quotient
Arsenic	**6.28**	**137**	**1.0**	**5**	**25**	**1E-06**	**70**	**9,125**	**1.7E-07**	**0.0003**	**5.6E-04**
										Total	**5.6E-04**

Table A29b - Parcel J9-23-24: Cancer and Non-Cancer Risks from Dermal Exposure to 1- to 6-Foot Soil
Pathway: Dermal Contact
Receptor: Utility Worker

CARCINOGENIC
Risk = CDI x CSF
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/Atc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATc Averaging Time Carcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	CSF Cancer Slope Factor[a] (mg/kg-d)$^{-1}$	Risk
Benzo(a)anthracene	0.35	0.8	3,300	0.13	5	25	1E-06	70	25,550	8.4E-09	0.73	6.1E-09
Benzo(a)pyrene	0.29	0.8	3,300	0.13	5	25	1E-06	70	25,550	7.0E-09	7.3	5.1E-08
Dibenzo(a,h)anthracene	0.17	0.8	3,300	0.13	5	25	1E-06	70	25,550	4.1E-09	7.3	3.0E-08
Arsenic	6.28	0.8	3,300	0.03	5	25	1E-06	70	25,550	3.5E-08	1.5	5.2E-08
											Total	**1.4E-07**

NONCARCINOGENIC
HQ = CDI/RfD
CDI =Cs x DAF x SA x DA x EF x ED x CF x 1/BW x 1/ATnc

Chemical	Cs Soil Concentration (mg/kg)	DAF Dermal Adherence Factor (mg/cm^2)	SA Surface Area Exposed (cm^2/day)	DA Dermal Absorption (unitless)	EF Exposure Frequency (d/yr)	ED Exposure Duration (yrs)	CF Conversion Factor (kg/mg)	BW Body Weight (kg)	ATnc Averaging Time Noncarcinogenic (days)	CDI Chronic Daily Intake (mg/kg-d)	RfD Reference Dose[b] (mg/kg-d)	HQ Hazard Quotient
Arsenic	**6.28**	**0.8**	**3,300**	**0.03**	**5**	**25**	**1E-06**	**70**	**9,125**	**9.7E-08**	**0.0003**	**3.2E-04**
											Total	**3.2E-04**

Total Carcinogenic Risk		Ingestion	Dermal	Total
	Benzo(a)anthracene	2.4E-09	6.1E-09	8.6E-09
	Benzo(a)pyrene	2.0E-08	5.1E-08	7.1E-08
	Dibenzo(a,h)anthracene	1.2E-08	3.0E-08	4.2E-08
	Arsenic	9.0E-08	5.2E-08	1.4E-07
	Total	**1.2E-07**	**1.4E-07**	**2.6E-07**
Total Noncarcinogenic Hazard		Ingestion	Dermal	Total
	Arsenic	5.6E-04	3.2E-04	8.9E-04
	Total	**0.00056**	**0.00032**	**0.00089**