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FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN , INDIANA
EPA ID No. IND044587848

DRAFT INDOOR AIR RISK EVALUATION FOR THE RESIDENCES ALONG FORSYTHE STREET

Submitted to:

Mr. William Buller
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Submitted by:

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EPA Work Assignment No.	**R05033**
Contract No.	**68-W4-0006**
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October 29, 1996

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DRAFT INDOOR AIR RISK EVALUATION FOR THE RESIDENCES ALONG FORSYTHE STREET

TABLE OF CONTENTS

TABLES

APPENDICES

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Reference: EPA Contract No. 68-W4-0006; EPA Work Assignment No. R05033; EPA ID No. IND044587848; Former Franklin Power Products/ Amphenol Facility, Franklin, Indiana; Draft Indoor Air Risk Evaluation for Residences along Forsythe Street; Task 02 Deliverable

Dear Mr. Buller:

Please find enclosed A.T. Kearney's Draft Indoor Air Risk Evaluation for the residences along Forsythe Street, adjacent to the Franklin Power Products/Amphenol facility. This review was performed by evaluating analytical data resulting from groundwater sampling which recently occurred along the right of way on Forsythe Street. Also enclosed is a diskette which contains this review in WordPerfect 6.1 for Windows format. In addition, the tables included in Appendix A and B were generated in Lotus 123 version 3.4. These files are also included.

The risk evaluation result appears to demonstrate that the risks associated with the contaminated groundwater underlying the facility and Forsythe Street poses little risk to the nearby residences. It is important to note that while the Johnson and Ettinger model attempts to emulate the conditions which would lead to transport of contamination into the basements, there are several default, or surrogate, parameters which need to be used, adding to the uncertainty associated with the results. In addition, models connecting the soil gas flux rate and indoor air concentration such as this model have not been validated with field data.

This document is a draft deliverable. We have included data and an evaluation of risks for MW-31. As you requested, only one-half of the reported concentrations were used in evaluating risk.

Please feel free to contact me or the A.T. Kearney Work Assignment Manager, Mr. John Koehnen, at 312/223-6253, if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5, w/o att.
W. Jordan, Central Files
J. Koehnen
M. Smith
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1.0 INTRODUCTION

An evaluation of the indoor air risks associated with volatile organic constituent (VOC) contamination of the groundwater along Forsythe Street has been performed. The procedures outlined in available U.S. EPA reference materials were used to perform a cursory evaluation of the indoor air risks to residents along Forsythe Street and adjacent to the Franklin facility. Franklin Power Products, Amphenol Corporation, was reported as the party responsible for leaks detected in the sanitary sewer which runs under the right of way along Forsythe Street in Franklin, Indiana. The sanitary sewer was reportedly used to convey chemical and other wastes from the Franklin facility to the City of Franklin treatment facility. A leak from the sanitary sewer, along Forsythe Street, resulted in a release of hazardous constituents to the soils and groundwater. The primary constituents included trichloroethene (TCE), 1,1,1 trichloroethane (TCA), tetrachloroethylene (PCE), and other VOCs.

Following this release to the environment, the sanitary sewer was replaced. However, neither the soil or groundwater contamination was addressed at that time. Franklin currently proposes that natural attenuation mechanisms will be adequate to remediate the plume of VOC constituents. While this theory is not fully supported, a recent series of groundwater samples has indicated that the concentrations within the plume appear to have decreased by an order of magnitude over the last few years. Notwithstanding these findings, an indoor air risk evaluation has been completed to aid in determining the need for, and the significance on the timing of, interim or corrective measures along Forsythe Street.

The available means for performing this assessment were evaluated. While limited, a series of models (algorithms) known as the Johnson and Ettinger (J&E) model is available for use in these circumstances. The J&E model allows for the determination of relative air concentrations, tied to the concentration of contaminant in the outer (i.e., perimeter or underlying) soils and groundwater surrounding the residences and basements. It is important to note that these models are "theoretical" and result in a qualitative evaluation of the potential for adverse health effects

resulting from nearby soil and groundwater contamination. The air concentrations defined by the J&E model are then evaluated against a series of risk criteria, including toxicity criteria and exposure scenarios, to determine a baseline risk number. The resulting data, or potential risk number, should be viewed as a general assessment of the risks and the significance of the number should be evaluated to determine whether additional risk evaluations are warranted. This may include active or passive air monitoring within the residences and/or additional soil gas or Geoprobe sampling directly adjacent to the residences. Thus, the J&E model results are a screening tool to further repudiate or confirm Franklin's proposal to allow natural attenuation to be used to remediate the plume.

In generating the J&E output, physical and chemical parameters included in the recent "Report of Additional Corrective Measures at the Amphenol Facility" were used. In addition, the J&E model uses a significant number of default or surrogate data parameters to supplement available data since it is assumed that only minimal site-specific information is available, otherwise a full, more detailed risk assessment/evaluation could be performed. To evaluate the sensitivity of the model, indoor air concentrations were calculated for multiple values of soil permeability and air exchange rate. This approach was taken to evaluate how changes in important model parameters, whose exact values were unknown, would impact the risk. The chemical concentrations from MW-31 (at one half their reported value - PCE 7.5 ppb, TCA 17.5 ppb, TCE 65 ppb) were used to better define the risks for the residents along Forsythe Street. The parameters used, their basis, and the resulting risks are further described in the following sections.

2.0 DERIVATION OF INDOOR AIR CONCENTRATIONS

In order to assess the potential risk to residents along Forsythe Street, the J&E model (USEPA, 1992; Johnson and Ettinger, 1991) was applied to estimate the ratio of indoor air concentration to source concentration for tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene. The ratios predicted by the model were multiplied by the analytical results obtained for the three chemicals at MW-31 to provide estimates of the indoor air concentrations in a hypothetical basement. Ratios were obtained for multiple parameter values to illustrate the sensitivity of the model to basement air exchange rate, soil permeability (in units of cm^2), and air and water diffusivity coefficients. A potential risk was determined for each case for which an indoor air concentration was estimated.

J&E hypothesized that the ratio, α, of indoor air concentration in a subgrade space to a source concentration in the underlying soil may be determined by:

$$\alpha = \frac{\frac{D_t^{eff} A_b}{Q_{bldg} L_T} \exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right)}{\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) + \left(\frac{D_t^{eff} A_b}{Q_{bldg} L_T}\right) + \left(\frac{D_t^{eff} A_b}{Q_{soil} L_T}\right)\left[\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) - 1\right]}$$

where:

D_t^{eff}	Overall effective diffusion coefficient
A_b	Cross-sectional area through which contaminants pass (approximated by the area of the floor and below grade walls
Q_{bldg}	Building ventilation rate
L_T	Distance from contaminant source to building foundation
Q_{soil}	Volumetric flow rate of soil gas into building
L_{crack}	Thickness of foundation, 15 cm (6 inches)
D_{crack}	Effective vapor-pressure diffusion coefficient through floor cracks
A_{crack}	Area of cracks/openings through which vapors pass

Each parameter value was calculated or determined from guidance documents or the general scientific literature as described below.

Calculation of D_t^{eff}

The overall effective diffusion coefficient, D_t^{eff}, was calculated from:

$$D_t^{eff} = \frac{D_G}{\frac{\rho_b K_d}{H} + \frac{\theta_M}{H} + \theta_a} + \frac{D_L}{\rho_b K_d + \theta_m + \theta_a H}$$

where:

D_G	Effective air diffusion coefficient
D_L	Effective water diffusion coefficient
θ	Total soil porosity, $\theta = \theta_a + \theta_m$
θ_a	Air-filled soil porosity
θ_m	Moisture-filled soil porosity
ρ_b	Dry bulk density of soil
K_d	Distribution coefficient and
H	Henry's Law constant (dimensionless form).

Values for D_G and D_L were determined using methods outlined in Lyman, 1990. D_G was calculated using the FSG Method:

$$D_G = \frac{1x10^{-3}T^{1.75}\sqrt{M_r}}{P(V_A^{1/3}+V_B^{1/3})^2}$$

D_L was determined using the Hayduk and Laudie method:

$$D_L = \frac{13.26x10^{-5}}{\eta_W^{1.14}V_B^{0.589}}$$

A site-specific value for total soil porosity, θ was not available. Therefore, the value of 0.5 provided by J&E (1991) was used. The value of θ_m was calculated as the product of the site-specific soil moisture content and soil bulk density determined at MW-31. θ_a was calculated as the difference between θ and θ_m.

As suggested in U.S. EPA Guidance (USEPA, 1990), the value of K_d was calculated from $K_d = K_{oc}f_{oc}$. The values of K_{oc} for tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). A value of 0.01 was assumed for f_{oc} as suggested for soils in the 1993 Addendum (USEPA, 1993).

Values for the dimensionless Henry's Law Constant were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996).

Calculation of A_b

The basement floor area was assumed to be 200 meters square. Approximately 2 meters of each wall was assumed to be below grade. This resulted in a subgrade area of 324 square meters.

Calculation of Q_{bldg}

Q_{bldg} was calculated as the product of the volume of the basement and the number of air changes per hour. The basement had a volume of 500 cubic meters. The number of air changes per hour was varied from 0.5 to 1.5 to 5 to illustrate the sensitivity of the indoor air concentration to the value of Q_{bldg}.

Calculation of Q_{soil}

As proposed in J&E (1991), Q_{soil} is calculated using:

$$Q_{soil} = \frac{2\Pi\Delta P k_v X_{crack}}{\mu \ln[\frac{2Z_{crack}}{r_{crack}}]}, \frac{r_{crack}}{Z_{crack}} \ll 1$$

where:

ΔP	Underpressurization of basement due to temperature and wind effects
k_v	Soil permeability in cm^2
X_{crack}	Total length of basement wall/floor perimeter crack
μ	Viscosity of air in g/(cm-sec)
Z_{crack}	Depth of basement wall below grade
r_{crack}	Radius of basement wall/floor perimeter crack

ΔP was calculated from:

$$\Delta P = \frac{P_V + \Delta P_C}{1 + (\frac{A_W}{A_L})^{1/N}}$$

P_V represents the static pressure over the building in Pascals (Pa) and is a function of the square of the wind velocity ($P_V = 0.6008V^2$). The pressure difference due to the thermal gradient, ΔP_C, is determined by $0.342\ Ph(T_1 - T_o)/T_1T_o$ where h represents the distance from the neutral pressure plane in the building and T_1 and T_o are the inside and outside temperature, respectively. Values for V and T_o were taken from the Climatological Summaries for the United States. The inside temperature was assumed to be 23°C (296.15°K).

h was calculated using the following equation (ASHRAE, 1977):

$$h = \frac{H}{1 + [(\frac{A_1}{A_2})^2 (\frac{T_i}{T_o})]}$$

where:

H	Distance between upper and lower openings
A_1	Area of lower opening m^2
A_2	Area of upper opening m^2
T_i	Inside temperature °K
T_o	Outside temperature °K.

The residence was assumed to be 16.5 meters high (i.e., above the ground surface) with 2.5 meters between the lower opening and the upper opening. The lower opening was a window approximately 1.2 meters square. The upper opening was assumed to be a dormer window with an area of 1 square meter. Substitution of these values into the above equation yielded an estimate for h of 0.9 meters.

The indoor air concentration was calculated for three values of soil permeability: 1×10^{-8}, 1×10^{-10}, and 1×10^{-13} cm^2. Table I of J&E indicates that a value of 1×10^{-8} cm^2 is representative of silty sand to fine sand. Likewise, the value of 1×10^{-10} cm^2 is the lowest value representative of silty soil. The third value used, 1×10^{-13} cm^2, was calculated from a soil permeability measured at MW-31 of 5.2×10^{-8} cm/sec. This value appears to be indicative of clayey soils of low permeability. According to the description of the soils from which the sample was taken, a result that represents low soil permeability is appropriate. The other values used appear to be appropriate for site soils that are closer to the surface.

As presented in J&E (1991), r_{crack} was calculated from:

$$r_{crack} = \frac{\eta A_B}{X_{crack}}$$

where:

η	A_{crack} / A_B

The vertical distance from the contaminant source to the building foundation, L_T, was calculated by assuming that the source was at the same depth as the existing contamination plume (approximately 12 feet or 3.66 meters). The basement floor was assumed to be 2 meters below grade. Therefore, L_T = 3.66-2 = 1.66 meters or 166 centimeters.

The crack between the basement wall and floor was assumed to run along the entire perimeter and be approximately 0.5 centimeters high. Assuming that the crack approximated a rectangle resulted in A_{crack} = (0.5 cm)(6,220 cm) = 3,110 cm^2.

Sensitivity Analysis

To illustrate the sensitivity of the indoor air concentration to variations in some parameter values, six cases were analyzed with one case (SRI2) serving as the baseline for all comparisons. Three values of soil permeability were used to examine the effect on indoor air concentration. In addition, indoor air concentrations were predicted for three values of Q_{bldg}. One case was analyzed using values for D_G and D_L taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). In the baseline case, these parameters were calculated using the equations presented above. Table 1 provides a description of each case analyzed.

Table 1
Cases Analyzed for Indoor Air Concentration

CASE	Air Exchanges (volumes/hour)	Soil Permeability (cm^2)	D_G	D_L
SRI2	0.5	1×10^{-8}	Calculated	Calculated
SRI2a	0.5	1×10^{-10}	Calculated	Calculated
SRI2b	0.5	1×10^{-13}	Calculated	Calculated
SRI2c	0.5	1×10^{-8}	SSG Value	SSG Value
SRI	5	1×10^{-8}	Calculated	Calculated
SRI	1.5	1×10^{-8}	Calculated	Calculated

Indoor air concentrations were predicted for all six cases using the measured concentrations at MW-31 as the source concentration.

Calculated Indoor Air Concentration

Table 2 lists the indoor air concentrations predicted using MW-31 analytical data.

Table 2
Franklin Facility Indoor Air Concentrations (ug/m^3)

Location/CASE	Tetrachloroethene	1,1,1-TCA	Trichloroethene
FOR MW-31			
SRI2	1.95E+00	9.59E+00	1.56E+01
SRI2a: $k_v = 1 \times 10^{-10}$ cm^2	5.19E-01	3.30E+00	2.11E+00
SRI2b: $k_v = 1 \times 10^{-13}$ cm^2	5.09E-01	3.26E+00	2.02E+00
SRI2c: D_G, D_L from SSG	1.94E+00	9.49E+00	1.55E+01
SRI: 5 air changes/hr	1.95E-01	9.59E-01	1.56E+00
SRI1: 1.5 air changes/hr	6.50E-01	3.20E+00	5.20E+00

An examination of cases SRI2, SRI2a, and SRI2b shows that decreasing values of soil permeability result in lower indoor air concentrations. In fact, closer examination reveals that the results do not vary much between SRI2a and SRI2b. Although the values of k_v differ by three orders of magnitude, both cases represent the limiting case of $[Q_{soil}L_{crack}/(D_{crack}A_{crack})] \rightarrow 0$. Therefore, the effect of soil permeability is minimized in both cases.

As pointed out in J&E (1991), the value of soil permeability is likely to vary several orders of magnitudes over a site. Based on descriptions of on-site soils, it is likely that soil permeability could fall within the 10^{-8} to 10^{-10} range between the surface and soils just beneath the basement floor; deeper soils should approach the 10^{-13} level (i.e., be less permeable).

According to Table 1, Chapter 21 of the 1997 ASHRAE Handbook of Fundamentals, a value of 0.5 air changes per hour corresponds to a room with no windows or exterior doors and only natural ventilation while a value of 1.5 air changes per hour represents a room with windows or exterior doors on two sides. Most basements that rely solely on natural ventilation should fall between these two values. ASHRAE does not describe a case higher than 2 air changes per hour (i.e., windows and exterior doors on three walls). Five air changes per hour produced the minimum indoor air concentrations and, as discussed in the Superfund guidance, shows that convection is dominating the transport of hazardous constituents in this case. It is of considerable interest that increasing the air changes from 0.5 to 1.5 also reduces the predicted indoor air concentrations by one third. Likewise, going from 0.5 to 5 air changes per hour reduces the

predicted indoor air concentrations by an order or magnitude. This illustrates the direct relationship between indoor air concentration and Q_{bldg} inherent in the J&E model.

3.0 EVALUATION OF RISKS

Contaminants of Concern

Contaminants of Concern (COCs) were identified from the "Report of Additional Corrective Measures Studies for the Former Amphenol Facility" (Earth Tech, 1996) as the chemicals expected to potentially pose the most risk to residential receptors. The COCs identified in this assessment include tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene.

Exposure Assessment

The potential exposure pathway of concern is the inhalation of indoor airborne vapors. Air concentrations have been estimated for the COCs (see Section 2.0). The indoor air concentration is the estimated air concentration quantified in the air modeling efforts (see Table B-1, Appendix B). This concentration is assumed to be the chemical concentration in air to which receptors may be exposed. As six different air concentration estimates have been modeled for MW-31, exposures and resultant risks to receptors are quantified for each modeled air concentration.

The air concentrations are assumed to be present in the "basement" level of the residences near the Franklin facility. Adult and child residents are assumed to be exposed to these air concentrations at the estimated level over a period of years. Exposures and resultant risks of adult and child residents to these basement air concentrations have been estimated. The exposure scenarios and parameters are based on U.S. EPA risk assessment guidance (EPA, 1989 and 1991) and professional judgement. Exposure parameter values were identified using worst case and average case exposure assumptions. Tables B-2 and B-3 present the exposure equations and parameters used to quantify the exposure of adult and child residents to concentrations of chemicals in indoor air.

Exposure Parameters

U.S. EPA risk assessment guidance (EPA 1989 and 1991) was used to identify adult and child resident exposure frequency, duration, body weight and averaging time. These values are standard default values and estimate the worst case (high end) and average case exposure conditions.

The inhalation rates for the adult and child residential receptors were calculated as outlined in U.S. EPA risk assessment guidance (EPA, 1991) for indoor air. This calculation uses the average

adult and six year old child inhalation rates for resting, light, moderate and heavy activities. It assumes that 25% of the activity will be resting, 60% will be light, 10% will be moderate and 5% will be heavy. From these values and percentages, an inhalation rate for indoor air is estimated.

The high end exposure and average case exposure times were estimated based upon professional judgement (see Table B-2, Appendix B). The high end exposure time assumes the adult resident works outside the home 10 hours per day and sleeps six hours per day. It assumes the basement level is used as the recreation room and all time not spent at work or asleep is spent on this level. The high end child resident exposure time assumes that the child sleeps half the day and spends the rest of their time in the "basement." The average case exposure time assumes that half of the estimated high end exposure time will be sufficient to estimate the receptors exposed to chemical concentrations under average exposure conditions.

Tables B-4 through B-7 present the high end and average exposures for the adult and child residential receptors.

Risk Characterization

Both non-carcinogenic and carcinogenic risks were calculated for the residential receptor populations and exposure routes as described below.

Non-Carcinogenic Hazards

Theoretical non-carcinogenic hazards associated with chronic exposure were characterized using the ratio of Non-carcinogenic Chronic Daily Intake (NCCDI) (see Tables B-4 and B-6) to the Reference Concentration (RfC) (see Table B-8). The Hazard Quotient is the ratio of the NCCDI to the RfC.

$$Hazard\ Quotient = \frac{NCCDI\ (mg/kg\text{-}d)}{RfC\ (mg/kg\text{-}d)}$$

The Hazard Index assesses the overall potential for non-carcinogenic effects. It assumes that multiple sub-threshold exposures could result in an adverse non-carcinogenic systemic health effect. Hazard Quotient and Index values below 1.0 suggest that non-carcinogenic toxic effects should not occur. Values above 1.0 indicate that effects could be of concern, especially in sensitive populations. (See Tables B-9 and B-11 in Appendix B for the Hazard Indices for the adult and child residential receptors.)

For the baseline indoor air concentration (SRI2), the adult and child hazard indices for the

chemicals of concern did not exceed the 1.0 non-carcinogenic threshold value. The hazard indices for all indoor air concentrations and all exposure scenarios were less than 1.0.

Carcinogenic Risks

Carcinogenic risks are estimated as the increased possibility, above background, that an individual will contract cancer in his lifetime under the exposure conditions assumed. The Carcinogenic Potency Slope (CPS) of a chemical is the upper 95% confidence limit of the slope of the extrapolated dose-response curve (see Table 8 for the CPSs used in this assessment). The CPS converts the Carcinogenic Chronic Daily Intake (CCDI) (see Tables 5 and 7) for potential carcinogens to incremental cancer risks values.

$$\textit{Incremental Lifetime Cancer Risk} = \textit{CCDI (mg/kg-d)} * \textit{CPS (mg/kg-d)}^{-1}$$

U.S. EPA risk assessment guidance (EPA, 1989) specifies a risk range for residential receptors of 10^{-4} to 10^{-6}. Carcinogenic risks exceeding this range suggest that the potential exists for risks to receptors to result under the exposure conditions identified in the assessment. (See Tables B-10 and B-12 for the carcinogenic risks to residential receptors.)

The carcinogenic risks stemming from the baseline indoor air concentrations (SRI2) estimated for the tetrachloroethene contamination level at MW-31 were below 10^{-6} for all exposure scenarios considered. The risks resulting from the baseline indoor air concentration for trichloroethene levels at MW-31 fell within the 10^{-4} to 10^{-6} range for all exposure scenarios.

Discussion of Risk Results

As with indoor air concentrations, case SRI2 generated the highest hazard indices and carcinogenic risks. This can be attributed to the relative high permeability of the soil and the low air exchange rate assumed for the baseline case.

As observed for indoor air concentration, decreasing values of soil permeability result in decreasing hazard indices and carcinogenic risks while increasing values of air exchange rate produce decreasing risk levels. These trends were expected within each exposure scenario as the indoor air concentration was the only numerical value that changed in the risk or hazard index calculations between cases.

Conclusions

The risk levels calculated for the high end adult and child exposure scenarios stemming from the chemical levels measured at off-site well MW-31 and the indoor air concentrations estimated for case SRI2 represent a reasonable worst case (lowest soil permeability values, lowest air exchange rate, aggressive exposure times) for residences along Forsythe Street. Based on the soil descriptions provided in the Earth Tech report, soil permeability likely decreases with depth. Also, most basements that rely solely on natural ventilation are likely to be fitted with at least one door or window (the air exchange rate assumed in case SRI2 is for no exterior windows or doors). Therefore, it appears likely that the actual risks stemming from indoor air concentrations of the chemicals of concern will be below or at the lowest level of the 10^{-4} to 10^{-6} acceptable range.

4.0 UNCERTAINTIES

- The contaminant source was assumed to be infinite (i.e., constant source concentration at a fixed distance from the basement) over the period of interest. This approach provides a "snapshot" of what risks might be if the source concentration remained unchanged. It is likely that the source concentration will actually decrease over time, therefore, the applied approach is conservative (i.e., overestimates risk).

- Uncertainty exists regarding the actual configuration/construction of the basements along Forsythe Street. Assumptions made regarding the size of the basement, the size of the crack between the basement walls and floor, crack diffusion coefficient, and other construction features increase the uncertainty and may result in an overestimation of risks. In addition, exact values for soil permeability and basement air exchange rate are unknown and their effect on modeled indoor air concentration was evaluated through a sensitivity analysis. Parameter values were chosen for the baseline case (SRI2) that appear to be conservative.

- No site specific value for total soil porosity was available. Hence a default value of 0.5 (cm^3/cm^3) was used as recommended in the J&E model. An air porosity of 0.27 and a moisture porosity of 0.23 were used. The moisture porosity value is considered to be low, and conservative, since any increases in the moisture porosity would be expected to reduce available pore space, and hence decrease the ability of VOCs in the groundwater to volatilize and travel through the void space to the residential basements. Therefore the use of the J&E default value for total porosity appears to add conservatism. If possible (i.e., if a more detailed study were to be performed), site-specific soil porosity values for both air and moisture porosity should be defined since these factors has a significant effect on the total effective diffusion coefficient (D_t^{eff}).

- Lack of toxicity criteria for the COCs adds to the uncertainty to the assessment. The toxicity values used are provisional values provided by the EPA Technical Support Center. These values have not been through U.S. EPA's formal review process, therefore, they don't represent an U.S. EPA verified assessment.

- Uncertainty exists regarding the actual conditions under which the receptors may be exposed. Assumptions made regarding exposure duration, exposure frequency, exposure time, and inhalation rate increase the uncertainty and may result in an overestimation of risks.

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TABLE OF CONTENTS

TABLES

APPENDICES

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Mr. William Buller
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Region 5 - DRE-8J
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Reference: EPA Contract No. 68-W4-0006; REPA Work Assignment No. RO5033; EPA ID No. IND044587848, Former Franklin Power Products/ Amphenol Facility, Franklin, Indiana; Draft Indoor Air Risk Evaluation for Residences along Forsythe Street; Task 02 Deliverable

Dear Mr. Buller:

Please find enclosed A.T. Kearney's Draft Indoor Air Risk Evaluation for the residences along Forsythe Street, adjacent to the Franklin Power Products/Amphenol facility. This review was performed by evaluating analytical data resulting from groundwater sampling which recently occurred along the right of way on Forsythe Street. Also enclosed is a diskette which contains this review in WordPerfect 6.1 for Windows format. In addition, the tables included in Appendix A and B were generated in Lotus 123 version 3.4. These files are also included.

The risk evaluation result appears to demonstrate that the risks associated with the contaminated groundwater underlying the facility and Forsythe Street poses little risk to the nearby residences. It is important to note that while the Johnson and Ettinger model attempts to emulate the conditions which would lead to transport of contamination into the basements, there are several default, or surrogate, parameters which need to be used, adding to the uncertainty associated with the results. In addition, models connecting the soil gas flux rate and indoor air concentration such as this model have not been validated with field data.

This document is a draft deliverable. We have included data and an evaluation of risks for both MW-31 and MW-12. Based upon your request earlier this week, a second deliverable which includes only data and a risk evaluation for MW-31 will be submitted. In addition, as you requested, only one-half of the reported concentrations were used in evaluating risk.

Please feel free to contact me or the A.T. Kearney Work Assignment Manager, Mr. John Koehnen, at 312/223-6253, if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5, w/o att.
W. Jordan, Central Files
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DRAFT

FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
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DRAFT INDOOR AIR RISK EVALUATION FOR THE RESIDENCES ALONG FORSYTHE STREET

1.0 INTRODUCTION

An evaluation of the indoor air risks associated with volatile organic constituent (VOC) contamination of the groundwater along Forsythe Street has been performed. The procedures outlined in available US EPA reference materials were used to perform a cursory evaluation of the indoor air risks to residents along Forsythe Street and adjacent to the Franklin facility. Franklin Power Products, Amphenol Corporation, was reported as the party responsible for leaks detected in the sanitary sewer which runs under the right of way along Forsythe Street in Franklin, Indiana. The sanitary sewer was reportedly used to convey chemical and other wastes from the Franklin facility to the City of Franklin treatment facility. A leak from the sanitary sewer, along Forsythe Street, resulted in a release of hazardous constituents to the soils and groundwater. The primary constituents included trichloroethene (TCE), 1,1,1 trichloroethane (TCA), tetrachloroethylene (PCE), and other VOCs.

Following this release to the environment, the sanitary sewer was replaced. However, neither the soil or groundwater contamination was addressed at that time. Franklin currently proposes that natural attenuation mechanisms will be adequate to remediate the plume of VOC constituents. While this theory is not fully supported, a recent series of groundwater samples has indicated that the concentrations within the plume appear to have decreased by an order of magnitude over the last few years. Notwithstanding these findings, an indoor air risk evaluation has been completed to aid in determining the need for, and the significance on the timing of, interim or corrective measures along Forsythe Street.

The available means for performing this assessment were evaluated. While limited, a series of models (algorithms) known as the Johnson and Ettinger (J&E) model is available for use in these circumstances. The J&E model allows for the determination of relative air concentrations, tied to the concentration of contaminant in the outer (i.e., perimeter or underlying) soils and groundwater surrounding the residences and basements. It is important to note that these models are "theoretical" and result in a qualitative evaluation of the potential for adverse health effects

resulting from nearby soil and groundwater contamination. The air concentrations defined by the J&E model are then evaluated against a series of risk criteria, including toxicity criteria and exposure scenarios, to determine a baseline risk number. The resulting data, or potential risk number, should be viewed as a general assessment of the risks and the significance of the number should be evaluated to determine whether additional risk evaluations are warranted. This may include active or passive air monitoring within the residences and/or additional soil gas or Geoprobe sampling directly adjacent to the residences. Thus, the J&E model results are a screening tool to further repudiate or confirm Franklin's proposal to allow natural attenuation to be used to remediate the plume.

In generating the J&E output, physical and chemical parameters included in the recent "Report of Additional Corrective Measures at the Amphenol Facility" were used. In addition, the J&E model uses a significant number of default or surrogate data parameters to supplement available data since it is assumed that only minimal site-specific information is available, otherwise a full, more detailed risk assessment/evaluation could be performed. To evaluate the sensitivity of the model, indoor air concentrations were calculated for multiple values of soil permeability and air exchange rate. This approach was taken to evaluate how changes in important model parameters, whose exact values were unknown, would impact the risk. The chemical concentrations from both MW-31 (at one half their reported value - PCE 7.5 ppb, TCA 35 ppb, TCE 65 ppb) and MW-12 were also used to better define the risks for both the residents along Forsythe Street and those residing directly adjacent to the site. The parameters used, their basis, and the resulting risks are further described in the following sections.

2.0 DERIVATION OF INDOOR AIR CONCENTRATIONS

In order to assess the potential risk to residents along Forsythe Street, the J&E model (USEPA, 1992; Johnson and Ettinger, 1991) was applied to estimate the ratio of indoor air concentration to source concentration for tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene. The ratios predicted by the model were multiplied by the analytical results obtained for the three chemicals at both MW-31 and MW-12 to provide estimates of the indoor air concentrations in a hypothetical basement. Ratios were obtained for multiple parameter values to illustrate the sensitivity of the model to basement air exchange rate, soil permeability (in units of cm^2), and air and water diffusivity coefficients. A potential risk was determined for each case for which an indoor air concentration was estimated.

Johnson and Ettinger hypothesized that the ratio, α, of indoor air concentration in a subgrade space to a source concentration in the underlying soil may be determined by:

$$\alpha = \frac{\frac{D_t^{eff} A_b}{Q_{bldg} L_T} \exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right)}{\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) + \left(\frac{D_t^{eff} A_b}{Q_{bldg} L_T}\right) + \left(\frac{D_t^{eff} A_b}{Q_{soil} L_T}\right)\left[\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) - 1\right]}$$

where:

D_t^{eff}	Overall effective diffusion coefficient
A_b	Cross-sectional area through which contaminants pass (approximated by the area of the floor and below grade walls
Q_{bldg}	Building ventilation rate
L_T	Distance from contaminant source to building foundation
Q_{soil}	Volumetric flow rate of soil gas into building
L_{crack}	Thickness of foundation, 15 cm (6 inches)
D_{crack}	Effective vapor-pressure diffusion coefficient through floor cracks
A_{crack}	Area of cracks/openings through which vapors pass

Each parameter value was calculated or determined from guidance documents or the general scientific literature as described below.

Calculation of D_t^{eff}

The overall effective diffusion coefficient, D_t^{eff}, was calculated from:

$$D_t^{eff} = \frac{D_G}{\frac{\rho_b K_d}{H} + \frac{\theta_M}{H} + \theta_a} + \frac{D_L}{\rho_b K_d + \theta_m + \theta_a H}$$

where:

D_G	Effective air diffusion coefficient
D_L	Effective water diffusion coefficient
θ	Total soil porosity, $\theta = \theta_a + \theta_m$
θ_a	Air-filled soil porosity
θ_m	Moisture-filled soil porosity
ρ_b	Dry bulk density of soil
K_d	Distribution coefficient; and
H	Henry's Law constant (dimensionless form).

Values for D_G and D_L were determined using methods outlined in Lyman, 1990. D_G was calculated using the FSG Method:

$$D_G = \frac{1x10^{-3}T^{1.75}\sqrt{M_r}}{P(V_A^{1/3}+V_B^{1/3})^2}$$

D_L was determined using the Hayduk and Laudie method:

$$D_L = \frac{13.26x10^{-5}}{\eta_W^{1.14}V_B^{0.589}}$$

A site-specific value for total soil porosity, θ was not available. Therefore, the value of 0.5 provided by Johnson and Ettinger (1991) was used. The value of θ_m was calculated as the product of the site-specific soil moisture content and soil bulk density determined at MW-31. θ_a was calculated as the difference between θ and θ_m.

As suggested in U.S. EPA Guidance (USEPA, 1990), the value of K_d was calculated from $K_d = K_{oc}f_{oc}$. The values of K_{oc} for tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). A value of 0.01 was assumed for f_{oc} as suggested for soils in the 1993 Addendum (USEPA, 1993).

Values for the dimensionless Henry's Law Constant were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996).

Calculation of A_b

The basement floor area was assumed to be 200 meters square. Approximately 2 meters of each wall was assumed to be below grade. This resulted in a subgrade area of 324 square meters.

Calculation of Q_{bldg}

Q_{bldg} was calculated as the product of the volume of the basement and the number of air changes per hour. The basement had a volume of 500 cubic meters. The number of air changes per hour was varied from 0.5 to 1.5 to 5 to illustrate the sensitivity of the indoor air concentration to the value of Q_{bldg}.

Calculation of Q_{soil}

As proposed in Johnson and Ettinger (1991), Q_{soil} is calculated using:

$$Q_{soil} = \frac{2\Pi\Delta P k_v X_{crack}}{\mu \ln[\frac{2Z_{crack}}{r_{crack}}]} \cdot \frac{r_{crack}}{Z_{crack}} << 1$$

where:

ΔP	Underpressurization of basement due to temperature and wind effects
k_v	Soil permeability in cm^2
X_{crack}	Total length of basement wall/floor perimeter crack
μ	Viscosity of air in g/(cm-sec)
Z_{crack}	Depth of basement wall below grade
r_{crack}	Radius of basement wall/floor perimeter crack

ΔP was calculated from:

$$\Delta P = \frac{P_V + \Delta P_C}{1 + (\frac{A_W}{A_L})^{1/N}}$$

P_V represents the static pressure over the building in Pascals (Pa) and is a function of the square of the wind velocity ($P_V = 0.6008V^2$). The pressure difference due to the thermal gradient, ΔP_C, is determined by $0.342\ Ph(T_1 - T_o)/T_1T_o$ where h represents the distance from the neutral pressure plane in the building and T_1 and T_o are the inside and outside temperature, respectively. Values for V and To were taken from the Climatological Summaries for the United States. The inside temperature was assumed to be 23°C (296.15°K).

h was calculated using the following equation (ASHRAE, 1977):

$$h = \frac{H}{1 + [(\frac{A_1}{A_2})^2 (\frac{T_i}{T_o})]}$$

where:

H	Distance between upper and lower openings
A_1	Area of lower opening m^2
A_2	Area of upper opening m^2
T_i	Inside temperature °K
T_o	Outside temperature °K.

The residence was assumed to be 16.5 meters high (i.e., above the ground surface) with 2.5 meters between the lower opening and the upper opening. The lower opening was a window approximately 1.2 meters square. The upper opening was assumed to be a dormer window with an area of 1 square meter. Substitution of these values into the above equation yielded an estimate for h of 0.9 meters.

The indoor air concentration was calculated for three values of soil permeability: 1×10^{-8}, 1×10^{-10}, and 1×10^{-13} cm^2. Table I of Johnson and Ettinger indicates that a value of 1×10^{-8} cm^2 is representative of silty sand to fine sand. Likewise, the value of 1×10^{-10} cm^2 is the lowest value representative of silty soil. The third value used, 1×10^{-13} cm^2, was calculated from a soil permeability measured at MW-31 of 5.2×10^{-8} cm/sec. This value appears to be indicative of clayey soils of low permeability. According to the description of the soils from which the sample was taken, a result that represents low soil permeability is appropriate. The other values used appear to be appropriate for site soils that are closer to the surface.

As presented in Johnson and Ettinger (1991), r_{crack} was calculated from:

$$r_{crack} = \frac{\eta A_B}{X_{crack}}$$

where:

η	A_{crack} / A_B

The vertical distance from the contaminant source to the building foundation, L_T, was calculated by assuming that the source was at the same depth as the existing contamination plume (approximately 12 feet or 3.66 meters). The basement floor was assumed to be 2 meters below grade. Therefore, L_T = 3.66-2 = 1.66 meters or 166 centimeters.

The crack between the basement wall and floor was assumed to run along the entire perimeter and be approximately 0.5 centimeters high. Assuming that the crack approximated a rectangle resulted in A_{crack} = (0.5 cm)(6,220 cm) = 3,110 cm^2.

Sensitivity Analysis

To illustrate the sensitivity of the indoor air concentration to variations in some parameter values, six cases were analyzed with one case (SRI2) serving as the baseline for all comparisons. Three values of soil permeability were used to examine the effect on indoor air concentration. In addition, indoor air concentrations were predicted for three values of Q_{bldg}. One case was analyzed using values for D_G and D_L taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). In the baseline case, these parameters were calculated using the equations presented above. Table 1 provides a description of each case analyzed.

Table 1
Cases Analyzed for Indoor Air Concentration

CASE	Air Exchanges (volumes/hour)	Soil Permeability (cm^2)	D_G	D_L
SRI2	0.5	1×10^{-8}	Calculated	Calculated
SRI2a	0.5	1×10^{-10}	Calculated	Calculated
SRI2b	0.5	1×10^{-13}	Calculated	Calculated
SRI2c	0.5	1×10^{-8}	SSG Value	SSG Value
SRI	5	1×10^{-8}	Calculated	Calculated
SRI	1.5	1×10^{-8}	Calculated	Calculated

Indoor air concentrations were predicted for all six cases using the measured concentrations at MW-31 as the source concentration. The analysis was repeated using the measured

concentrations at MW-12.

Calculated Indoor Air Concentration

Table 2 lists the indoor air concentrations for all analyzed cases. The table indicates that the highest concentrations were obtained for case SRI2 (i.e., baseline) with the results for the source concentration at MW-12 being approximately one order of magnitude higher than those predicted using MW-31.

Table 2
Franklin Facility Indoor Air Concentrations (ug/m^3)

Location/CASE	Tetrachloroethene	1,1,1-TCA	Trichloroethene
FOR MW-31			
SRI2	1.95E+00	9.59E+00	1.56E+01
SRI2a: $k_v = 1 \times 10^{-10}$ cm^2	5.19E-01	3.30E+00	2.11E+00
SRI2b: $k_v = 1 \times 10^{-13}$ cm^2	5.09E-01	3.26E+00	2.02E+00
SRI2c: D_G, D_L from SSG	1.94E+00	9.49E+00	1.55E+01
SRI: 5 air changes/hr	1.95E-01	9.59E-01	1.56E+00
SRI1: 1.5 air changes/hr	6.50E-01	3.20E+00	5.20E+00
FOR MW-12			
SRI2	3.90E+02	2.74E+02	2.88E+02
SRI2a: $k_v = 1 \times 10^{-10}$ cm^2	1.04E+02	9.44E+01	3.89E+01
SRI2b: $k_v = 1 \times 10^{-13}$ cm^2	1.02E+02	9.31E+01	3.73E+01
SRI2c: D_G, D_L from SSG	3.87E+02	2.71E+02	2.86E+02
SRI: 5 air changes/hr	3.90E+01	2.74E+01	2.88E+01
SRI1: 1.5 air changes/hr	1.30E+02	9.13E+01	9.59E+01

An examination of cases SRI2, SRI2a, and SRI2b shows that decreasing values of soil permeability result in lower indoor air concentrations. In fact, closer examination reveals that the results do not vary much between SRI2a and SRI2b. Although the values of k_v differ by three orders of magnitude, both cases represent the limiting case of $[Q_{soil}L_{crack}/(D_{crack}A_{crack})] \rightarrow 0$. Therefore, the effect of soil permeability is minimized in both cases.

As pointed out in Johnson and Ettinger (1991), the value of soil permeability is likely to vary several orders of magnitudes over a site. Based on descriptions of on-site soils, it is likely that soil permeability could fall within the 10^{-8} to 10^{-10} range between the surface and soils just beneath the basement floor; deeper soils should approach the 10^{-13} level (i.e., be less permeable).

According to Table 1, Chapter 21 of the 1997 ASHRAE Handbook of Fundamentals, a value of 0.5 air changes per hour corresponds to a room with no windows or exterior doors and only natural ventilation while a value of 1.5 air changes per hour represents a room with windows or exterior doors on two sides. Most basements that rely solely on natural ventilation should fall between these two values. ASHRAE does not describe a case higher than 2 air changes per hour (i.e., windows and exterior doors on three walls). Five air changes per hour produced the minimum indoor air concentrations and, as discussed in the Superfund guidance, shows that convection is dominating the transport of hazardous constituents in this case. It is of considerable interest that increasing the air changes from 0.5 to 1.5 also reduces the predicted indoor air concentrations by one third. Likewise, going from 0.5 to 5 air changes per hour reduces the predicted indoor air concentrations by an order or magnitude. This illustrates the direct relationship between indoor air concentration and Q_{bldg} inherent in the Johnson Ettinger model.

3.0 EVALUATION OF RISKS

Contaminants of Concern

Contaminants of Concern (COCs) were identified from the "Report of Additional Corrective Measures Studies for the Former Amphenol Facility" (Earth Tech, 1996) as the chemicals expected to potentially pose the most risk to residential receptors. The COCs identified in this assessment include tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene.

Exposure Assessment

The potential exposure pathway of concern is the inhalation of indoor airborne vapors. Air concentrations have been estimated for the COCs (see Section 2.0). The indoor air concentration is the estimated air concentration quantified in the air modeling efforts (see Table B-1, Appendix B). This concentration is assumed to be the chemical concentration in air to which receptors may be exposed. As six different air concentration estimates have been modeled for both MW-12 and MW-31, exposures and resultant risks to receptors are quantified for each modeled air concentration.

The air concentrations are assumed to be present in the "basement" level of the residences near the Franklin facility. Adult and child residents are assumed to be exposed to these air

concentrations at the estimated level over a period of years. Exposures and resultant risks of adult and child residents to these basement air concentrations have been estimated. The exposure scenarios and parameters are based on EPA risk assessment guidance (EPA, 1989 and 1991) and professional judgement. Exposure parameter values were identified using worst case and average case exposure assumptions. Tables B-2 and B-3 present the exposure equations and parameters used to quantify the exposure of adult and child residents to concentrations of chemicals in indoor air.

Exposure Parameters

U.S. EPA risk assessment guidance (EPA 1989 and 1991) was used to identify adult and child resident exposure frequency, duration, body weight and averaging time. These values are standard default values and estimate the worst case (high end) and average case exposure conditions.

The inhalation rates for the adult and child residential receptors were calculated as outlined in U.S. EPA risk assessment guidance (EPA, 1991) for indoor air. This calculation uses the average adult and six year old child inhalation rates for resting, light, moderate and heavy activities. It assumes that 25% of the activity will be resting, 60% will be light, 10% will be moderate and 5% will be heavy. From these values and percentages, an inhalation rate for indoor air is estimated.

The high end exposure and average case exposure times were estimated based upon professional judgement (see Table B-2, Appendix B). The high end exposure time assumes the adult resident works outside the home 10 hours per day and sleeps six hours per day. It assumes the basement level is used as the recreation room and all time not spent at work or asleep is spent on this level. The high end child resident exposure time assumes that the child sleeps half the day and spends the rest of their time in the "basement." The average case exposure time assumes that half of the estimated high end exposure time will be sufficient to estimate the receptors exposed to chemical concentrations under average exposure conditions.

Tables B-4 through B-7 present the high end and average exposures for the adult and child residential receptors.

Risk Characterization

Both non-carcinogenic and carcinogenic risks were calculated for the residential receptor populations and exposure routes as described below.

Non-Carcinogenic Hazards

Theoretical non-carcinogenic hazards associated with chronic exposure were characterized using

the ratio of Non-carcinogenic Chronic Daily Intake (NCCDI) (see Tables B-4 and B-6) to the Reference Concentration (RfC) (see Table B-8). The Hazard Quotient is the ratio of the NCCDI to the RfC.

$$\textit{Hazard Quotient} = \frac{\textit{NCCDI (mg/kg-d)}}{\textit{RfC (mg/kg-d)}}$$

The Hazard Index assesses the overall potential for non-carcinogenic effects. It assumes that multiple sub-threshold exposures could result in an adverse non-carcinogenic systemic health effect. Hazard Quotient and Index values below 1.0 suggest that non-carcinogenic toxic effects should not occur. Values above 1.0 indicate that effects could be of concern, especially in sensitive populations. (See Tables B-9 and B-11 in Appendix B for the Hazard Indices for the adult and child residential receptors.)

For the baseline indoor air concentration (SRI2), the adult and child hazard indices for the chemicals of concern did not exceed the 1.0 non-carcinogenic threshold value. The hazard indices for all indoor air concentrations and all exposure scenarios were less than 1.0.

Carcinogenic Risks

Carcinogenic risks are estimated as the increased possibility, above background, that an individual will contract cancer in his lifetime under the exposure conditions assumed. The Carcinogenic Potency Slope (CPS) of a chemical is the upper 95% confidence limit of the slope of the extrapolated dose-response curve (see Table 8 for the CPSs used in this assessment). The CPS converts the Carcinogenic Chronic Daily Intake (CCDI) (see Tables 5 and 7) for potential carcinogens to incremental cancer risks values.

$$\textit{Incremental Lifetime Cancer Risk} = \textit{CCDI (mg/kg-d)} * \textit{CPS (mg/kg-d)}^{-1}$$

U.S. EPA risk assessment guidance (EPA, 1989) specifies a risk range for residential receptors of 10^{-4} to 10^{-6}. Carcinogenic risks exceeding this range suggest that the potential exists for risks to receptors to result under the exposure conditions identified in the assessment. (See Tables B-10 and B-12 for the carcinogenic risks to residential receptors.)

The carcinogenic risks stemming from the baseline indoor air concentrations (SRI2) estimated for

the tetrachloroethene contamination level at MW-31 were below 10^{-6} for all exposure scenarios considered. The risks resulting from the baseline indoor air concentration for trichloroethene levels at MW-31 fell within the 10^{-4} to 10^{-6} range for all exposure scenarios.

Indoor air concentrations stemming from source contamination levels at MW-12 resulted in carcinogenic risks within the acceptable range for both chemicals under the average exposure scenario. The high end exposure scenario also produced risks within the acceptable range for tetrachloroethene for all six modeled indoor air concentrations. However, the high end carcinogenic risks exceed the 10^{-4} to 10^{-6} risk range for trichloroethene for both the adult and child receptor for the baseline case (SRI2) and case SRI2c.

Discussion of Risk Results

As with indoor air concentrations, case SRI2 generated the highest hazard indices and carcinogenic risks. This can be attributed to the relative high permeability of the soil and the low air exchange rate assumed for the baseline case.

As observed for indoor air concentration, decreasing values of soil permeability result in decreasing hazard indices and carcinogenic risks while increasing values of air exchange rate produce decreasing risk levels. These trends were expected within each exposure scenario as the indoor air concentration was the only numerical value that changed in the risk or hazard index calculations between cases.

Conclusions

The risk levels calculated for the high end adult and child exposure scenarios stemming from the chemical levels measured at off-site well MW-31 and the indoor air concentrations estimated for case SRI2 represent a reasonable worst case (lowest soil permeability values, lowest air exchange rate, aggressive exposure times) for residences along Forsythe Street. Based on the soil descriptions provided in the Earth Tech report, soil permeability likely decreases with depth. Also, most basements that rely solely on natural ventilation are likely to be fitted with at least one door or window (the air exchange rate assumed in case SRI2 is for no exterior windows or doors). Therefore, it appears likely that the actual risks stemming from indoor air concentrations of the chemicals of concern will be below or at the lowest level of the 10^{-4} to 10^{-6} acceptable range.

4.0 UNCERTAINTIES

- The contaminant source was assumed to be infinite (i.e., constant source concentration at a fixed distance from the basement) over the period of interest. This approach provides a

"snapshot" of what risks might be if the source concentration remained unchanged. It is likely that the source concentration will actually decrease over time, therefore, the applied approach is conservative (i.e., overestimates risk).

- Uncertainty exists regarding the actual configuration/construction of the basements along Forsythe Street. Assumptions made regarding the size of the basement, the size of the crack between the basement walls and floor, crack diffusion coefficient, and other construction features increase the uncertainty and may result in an overestimation of risks. In addition, exact values for soil permeability and basement air exchange rate are unknown and their effect on modeled indoor air concentration was evaluated through a sensitivity analysis. Parameter values were chosen for the baseline case (SRI2) that appear to be conservative.

- No site specific value for total soil porosity was available. Hence a default value of 0.5 (cm^3/cm^3) was used as recommended in the J&E model. An air porosity of 0.27 and a moisture porosity of 0.23 were used. The moisture porosity value is considered to be low, and conservative, since any increases in the moisture porosity would be expected to reduce available pore space, and hence decrease the ability of VOCs in the groundwater to volatilize and travel through the void space to the residential basements. Therefore the use of the J&E default value for total porosity appears to add conservatism. If possible (i.e., if a more detailed study were to be performed), site-specific soil porosity values for both air and moisture porosity should be defined since these factors has a significant effect on the total effective diffusion coefficient (D_t^{eff}).

- Lack of toxicity criteria for the COCs adds to the uncertainty to the assessment. The toxicity values used are provisional values provided by the EPA Technical Support Center. These values have not been through EPA's formal review process, therefore, they don't represent an EPA verified assessment.

- Uncertainty exists regarding the actual conditions under which the receptors may be exposed. Assumptions made regarding exposure duration, exposure frequency, exposure time, and inhalation rate increase the uncertainty and may result in an overestimation of risks.

5.0 REFERENCES

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APPENDIX A

SUMMARY TABLES OF ESTIMATED INDOOR AIR CONCENTRATIONS USING THE JOHNSON-ETTINGER MODEL

TABLE A1-1: CASE SRII

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	6.50E-01	7500	8.66E-05
1,1,1-trichloroethane	3.20E+00	35000	9.13E-05
trichloroethene	5.20E+00	65000	7.99E-05

FOR MW-12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.30E+02	1500000	8.66E-05
1,1,1-trichloroethane	9.13E+01	1000000	9.13E-05
trichloroethene	9.59E+01	1200000	7.99E-05

TABLE A1-2: CASE SRI1

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/s
$D_{T\,eff}$	Overall effective diffusion coefficient, cm^2/s
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	8.66E-05	2379000	166	15	2.08E+05	2.31E-02	2.31E-02	3110	1.87E+01
1,1,1-trichloroethane	9.13E-05	2379000	166	15	2.08E+05	3.16E-02	3.16E-02	3110	1.87E+01
trichloroethene	7.99E-05	2379000	166	15	2.08E+05	1.06E-02	1.06E-02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	1.59E-03	3.91	1.77E+01
1,1,1-trichloroethane	2.18E-03	2.85	2.42E+01
trichloroethene	7.27E-04	8.54	8.10E+00

TABLE A1-3: CASE SR11

$$Q_{soil} = \frac{2\,pi\,deltaPk_v X_{crack}}{\mu \ln [2 z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm-s
z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	$\overline{Q_{soil}}$	deltaP	$\overline{k_v}$	μ	$\overline{X_{crack}}$	z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A1-4: CASE SRI1

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \theta_w / H + \theta_a} + \frac{D_L}{P_b K_d + \theta_w + \theta_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
θ_a	Air-filled soil porosity, cm^3/cm^3
θ_w	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	$\overline{D_T^{eff}}$	$\overline{D_G}$	$\overline{D_L}$	$\overline{\theta_a}$	$\overline{\theta_w}$	$\overline{P_b}$	$\overline{K_d}$	$\overline{H}$
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A1-5: CASE SRIT

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A1-6: CASE SR11

$$D_G = \frac{10^{-3}\, T^{1.75}\, Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r = (M_A + M_B)/M_A M_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2b-1: CASE SH2b

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	5.09E-01	7500	6.79E-05
1,1,1-trichloroethane	3.26E+00	35000	9.31E-05
trichloroethene	2.02E+00	65000	3.11E-05

TABLE A2b-2: CASE SRI2b

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp (Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	6.79E-05	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E-04
1,1,1-trichloroethane	9.31E-05	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E-04
trichloroethene	3.11E-05	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E-04

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	3.91E-05	1.77E+06
1,1,1-trichloroethane	6.53E-03	2.85E-05	2.42E+06
trichloroethene	2.18E-03	8.54E-05	8.10E+05

TABLE A2b-3: CASE SRI2b

$$Q_{soil} = \frac{2\,pi\;deltaP\,k_v\,X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 (from 5.2E-08 cm/sec [1])
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005
trichloroethene	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005

[1] Earth Tech, 1996

TABLEA2b-4: CASE SRI2b

$$D_T^{eff} = \frac{D_a}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_w}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_O	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_a	D_w	$\emptyset_a$	$\emptyset_w$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1 -trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.68	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A2b-5: CASE SRt2b

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2b-6: CASE SRI2b

$$D_G = \frac{10^{-3} T^{1.75} \, Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_B)/M_AM_B$)
V_A	Molar volume for air, 20.1 cm^3/mol[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2c-1: CASE SRI2c	
Indoor Air Concentration = alpha x Source Concentration	
Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.94E+00	7500	2.58E-04
1,1,1-trichloroethane	9.49E+00	35000	2.71E-04
trichloroethene	1.55E+01	65000	2.38E-04

TABLE A2c-2: CASE SRI2c

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp (Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.58E-04	2379000	166	15	6.94E+04	2.18E-02	2.18E-02	3110	1.87E+01
1,1,1-trichloroethane	2.71E-04	2379000	166	15	6.94E+04	3.01E-02	3.01E-02	3110	1.87E+01
trichloroethene	2.38E-04	2379000	166	15	6.94E+04	9.99E-03	9.99E-03	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.49E-03	4.14	1.67E+01
1,1,1-trichloroethane	6.21E-03	3.00	2.30E+01
trichloroethene	2.06E-03	9.03	7.65E+00

TABLE A2c-3: CASE SRI2c

$$Q_{soil} = \frac{2\,pi\,deltaP\,k_v\,X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, "Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings," Table I, 1991

TABLE A2c-4: CASE SRI2c

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \theta_w / H + \theta_a} + \frac{D_L}{P_b K_d + \theta_w + \theta_a H}$$

D_G Effective air diffusion coefficient, cm^2/s (1)
D_L Effective water diffusion coefficient, cm^2/s (1)
θ_a Air-filled soil porosity, cm^3/cm^3
θ_w Moisture-filled soil porosity, cm^3/cm^3
P_b Dry bulk density of soil, g/cm^3
K_d Distribution coefficient, cm^3/g
H Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	θ_a	θ_w	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.18E-02	7.20E-02	8.20E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.01E-02	7.80E-02	8.80E-06	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	9.99E-03	7.90E-02	9.10E-06	0.27	0.23	2.15	1.66	4.22E-01

(1) Soil Screening Guidance: User's Guide, Table C-1, USEPA, 1996

TABLE A2-1: BASELINE CASE SRI2

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
SourceConcentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.95E+00	7500	2.60E-04
1,1,1-trichloroethane	9.59E+00	35000	2.74E-04
trichloroethene	1.56E+01	65000	2.40E-04

TABLE A2-2: BASELINE CASE SRI2

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.60E-04	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E+01
1,1,1-trichloroethane	2.74E-04	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E+01
trichloroethene	2.40E-04	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	3.91	1.77E+01
1,1,1-trichloroethane	6.53E-03	2.85	2.42E+01
trichloroethene	2.18E-03	8.54	8.10E+00

TABLE A2-3: BASELINE CASE SRI2

$$Q_{soil} = \frac{2\,pi\;deltaP\,k_v\,X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, m^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1 -trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A2-4. BASELINE CASE SRI2

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_G Effective air diffusion coefficient, cm^2/sec
D_L Effective water diffusion coefficient, cm^2/sec
$\emptyset_a$ Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$ Moisture-filled soil porosity, cm^3/cm^3
P_b Dry bulk density of soil, g/cm^3
K_d Distribution coefficient, cm^3/g
H Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_w$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech. 1996
(2) Montgomery and Welkom, 1990

TABLE A2-5: BASELINE CASE SRI2

$$D_L = \frac{13.26 \times 10^{-5}}{n_W^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_W Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_W	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2-6: BASELINE CASE SRI2

$$D_G = \frac{10^{-3}\, T^{1.75}\, Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r = (M_A + M_B)/M_A M_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A-1: CASE SRI

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	**Compound concentration in basement, ug/m^3**
Source Concentration	**Compound concentration in soil (at source), ug/m^3**
alpha	**Ratio of Indoor Air Concentration to** Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.95E-01	7500	2.60E-05
1,1,1-trichloroethane	9.59E-01	35000	2.74E-05
trichloroethene	1.56E+00	65000	2.40E-05

TABLE A–2: CASE SR1

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp (Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross–sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor–pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.60E–05	2379000	166	15	6.94E+05	2.31E–02	2.31E–02	3110	1.87E+01
1,1,1–trichloroethane	2.74E–05	2379000	166	15	6.94E+05	3.16E–02	3.16E–02	3110	1.87E+01
trichloroethene	2.40E–05	2379000	166	15	6.94E+05	1.06E–02	1.06E–02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E–04	3.91	1.77E+01
1,1,1–trichloroethane	6.53E–04	2.85	2.42E+01
trichloroethene	2.18E–04	8.54	8.10E+00

TABLE A-3: CASESRI

$$Q_{soil} = \frac{2\,pi\;deltaP\,k_v\,X_{crack}}{\mu ln\,(2\,Z_{crack} / r_{crack})} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, m^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	82.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A-4: CASE SRI

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_G Effective air diffusion coefficient, cm^2/sec
D_L Effective water diffusion coefficient, cm^2/sec
$\emptyset_a$ Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$ Moisture-filled soil porosity, cm^3/cm^3
P_b Dry bulk density of soil, g/cm^3
K_d Distribution coefficient, cm^3/g
H Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_w$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1 -trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A-5: CASE SRI

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B{}^{0.589}}$$

D_L Effective water diffusion coefficient, cm^2/sec
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A-6: CASE SRI

$$D_G = \frac{10^{-3} T^{1.75} \; Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_S)/M_AM_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1 – trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

(1) Lyman, 1990
(2) Montgomery and Welkom, 1990

APPENDIX B:

SUMMARY TABLES OF RISK CALCULATIONS FOR FORSYTHE STREET RESIDENCES

TABLE B-1: INDOOR AIR CONCENTRATIONS

Sensitivity of Indoor Air Concentration to Varying Property Values

SRI2	0.5 air changes/hr; k_v = 1 x 10^{-8} cm^2; calculated D_G and D_L values
SRI2a	0.5 air changes/hr; k_v = 1 x 10^{-10} cm^2; calculated D_G and D_L values
SRI2b	0.5 air changes/hr; k_v = 1 x 10^{-13} cm^2; calculated D_G and D_L values
SRI2c	0.5 air changes/hr; k_v = 1 x 10^{-8} cm^2; D_G and D_L from SSL User's Guide
SRI	5 air changes/hr; k_v = 1 x 10^{-8} cm^2; calculated D_G and D_L values
SRI1	1.5 air changes/hr; k_v = 1 x 10^{-8} cm^2; calculated D_G and D_L values

	Indoor Air Concentrations, ug/m^3		
FOR MW-31	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
SRI2	1.95E+00	9.59E+00	1.58E+01
SRI2a: k_v = 1 x 10^{-10} cm^2	5.19E-01	3.30E+00	2.11E+00
SRI2b: k_v = 1 x 10^{-13} cm^2	5.09E-01	3.26E+00	2.02E+00
SRI2c: D_G, D_L from SSG User's Guide	1.94E+00	9.49E+00	1.55E+01
SRI: 5 air changes/hr	1.95E-01	9.59E-01	1.56E+00
SRI1: 1.5 air changes/hr	6.50E-01	3.20E+00	5.20E+00

TABLE B-2: Residential Exposure - High End Exposure

Inhalation of Airborne Chemicals

$$\frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:

CA = Contaminant Concentration in Air (mg/m_3)
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged)

	Non-carcinogenic		Carcinogenic	
	Adult	Child	Adult	Child
CA	see Table 1	see Table 1	see Table 1	see Table 1
IR	0.89 (a)	0.9 (a)	0.89 (a)	0.9 (a)
ET	8 (b)	12 (b)	8 (b)	12 (b)
EF	350 (c)	350 (c)	350 (c)	350 (c)
ED	24 (c)	6 (c)	70 (c)	6 (c)
BW	70 (c)	15 (a)	70 (c)	15 (a)
AT	8760 (c)	2190 (c)	25550 (c)	25550 (c)

(a) EPA, 1991
(b) professional judgement
(c) EPA, 1989

TABLE B-3: Residential Exposure re Average Exposure
Inhalation of Airborne Chemicals

$$\frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:
CA = Contaminant Concentration in Air (mg/m3)
IR = Inhalation Rate (m3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged)

	Non-carcinogenic		Carcinogenic	
	Adult	Child	Adult	Child
CA	see Table 1	see Table 1	see Table 1	see Table 1
IR	0.83 (a)	0.9 (a)	0.83 (a)	0.9 (a)
ET	4 (b)	6 (b)	4 (b)	6 (b)
EF	350 (c)	350 (c)	350 (c)	350 (c)
ED	9 (c)	6 (c)	70 (c)	6 (c)
BW	70 (c)	15 (a)	70 (c)	15 (a)
AT	3285 (c)	2190 (c)	25550 (c)	25550 (c)

(a) EPA, 1991
(b) professional judgement
(c) EPA, 1989

TABLE B-4: Inhalation of Contaminants in Indoor Air - High End Exposure						
Non-Carcinogenic Chronic Daily Intake						
	Adult			Child		
	Tetrachloroethene	1,1,1-trichloroethane	Trichloroethene	Tetrachloroethene	1,1,1-trichloroethane	Trichloroethene
FOR MW-31						
SRI2	1.90E-04	9.35E-04	1.52E-03	1.35E-03	6.62E-03	1.08E-02
SRI2a	5.06E-05	3.22E-04	2.06E-04	3.58E-04	2.28E-03	1.46E-03
SRI2b	4.97E-05	3.18E-04	1.97E-04	3.52E-04	2.25E-03	1.40E-03
SRI2c	1.89E-04	9.26E-04	1.51E-03	1.34E-03	6.55E-03	1.07E-02
SRI	1.90E-05	9.35E-05	1.52E-04	1.35E-04	6.62E-04	1.08E-03
SRI1	6.34E-05	3.12E-04	5.07E-04	4.49E-04	2.21E-03	3.59E-03

TABLE R.5: Inhalation of Contaminants in Indoor Air - High End Exposure

Carcinogenic Chronic Daily Intake

	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	1.90E-04	9.35E-04	1.52E-03	1.15E-04	5.67E-04	9.23E-04
SRI2a	5.06E-05	3.22E-04	2.06E-04	3.07E-05	1.95E-04	1.25E-04
SRI2b	4.97E-05	3.16E-04	1.97E-04	3.01E-05	1.93E-04	1.20E-04
SRI2c	1.89E-04	9.28E-04	1.51E-03	1.15E-04	5.62E-04	9.17E-04
SRI	1.90E-05	9.35E-05	1.52E-04	1.15E-05	5.67E-05	9.23E-05
SRI1	6.34E-05	3.12E-04	5.07E-04	3.85E-05	1.89E-04	3.08E-04

TABLE B-6: Inhalation of Contaminants in Indoor Air - Average Exposure						
Non-Carcinogenic Chronic Daily Intake						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	9.51E-05	4.67E-04	7.60E-04	6.73E-04	3.31E-03	5.38E-03
SRI2a	2.53E-05	1.61E-04	1.03E-04	1.79E-04	1.14E-03	7.28E-04
SRI2b	2.48E-05	1.59E-04	9.86E-05	1.76E-04	1.12E-03	6.96E-04
SRI2c	9.44E-05	4.63E-04	7.55E-04	6.68E-04	3.26E-03	5.35E-03
SRI	9.51E-06	4.67E-05	7.60E-05	6.73E-05	3.31E-04	5.38E-04
SRI1	3.17E-05	1.56E-04	2.53E-04	2.24E-04	1.10E-03	1.79E-03

TABLE B-7: Inhalation of Contaminants in Indoor Air - Average Exposure

Carcinogens: Chronic Daily Intake

	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	9.51E-05	4.67E-04	7.60E-04	5.77E-05	2.84E-04	4.61E-04
SRI2a	2.56E-05	1.61E-04	1.03E-04	1.54E-05	9.77E-05	6.24E-05
SRI2b	2.49E-05	1.59E-04	9.86E-05	1.51E-05	9.64E-05	5.98E-05
SRI2c	9.44E-05	4.63E-04	7.55E-04	5.73E-05	2.81E-04	4.58E-04
SRI	9.51E-06	4.67E-05	7.60E-05	5.77E-06	2.84E-05	4.61E-05
SRI1	3.17E-05	1.56E-04	2.53E-04	1.92E-05	9.45E-05	1.54E-04

TABLE B-8: Toxicity Criteria		
	RfC (mg/kg-d)	CPS (mg/kg-d)-1
tetrachloroethene	NA	2.03E-03 (a)
1,1,1-trichloroethane	1.00E+00 (a)	NA
trichloroethene	NA	6.00E-03 (a)

(a) USEPA-Health Risk Technical Support Center
(a) (STSC, 1996)
NA - Toxicity values are not available for these chemicals

TABLE B-4: Inhalation of Contaminants in Indoor Air - High End Exposure

Hazard Indices

	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2		9.35E-04			6.62E-03	
SRI2a		3.22E-04			2.28E-03	
SRI2b		3.16E-04			2.25E-03	
SRI2c		9.26E-04			6.55E-03	
SRI		9.35E-05			6.62E-04	
SRI1		3.12E-04			2.21E-03	

TABLE B-10: Inhalation of Contaminants in Indoor Air - High End Exposure						
Carcinogenic Risks						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	3.86E-07		9.12E-06	2.34E-07		5.54E-06
SRI2a	1.03E-07		1.23E-06	6.24E-08		7.49E-07
SRI2b	1.01E-07		1.18E-06	6.12E-08		7.18E-07
SRI2c	3.83E-07		9.06E-06	2.32E-07		5.50E-06
SRI	3.86E-08		9.12E-07	2.34E-08		5.54E-07
SRI1	1.29E-07		3.04E-06	7.81E-08		1.85E-06

TABLE B-11: Inhalation of Contaminants in Indoor Air - Average Exposure

Hazard Indices

	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FORMW-3T						
SRI2		4.67E-04			3.31E-03	
SRI2a		1.61E-04			1.14E-03	
SRI2b		1.59E-04			1.12E-03	
SRI2c		4.63E-04			3.28E-03	
SRI		4.67E-05			3.31E-04	
SRI1		1.56E-04			1.10E-03	

TABLE B-12: Inhalation of Contaminants in Indoor Air - Average Exposure						
Carcinogenic Risks						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	1.93E-07		4.56E-06	1.17E-07		2.77E-06
SRI2a	5.14E-06		6.17E-07	3.12E-06		3.74E-07
SRI2b	5.04E-06		5.92E-07	3.06E-06		3.59E-07
SRI2c	1.92E-07		4.53E-06	1.16E-07		2.75E-06
SRI	1.93E-06		4.56E-07	1.17E-06		2.77E-07
SRI1	6.43E-06		1.52E-06	3.90E-06		9.23E-07

TABLE A2a-6: CASE SRI2a

$$D_G = \frac{10^{-3}\, T^{1.75}\, Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_B)/M_AM_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroathane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2a-5: CASE SRI2a

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2a-4: CASE SRI 2a

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_w$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A2a–3: CASE SRI2a

$$Q_{soil} = \frac{2\,pi\,deltaP\,k_v\,X_{crack}}{\mu ln\,[2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm–s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm–s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	$\overline{Q_{soil}}$	deltaP	k_v	μ	$\overline{X_{crack}}$	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E–07	57.6	1.0E–14	0.00018	62.2	2	0.005
1,1,1–trichloroethane	1.87E–07	57.6	1.0E–14	0.00018	62.2	2	0.005
trichloroethene	1.87E–07	57.6	1.0E–14	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A2a-2: CASE SRI2a

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	6.92E-05	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E-01
1,1,1-trichloroethane	9.44E-05	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E-01
trichloroethene	3.24E-05	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E-01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	0.04	1.77E+03
1,1,1-trichloroethane	6.53E-03	0.03	2.42E+03
trichloroethene	2.18E-03	0.09	8.10E+02

TABLE A2a-1: CASE SRI2a
Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	5.19E-01	7500	6.92E-05
1,1,1-trichloroethane	3.30E+00	35000	9.44E-05
trichloroethene	2.11E+00	65000	3.24E-05

TABLE A1-6: CASE SR11

$$D_G = \frac{10^{-3} T^{1.75} M_r^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r = (M_A + M_B)/M_A M_B$)
V_A	Molar volume for air, 20.1cm^3/mol[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A1-5: CASE SR1

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLEA1-4: CASE SRI1

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \theta_w / H + \theta_a} + \frac{D_L}{P_b K_d + \theta_w + \theta_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
θ_a	Air-filled soil porosity, cm^3/cm^3
θ_w	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	θ_a	θ_w	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A1-3: CASESRI1

$$Q_{soil} = \frac{2\,pi\,deltaP\,k_v\,X_{crack}}{\mu \ln [2\,z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm-s
z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A1-2: CASESRI1

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/s
D_T^{eff}	Overall effective diffusion coefficient, cm^2/s
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	8.66E-05	2379000	166	15	2.08E+05	2.31E-02	2.31E-02	3110	1.87E+01
1,1,1-trichloroethane	9.13E-05	2379000	166	15	2.08E+05	3.16E-02	3.16E-02	3110	1.87E+01
trichloroethene	7.99E-05	2379000	166	15	2.08E+05	1.06E-02	1.06E-02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	1.59E-03	3.91	1.77E+01
1,1,1-trichloroethene	2.18E-03	2.85	2.42E+01
trichloroethene	7.27E-04	8.54	8.10E+00

TABLE A1-1: CASE SHIT

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m³
Source Concentration	Compound concentration in soil (at source), ug/m³
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	6.50E-01	7500	8.66E-05
1,1,1-trichloroethane	3.20E+00	35000	9.13E-05
trichloroethene	5.20E+00	65000	7.99E-05

APPENDIX A

SUMMARY TABLES OF ESTIMATED INDOOR AIR CONCENTRATIONS USING THE JOHNSON-ETTINGER MODEL

5.0 REFERENCES

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Superfund Technical Support Center (STSC). 1996. Risk Assessment Issue Paper for: Derivation of a Chronic RfC for 1,1,1-Trichloroethane. (CASRN 71-55-6). October 23, 1996.

- Lack of toxicity criteria for the COCs adds to the uncertainty to the assessment. The toxicity values used are provisional values provided by the EPA Technical Support Center. These values have not been through U.S. EPA's formal review process, therefore, they don't represent an U.S. EPA verified assessment.

- Uncertainty exists regarding the actual conditions under which the receptors may be exposed. Assumptions made regarding exposure duration, exposure frequency, exposure time, and inhalation rate increase the uncertainty and may result in an overestimation of risks.

Conclusions

The risk levels calculated for the high end adult and child exposure scenarios stemming from the chemical levels measured at off-site well MW-31 and the indoor air concentrations estimated for case SRI2 represent a reasonable worst case (lowest soil permeability values, lowest air exchange rate, aggressive exposure times) for residences along Forsythe Street. Based on the soil descriptions provided in the Earth Tech report, soil permeability likely decreases with depth. Also, most basements that rely solely on natural ventilation are likely to be fitted with at least one door or window (the air exchange rate assumed in case SRI2 is for no exterior windows or doors). Therefore, it appears likely that the actual risks stemming from indoor air concentrations of the chemicals of concern will be below or at the lowest level of the 10^{-4} to 10^{-6} acceptable range.

4.0 UNCERTAINTIES

- The contaminant source was assumed to be infinite (i.e., constant source concentration at a fixed distance from the basement) over the period of interest. This approach provides a "snapshot" of what risks might be if the source concentration remained unchanged. It is likely that the source concentration will actually decrease over time, therefore, the applied approach is conservative (i.e., overestimates risk).

- Uncertainty exists regarding the actual configuration/construction of the basements along Forsythe Street. Assumptions made regarding the size of the basement, the size of the crack between the basement walls and floor, crack diffusion coefficient, and other construction features increase the uncertainty and may result in an overestimation of risks. In addition, exact values for soil permeability and basement air exchange rate are unknown and their effect on modeled indoor air concentration was evaluated through a sensitivity analysis. Parameter values were chosen for the baseline case (SRI2) that appear to be conservative.

- No site specific value for total soil porosity was available. Hence a default value of 0.5 (cm^3/cm^3) was used as recommended in the J&E model. An air porosity of 0.27 and a moisture porosity of 0.23 were used. The moisture porosity value is considered to be low, and conservative, since any increases in the moisture porosity would be expected to reduce available pore space, and hence decrease the ability of VOCs in the groundwater to volatilize and travel through the void space to the residential basements. Therefore the use of the J&E default value for total porosity appears to add conservatism. If possible (i.e., if a more detailed study were to be performed), site-specific soil porosity values for both air and moisture porosity should be defined since these factors has a significant effect on the total effective diffusion coefficient (D_t^{eff}).

chemicals of concern did not exceed the 1.0 non-carcinogenic threshold value. The hazard indices for all indoor air concentrations and all exposure scenarios were less than 1.0.

Carcinogenic Risks

Carcinogenic risks are estimated as the increased possibility, above background, that an individual will contract cancer in his lifetime under the exposure conditions assumed. The Carcinogenic Potency Slope (CPS) of a chemical is the upper 95% confidence limit of the slope of the extrapolated dose-response curve (see Table 8 for the CPSs used in this assessment). The CPS converts the Carcinogenic Chronic Daily Intake (CCDI) (see Tables 5 and 7) for potential carcinogens to incremental cancer risks values.

$$\textit{Incremental Lifetime Cancer Risk} = \textit{CCDI}\ (mg/kg\text{-}d) * \textit{CPS}\ (mg/kg\text{-}d)^{-1}$$

U.S. EPA risk assessment guidance (EPA, 1989) specifies a risk range for residential receptors of 10^{-4} to 10^{-6}. Carcinogenic risks exceeding this range suggest that the potential exists for risks to receptors to result under the exposure conditions identified in the assessment. (See Tables B-10 and B-12 for the carcinogenic risks to residential receptors.)

The carcinogenic risks stemming from the baseline indoor air concentrations (SRI2) estimated for the tetrachloroethene contamination level at MW-31 were below 10^{-6} for all exposure scenarios considered. The risks resulting from the baseline indoor air concentration for trichloroethene levels at MW-31 fell within the 10^{-4} to 10^{-6} range for all exposure scenarios.

Discussion of Risk Results

As with indoor air concentrations, case SRI2 generated the highest hazard indices and carcinogenic risks. This can be attributed to the relative high permeability of the soil and the low air exchange rate assumed for the baseline case.

As observed for indoor air concentration, decreasing values of soil permeability result in decreasing hazard indices and carcinogenic risks while increasing values of air exchange rate produce decreasing risk levels. These trends were expected within each exposure scenario as the indoor air concentration was the only numerical value that changed in the risk or hazard index calculations between cases.

adult and six year old child inhalation rates for resting, light, moderate and heavy activities. It assumes that 25% of the activity will be resting, 60% will be light, 10% will be moderate and 5% will be heavy. From these values and percentages, an inhalation rate for indoor air is estimated.

The high end exposure and average case exposure times were estimated based upon professional judgement (see Table B-2, Appendix B). The high end exposure time assumes the adult resident works outside the home 10 hours per day and sleeps six hours per day. It assumes the basement level is used as the recreation room and all time not spent at work or asleep is spent on this level. The high end child resident exposure time assumes that the child sleeps half the day and spends the rest of their time in the "basement." The average case exposure time assumes that half of the estimated high end exposure time will be sufficient to estimate the receptors exposed to chemical concentrations under average exposure conditions.

Tables B-4 through B-7 present the high end and average exposures for the adult and child residential receptors.

Risk Characterization

Both non-carcinogenic and carcinogenic risks were calculated for the residential receptor populations and exposure routes as described below.

Non-Carcinogenic Hazards

Theoretical non-carcinogenic hazards associated with chronic exposure were characterized using the ratio of Non-carcinogenic Chronic Daily Intake (NCCDI) (see Tables B-4 and B-6) to the Reference Concentration (RfC) (see Table B-8). The Hazard Quotient is the ratio of the NCCDI to the RfC.

$$Hazard\ Quotient = \frac{NCCDI\ (mg/kg\text{-}d)}{RfC\ (mg/kg\text{-}d)}$$

The Hazard Index assesses the overall potential for non-carcinogenic effects. It assumes that multiple sub-threshold exposures could result in an adverse non-carcinogenic systemic health effect. Hazard Quotient and Index values below 1.0 suggest that non-carcinogenic toxic effects should not occur. Values above 1.0 indicate that effects could be of concern, especially in sensitive populations. (See Tables B-9 and B-11 in Appendix B for the Hazard Indices for the adult and child residential receptors.)

For the baseline indoor air concentration (SRI2), the adult and child hazard indices for the

predicted indoor air concentrations by an order or magnitude. This illustrates the direct relationship between indoor air concentration and Q_{bldg} inherent in the J&E model.

3.0 EVALUATION OF RISKS

Contaminants of Concern

Contaminants of Concern (COCs) were identified from the "Report of Additional Corrective Measures Studies for the Former Amphenol Facility" (Earth Tech, 1996) as the chemicals expected to potentially pose the most risk to residential receptors. The COCs identified in this assessment include tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene.

Exposure Assessment

The potential exposure pathway of concern is the inhalation of indoor airborne vapors. Air concentrations have been estimated for the COCs (see Section 2.0). The indoor air concentration is the estimated air concentration quantified in the air modeling efforts (see Table B-1, Appendix B). This concentration is assumed to be the chemical concentration in air to which receptors may be exposed. As six different air concentration estimates have been modeled for MW-31, exposures and resultant risks to receptors are quantified for each modeled air concentration.

The air concentrations are assumed to be present in the "basement" level of the residences near the Franklin facility. Adult and child residents are assumed to be exposed to these air concentrations at the estimated level over a period of years. Exposures and resultant risks of adult and child residents to these basement air concentrations have been estimated. The exposure scenarios and parameters are based on U.S. EPA risk assessment guidance (EPA, 1989 and 1991) and professional judgement. Exposure parameter values were identified using worst case and average case exposure assumptions. Tables B-2 and B-3 present the exposure equations and parameters used to quantify the exposure of adult and child residents to concentrations of chemicals in indoor air.

Exposure Parameters

U.S. EPA risk assessment guidance (EPA 1989 and 1991) was used to identify adult and child resident exposure frequency, duration, body weight and averaging time. These values are standard default values and estimate the worst case (high end) and average case exposure conditions.

The inhalation rates for the adult and child residential receptors were calculated as outlined in U.S. EPA risk assessment guidance (EPA, 1991) for indoor air. This calculation uses the average

Calculated Indoor Air Concentration

Table 2 lists the indoor air concentrations predicted using MW-31 analytical data.

Table 2
Franklin Facility Indoor Air Concentrations (ug/m^3)

Location/CASE	Tetrachloroethene	1,1,1-TCA	Trichloroethene
FOR MW-31			
SRI2	1.95E+00	9.59E+00	1.56E+01
SRI2a: $k_v = 1 \times 10^{-10}$ cm^2	5.19E-01	3.30E+00	2.11E+00
SRI2b: $k_v = 1 \times 10^{-13}$ cm^2	5.09E-01	3.26E+00	2.02E+00
SRI2c: D_G, D_L from SSG	1.94E+00	9.49E+00	1.55E+01
SRI: 5 air changes/hr	1.95E-01	9.59E-01	1.56E+00
SRI1: 1.5 air changes/hr	6.50E-01	3.20E+00	5.20E+00

An examination of cases SRI2, SRI2a, and SRI2b shows that decreasing values of soil permeability result in lower indoor air concentrations. In fact, closer examination reveals that the results do not vary much between SRI2a and SRI2b. Although the values of k_v differ by three orders of magnitude, both cases represent the limiting case of $[Q_{soil}L_{crack}/(D_{crack}A_{crack})] \rightarrow 0$. Therefore, the effect of soil permeability is minimized in both cases.

As pointed out in J&E (1991), the value of soil permeability is likely to vary several orders of magnitudes over a site. Based on descriptions of on-site soils, it is likely that soil permeability could fall within the 10^{-8} to 10^{-10} range between the surface and soils just beneath the basement floor; deeper soils should approach the 10^{-13} level (i.e., be less permeable).

According to Table 1, Chapter 21 of the 1997 ASHRAE Handbook of Fundamentals, a value of 0.5 air changes per hour corresponds to a room with no windows or exterior doors and only natural ventilation while a value of 1.5 air changes per hour represents a room with windows or exterior doors on two sides. Most basements that rely solely on natural ventilation should fall between these two values. ASHRAE does not describe a case higher than 2 air changes per hour (i.e., windows and exterior doors on three walls). Five air changes per hour produced the minimum indoor air concentrations and, as discussed in the Superfund guidance, shows that convection is dominating the transport of hazardous constituents in this case. It is of considerable interest that increasing the air changes from 0.5 to 1.5 also reduces the predicted indoor air concentrations by one third. Likewise, going from 0.5 to 5 air changes per hour reduces the

The vertical distance from the contaminant source to the building foundation, L_T, was calculated by assuming that the source was at the same depth as the existing contamination plume (approximately 12 feet or 3.66 meters). The basement floor was assumed to be 2 meters below grade. Therefore, $L_T = 3.66\text{-}2 = 1.66$ meters or 166 centimeters.

The crack between the basement wall and floor was assumed to run along the entire perimeter and be approximately 0.5 centimeters high. Assuming that the crack approximated a rectangle resulted in $A_{crack} = (0.5 \text{ cm})(6{,}220 \text{ cm}) = 3{,}110 \text{ cm}^2$.

Sensitivity Analysis

To illustrate the sensitivity of the indoor air concentration to variations in some parameter values, six cases were analyzed with one case (SRI2) serving as the baseline for all comparisons. Three values of soil permeability were used to examine the effect on indoor air concentration. In addition, indoor air concentrations were predicted for three values of $Q_{building}$. One case was analyzed using values for D_G and D_L taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). In the baseline case, these parameters were calculated using the equations presented above. Table 1 provides a description of each case analyzed.

Table 1
Cases Analyzed for Indoor Air Concentration

CASE	Air Exchanges (volumes/hour)	Soil Permeability (cm^2)	D_G	D_L
SRI2	0.5	1×10^{-8}	Calculated	Calculated
SRI2a	0.5	1×10^{-10}	Calculated	Calculated
SRI2b	0.5	1×10^{-13}	Calculated	Calculated
SRI2c	0.5	1×10^{-6}	SSG Value	SSG Value
SRI	5	1×10^{-8}	Calculated	Calculated
SRI	1.5	1×10^{-8}	Calculated	Calculated

Indoor air concentrations were predicted for all six cases using the measured concentrations at MW-31 as the source concentration.

$$h = \frac{H}{1 + [(\frac{A_1}{A_2})^2 (\frac{T_i}{T_o})]}$$

where:

H	Distance between upper and lower openings
A_1	Area of lower opening m^2
A_2	Area of upper opening m^2
T_i	Inside temperature °K
T_o	Outside temperature °K.

The residence was assumed to be 16.5 meters high (i.e., above the ground surface) with 2.5 meters between the lower opening and the upper opening. The lower opening was a window approximately 1.2 meters square. The upper opening was assumed to be a dormer window with an area of 1 square meter. Substitution of these values into the above equation yielded an estimate for h of 0.9 meters.

The indoor air concentration was calculated for three values of soil permeability: 1×10^{-8}, 1×10^{-10}, and 1×10^{-13} cm^2. Table I of J&E indicates that a value of 1×10^{-8} cm^2 is representative of silty sand to fine sand. Likewise, the value of 1×10^{-10} cm^2 is the lowest value representative of silty soil. The third value used, 1×10^{-13} cm^2, was calculated from a soil permeability measured at MW-31 of 5.2×10^{-8} cm/sec. This value appears to be indicative of clayey soils of low permeability. According to the description of the soils from which the sample was taken, a result that represents low soil permeability is appropriate. The other values used appear to be appropriate for site soils that are closer to the surface.

As presented in J&E (1991), r_{crack} was calculated from:

$$r_{crack} = \frac{\eta A_B}{X_{crack}}$$

where:

η	A_{crack} / A_B

Calculation of Q_{soil}

As proposed in J&E (1991), Q_{soil} is calculated using:

$$Q_{soil} = \frac{2\Pi\Delta P k_v X_{crack}}{\mu \ln[\frac{2Z_{crack}}{r_{crack}}]}, \frac{r_{crack}}{Z_{crack}} \ll 1$$

where:

ΔP	Underpressurization of basement due to temperature and wind effects
k_v	Soil permeability in cm^2
X_{crack}	Total length of basement wall/floor perimeter crack
μ	Viscosity of air in g/(cm-sec)
Z_{crack}	Depth of basement wall below grade
r_{crack}	Radius of basement wall/floor perimeter crack

ΔP was calculated from:

$$\Delta P = \frac{P_V + \Delta P_C}{1 + (\frac{A_W}{A_L})^{1/N}}$$

P_v represents the static pressure over the building in Pascals (Pa) and is a function of the square of the wind velocity ($P_v = 0.6008V^2$). The pressure difference due to the thermal gradient, ΔP_C, is determined by $0.342\ Ph(T_i - T_o)/T_i T_o$ where h represents the distance from the neutral pressure plane in the building and T_i and T_o are the inside and outside temperature, respectively. Values for V and T_o were taken from the Climatological Summaries for the United States. The inside temperature was assumed to be 23°C (296.15°K).

h was calculated using the following equation (ASHRAE, 1977):

Values for D_G and D_L were determined using methods outlined in Lyman, 1990. D_G was calculated using the FSG Method:

$$D_G = \frac{1x10^{-3}T^{1.75}\sqrt{M_r}}{P(V_A^{1/3}+V_B^{1/3})^2}$$

D_L was determined using the Hayduk and Laudie method:

$$D_L = \frac{13.26x10^{-5}}{\eta_W^{1.14}V_B^{0.589}}$$

A site-specific value for total soil porosity, θ was not available. Therefore, the value of 0.5 provided by J&E (1991) was used. The value of θ_m was calculated as the product of the site-specific soil moisture content and soil bulk density determined at MW-31. θ_a was calculated as the difference between θ and θ_m.

As suggested in U.S. EPA Guidance (USEPA, 1990), the value of K_d was calculated from $K_d = K_{oc}f_{oc}$. The values of K_{oc} for tetrachloroethene, 1,1,1-trichloroethane, and trichloroethene were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996). A value of 0.01 was assumed for f_{oc} as suggested for soils in the 1993 Addendum (USEPA, 1993).

Values for the dimensionless Henry's Law Constant were taken from Table C-1 of the *Soil Screening Guidance User's Guide* (USEPA, 1996).

Calculation of A_b

The basement floor area was assumed to be 200 meters square. Approximately 2 meters of each wall was assumed to be below grade. This resulted in a subgrade area of 324 square meters.

Calculation of $Q_{building}$

$Q_{building}$ was calculated as the product of the volume of the basement and the number of air changes per hour. The basement had a volume of 500 cubic meters. The number of air changes per hour was varied from 0.5 to 1.5 to 5 to illustrate the sensitivity of the indoor air concentration to the value of $Q_{building}$.

$$\alpha = \frac{\frac{D_t^{eff} A_b}{Q_{bldg} L_T} \exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right)}{\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) + \left(\frac{D_t^{eff} A_b}{Q_{bldg} L_T}\right) + \left(\frac{D_t^{eff} A_b}{Q_{soil} L_T}\right)\left[\exp\left(\frac{Q_{soil} L_{crack}}{D_{crack} A_{crack}}\right) - 1\right]}$$

where:

D_t^{eff}	Overall effective diffusion coefficient
A_b	Cross-sectional area through which contaminants pass (approximated by the area of the floor and below grade walls
Q_{bldg}	Building ventilation rate
L_T	Distance from contaminant source to building foundation
Q_{soil}	Volumetric flow rate of soil gas into building
L_{crack}	Thickness of foundation, 15 cm (6 inches)
D_{crack}	Effective vapor-pressure diffusion coefficient through floor cracks
A_{crack}	Area of cracks/openings through which vapors pass

Each parameter value was calculated or determined from guidance documents or the general scientific literature as described below.

Calculation of D_t^{eff}

The overall effective diffusion coefficient, D_t^{eff}, was calculated from:

$$D_t^{eff} = \frac{D_G}{\frac{\rho_b K_d}{H} + \frac{\theta_M}{H} + \theta_a} + \frac{D_L}{\rho_b K_d + \theta_m + \theta_a H}$$

where:

D_G	Effective air diffusion coefficient
D_L	Effective water diffusion coefficient
θ	Total soil porosity, $\theta = \theta_a + \theta_m$
θ_a	Air-filled soil porosity
θ_m	Moisture-filled soil porosity
ρ_b	Dry bulk density of soil
K_d	Distribution coefficient and
H	Henry's Law constant (dimensionless form).

INDOOR AIR RISK EVALUATION

1. INTRODUCTION

A risk assessment was performed by U.S. EPA to evaluate the indoor air risk due to the occurrence of volatile organic compounds (VOC)s in groundwater near the Franklin Power Products/Amphenol Facility. The parameters used and results of the analysis are discussed herein.

The Johnson and Ettinger (J &E) model which incorporates a series of models (algorithms was employed for the risk evaluation. The J&E model allows for the determination of relative air concentrations as tied to the concentration of contaminant in the outer (i.e., perimeter or underlying) soils and groundwater surrounding the residences and basements. It is important to note that these models are "theoretical" and result in a qualitative evaluation of the potential for adverse health effects resulting from nearby soil and groundwater contamination. The air concentrations defined by the J&E model were evaluated against a series of risk criteria, including toxicity criteria and exposure scenarios, to determine a baseline risk number. The resulting data, or risk number, should be viewed as a general assessment of the risks.

In generating the J&E output, physical and chemical parameters included in the recent "Report of Additional Corrective Measures at the Amphenol Facility" were used. The J&E model uses a significant number of default or surrogate data parameters since it is assumed that only minimal site-specific information is available. To evaluate the sensitivity of the model, indoor air concentrations were calculated for multiple values of soil permeability and air exchange rate. This approach was take to evaluate how changes in important model parameters, whose exact values were unknown, would impact the risk. The VOC groundwater concentrations of 7.5 for PCE, 17.5 for TCA, and 65 ppb for TCE were used, and held constant, to estimate the risks for residents along Forsythe Street. The values were extrapolated from analytical results of a 1996 sampling of monitoring well MW 31 which is located in the right of way at Forsythe Street. The 1996 MW 31 analytical results were halfed so as to provide a more representative concentration level of the VOC content in groundwater underlying the residences adjacent to Forsythe Street.

2. DERIVATION OF INDOOR AIR CONCENTRATIONS

In order to assess the potential risk to residents along Forsythe Street, the J&E model (USEPA, 1992; Johnson and Ettinger, 1991) was applied to estimate the ratio of indoor air concentration to source concentration for the VOCs noted above. The ratios predicted by the model were multiplied by the concentration values for the three VOCs to provide estimates of the indoor air concentrations in a hypothetical basement. Ratios were obtained for multiple parameter values to illustrate the sensitivity of the model to basement air exchange rate, soil permeability (in units of cm squared), and air and water diffusivity coefficients. A potential risk was determined for each case for which an indoor air concentration was estimated. J&E hypothesized that the ratio (alpha) of indoor air concentration in a subgrade space to a source concentration in the underlying soul may be determined by:

FRANKLIN POWER PRODUCTS/AMPHENOL
FRANKLIN, INDIANA
INDOOR AIR RISK EVALUATION

D.4.1

BY U.S. EPA

October, 1996

APPENDIX B:

SUMMARY TABLES OF RISK CALCULATIONS FOR FORSYTHE STREET RESIDENCES

TABLE B-1: INDOOR AIR CONCENTRATIONS

Sensitivity of Indoor Air Concentration to Varying Property Values

SRI2 — 0.5 air changes/hr; $k_v = 1 \times 10^{-8}$ cm²; calculated D_G and D_L values
SRI2a — 0.5 air changes/hr: $k_v = 1 \times 10^{-10}$ cm²; calculated D_G and D_L values
SRI2b — 0.5 air changes/hr: $k_v = 1 \times 10^{-13}$ cm²; calculated D_G and D_L values
SRI2c — 0.5 air changes/hr; $k_v = 1 \times 10^{-6}$ cm²; D_G and D_L from SSL User's Guide
SRI — 5 air changes/hr; $k_v = 1 \times 10^{-6}$ cm²; calculated D_G and D_L values
SRI1 — 1.5 air changes/hr; $k_v = 1 \times 10^{-8}$ cm²; calculated D_G and D_L values

	Indoor Air Concentrations, ug/m³		
FOR MW-31	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
SRI2	1.95E+00	9.59E+00	1.56E+01
SRI2a: $k_v = 1 \times 10^{-10}$ cm²	5.19E-01	3.30E+00	2.11E+00
SRI2b: $k_v = 1 \times 10^{-13}$ cm²	5.09E-01	3.26E+00	2.02E+00
SRI2c: D_G, D_L from SSG User's Guide	1.94E+00	9.49E+00	1.55E+01
SRI: 5 air changes/hr	1.95E-01	9.59E-01	1.56E+00
SRI1: 1.5 air changes/hr	6.50E-01	3.20E+00	5.20E+00
FOR MW-12	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
SRI2	3.90E+02	2.74E+02	2.88E+02
SRI2a: $k_v = 1 \times 10^{-10}$ cm²	1.04E+02	9.44E+01	3.89E+01
SRI2b: $k_v = 1 \times 10^{-13}$ cm²	1.02E+02	9.31E+01	3.73E+01
SRI2c: D_G, D_L from SSG User's Guide	3.87E+02	2.71E+02	2.86E+02
SRI: 5 air changes/hr	3.90E+01	2.74E+01	2.88E+01
SRI1: 1.5 air changes/hr	1.30E+02	9.13E+01	9.59E+01

TABLE B-2: Residential Exposure – High End Exposure

Inhalation of Airborne Chemicals

$$\frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:
CA = Contaminant Concentration in Air (mg/m^3)
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged)

	Non-carcinogenic		Carcinogenic	
	Adult	Child	Adult	Child
CA	see Table 1	see Table 1	see Table 1	see Table 1
IR	0.89 [b]	0.9 [b]	0.89 [a]	0.9 [b]
ET	8 [b]	12 [b]	8 [b]	12 [b]
EF	350 [c]	350 [c]	350 [c]	350 [c]
ED	24 [c]	6 [c]	70 [c]	6 [c]
BW	70 [c]	15 [b]	70 [c]	15 [b]
AT	8760 [c]	2190 [c]	25550 [c]	25550 [c]

[a] EPA, 1991
[b] professional judgement
[c] EPA, 1989

TABLE B-3: Residential Exposure – Average Exposure

Inhalation of Airborne Chemicals

$$\frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:
CA = Contaminant Concentration in Air (mg/m^3)
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged)

	Non-carcinogenic		Carcinogenic	
	Adult	Child	Adult	Child
CA	see Table 1	see Table 1	see Table 1	see Table 1
IR	0.89 [a]	0.9 [a]	0.89 [a]	0.9 [a]
ET	4 [b]	6 [b]	4 [b]	6 [b]
EF	350 [c]	350 [c]	350 [c]	350 [c]
ED	9 [c]	6 [c]	70 [c]	6 [c]
BW	70 [c]	15 [a]	70 [c]	15 [a]
AT	3285 [c]	2190 [c]	25550 [c]	25550 [c]

[a] EPA, 1991
[b] professional judgement
[c] EPA, 1989

TABLE B-4: Inhalation of Contaminants in Indoor Air – High End Exposure

Non-Carcinogenic Chronic Daily Intake

	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethane	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	1.90E-04	9.35E-04	1.52E-03	1.35E-03	6.62E-03	1.08E-02
SRI2a	5.06E-05	3.22E-04	2.06E-04	3.58E-04	2.28E-03	1.46E-03
SRI2b	4.97E-05	3.18E-04	1.97E-04	3.52E-04	2.25E-03	1.40E-03
SRI2c	1.89E-04	9.26E-04	1.51E-03	1.34E-03	6.55E-03	1.07E-02
SRI	1.90E-05	9.35E-05	1.52E-04	1.35E-04	6.62E-04	1.08E-03
SRI1	6.34E-05	3.12E-04	5.07E-04	4.49E-04	2.21E-03	3.59E-03
FOR MW-12						
SRI2	3.80E-02	2.67E-02	2.81E-02	2.69E-01	1.89E-01	1.99E-01
SRI2a	1.01E-02	9.21E-03	3.80E-03	7.17E-02	6.52E-02	2.69E-02
SRI2b	9.93E-03	9.08E-03	3.64E-03	7.03E-02	6.43E-02	2.58E-02
SRI2c	3.77E-02	2.64E-02	2.79E-02	2.67E-01	1.87E-01	1.97E-01
SRI	3.80E-03	2.67E-03	2.81E-03	2.69E-02	1.89E-02	1.99E-02
SRI1	1.27E-02	8.90E-03	9.36E-03	8.97E-02	6.30E-02	6.62E-02

TABLE B-5: Inhalation of Contaminants In Indoor Air - High End Exposure						
Carcinogenic Chronic Daily Intake						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	1.90E-04	9.35E-04	1.52E-03	1.15E-04	5.67E-04	9.23E-04
SRI2a	5.06E-05	3.22E-04	2.06E-04	3.07E-05	1.95E-04	1.25E-04
SRI2b	4.97E-05	3.18E-04	1.97E-04	3.01E-05	1.93E-04	1.20E-04
SRI2c	1.89E-04	9.26E-04	1.51E-03	1.15E-04	5.62E-04	9.17E-04
SRI	1.90E-05	9.35E-05	1.52E-04	1.15E-05	5.67E-05	9.23E-05
SRI1	6.34E-05	3.12E-04	5.07E-04	3.85E-05	1.89E-04	3.08E-04
FOR MW-12						
SRI2	3.80E-02	2.67E-02	2.81E-02	2.31E-02	1.62E-02	1.70E-02
SRI2a	1.01E-02	9.21E-03	3.80E-03	6.14E-03	5.59E-03	2.30E-03
SRI2b	9.93E-03	9.08E-03	3.64E-03	6.03E-03	5.51E-03	2.21E-03
SRI2c	3.77E-02	2.64E-02	2.79E-02	2.29E-02	1.60E-02	1.69E-02
SRI	3.80E-03	2.67E-03	2.81E-03	2.31E-03	1.62E-03	1.70E-03
SRI1	1.27E-02	8.90E-03	9.36E-03	7.69E-03	5.40E-03	5.68E-03

TABLE B-6: Inhalation of Contaminants in Indoor Air – Average Exposure						
Non-Carcinogenic Chronic Daily Intake						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	9.51E-05	4.67E-04	7.60E-04	6.73E-04	3.31E-03	5.38E-03
SRI2a	2.53E-05	1.61E-04	1.03E-04	1.79E-04	1.14E-03	7.28E-04
SRI2b	2.48E-05	1.59E-04	9.86E-05	1.76E-04	1.12E-03	6.98E-04
SRI2c	9.44E-05	4.63E-04	7.55E-04	6.68E-04	3.28E-03	5.35E-03
SRI	9.51E-06	4.67E-05	7.60E-05	6.73E-05	3.31E-04	5.38E-04
SRI1	3.17E-05	1.56E-04	2.53E-04	2.24E-04	1.10E-03	1.79E-03
FOR MW-12						
SRI2	1.90E-02	1.34E-02	1.40E-02	1.35E-01	9.45E-02	9.93E-02
SRI2a	5.06E-03	4.60E-03	1.90E-03	3.58E-02	3.26E-02	1.34E-02
SRI2b	4.97E-03	4.54E-03	1.82E-03	3.52E-02	3.21E-02	1.29E-02
SRI2c	1.89E-02	1.32E-02	1.39E-02	1.34E-01	9.36E-02	9.87E-02
SRI	1.90E-03	1.34E-03	1.40E-03	1.35E-02	9.45E-03	9.93E-03
SRI1	6.34E-03	4.45E-03	4.68E-03	4.49E-02	3.15E-02	3.31E-02

TABLE B-7: Inhalation of Contaminants in Indoor Air – Average Exposure						
Carcinogenic Chronic Daily Intake						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	9.51E-05	4.67E-04	7.60E-04	5.77E-05	2.84E-04	4.61E-04
SRI2a	2.53E-05	1.61E-04	1.03E-04	1.54E-05	9.77E-05	6.24E-05
SRI2b	2.46E-05	1.59E-04	9.86E-05	1.51E-05	9.64E-05	5.98E-05
SRI2c	9.44E-05	4.63E-04	7.55E-04	5.73E-05	2.81E-04	4.58E-04
SRI	9.51E-06	4.67E-05	7.60E-05	5.77E-06	2.84E-05	4.61E-05
SRI1	3.17E-05	1.56E-04	2.53E-04	1.92E-05	9.45E-05	1.54E-04
FOR MW-12						
SRI2	1.90E-02	1.34E-02	1.40E-02	1.15E-02	8.10E-03	8.52E-03
SRI2a	5.06E-03	4.60E-03	1.90E-03	3.07E-03	2.79E-03	1.15E-03
SRI2b	4.97E-03	4.54E-03	1.82E-03	3.01E-03	2.75E-03	1.10E-03
SRI2c	1.89E-02	1.32E-02	1.39E-02	1.15E-02	8.02E-03	8.46E-03
SRI	1.90E-03	1.34E-03	1.40E-03	1.15E-03	8.10E-04	8.52E-04
SRI1	6.34E-03	4.45E-03	4.68E-03	3.85E-03	2.70E-03	2.84E-03

TABLE B-8: Toxicity Criteria		
	RfC (mg/kg-d)	CPS $(mg/kg-d)^{-1}$
tetrachloroethene	NA	2.03E-03 [a]
1,1,1-trichloroethane	1.00E+00 [b]	NA
trichloroethene	NA	6.00E-03 [a]

[a] USEPA- Health Risk Technical Support Center
[b] (STSC, 1996)
NA – Toxicity values are not available for these chemicals

TABLE B-9: Inhalation of Contaminants in Indoor Air – High End Exposure

	Hazard Indices					
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2		9.35E-04			6.62E-03	
SRI2a		3.22E-04			2.28E-03	
SRI2b		3.18E-04			2.25E-03	
SRI2c		9.26E-04			6.55E-03	
SRI		9.35E-05			6.62E-04	
SRI1		3.12E-04			2.21E-03	
FOR MW-12						
SRI2		2.67E-02			1.89E-01	
SRI2a		9.21E-03			6.52E-02	
SRI2b		9.08E-03			6.43E-02	
SRI2c		2.64E-02			1.87E-01	
SRI		2.67E-03			1.89E-02	
SRI1		8.90E-03			6.30E-02	

TABLE B-T0: Inhalation of Contaminants in Indoor Air - Hion End Exposure						
	Carcinogenic Risks					
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	3.86E-07		9.12E-06	2.34E-07		5.54E-06
SRI2a	1.03E-07		1.23E-06	6.24E-08		7.49E-07
SRI2b	1.01E-07		1.18E-06	6.12E-08		7.18E-07
SRI2c	3.83E-07		9.06E-06	2.32E-07		5.50E-06
SRI	3.86E-08		9.12E-07	2.34E-08		5.54E-07
SRI1	1.29E-07		3.04E-06	7.81E-08		1.85E-06
FOR MW-12						
SRI2	7.72E-05		1.68E-04	4.68E-05		1.02E-04
SRI2a	2.06E-05		2.28E-05	1.25E-05		1.38E-05
SRI2b	2.02E-05		2.18E-05	1.22E-05		1.33E-05
SRI2c	7.66E-05		1.67E-04	4.65E-05		1.02E-04
SRI	7.72E-06		1.68E-05	4.68E-06		1.02E-05
SRI1	2.57E-05		5.61E-05	1.56E-05		3.41E-05

TABLE B-12: Inhalation of Contaminants in Indoor Air - Average Exposure						
Carcinogenic Risks						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2	1.93E-07		4.56E-06	1.17E-07		2.77E-06
SRI2a	5.14E-08		6.17E-07	3.12E-08		3.74E-07
SRI2b	5.04E-08		5.92E-07	3.06E-08		3.59E-07
SRI2c	1.92E-07		4.53E-06	1.16E-07		2.75E-06
SRI	1.93E-08		4.56E-07	1.17E-08		2.77E-07
SRII	6.43E-08		1.52E-06	3.90E-08		9.23E-07
FOR MW-12						
SRI2	3.86E-05		8.42E-05	2.34E-05		5.11E-05
SRI2a	1.03E-05		1.14E-05	6.24E-06		6.91E-06
SRI2b	1.01E-05		1.09E-05	6.12E-06		6.63E-06
SRI2c	3.83E-05		8.37E-05	2.32E-05		5.08E-05
SRI	3.86E-06		8.42E-06	2.34E-06		5.11E-06
SRII	1.29E-05		2.81E-05	7.81E-06		1.70E-05

TABLE B-11: Inhalation of Contaminants in Indoor Air - Average Exposure						
Hazard Indices						
	Adult			Child		
	tetrachloroethene	1,1,1-trichloroethane	trichloroethene	tetrachloroethene	1,1,1-trichloroethane	trichloroethene
FOR MW-31						
SRI2		4.67E-04			3.31E-03	
SRI2a		1.61E-04			1.14E-03	
SRI2b		1.59E-04			1.12E-03	
SRI2c		4.63E-04			3.28E-03	
SRI		4.67E-05			3.31E-04	
SRI1		1.56E-04			1.10E-03	
FOR MW-12						
SRI2		1.34E-02			9.45E-02	
SRI2a		4.60E-03			3.26E-02	
SRI2b		4.54E-03			3.21E-02	
SRI2c		1.32E-02			9.36E-02	
SRI		1.34E-03			9.45E-03	
SRI1		4.45E-03			3.15E-02	

TABLE A–6: CASESRI

$$D_G = \frac{10^{-3} T^{1.75} \; Mr^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_B)/M_AM_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1 -trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A-5: CASE SRI

$$D_L = \frac{13.26 \times 10^{-5}}{n_W^{1.14} \times V'_B \; 0.589}$$

D_L Effective water diffusion coefficient, cm^2/sec
n_W Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_W	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A–4: CASE SRI

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_m / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_m + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/sec
D_L	Effective water diffusion coefficient, cm^2/sec
$\emptyset_a$	Air–filled soil porosity, cm^3/cm^3
$\emptyset_m$	Moisture–filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_m$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E–02	7.63E–02	9.45E–06	0.27	0.23	2.15	1.55	7.54E–01
1,1,1 –trichloroethane	3.16E–02	8.20E–02	1.02E–05	0.27	0.23	2.15	1.10	7.05E–01
trichloroethene	1.06E–02	8.36E–02	1.05E–05	0.27	0.23	2.15	1.66	4.22E–01

(1) Earth Tech. 1996
(2) Montgomery and Welkom, 1990

TABLE A-3: CASESRI

$$Q_{soil} = \frac{2\,pi\;deltaP\,k_v\,X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, m^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A–2: CASE SRI

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross–sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor–pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flowrate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.60E–05	2379000	166	15	6.94E+05	2.31E–02	2.31E–02	3110	1.87E+01
1,1,1–trichloroethane	2.74E–05	2379000	166	15	6.94E+05	3.16E–02	3.16E–02	3110	1.87E+01
trichloroethene	2.40E–05	2379000	166	15	6.94E+05	1.06E–02	1.06E–02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E–04	3.91	1.77E+01
1,1,1–trichloroethane	6.53E–04	2.85	2.42E+01
trichloroethene	2.18E–04	8.54	8.10E+00

TABLE A–1: CASE SRT	
Indoor Air Concentration = alpha x Source Concentration	
Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW–31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.95E–01	7500	2.60E–05
1,1,1–trichloroethane	9.59E–01	35000	2.74E–05
trichloroethene	1.56E+00	65000	2.40E–05

FOR MW–12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	3.90E+01	1500000	2.60E–05
1,1,1–trichloroethane	2.74E+01	1000000	2.74E–05
trichloroethene	2.88E+01	1200000	2.40E–05

TABLE A2-6: BASELINE CASE SRI2

$$D_G = \frac{10^{-3} T^{1.75} M_r^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_B)/M_AM_B$)
V_A	Molar volume for air, 20.1cm^3/mol[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_{G_i}	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1 -trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2–5: BASELINE CASE SRI2

$$D_L = \frac{13.26 \times 10^{-5}}{n_W^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_W Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E–06	8.90E–01	111
1,1,1 –trichloroethane	1.02E–05	8.90E–01	97.44
trichloroethene	1.05E–05	8.90E–01	9348

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2-4: BASELINE CASE SRI2

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_m / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_m + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/sec
D_L	Effective water diffusion coefficient, cm^2/sec
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_m$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_m$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A2-3: BASELINE CASE SRI2

$$Q_{soil} = \frac{2\,pi\,deltaPk_v X_{crack}}{\mu \ln [2 Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, m^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	$\overline{Q}_{soil}$	deltaP	k_v	μ	$\overline{X}_{crack}$	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A2-2: BASELINE CASE SRI2

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.60E-04	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E+01
1,1,1-trichloroethane	2.74E-04	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E+01
trichloroethene	2.40E-04	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	3.91	1.77E+01
1,1,1-trichloroethane	6.53E-03	2.85	2.42E+01
trichloroethene	2.18E-03	8.54	8.10E+00

TABLE A2-1: BASELINE CASE SR12

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.95E+00	7500	2.60E-04
1,1,1-trichloroethane	9.59E+00	35000	2.74E-04
trichloroethene	1.56E+01	65000	2.40E-04

FORMW-12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	3.90E+02	1500000	2.60E-04
1,1,1-trichloroethane	2.74E+02	1000000	2.74E-04
trichloroethene	2.88E+02	1200000	2.40E-04

TABLE A2c-4: CASE SRI2c

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s [1]
D_L	Effective water diffusion coefficient, cm^2/s [1]
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_w$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.18E-02	7.20E-02	8.20E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.01E-02	7.80E-02	8.80E-06	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	9.99E-03	7.90E-02	9.10E-06	0.27	0.23	2.15	1.66	4.22E-01

[1] SoilScreening Guidance: User's Guide, Table C-1, USEPA, 1996

TABLE A2c-3: CASE SRI2c

$$Q_{soil} = \frac{2\,pi\;deltaPk_v X_{crack}}{\mu \ln [2 Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005
trichloroethene	1.87E-05	57.6	1.0E-12	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, "Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors Into Buildings," Table I, 1991

TABLE A2c–2: CASE SRI2c

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross–sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor–pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	2.58E–04	2379000	166	15	6.94E+04	2.18E–02	2.18E–02	3110	1.87E+01
1,1,1 –trichloroethane	2.71E–04	2379000	166	15	6.94E+04	3.01E–02	3.01E–02	3110	1.87E+01
trichloroethene	2.38E–04	2379000	166	15	6.94E+04	9.99E–03	9.99E–03	3110	1.87E+01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.49E–03	4.14	1.67E+01
1,1,1 –trichloroethane	6.21E–03	3.00	2.30E+01
trichloroethene	2.06E–03	9.03	7.65E+00

TABLE A2c-1: CASE SRI2c

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.94E+00	7500	2.58E-04
1,1,1 -trichloroethane	9.49E+00	35000	2.71E-04
trichloroethene	1.55E+01	65000	2.38E-04

FOR MW-12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	3.87E+02	1500000	2.58E-04
1,1,1-trichloroethane	2.71E+02	1000000	2.71E-04
trichloroethene	2.86E+02	1200000	2.38E-04

TABLE A2b–6: CASE SRI2b

$$D_G = \frac{10^{-3} T^{1.75} M_r^{0.5}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r=(M_A+M_B)/M_AM_B$)
V_A	Molar volume for air, $20.1 cm^3/mol$[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E–02	298.15	111	20.1	1	4.05E–02	28.97	165.83
1,1,1–trichloroethane	8.20E–02	298.15	97.44	20.1	1	4.20E–02	28.97	133.4
trichloroethene	8.36E–02	298.15	93.48	20.1	1	4.21E–02	28.97	131.39

(1) Lyman, 1990
(2) Montgomery and Welkom, 1990

TABLE A2b-5: CASE SRI2b

$$D_L = \frac{13.26 \times 10^{-5}}{n_W^{1.14} \times V'_B\ 0.589}$$

D_L Effective water diffusion coefficient, cm^2/s
n_W Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_W	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1 -trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2b-4: CASE SRI2b

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_w / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_w + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_w$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\overline{\emptyset_w}$	$\overline{P_b}$	$\overline{K_d}$	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A2b-3: CASE SRI2b

$$Q_{soil} = \frac{2\,pi\;deltaPk_v X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 (from 5.2E-08 cm/sec [1])
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	$\overline{Q_{soil}}$	deltaP	$\overline{k_v}$	μ	$\overline{X_{crack}}$	$\overline{Z_{crack}}$	$\overline{r_{crack}}$
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005
trichloroethene	1.87E-10	57.6	1.0E-17	0.00018	62.2	2	0.005

[1] Earth Tech, 1996

TABLE A2b-2: CASE SRI2b

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp (Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp (Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	6.79E-05	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E-04
1,1,1-trichloroethane	9.31E-05	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E-04
trichloroethene	3.11E-05	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E-04

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	3.91E-05	1.77E+06
1,1,1-trichloroethane	6.53E-03	2.85E-05	2.42E+06
trichloroethene	2.18E-03	8.54E-05	8.10E+05

TABLE A2B-1: CASE SRI2B

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	5.09E-01	7500	6.79E-05
1,1,1-trichloroethane	3.26E+00	35000	9.31E-05
trichloroethene	2.02E+00	65000	3.11E-05

FOR MW-12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.02E+02	1500000	6.79E-05
1,1,1-trichloroethane	9.31E+01	1000000	9.31E-05
trichloroethene	3.73E+01	1200000	3.11E-05

TABLE A2a-6: CASE SRI2a

$$D_G = \frac{10^{-3} T^{1.75} \frac{Mr^{0.5}}{}}{P(V_A^{1/3} + V_B^{1/3})^2}$$

D_G	Effective air diffusion coefficient, cm^2/s
T	Temperature, °K
M_r	Molecular weight[1]; (where $M_r = (M_A + M_B)/M_A M_B$)
V_A	Molar volume for air, 20.1cm^3/mol[1]
V_B	Molar volume of gas, cm^3/mol[1,2]
P	Pressure, atm assume 1.0

Chemical	D_G	T	V_B	V_A	P	M_r	M_A	M_B
Volatile Organics (ug/kg)								
tetrachloroethene	7.63E-02	298.15	111	20.1	1	4.05E-02	28.97	165.83
1,1,1-trichloroethane	8.20E-02	298.15	97.44	20.1	1	4.20E-02	28.97	133.4
trichloroethene	8.36E-02	298.15	93.48	20.1	1	4.21E-02	28.97	131.39

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2a-5: CASE SRI2a

$$D_L = \frac{13.26 \times 10^{-5}}{n_w^{1.14} \times V'_B{}^{0.589}}$$

D_L Effective water diffusion coefficient, cm^2/s
n_w Viscosity of water, at the desired temperature (assume 25°C), cp[1]
V'_B Molar volumes of the gas, cm^3/mol[1,2]

Chemical	D_L	n_w	V'_B
Volatile Organics			
tetrachloroethene	9.45E-06	8.90E-01	111
1,1,1-trichloroethane	1.02E-05	8.90E-01	97.44
trichloroethene	1.05E-05	8.90E-01	93.48

[1] Lyman, 1990
[2] Montgomery and Welkom, 1990

TABLE A2a-4: CASE SRI 2a

$$D_T^{eff} = \frac{D_G}{P_b K_d / H + \emptyset_{wn} / H + \emptyset_a} + \frac{D_L}{P_b K_d + \emptyset_{wn} + \emptyset_a H}$$

D_G	Effective air diffusion coefficient, cm^2/s
D_L	Effective water diffusion coefficient, cm^2/s
$\emptyset_a$	Air-filled soil porosity, cm^3/cm^3
$\emptyset_{wn}$	Moisture-filled soil porosity, cm^3/cm^3
P_b	Dry bulk density of soil, g/cm^3
K_d	Distribution coefficient, cm^3/g
H	Henry's law constant, dimensionless

Chemical	D_T^{eff}	D_G	D_L	$\emptyset_a$	$\emptyset_{wn}$	P_b	K_d	H
Volatile Organics (ug/kg)								
tetrachloroethene	2.31E-02	7.63E-02	9.45E-06	0.27	0.23	2.15	1.55	7.54E-01
1,1,1-trichloroethane	3.16E-02	8.20E-02	1.02E-05	0.27	0.23	2.15	1.10	7.05E-01
trichloroethene	1.06E-02	8.36E-02	1.05E-05	0.27	0.23	2.15	1.66	4.22E-01

(1) Earth Tech, 1996
(2) Montgomery and Welkom, 1990

TABLE A2a-3: CASE SRI2a

$$Q_{soil} = \frac{2\,pi\,deltaP\,k_v\,X_{crack}}{\mu \ln [2\,Z_{crack} / r_{crack}]} \qquad \frac{r_{crack}}{Z_{crack}} << 1$$

deltaP	Pressure, g/cm-s^2
k_v	Soil permeability to vapor flow, cm^2 [1]
μ	Vapor viscosity, g/cm-s
Z_{crack}	Depth, m
X_{crack}	length, m
r_{crack}	radius, m

Chemical	Q_{soil}	deltaP	k_v	μ	X_{crack}	Z_{crack}	r_{crack}
Volatile Organics (ug/kg)							
tetrachloroethene	1.87E-07	57.6	1.0E-14	0.00018	62.2	2	0.005
1,1,1-trichloroethane	1.87E-07	57.6	1.0E-14	0.00018	62.2	2	0.005
trichloroethene	1.87E-07	57.6	1.0E-14	0.00018	62.2	2	0.005

[1] Johnson and Ettinger, 1991

TABLE A2a-2: CASE SRI2a

$$\text{alpha} = \frac{[D_T^{eff} A_B / Q_{building} L_T] \times \exp(Q_{soil} L_{crack} / D_{crack} A_{crack})}{\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) + [D_T^{eff} A_B / Q_{building} L_T] + [D_T^{eff} A_B / Q_{soil} L_T] [\exp(Q_{soil} L_{crack} / D_{crack} A_{crack}) - 1]}$$

A_B	Cross-sectional area through which contaminants may pass, cm^2
L_{crack}	Thickness of foundation, cm
$Q_{building}$	Building ventilation rate, cm^3/sec
D_T^{eff}	Overall effective diffusion coefficient, cm^2/sec
D_{crack}	Effective vapor-pressure diffusion coefficient through the crack, cm^2/sec
A_{crack}	Area of cracks/openings through which vapors can pass, cm^2
L_T	Distance from contaminant source to building foundation, cm
Q_{soil}	Volumetric flow rate of soil gas into the building, cm^3/sec

Chemical	alpha	A_B	L_T	L_{crack}	$Q_{building}$	D_T^{eff}	D_{crack}	A_{crack}	Q_{soil}
Volatile Organics									
tetrachloroethene	6.92E-05	2379000	166	15	6.94E+04	2.31E-02	2.31E-02	3110	1.87E-01
1,1,1-trichloroethane	9.44E-05	2379000	166	15	6.94E+04	3.16E-02	3.16E-02	3110	1.87E-01
trichloroethene	3.24E-05	2379000	166	15	6.94E+04	1.06E-02	1.06E-02	3110	1.87E-01

Chemical	$D_T^{eff} A_B / Q_{building} L_T$	$Q_{soil} L_{crack} / D_{crack} A_{crack}$	$D_T^{eff} A_B / Q_{soil} L_T$
Volatile Organics			
tetrachloroethene	4.76E-03	0.04	1.77E+03
1,1,1-trichloroethane	6.53E-03	0.03	2.42E+03
trichloroethene	2.18E-03	0.09	8.10E+02

TABLE A2a-1: CASE SRI2a

Indoor Air Concentration = alpha x Source Concentration

Indoor Air Concentration	Compound concentration in basement, ug/m^3
Source Concentration	Compound concentration in soil (at source), ug/m^3
alpha	Ratio of Indoor Air Concentration to Source Concentration

FOR MW-31

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	5.19E-01	7500	6.92E-05
1,1,1-trichloroethane	3.30E+00	35000	9.44E-05
trichloroethene	2.11E+00	65000	3.24E-05

FOR MW-12

Chemical	Indoor Air Concentration	Source Concentration	alpha
Volatile Organics			
tetrachloroethene	1.04E+02	1500000	6.92E-05
1,1,1-trichloroethane	9.44E+01	1000000	9.44E-05
trichloroethene	3.89E+01	1200000	3.24E-05

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RZ2.R05033.01.ID.019

May 3, 1996

ATKEARNEY

Mr. William Buller
Work Assignment Manager
U.S. EPA Region 5
77 W. Jackson, DRE-8J
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W4-0006; EPA Work Assignment No. R05033; Corrective Action Document Review; Franklin Power Products, Amphenol Facility, Indianapolis, Indiana; EPA ID. No. IND044587848; Review of facility comments on, and revisions to, the Inorganic Risk Calculations; Task 04 Deliverable

Dear Mr. Buller:

Enclosed please find our revised deliverable for the Inorganic Risk Calculations originally submitted on October 16, 1995. This deliverable was revised based upon comments received by U.S. EPA from the facility representative Mr. Samuel Waldo on March 26, 1996. Mr. Waldo identified inaccuracies in the original deliverable which resulted from the use of an earlier and outdated set of background data for the inorganic constituents. For your convenience, enclosed are both a hard copy and the electronic file for the review document on a 3.5-inch diskette formatted in WordPerfect 5.1.

As you are aware, the A.T. Kearney Team completed an evaluation of inorganic constituents based upon information provided in facility documents. This document was later reviewed by Mr. Waldo. Mr. Waldo's letter to U.S. EPA identified the submittal of a (new) comparison between the site specific constituent concentrations and the background concentrations. Mr. Waldo's letter indicated that new comparisons had been submitted as an attachment to a Response to Comments on the Draft RFI Report, which was submitted to U.S. EPA on September 22, 1995.

Based on the new pieces of information provided in the comment letter dated March 26, 1996, and a subsequent review of the statistical evaluation performed on the inorganic constituents (arsenic, beryllium, cobalt, and manganese) which was submitted as Attachment 1 to a September 22, 1995 letter ("Response to U.S. EPA Comments,

Draft Report Corrective Measures Study for the Former Amphenol Facility, Franklin, IN, March 1995), the risk evaluation report has been revised.

Revisions to the risk evaluation included a re-evaluation of background locations and risk results based on the background data utilized in the statistical evaluation. In the previous risk evaluation report (July 21, 1995) background locations included MW20 (6 and 12 feet) and MW24 (6 feet). However, the statistical evaluation reported background locations as MW20 (6 and 12 feet) and MW26 (6 and 12 feet). The data utilized in the risk evaluation were revised in order to incorporate the background data utilized in the statistical comparison. The resulting risks were even more similar between site-specific and background concentrations, based on these data changes.

Based on the revised risk evaluation, it is anticipated that no further evaluation for the site is necessary for metals based on the results of the risk evaluation for residential receptors (utilized to conservatively represent a manufacturing facility) and also on the results of the statistical evaluation which demonstrated no significant differences between site-related and background metal concentrations.

Please contact me or the A.T. Kearney Work Assignment Manager, Mr. John Koehnen, at 312/223-6253 if you have any questions regarding this deliverable.

Sincerely,

Robert Vaz for P.B.D.

Patricia M. Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5
W. Jordan/Central Files
J. Koehnen
D. Gray, M&E
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A. Williams

FRANKLIN POWER PRODUCTS
FRANKLIN, INDIANA
EPA I.D. NO. IND044587848

REVIEW OF THE RESPONSE TO COMMENTS ON THE RISK EVALUATION FOR INORGANIC CONSTITUENTS

Submitted to:

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Submitted by:

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Contract No.	:68-W4-0006
A.T. Kearney WAM	:John Koehnen
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May 3, 1996

REVISED INORGANIC CONSTITUENT CALCULATIONS
(Revised from A.T. Kearney's October 1995 Statistical Evaluation)

Introduction

A risk evaluation was performed for naturally occurring inorganic chemicals detected on-site and in background samples in order to provide a comparison between site-related risks and risks associated with background concentrations. Carcinogenic risk and noncancer hazard calculations were performed for the 24 naturally occurring inorganic chemicals detected in soil collected from the former Amphenol site in Franklin, Indiana. Risk and hazard calculations were also performed for 17 of the 24 naturally occurring inorganics that were associated with background soil samples. Appendix A provides the risk calculations.

This risk evaluation was based on U.S. EPA Risk Assessment Guidance for Superfund (RAGS), Volume I [Human Health Evaluation Manual (HHEM)] (U.S. EPA, 1989), the U.S. EPA HHEM Supplemental Guidance for Standard Exposure Factors (U.S. EPA, 1991), and the U.S. EPA Dermal Exposure Assessment: Principles and Applications (U.S. EPA, 1992a).

A reasonable maximum exposure (RME) and a central tendency exposure (CTE) were both evaluated. The RME is the maximum exposure reasonably expected to occur at the site (U.S. EPA 1989). The CTE is used to approximate the average estimate of exposure and can be derived by using average values for exposure variables.

Data Evaluation Considerations and Uncertainties

The soil analytical data for the naturally occurring inorganics were provided to the A.T. Kearney Team in summary table format. Information concerning sampling locations, data quality, and data qualifier descriptions was not included in the data summary table. It was assumed that the data were of appropriate quality for use in the risk assessment, and that the types of qualifiers used to describe some of the data were consistent with those used in the U.S. EPA Contract Laboratory Program (CLP).

The soil samples were collected from borings (monitoring well borings or soil borings) installed on the site. A total of 32 soil samples were collected, four of which were considered to represent background conditions. Samples were collected from depths ranging between 2 to 35 feet below ground surface (bgs). Surface soils (0 to 1 foot) were not sampled. Two of the background samples were collected at 6 feet bgs (MW-20 and MW-26) and two of the background samples were collected at 12 feet bgs (MW-20 and MW-26). Three samples which were collected at depths greater than 20 feet were not included in the risk evaluation. These samples were MW23 (21.5 feet), MW25 (35 feet), and MW27 (23 feet). A review of the inorganic constituents detected in site soils related to the inorganic constituent concentrations detected in background soil indicated that the concentrations of

those constituents were similar at the subsurface depths. The range of constituent concentrations detected on-site overlap with the range of concentrations from background locations for most of the inorganic parameters. There is no notable separation between site and background constituent concentrations for inorganics. However, it should also be noted that four background samples (two locations with two sample depths each) may not be sufficient to adequately represent accurate background conditions for the site. A direct visual comparison of concentrations with regards to the physical locations of the borings was not performed.

As mentioned previously, data qualifiers were assumed to represent CLP classification. Exhibit 5-4 of RAGS (U.S. EPA, 1989) was used to determine which data with qualifiers should be used in the risk assessment. Therefore, based on Exhibit 5-4 of RAGS, all data were used to determine exposure concentrations for the chemicals of potential concern. It should be noted that the data with qualifiers indicated uncertainties in concentrations but not in identification.

The uncertainties which may have an impact on the estimates of exposure concentration are identified below:

- Use of subsurface soil samples most often at depths greater than six feet bgs to represent potential concentrations of chemicals of concern related to site history
- Lack of information concerning soil boring locations which would be helpful to identify problem areas or "hotspots"
- Using the data with qualifiers which indicate that the reported concentrations may not be accurate

Exposure Assumptions

A residential land-use scenario featuring an adult and a child resident is used to characterize potential future activities and exposure assumptions for the site. In such a scenario, exposure is assumed to occur through:

- Soil ingestion
- Dermal contact with soil
- Inhalation of airborne particulates from soil

The potential exposure to the adult receptor is examined from the perspective of a chronically exposed future resident who lives on-site for a total of 30 years. The child receptor is evaluated based on a six year period, or subchronic exposure duration. Table 1 provides the exposure assumptions.

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U.S. EPA 1996

RISK EVALUATION FOR INORGANIC CONSTITUENTS
FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN, INDIANA

U.S. EPA 1996

Introduction

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This risk evaluation was based on U.S. EPA Risk Assessment Guidance for Superfund (RAGS), Volume I [Human Health Evaluation Manual (HHEM)] (U.S. EPA, 1989), the U.S. EPA HHEM Supplemental Guidance for Standard Exposure Factors (U.S. EPA, 1991), and the U.S. EPA Dermal Exposure Assessment: Principles and Applications (U.S. EPA, 1992a).

A reasonable maximum exposure (RME) and a central tendency exposure (CTE) were both evaluated. The RME is the maximum exposure reasonably expected to occur at the site (U.S. EPA 1989). The CTE is used to approximate the average estimate of exposure and can be derived by using average values for exposure variables.

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The soil analytical data for the naturally occurring inorganics were provided to the A.T. Kearney Team in summary table format. Information concerning sampling locations, data quality, and data qualifier descriptions was not included in the data summary table. It was assumed that the data were of appropriate quality for use in the risk assessment, and that the types of qualifiers used to describe some of the data were consistent with those used in the U.S. EPA Contract Laboratory Program (CLP).

The soil samples were collected from borings (monitoring well borings or soil borings) installed on the site. A total of 32 soil samples were collected, four of which were considered to represent background conditions. Samples were collected from depths ranging between 2 to 35 feet below ground surface (bgs). Surface soils (0 to 1 foot) were not sampled. Two of the background samples were collected at 6 feet bgs (MW-20 and MW-26) and two of the background samples were collected at 12 feet bgs (MW-20 and MW-26). Three samples which were collected at depths greater than 20 feet were not included in the risk evaluation. These samples were MW23 (21.5 feet), MW25 (35 feet), and MW27 (23 feet). A review of the inorganic constituents detected in site soils related to the inorganic constituent concentrations detected in background soil indicated that the concentrations of

those constituents were similar at the subsurface depths. The range of constituent concentrations detected on-site overlap with the range of concentrations from background locations for most of the inorganic parameters. There is no notable separation between site and background constituent concentrations for inorganics. However, it should also be noted that four background samples (two locations with two sample depths each) may not be sufficient to adequately represent accurate background conditions for the site. A direct visual comparison of concentrations with regards to the physical locations of the borings was not performed.

As mentioned previously, data qualifiers were assumed to represent CLP classification. Exhibit 5-4 of RAGS (U.S. EPA, 1989) was used to determine which data with qualifiers should be used in the risk assessment. Therefore, based on Exhibit 5-4 of RAGS, all data were used to determine exposure concentrations for the chemicals of potential concern. It should be noted that the data with qualifiers indicated uncertainties in concentrations but not in identification.

The uncertainties which may have an impact on the estimates of exposure concentration are identified below:

- Use of subsurface soil samples most often at depths greater than six feet bgs to represent potential concentrations of chemicals of concern related to site history
- Lack of information concerning soil boring locations which would be helpful to identify problem areas or "hotspots"
- Using the data with qualifiers which indicate that the reported concentrations may not be accurate

Exposure Assumptions

A residential land-use scenario featuring an adult and a child resident is used to characterize potential future activities and exposure assumptions for the site. In such a scenario, exposure is assumed to occur through:

- Soil ingestion
- Dermal contact with soil
- Inhalation of airborne particulates from soil

The potential exposure to the adult receptor is examined from the perspective of a chronically exposed future resident who lives on-site for a total of 30 years. The child receptor is evaluated based on a six year period, or subchronic exposure duration. Table 1 provides the exposure assumptions.

In order to "bracket" the uncertainty associated with any estimate of exposure concentrations, three different concentration estimates are used for the risk evaluations:

- maximum concentration
- average concentration
- 95 percent upper confidence level (95% UCL) (U.S. EPA, 1992b)

Table 2 provides a summary of the exposure concentrations. Air concentrations for particulates were predicted using conservative models.

Toxicity Assessment

Toxicity data were obtained from the Integrated Risk Information System (IRIS, 1995) and Health Effects Assessment Summary Tables (HEAST, 1994), and U.S. EPA Environmental Criteria and Assessment Office (ECAO). Toxicity values for the chemicals of concern are provided in Table 3.

Risk Characterization

The risk characterization provides a comparison of the site-related and background risk estimates. The outcome of this comparison is used to determine whether site-related constituent concentrations may be associated with higher risks than background constituent concentrations. Table 4 provides a summary of the risk and hazard calculations for site-related and background risk evaluations.

Three different comparisons were made, as shown in Table 4, and the results of each comparison are provided below.

Site Maximum vs. Background Maximum

For this comparison, the maximum concentrations of both the site-related and background constituents were used in conjunction with RME assumptions (Table 1). Overall, the results indicated that site-related maximum concentrations were associated with only slightly higher risks, but on the same order of magnitude as the risk associated with background maximum concentrations.

For the residential adult, the site-related total risk was 2E-05, and the total hazard was 0.4. Background total risk was slightly lower at 1E-05, and total hazard was 0.1. For the residential child, the site-related total risk was 3E-05, and the total hazard was 1.0. Background total risk was slightly lower at 2E-05, and total hazard was 0.6.

Ingestion of arsenic and beryllium in soil were associated with excess carcinogenic risk, as shown in Tables 2 and 4 of Attachment 1 of Appendix A. Maximum concentrations for these chemicals are provided in Table 2. The site-related maximum arsenic concentration of 9.5 mg/kg is higher than the background maximum concentration of 6.7 mg/kg. In addition, the site-related maximum beryllium concentration of 1.6 mg/kg is higher than the background maximum beryllium concentration of 0.97 mg/kg.

Site 95% UCL vs. Background Maximum

For this comparison, the 95% UCL was used as the exposure concentration for site-related constituents, whereas the maximum concentrations were used for background constituents in conjunction with reasonable maximum exposure assumptions (Table 1). Because the background data were collected from only four sampling locations (e.g., two locations and two sampling depths), spuriously high values resulted when the 95% UCL was derived for the background constituents (Table 2). Therefore, based on professional judgement, the 95% UCLs were considered inappropriate, and maximum concentrations were used instead. Overall, the results indicated that site 95% UCL concentrations were associated with slightly higher risks than background maximum concentrations.

For the residential adult, the site-related total risk was 1E-05, and the total hazard was 0.1. Background total risk was also at 1E-05, and total hazard was also 0.1. For the residential child, the site-related total risk was 2E-05, and the total hazard was 0.7. Background total risk was also 2E-05, and total hazard was slightly lower at 0.6.

Ingestion of arsenic and beryllium was associated with excess carcinogenic risk, as shown in Tables 1 and 4 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related 95% UCL arsenic concentration of 5.7 mg/kg is slightly lower than the background maximum concentration of 6.7 mg/kg. Also, the site-related 95% UCL beryllium concentration of 1.3 mg/kg is more than the background maximum beryllium concentration of 0.97 mg/kg.

Site Average vs. Background Average

For this comparison, the average value was used as the exposure concentration for site-related and background constituents in conjunction with central tendency exposure assumptions (Table 1). Overall, the results indicated that the average concentration values for site-related and background concentrations were associated with very similar risks. In fact, the background risks were slightly higher than site-related risks.

For the residential adult, the site-related total risk was 8E-07, and the total hazard was 0.04. Background total risk was slightly higher at 1E-06, and total hazard was 0.04. For the residential child, the site-related total risk was 4E-06, and the total hazard was 0.2. Background total risk was 6E-06, and total hazard was 0.2.

Ingestion of arsenic and beryllium was associated with excess carcinogenic risk, as shown in Tables 3 and 5 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related average arsenic concentration is 2.4 mg/kg and the background average concentration is 3.9 mg/kg. Also, the site-related average beryllium concentration is 0.46 mg/kg and the background average beryllium concentration is 0.67 mg/kg.

A comparison of the arsenic and beryllium site-related and background concentrations to U.S. EPA Region IX residential preliminary remediation goals (PRGs) (U.S. EPA, 1995) was also performed (Table 2). The PRGs for both of these inorganics were exceeded by both the site-related and background constituent concentrations.

A comparison of the regional arsenic and beryllium soil concentrations to site concentrations as shown below, indicate that the ranges of concentrations detected on-site are within the ranges determined for Indiana soils.

Element	Site-specific Concentration Range (mg/kg)	North American Soils Indiana Range (a) (mg/kg)
Arsenic	0.76 - 9.5	3.6 - 15 and 2.0 - 4.0
Beryllium	0.21 - 1.6	non-detect - 2.0

(a) Source: Dragun, James and Andrew Chiasson. Elements in North American Soils. Hazardous Materials Control Resources Institute. 1991.

A statistical analysis was performed to determine whether the distribution of arsenic, beryllium, cobalt, and manganese concentrations from the site-specific results differed significantly than the results for background sampling locations (A.T. Kearney, Attachment 1, September 22, 1995). It was determined that there was no significant difference between the means of the site-related and background data sets (using a 95% confidence level) for arsenic, beryllium, cobalt, and manganese.

It is recommended that no further evaluation for the site is necessary for metals based on the results of the risk evaluation for residential receptors (utilized to conservatively represent a manufacturing facility) and also on the results of the statistical evaluation which demonstrated no significant differences between site-related and background metal concentrations.

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TABLES

SUMMARY TABLES

Table 1 Summary of Exposure Parameter Values for the Risk Evaluation – Former Amphenol Site

PATHWAY	PARAMETER	UNITS	Residential			
			Child		Adult	
			RME (1)	CTE (2)	RME (1)	CTE (2)
General	Body weight	kg	15 a	15 a	70 a	70 a
	Exposure duration	years	6 c	6 c	30 a	9 a
	Averaging time – noncancer	days	2190 a	2190 a	10950 a	3285 a
	Averaging time – cancer	days	25550 a	25550 a	25550 a	25550 a
Soil Ingestion	Ingestion rate	mg/day	200 a	100 a	100 a	50 e
	Exposure frequency	days/year	350 a	350 a	350	350
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
	Exposure duration	years	6 a	6 a	30 a	9 a
Soil Dermal Contact	Skin surface area available	cm2/day	2010 b	1750 b	5800 b	5000 d
	Soil-to-skin adherence factor	mg/cm2	1 b	1 b	1 b	1 b
	Dermal absorption factor	none	**	**	**	**
	Exposure frequency	days/year	350 a	234 a	350 a	234 a
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
Fugitive Dust Inhalation	Inhalation rate	m3/day	20 d	20 d	20 d	20 d
	Exposure time	hours/day	24 a	24 e	24 a	24 e
	Exposure frequency	days/year	350 a	234 a	350 a	234 a

(1) Reasonable Maximum Exposure (RME) used in conjunction with the maxium and 95% UCL exposure concentrations

(2) Central Tendency Exposure (CTE) used in conjunction with the average exposure concentrations

**Chemical Specific

a. EPA 1993, Superfund's Standard Default Exposure Factors for the Central Tendancy and Reasonable Maximum Exposure of the ingestion rates for residential and commercial adults are for non-contact intensive activities (for contact intensive activities, different ingestion rates are recommended).
The ingestion rate for the residential adult assumes a 30 year chronic adult exposure duration.

b. EPA 1992a, Dermal Exposure Assessmement: for skin surface area during soil and sediment dermal contact, assumes 25%of total bodysurface area (pp.8-10 and 8-12 of EPA, 1992a)

c. EPA 1989a, Risk Assessment Guidance for Superfund Part A

d. EPA 1989b, Exposure Factors Handbook (EFH); for fugitive dust inhalation rates, values are consistent with EFH values

e. If guidance is not available for the CT but does exist for the RME, the RME value was adopted as the CT.

Table 2 Summary of Comparison of Concentrations Between Site–Specific and Background Data and USEPA Region IX PRGs

	COMPARISON OF CONCENTRATIONS (MG/KG)						USEPA REGION IX RESIDENTIAL PRG (a) (MG/KG)
	AVERAGE		MAXIMUM		95% UCL		
INORGANIC	Site–specific	Background	Site–specific	Background	Site–specific	Background	
Aluminum	3703.1	8090.0	18200.0	15200.0	6169.5	2364915.5	77000
Antimony	2.6	ND	12.4	ND	6.7	ND	31
Arsenic	2.4	3.9	9.5	6.7	5.7	16.0	0.32
Barium	17.0	43.9	115.0	83.1	45.4	733.1	5300
Beryllium	0.5	0.7	1.6	1.0	1.3	1.2	0.14
Cadmium	0.5	ND	13.2	ND	0.9	ND	38
Calcium	72758.6	34525.0	163000.0	94700.0	274691.3	6.4E+12	NA
Chromium	4.8	10.2	19.4	20.7	17.1	30281508.6	210 (total), 30 (Cr 6+)
Cobalt	2.1	5.3	11.2	8.0	5.4	15.6	NA
Copper	121.1	14.7	1970.0	22.8	138.4	29.9	2800
Cyanide (total)	2.1	ND	21.6	ND	3.5	0.0	1300
Iron	7013.4	13355.0	23000.0	20500.0	10473.4	151053.0	NA
Lead	7.9	12.1	52.9	20.3	15.0	165.9	400
Magnesium	24318.8	14995.0	59900.0	33500.0	43831.9	62217892.2	NA
Manganese	283.6	370.0	1000.0	687.0	455.2	1791.9	380
Mercury	0.1	ND	2.3	ND	0.1	ND	23
Nickel	8.2	12.9	38.3	18.9	14.2	57.1	1500
Potassium	342.8	570.3	1470.0	1120.0	763.1	6709.6	NA
Selenium	0.1	ND	0.4	ND	0.3	ND	380
Silver	0.4	ND	1.8	ND	1.1	ND	380
Sodium	55.4	91.5	281.0	142.0	143.0	398.4	NA
Thallium	0.1	ND	0.4	ND	0.3	ND	6.1
Vanadium	7.2	16.7	33.8	27.8	14.6	322.7	540
Zinc	35.6	45.4	91.0	77.3	45.3	325.7	23000

NA – Not Applicable
ND – Not Detected
PRG – Preliminary Remediation Goal
(a) USEPA Region IX Preliminary Remediation Goals (PRGs) First Half 1995, February 1, 1995.

Table 3 Toxicity Values for Chemicals of Potential Concern at the Former Amphenol Site

	NONCARCINOGENIC RfDs						CANCER SLOPE FACTORS			
	ORAL RfD (MG/KG/DAY)		ADJUSTED ORAL (DERMAL) (MG/KG/DAY) (a)		INHALATION RfD (MG/KG/DAY)		ORAL SLOPE FACTOR (MG/KG/DAY) -1	ADJUSTED ORAL (DERMAL) SLOPE FACTOR (b) (MG/KG/DAY) -1	INHALATION SLOPE FACTOR (MG/KG/DAY) -1 (b)	ORAL ABSORPTION FACTOR (UNITLESS) (c)
CHEMICAL	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC				
Aluminum	NA	1.0E+00	NA	2.0E-01	NA	NA	NA	NA	NA	0.20
Antimony	4.0E-04	4.0E-04	2.4E-04	2.4E-04	NA	NA	NA	NA	NA	0.60
Arsenic	3.0E-04	3.0E-04	2.8E-04	2.8E-04	NA	NA	1.8E+00	1.8E+00	5.0E+01	0.95
Barium	7.0E-02	7.0E-02	3.5E-03	3.5E-03	1.0E-03	1.0E-04	NA	NA	NA	0.05
Beryllium	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	4.3E+00	4.3E+01	8.4E+00	0.10
Cadmium	NA	5.0E-04	NA	3.5E-05	NA	NA	NA	NA	6.1E+00	0.07
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Chromium (total) (d)	2.0E-02	5.0E-03	1.0E-02	2.5E-03	NA	NA	NA	NA	4.2E+01	0.50
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Copper	NA	4.0E-02	NA	4.0E-02	NA	NA	NA	NA	NA	0.99
Cyanide (total)	2.0E-02	2.0E-02	1.4E-02	1.4E-02	NA	NA	NA	NA	NA	0.70
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Manganese	1.4E-01	1.4E-01	5.6E-03	5.6E-03	1.0E-04	1.0E-04	NA	NA	NA	0.04
Mercury	3.0E-04	3.0E-04	4.5E-05	4.5E-05	8.6E-05	8.6E-05	NA	NA	NA	0.15
Nickel	2.0E-02	2.0E-02	2.0E-03	2.0E-03	NA	NA	NA	NA	8.4E-01	0.10
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Selenium	5.0E-03	5.0E-03	4.9E-03	4.9E-03	NA	NA	NA	NA	NA	0.97
Silver	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	NA	NA	NA	0.10
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Thallium (Thallium chloride)**	8.0E-04	8.0E-05	8.0E-05	8.0E-06	NA	NA	NA	NA	NA	0.10
Vanadium	7.0E-03	7.0E-03	7.0E-05	7.0E-05	NA	NA	NA	NA	NA	0.01
Zinc	3.0E-01	3.0E-01	9.0E-02	9.0E-02	NA	NA	NA	NA	NA	0.30

Sources: U.S. EPA. Integrated Risk Information System (IRIS) database accessed May 1995.
US EPA Health Effects Assessment Tables (HEAST), Annual FY-1994 edition (Heast, 1994).

*Region IV default oral absorption factors were used when necessary and are as follows: VOCs = 0.80, SVOCs = 0.50, inorganics = 0.20.

**Toxicity values for thallium chloride were used to calculate risk and hazard values for thallium.

NA = Toxicity values (RfD/CSF) not available from IRIS, HEAST, scientific literature, USEPA nor OhioEPA for risk evaluation.

(a) Adjusted oral toxicity values used for calculation of dermal hazards.
Adjustment of an administered to an absorbed dose RfD:
(Administered RfD) x (Oral Absorption Factor) = Absorbed Dose RfD.

(b) Adjusted oral toxicity values used for calculation of dermal risks.
Adjustment of an administered to an absorbed dose CSF:
(Administered CSF) = 1 / (Oral Absorption Factor) = Absorbed Dose CSF.

(c) Oral absorption factors from chemical-specific Toxicological Profiles, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service.

(d) As a conservative measure, total chromium utilizes hexavalent chromium toxicity values.

Table 4 Summary of Risk and Hazard Calculations for the Former Amphenol Site

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	9E-06	9E-02	1E-05	7E-02
	Dermal	2E-06	4E-02	2E-06	5E-02
	Inhalation	8E-07	1E-02	1E-06	1E-02
Total		1E-05	1E-01	1E-05	1E-01
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	2E-05	6E-01	2E-05	4E-01
	Dermal	7E-07	5E-02	6E-07	7E-02
	Inhalation	8E-07	4E-02	9E-07	6E-02
Total		2E-05	7E-01	2E-05	6E-01
RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	1E-05	3E-01	1E-05	7E-02
	Dermal	3E-06	1E-01	2E-06	5E-02
	Inhalation	1E-06	2E-02	1E-06	1E-02
Total		2E-05	4E-01	1E-05	1E-01
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-05	1E+00	2E-05	4E-01
	Dermal	1E-06	1E-01	6E-07	7E-02
	Inhalation	1E-06	9E-02	9E-07	6E-02
Total		3E-05	1E+00	2E-05	6E-01
RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	6E-07	2E-02	9E-07	2E-02
	Dermal	1E-07	1E-02	2E-07	2E-02
	Inhalation	6E-08	4E-03	1E-07	5E-03
Total		8E-07	4E-02	1E-06	4E-02
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-06	1E-01	5E-06	1E-01
	Dermal	2E-07	1E-02	2E-07	3E-02
	Inhalation	2E-07	2E-02	3E-07	2E-07
Total		4E-06	2E-01	6E-06	2E-01

APPENDIX A

RISK CALCULATIONS

APPENDIX A

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.62E+04	100	1.0E-06	1.0	350	30	70	25550	1.07E-02	NA	ND
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	25550	7.28E-06	NA	ND
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	25550	5.58E-06	1.80E+00	1.00E-05
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	25550	6.75E-05	NA	ND
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	25550	9.39E-07	4.30E+00	4.04E-06
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	25550	7.75E-06	NA	ND
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	25550	9.57E-02	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	25550	1.14E-05	NA	ND
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	25550	6.58E-06	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	25550	1.16E-03	NA	ND
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	25550	1.27E-05	NA	ND
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	25550	1.35E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	25550	3.11E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	25550	3.52E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	25550	5.87E-04	NA	ND
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	25550	1.35E-06	NA	ND
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	25550	2.25E-05	NA	ND
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	25550	8.63E-04	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	25550	2.58E-07	NA	ND
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	25550	1.06E-06	NA	ND
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	25550	1.65E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	25550	2.47E-07	NA	ND
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	25550	1.98E-05	NA	ND
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	25550	5.34E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.41E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	100	1.0E-06	1.0	350	30	70	10950	2.49E-02	1.00E+00	2.49E-02
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	10950	1.70E-05	4.00E-04	4.25E-02
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	10950	1.30E-05	3.00E-04	4.34E-02
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	10950	1.58E-04	7.00E-02	2.25E-03
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	10950	2.19E-06	5.00E-03	4.38E-04
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	10950	1.81E-05	5.00E-04	3.62E-02
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	10950	2.23E-01	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	10950	2.66E-05	5.00E-03	5.32E-03
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	10950	1.53E-05	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	10950	2.70E-03	4.00E-02	6.75E-02
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	10950	2.96E-05	2.00E-02	1.48E-03
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	10950	3.15E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	10950	7.25E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	10950	8.21E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	10950	1.37E-03	1.40E-01	9.78E-03
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	10950	3.15E-06	3.00E-04	1.05E-02
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	10950	5.25E-05	2.00E-02	2.62E-03
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	10950	2.01E-03	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	10950	6.03E-07	5.00E-03	1.21E-04
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	10950	2.47E-06	5.00E-03	4.93E-04
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	10950	3.85E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	10950	5.75E-07	8.00E-05	7.19E-03
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	10950	4.63E-05	7.00E-03	6.61E-03
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	10950	1.25E-04	3.00E-01	4.16E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.62E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.62E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.20E-04	NA	ND
Antimony	1.24E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.22E-07	NA	ND
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.23E-07	1.69E+00	6.11E-07
Barium	1.15E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.92E-06	NA	ND
Beryllium	1.60E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.45E-06	4.30E+01	2.34E-06
Cadmium	1.32E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.49E-07	NA	ND
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.55E-03	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.61E-07	NA	ND
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.81E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.71E-05	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.35E-07	NA	ND
Iron	2.30E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.83E-04	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.80E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.04E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.41E-05	NA	ND
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.83E-06	NA	ND
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.30E-06	NA	ND
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.01E-05	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.50E-06	NA	ND
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.13E-06	NA	ND
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.57E-06	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.43E-06	NA	ND
Vanadium	3.38E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.15E-06	NA	ND
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.10E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.95E-06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.45E-03	2.00E-01	7.23E-03
Antimony	1.24E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.85E-07	2.40E-04	4.11E-03
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.55E-07	2.85E-04	2.65E-03
Barium	1.15E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.14E-06	3.50E-03	2.61E-03
Beryllium	1.60E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.27E-07	5.00E-04	2.54E-04
Cadmium	1.32E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.05E-06	3.50E-05	3.00E-02
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.30E-02	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.54E-06	2.50E-03	6.17E-04
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.90E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.57E-04	3.96E-02	3.95E-03
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.72E-06	1.40E-02	1.23E-04
Iron	2.30E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-03	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.20E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.76E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.95E-05	5.60E-03	1.42E-02
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-07	4.50E-05	4.06E-03
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.04E-06	2.00E-03	1.52E-03
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.17E-04	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.50E-08	4.85E-03	7.21E-06
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.43E-07	5.00E-04	2.86E-04
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.23E-05	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.34E-08	8.00E-06	4.17E-03
Vanadium	3.36E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.69E-06	7.00E-05	3.84E-02
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.23E-06	9.00E-02	8.03E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.14E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.26E-04	0.83	24	350	30	70	25550	1.50E-05	NA	ND
Antimony	6.74E-06	0.83	24	350	30	70	25550	1.02E-06	NA	ND
Arsenic	6.69E-06	0.83	24	350	30	70	25550	7.83E-09	5.00E+01	3.91E-07
Barium	6.10E-07	0.83	24	350	30	70	25550	9.47E-08	NA	ND
Beryllium	1.13E-06	0.83	24	350	30	70	25550	1.32E-09	6.40E+00	1.11E-06
Cadmium	9.30E-06	0.83	24	350	30	70	25550	1.09E-06	6.10E+00	6.63E-06
Calcium	1.15E-03	0.83	24	350	30	70	25550	1.34E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	25550	1.60E-08	4.20E+01	6.71E-07
Cobalt	7.89E-06	0.83	24	350	30	70	25550	9.23E-09	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	25550	1.62E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	25550	1.78E-08	NA	ND
Iron	1.62E-04	0.83	24	350	30	70	25550	1.89E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	25550	4.36E-08	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	25550	4.94E-05	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	25550	8.24E-07	NA	ND
Mercury	1.62E-06	0.83	24	350	30	70	25550	1.89E-09	NA	ND
Nickel	2.70E-07	0.83	24	350	30	70	25550	3.16E-08	6.40E-01	2.85E-08
Potassium	1.04E-05	0.83	24	350	30	70	25550	1.21E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	25550	3.63E-10	NA	ND
Silver	1.27E-06	0.83	24	350	30	70	25550	1.48E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	25550	2.32E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	25550	3.46E-10	NA	ND
Vanadium	2.36E-07	0.83	24	350	30	70	25550	2.76E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	25550	7.50E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.17E-06

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.28E-04	0.83	24	350	30	70	10950	3.50E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	30	70	10950	2.38E-08	NA	ND
Arsenic	8.69E-08	0.83	24	350	30	70	10950	1.83E-08	NA	ND
Barium	8.10E-07	0.83	24	350	30	70	10950	2.21E-07	1.00E-04	2.21E-03
Beryllium	1.13E-08	0.83	24	350	30	70	10950	3.08E-09	NA	ND
Cadmium	9.30E-08	0.83	24	350	30	70	10950	2.54E-08	NA	ND
Calcium	1.15E-03	0.83	24	350	30	70	10950	3.13E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	10950	3.73E-08	NA	ND
Cobalt	7.89E-08	0.83	24	350	30	70	10950	2.15E-08	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	10950	3.79E-08	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	10950	4.15E-08	NA	ND
Iron	1.62E-04	0.83	24	350	30	70	10950	4.42E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	10950	1.02E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	10950	1.15E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	10950	1.92E-06	1.00E-04	1.92E-02
Mercury	1.62E-06	0.83	24	350	30	70	10950	4.42E-09	8.60E-05	5.14E-05
Nickel	2.70E-07	0.83	24	350	30	70	10950	7.38E-08	NA	ND
Potassium	1.04E-05	0.83	24	350	30	70	10950	2.83E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	10950	8.48E-10	NA	ND
Silver	1.27E-06	0.83	24	350	30	70	10950	3.48E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	10950	5.40E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	10950	8.07E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	30	70	10950	6.50E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	10950	1.75E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.15E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.62E+04	200	1.0E-06	1.0	350	6	15	25550	1.99E-02	NA	ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	25550	1.36E-05	NA	ND
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	25550	1.04E-05	1.80E+00	1.87E-05
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	25550	1.26E-04	NA	ND
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	25550	1.75E-06	4.30E+00	7.54E-06
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	25550	1.45E-05	NA	ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	25550	1.79E-01	NA	ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	25550	2.13E-05	NA	ND
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	25550	1.23E-05	NA	ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	25550	2.16E-03	NA	ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	25550	2.37E-05	NA	ND
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	25550	2.52E-02	NA	ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	25550	5.80E-05	NA	ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	25550	6.56E-02	NA	ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	25550	1.10E-03	NA	ND
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	25550	2.52E-06	NA	ND
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	25550	4.20E-05	NA	ND
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	25550	1.61E-03	NA	ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	25550	4.82E-07	NA	ND
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	25550	1.97E-06	NA	ND
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	25550	3.08E-04	NA	ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	25550	4.60E-07	NA	ND
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	25550	3.70E-05	NA	ND
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	25550	9.97E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 2.63E-05

INGESTION OF CHEMICALS IN SOIL -- HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD -- SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.62E+04	200	1.0E-06	1.0	350	6	15	2190	2.33E-01	NA	ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	2190	1.59E-04	4.00E-04	3.96E-01
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	2190	1.21E-04	3.00E-04	4.05E-01
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	2190	1.47E-03	7.00E-02	2.10E-02
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	2190	2.05E-05	5.00E-03	4.09E-03
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	2190	1.69E-04	NA	ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	2190	2.08E+00	NA	ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	2190	2.48E-04	2.00E-02	1.24E-02
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	2190	1.43E-04	NA	ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	2190	2.52E-02	NA	ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	2190	2.76E-04	2.00E-02	1.38E-02
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	2190	2.94E-01	NA	ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	2190	6.76E-04	NA	ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	2190	7.66E-01	NA	ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	2190	1.28E-02	1.40E-01	9.13E-02
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	2190	2.94E-05	3.00E-04	9.80E-02
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	2190	4.90E-04	2.00E-02	2.45E-02
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	2190	1.88E-02	NA	ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	2190	5.63E-06	5.00E-03	1.13E-03
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	2190	2.30E-05	5.00E-03	4.60E-03
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	2190	3.59E-03	NA	ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	2190	5.37E-06	8.00E-04	6.71E-03
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	2190	4.32E-04	7.00E-03	6.17E-02
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	2190	1.16E-03	3.00E-01	3.86E-03

NA/ND -- Not available/ Not determined

TOTAL HAZARD **1.14E+00**

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.62E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.00E-04	NA	ND
Antimony	1.24E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.37E-07	NA	ND
Arsenic	9.50E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.05E-07	1.89E+00	1.98E-07
Barium	1.15E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.27E-06	NA	ND
Beryllium	1.60E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.76E-08	4.30E+01	7.58E-07
Cadmium	1.32E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.45E-07	NA	ND
Calcium	1.63E+05	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.80E-03	NA	ND
Chromium	1.94E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.14E-07	NA	ND
Cobalt	1.12E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.23E-07	NA	ND
Copper	1.97E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.17E-05	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.38E-07	NA	ND
Iron	2.30E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.53E-04	NA	ND
Lead	5.29E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.83E-07	NA	ND
Magnesium	5.99E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	6.60E-04	NA	ND
Manganese	1.00E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.10E-05	NA	ND
Mercury	2.30E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.53E-08	NA	ND
Nickel	3.83E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.22E-07	NA	ND
Potassium	1.47E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.62E-05	NA	ND
Selenium	4.40E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.85E-09	NA	ND
Silver	1.80E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.98E-08	NA	ND
Sodium	2.81E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.09E-06	NA	ND
Thallium	4.20E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.63E-09	NA	ND
Vanadium	3.38E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.72E-07	NA	ND
Zinc	9.10E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.00E-06	NA	ND

TOTAL RISK 9.55E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.34E-03 NA		ND
Antimony	1.24E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.59E-06	2.40E-04	6.64E-03
Arsenic	9.50E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.22E-06	2.85E-04	4.28E-03
Barium	1.15E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.48E-05	3.50E-03	4.22E-03
Beryllium	1.60E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.06E-07	5.00E-04	4.11E-04
Cadmium	1.32E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.70E-06 NA		ND
Calcium	1.63E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.09E-02 NA		ND
Chromium	1.94E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.49E-06	1.00E-02	2.49E-04
Cobalt	1.12E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.44E-06 NA		ND
Copper	1.97E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.53E-04 NA		ND
Cyanide (total)	2.16E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.76E-06	1.40E-02	1.96E-04
Iron	2.30E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-03 NA		ND
Lead	5.29E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.80E-06 NA		ND
Magnesium	5.99E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.70E-03 NA		ND
Manganese	1.00E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.28E-04	5.80E-03	2.29E-02
Mercury	2.30E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-07	4.50E-05	6.57E-03
Nickel	3.83E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.92E-06	2.00E-03	2.46E-03
Potassium	1.47E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.89E-04 NA		ND
Selenium	4.40E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.65E-06	4.85E-03	1.17E-05
Silver	1.80E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.31E-07	5.00E-04	4.63E-04
Sodium	2.61E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.61E-05 NA		ND
Thallium	4.20E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.40E-06	8.00E-05	6.75E-04
Vanadium	3.38E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.34E-06	7.00E-05	6.20E-02
Zinc	9.10E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.17E-05	9.00E-02	1.30E-04

NA/ND – Not available / Not determined

TOTAL HAZARD 1.11E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.28E-04	0.83	24	350	6	15	25550	1.40E-05	NA	ND
Antimony	8.74E-06	0.83	24	350	6	15	25550	9.54E-09	NA	ND
Arsenic	6.69E-06	0.83	24	350	6	15	25550	7.31E-09	5.00E+01	3.65E-07
Barium	6.10E-07	0.83	24	350	6	15	25550	6.64E-06	NA	ND
Beryllium	1.13E-06	0.83	24	350	6	15	25550	1.23E-09	8.40E+00	1.03E-06
Cadmium	9.30E-06	0.83	24	350	6	15	25550	1.02E-06	6.10E+00	6.19E-06
Calcium	1.15E-03	0.83	24	350	6	15	25550	1.25E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	6	15	25550	1.49E-06	4.20E+01	6.27E-07
Cobalt	7.89E-06	0.83	24	350	6	15	25550	8.61E-09	NA	ND
Copper	1.39E-05	0.83	24	350	6	15	25550	1.51E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	25550	1.66E-06	NA	ND
Iron	1.62E-04	0.83	24	350	6	15	25550	1.77E-05	NA	ND
Lead	3.73E-07	0.83	24	350	6	15	25550	4.07E-06	NA	ND
Magnesium	4.22E-04	0.83	24	350	6	15	25550	4.61E-05	NA	ND
Manganese	7.05E-06	0.83	24	350	6	15	25550	7.69E-07	NA	ND
Mercury	1.62E-06	0.83	24	350	6	15	25550	1.77E-09	NA	ND
Nickel	2.70E-07	0.83	24	350	6	15	25550	2.95E-06	8.40E-01	2.47E-06
Potassium	1.04E-05	0.83	24	350	6	15	25550	1.13E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	6	15	25550	3.38E-10	NA	ND
Silver	1.27E-06	0.83	24	350	6	15	25550	1.38E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	6	15	25550	2.16E-07	NA	ND
Thallium	2.98E-09	0.83	24	350	6	15	25550	3.23E-10	NA	ND
Vanadium	2.36E-07	0.83	24	350	6	15	25550	2.60E-06	NA	ND
Zinc	6.41E-07	0.83	24	350	6	15	25550	7.00E-06	NA	ND
									TOTAL RISK	1.09E-05

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.26E-04	0.83	24	350	6	15	2190	1.83E-04	NA	ND
Antimony	8.74E-08	0.83	24	350	6	15	2190	1.11E-07	NA	ND
Arsenic	8.69E-08	0.83	24	350	6	15	2190	8.52E-08	NA	ND
Barium	8.10E-07	0.83	24	350	6	15	2190	1.03E-08	1.00E-03	1.03E-03
Beryllium	1.13E-08	0.83	24	350	6	15	2190	1.44E-08	NA	ND
Cadmium	9.30E-08	0.83	24	350	6	15	2190	1.18E-07	NA	ND
Calcium	1.15E-03	0.83	24	350	6	15	2190	1.46E-03	NA	ND
Chromium	1.37E-07	0.83	24	350	6	15	2190	1.74E-07	NA	ND
Cobalt	7.89E-08	0.83	24	350	6	15	2190	1.00E-07	NA	ND
Copper	1.39E-05	0.83	24	350	6	15	2190	1.77E-05	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	2190	1.94E-07	NA	ND
Iron	1.62E-04	0.83	24	350	6	15	2190	2.06E-04	NA	ND
Lead	3.73E-07	0.83	24	350	6	15	2190	4.75E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	6	15	2190	5.37E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	6	15	2190	8.97E-06	1.00E-04	8.97E-02
Mercury	1.62E-08	0.83	24	350	6	15	2190	2.06E-08	8.60E-05	2.40E-04
Nickel	2.70E-07	0.83	24	350	6	15	2190	3.44E-07	NA	ND
Potassium	1.04E-05	0.83	24	350	6	15	2190	1.32E-05	NA	ND
Selenium	3.10E-09	0.83	24	350	6	15	2190	3.95E-09	NA	ND
Silver	1.27E-08	0.83	24	350	6	15	2190	1.61E-08	NA	ND
Sodium	1.98E-06	0.83	24	350	6	15	2190	2.52E-06	NA	ND
Thallium	2.96E-09	0.83	24	350	6	15	2190	3.77E-09	NA	ND
Vanadium	2.38E-07	0.83	24	350	6	15	2190	3.03E-07	NA	ND
Zinc	6.41E-07	0.83	24	350	6	15	2190	8.16E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.10E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.17E+03	100	1.0E-06	1.0	350	30	70	25550	3.62E-03	NA	ND
Antimony	6.69E+00	100	1.0E-06	1.0	350	30	70	25550	3.93E-06	NA	ND
Arsenic	5.72E+00	100	1.0E-06	1.0	350	30	70	25550	3.36E-06	1.80E+00	6.04E-06
Barium	4.54E+01	100	1.0E-06	1.0	350	30	70	25550	2.66E-05	NA	ND
Beryllium	1.31E+00	100	1.0E-06	1.0	350	30	70	25550	7.69E-07	4.30E+00	3.31E-06
Cadmium	8.73E-01	100	1.0E-06	1.0	350	30	70	25550	5.13E-07	NA	ND
Calcium	2.75E+05	100	1.0E-06	1.0	350	30	70	25550	1.61E-01	NA	ND
Chromium	1.71E+01	100	1.0E-06	1.0	350	30	70	25550	1.00E-05	NA	ND
Cobalt	5.43E+00	100	1.0E-06	1.0	350	30	70	25550	3.19E-06	NA	ND
Copper	1.38E+02	100	1.0E-06	1.0	350	30	70	25550	8.12E-05	NA	ND
Cyanide (total)	3.53E+00	100	1.0E-06	1.0	350	30	70	25550	2.07E-06	NA	ND
Iron	1.05E+04	100	1.0E-06	1.0	350	30	70	25550	6.15E-03	NA	ND
Lead	1.50E+01	100	1.0E-06	1.0	350	30	70	25550	8.83E-06	NA	ND
Magnesium	4.38E+04	100	1.0E-06	1.0	350	30	70	25550	2.57E-02	NA	ND
Manganese	4.55E+02	100	1.0E-06	1.0	350	30	70	25550	2.67E-04	NA	ND
Mercury	1.19E-01	100	1.0E-06	1.0	350	30	70	25550	6.97E-08	NA	ND
Nickel	1.42E+01	100	1.0E-06	1.0	350	30	70	25550	8.36E-06	NA	ND
Potassium	7.63E+02	100	1.0E-06	1.0	350	30	70	25550	4.48E-04	NA	ND
Selenium	2.76E-01	100	1.0E-06	1.0	350	30	70	25550	1.62E-07	NA	ND
Silver	1.08E+00	100	1.0E-06	1.0	350	30	70	25550	6.33E-07	NA	ND
Sodium	1.43E+02	100	1.0E-06	1.0	350	30	70	25550	8.40E-05	NA	ND
Thallium	2.85E-01	100	1.0E-06	1.0	350	30	70	25550	1.67E-07	NA	ND
Vanadium	1.48E+01	100	1.0E-06	1.0	350	30	70	25550	8.59E-06	NA	ND
Zinc	4.53E+01	100	1.0E-06	1.0	350	30	70	25550	2.66E-05	NA	ND
										TOTAL RISK	9.35E-06

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.17E+03	100	1.0E-06	1.0	350	30	70	10950	8.45E-03	1.00E+00	8.45E-03
Antimony	6.69E+00	100	1.0E-06	1.0	350	30	70	10950	9.16E-06	4.00E-04	2.29E-02
Arsenic	5.72E+00	100	1.0E-06	1.0	350	30	70	10950	7.83E-06	3.00E-04	2.61E-02
Barium	4.54E+01	100	1.0E-06	1.0	350	30	70	10950	6.21E-05	7.00E-02	8.88E-04
Beryllium	1.31E+00	100	1.0E-06	1.0	350	30	70	10950	1.79E-06	5.00E-03	3.59E-04
Cadmium	6.73E-01	100	1.0E-06	1.0	350	30	70	10950	1.20E-06	5.00E-04	2.39E-03
Calcium	2.75E+05	100	1.0E-06	1.0	350	30	70	10950	3.76E-01	NA	ND
Chromium	1.71E+01	100	1.0E-06	1.0	350	30	70	10950	2.34E-05	5.00E-03	4.87E-03
Cobalt	5.43E+00	100	1.0E-06	1.0	350	30	70	10950	7.44E-06	NA	ND
Copper	1.38E+02	100	1.0E-06	1.0	350	30	70	10950	1.90E-04	4.00E-02	4.74E-03
Cyanide (total)	3.53E+00	100	1.0E-06	1.0	350	30	70	10950	4.84E-06	2.00E-02	2.42E-04
Iron	1.05E+04	100	1.0E-06	1.0	350	30	70	10950	1.43E-02	NA	ND
Lead	1.50E+01	100	1.0E-06	1.0	350	30	70	10950	2.06E-05	NA	ND
Magnesium	4.38E+04	100	1.0E-06	1.0	350	30	70	10950	6.00E-02	NA	ND
Manganese	4.55E+02	100	1.0E-06	1.0	350	30	70	10950	6.24E-04	1.40E-01	4.45E-03
Mercury	1.19E-01	100	1.0E-06	1.0	350	30	70	10950	1.63E-07	3.00E-04	5.42E-04
Nickel	1.42E+01	100	1.0E-06	1.0	350	30	70	10950	1.95E-05	2.00E-02	9.75E-04
Potassium	7.63E+02	100	1.0E-06	1.0	350	30	70	10950	1.05E-03	NA	ND
Selenium	2.76E-01	100	1.0E-06	1.0	350	30	70	10950	3.78E-07	5.00E-03	7.55E-05
Silver	1.08E+00	100	1.0E-06	1.0	350	30	70	10950	1.48E-06	5.00E-03	2.95E-04
Sodium	1.43E+02	100	1.0E-06	1.0	350	30	70	10950	1.96E-04	NA	ND
Thallium	2.85E-01	100	1.0E-06	1.0	350	30	70	10950	3.90E-07	6.00E-05	4.88E-03
Vanadium	1.46E+01	100	1.0E-06	1.0	350	30	70	10950	2.00E-05	7.00E-03	2.86E-03
Zinc	4.53E+01	100	1.0E-06	1.0	350	30	70	10950	6.21E-05	3.00E-01	2.07E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 8.50E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	6.17E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.10E-04 NA		ND
Antimony	6.69E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.28E-07 NA		ND
Arsenic	5.72E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.95E-07	1.69E+00	3.66E-07
Barium	4.54E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.54E-06 NA		ND
Beryllium	1.31E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.46E-06	4.30E+01	1.92E-06
Cadmium	8.73E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.97E-06 NA		ND
Calcium	2.75E+05	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.35E-03 NA		ND
Chromium	1.71E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.81E-07 NA		ND
Cobalt	5.43E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.85E-07 NA		ND
Copper	1.38E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.71E-06 NA		ND
Cyanide (total)	3.53E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.20E-07 NA		ND
Iron	1.05E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.57E-04 NA		ND
Lead	1.50E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.12E-07 NA		ND
Magnesium	4.36E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.49E-03 NA		ND
Manganese	4.55E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.55E-05 NA		ND
Mercury	1.19E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.04E-09 NA		ND
Nickel	1.42E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.85E-07 NA		ND
Potassium	7.63E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.60E-05 NA		ND
Selenium	2.76E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.39E-09 NA		ND
Silver	1.06E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.67E-06 NA		ND
Sodium	1.43E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.87E-06 NA		ND
Thallium	2.85E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.70E-09 NA		ND
Vanadium	1.46E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.98E-07 NA		ND
Zinc	4.53E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.54E-06 NA		ND

NA/ND – Not available / Not determined

TOTAL RISK 2.26E-06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.17E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.90E-04	2.00E-01	2.45E-03
Antimony	6.69E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.31E-07	2.40E-04	2.21E-03
Arsenic	5.72E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.54E-07	2.85E-04	1.59E-03
Barium	4.54E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.60E-08	3.50E-03	1.03E-03
Beryllium	1.31E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.04E-07	5.00E-04	2.08E-04
Cadmium	8.73E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.94E-08	3.50E-05	1.98E-03
Calcium	2.75E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.18E-02	NA	ND
Chromium	1.71E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.36E-06	2.50E-03	5.42E-04
Cobalt	5.43E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.31E-07	NA	ND
Copper	1.38E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.10E-05	3.96E-02	2.78E-04
Cyanide (total)	3.53E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.81E-07	1.40E-02	2.00E-05
Iron	1.05E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.32E-04	NA	ND
Lead	1.50E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.19E-06	NA	ND
Magnesium	4.38E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.46E-03	NA	ND
Manganese	4.55E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.62E-05	5.60E-03	6.46E-03
Mercury	1.19E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.43E-09	4.50E-05	2.09E-04
Nickel	1.42E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.13E-06	2.00E-03	5.65E-04
Potassium	7.83E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.06E-05	NA	ND
Selenium	2.76E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.19E-08	4.85E-03	4.52E-06
Silver	1.08E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.56E-08	5.00E-04	1.71E-04
Sodium	1.43E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.14E-05	NA	ND
Thallium	2.85E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.26E-08	8.00E-06	2.83E-03
Vanadium	1.46E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.16E-06	7.00E-05	1.66E-02
Zinc	4.53E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.60E-06	9.00E-02	4.00E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 3.72E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) -1	RISK
Aluminum	4.35E-05	0.83	24	350	30	70	25550	5.08E-06	NA	ND
Antimony	4.71E-06	0.83	24	350	30	70	25550	5.51E-09	NA	ND
Arsenic	4.03E-06	0.83	24	350	30	70	25550	4.71E-09	5.00E+01	2.36E-07
Barium	3.20E-07	0.83	24	350	30	70	25550	3.74E-08	NA	ND
Beryllium	9.22E-09	0.83	24	350	30	70	25550	1.08E-09	8.40E+00	9.06E-09
Cadmium	6.15E-09	0.83	24	350	30	70	25550	7.19E-10	6.10E+00	4.39E-09
Calcium	1.94E-03	0.83	24	350	30	70	25550	2.28E-04	NA	ND
Chromium	1.20E-07	0.83	24	350	30	70	25550	1.41E-08	4.20E+01	5.90E-07
Cobalt	3.83E-08	0.83	24	350	30	70	25550	4.47E-09	NA	ND
Copper	9.75E-07	0.83	24	350	30	70	25550	1.14E-07	NA	ND
Cyanide (total)	2.49E-08	0.83	24	350	30	70	25550	2.91E-09	NA	ND
Iron	7.36E-05	0.83	24	350	30	70	25550	8.63E-06	NA	ND
Lead	1.06E-07	0.83	24	350	30	70	25550	1.24E-08	NA	ND
Magnesium	3.09E-04	0.83	24	350	30	70	25550	3.61E-05	NA	ND
Manganese	3.21E-06	0.83	24	350	30	70	25550	3.75E-07	NA	ND
Mercury	8.38E-10	0.83	24	350	30	70	25550	9.77E-11	NA	ND
Nickel	1.00E-07	0.83	24	350	30	70	25550	1.17E-08	8.40E-01	9.85E-09
Potassium	5.36E-06	0.83	24	350	30	70	25550	6.29E-07	NA	ND
Selenium	1.94E-09	0.83	24	350	30	70	25550	2.27E-10	NA	ND
Silver	7.59E-09	0.83	24	350	30	70	25550	8.88E-10	NA	ND
Sodium	1.01E-06	0.83	24	350	30	70	25550	1.18E-07	NA	ND
Thallium	2.01E-09	0.83	24	350	30	70	25550	2.35E-10	NA	ND
Vanadium	1.03E-07	0.83	24	350	30	70	25550	1.21E-08	NA	ND
Zinc	3.19E-07	0.83	24	350	30	70	25550	3.73E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 8.49E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.35E-05	0.83	24	350	30	70	10950	1.19E-05	NA	ND
Antimony	4.71E-08	0.83	24	350	30	70	10950	1.29E-08	NA	ND
Arsenic	4.03E-08	0.83	24	350	30	70	10950	1.10E-08	NA	ND
Barium	3.20E-07	0.83	24	350	30	70	10950	8.72E-08	1.00E-04	8.72E-04
Beryllium	9.22E-09	0.83	24	350	30	70	10950	2.52E-09	NA	ND
Cadmium	6.15E-09	0.83	24	350	30	70	10950	1.68E-09	NA	ND
Calcium	1.94E-03	0.83	24	350	30	70	10950	5.28E-04	NA	ND
Chromium	1.20E-07	0.83	24	350	30	70	10950	3.28E-08	NA	ND
Cobalt	3.83E-08	0.83	24	350	30	70	10950	1.04E-08	NA	ND
Copper	9.75E-07	0.83	24	350	30	70	10950	2.66E-07	NA	ND
Cyanide (total)	2.49E-08	0.83	24	350	30	70	10950	6.79E-09	NA	ND
Iron	7.38E-05	0.83	24	350	30	70	10950	2.01E-05	NA	ND
Lead	1.06E-07	0.83	24	350	30	70	10950	2.89E-08	NA	ND
Magnesium	3.09E-04	0.83	24	350	30	70	10950	8.43E-05	NA	ND
Manganese	3.21E-06	0.83	24	350	30	70	10950	8.75E-07	1.00E-04	8.75E-03
Mercury	8.38E-10	0.83	24	350	30	70	10950	2.28E-10	8.60E-05	2.65E-06
Nickel	1.00E-07	0.83	24	350	30	70	10950	2.74E-08	NA	ND
Potassium	5.38E-06	0.83	24	350	30	70	10950	1.47E-06	NA	ND
Selenium	1.94E-09	0.83	24	350	30	70	10950	5.30E-10	NA	ND
Silver	7.59E-09	0.83	24	350	30	70	10950	2.07E-09	NA	ND
Sodium	1.01E-06	0.83	24	350	30	70	10950	2.75E-07	NA	ND
Thallium	2.01E-09	0.83	24	350	30	70	10950	5.48E-10	NA	ND
Vanadium	1.03E-07	0.83	24	350	30	70	10950	2.81E-08	NA	ND
Zinc	3.19E-07	0.83	24	350	30	70	10950	8.71E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.62E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.17E+03	200	1.0E-06	1.0	350	6	15	25550	6.76E-03	NA	ND
Antimony	6.69E+00	200	1.0E-06	1.0	350	6	15	25550	7.33E-06	NA	ND
Arsenic	5.72E+00	200	1.0E-06	1.0	350	6	15	25550	6.27E-06	1.80E+00	1.13E-05
Barium	4.54E+01	200	1.0E-06	1.0	350	6	15	25550	4.97E-05	NA	ND
Beryllium	1.31E+00	200	1.0E-06	1.0	350	6	15	25550	1.43E-06	4.30E+00	6.17E-06
Cadmium	8.73E-01	200	1.0E-06	1.0	350	6	15	25550	9.57E-07	NA	ND
Calcium	2.75E+05	200	1.0E-06	1.0	350	6	15	25550	3.01E-01	NA	ND
Chromium	1.71E+01	200	1.0E-06	1.0	350	6	15	25550	1.87E-05	NA	ND
Cobalt	5.43E+00	200	1.0E-06	1.0	350	6	15	25550	5.95E-06	NA	ND
Copper	1.38E+02	200	1.0E-06	1.0	350	6	15	25550	1.52E-04	NA	ND
Cyanide (total)	3.53E+00	200	1.0E-06	1.0	350	6	15	25550	3.87E-06	NA	ND
Iron	1.05E+04	200	1.0E-06	1.0	350	6	15	25550	1.15E-02	NA	ND
Lead	1.50E+01	200	1.0E-06	1.0	350	6	15	25550	1.65E-05	NA	ND
Magnesium	4.38E+04	200	1.0E-06	1.0	350	6	15	25550	4.80E-02	NA	ND
Manganese	4.55E+02	200	1.0E-06	1.0	350	6	15	25550	4.99E-04	NA	ND
Mercury	1.19E-01	200	1.0E-06	1.0	350	6	15	25550	1.30E-07	NA	ND
Nickel	1.42E+01	200	1.0E-06	1.0	350	6	15	25550	1.56E-05	NA	ND
Potassium	7.63E+02	200	1.0E-06	1.0	350	6	15	25550	8.36E-04	NA	ND
Selenium	2.76E-01	200	1.0E-06	1.0	350	6	15	25550	3.02E-07	NA	ND
Silver	1.08E+00	200	1.0E-06	1.0	350	6	15	25550	1.18E-06	NA	ND
Sodium	1.43E+02	200	1.0E-06	1.0	350	6	15	25550	1.57E-04	NA	ND
Thallium	2.85E-01	200	1.0E-06	1.0	350	6	15	25550	3.12E-07	NA	ND
Vanadium	1.46E+01	200	1.0E-06	1.0	350	6	15	25550	1.60E-05	NA	ND
Zinc	4.53E+01	200	1.0E-06	1.0	350	6	15	25550	4.97E-05	NA	ND
										TOTAL RISK	1.74E-05

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.17E+03	200	1.0E-06	1.0	350	6	15	2190	7.89E-02	NA	ND
Antimony	6.69E+00	200	1.0E-06	1.0	350	6	15	2190	8.55E-05	4.00E-04	2.14E-01
Arsenic	5.72E+00	200	1.0E-06	1.0	350	6	15	2190	7.31E-05	3.00E-04	2.44E-01
Barium	4.54E+01	200	1.0E-06	1.0	350	6	15	2190	5.80E-04	7.00E-02	8.28E-03
Beryllium	1.31E+00	200	1.0E-06	1.0	350	6	15	2190	1.67E-05	5.00E-03	3.35E-03
Cadmium	8.73E-01	200	1.0E-06	1.0	350	6	15	2190	1.12E-05	NA	ND
Calcium	2.75E+05	200	1.0E-06	1.0	350	6	15	2190	3.51E+00	NA	ND
Chromium	1.71E+01	200	1.0E-06	1.0	350	6	15	2190	2.18E-04	2.00E-02	1.09E-02
Cobalt	5.43E+00	200	1.0E-06	1.0	350	6	15	2190	6.94E-05	NA	ND
Copper	1.38E+02	200	1.0E-06	1.0	350	6	15	2190	1.77E-03	NA	ND
Cyanide (total)	3.53E+00	200	1.0E-06	1.0	350	6	15	2190	4.51E-05	2.00E-02	2.26E-03
Iron	1.05E+04	200	1.0E-06	1.0	350	6	15	2190	1.34E-01	NA	ND
Lead	1.50E+01	200	1.0E-06	1.0	350	6	15	2190	1.92E-04	NA	ND
Magnesium	4.38E+04	200	1.0E-06	1.0	350	6	15	2190	5.60E-01	NA	ND
Manganese	4.55E+02	200	1.0E-06	1.0	350	6	15	2190	5.82E-03	1.40E-01	4.16E-02
Mercury	1.19E-01	200	1.0E-06	1.0	350	6	15	2190	1.52E-06	3.00E-04	5.06E-03
Nickel	1.42E+01	200	1.0E-06	1.0	350	6	15	2190	1.82E-04	2.00E-02	9.10E-03
Potassium	7.63E+02	200	1.0E-06	1.0	350	6	15	2190	9.76E-03	NA	ND
Selenium	2.76E-01	200	1.0E-06	1.0	350	6	15	2190	3.52E-06	5.00E-03	7.05E-04
Silver	1.08E+00	200	1.0E-06	1.0	350	6	15	2190	1.38E-05	5.00E-03	2.76E-03
Sodium	1.43E+02	200	1.0E-06	1.0	350	6	15	2190	1.83E-03	NA	ND
Thallium	2.85E-01	200	1.0E-06	1.0	350	6	15	2190	3.64E-06	8.00E-04	4.55E-03
Vanadium	1.48E+01	200	1.0E-06	1.0	350	6	15	2190	1.87E-04	7.00E-03	2.67E-02
Zinc	4.53E+01	200	1.0E-06	1.0	350	6	15	2190	5.79E-04	3.00E-01	1.93E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.75E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) - 1	RISK
Aluminum	6.17E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	6.79E-05	NA	ND
Antimony	6.69E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	7.37E-06	NA	ND
Arsenic	5.72E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	6.30E-06	1.69E+00	1.19E-07
Barium	4.54E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.00E-07	NA	ND
Beryllium	1.31E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.44E-06	4.30E+01	6.20E-07
Cadmium	8.73E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	9.62E-09	NA	ND
Calcium	2.75E+05	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.03E-03	NA	ND
Chromium	1.71E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.88E-07	NA	ND
Cobalt	5.43E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.98E-06	NA	ND
Copper	1.38E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.52E-06	NA	ND
Cyanide (total)	3.53E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.89E-06	NA	ND
Iron	1.05E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.15E-04	NA	ND
Lead	1.50E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.66E-07	NA	ND
Magnesium	4.36E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.83E-04	NA	ND
Manganese	4.55E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.01E-06	NA	ND
Mercury	1.19E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.31E-09	NA	ND
Nickel	1.42E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.57E-07	NA	ND
Potassium	7.63E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	8.40E-06	NA	ND
Selenium	2.76E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.04E-09	NA	ND
Silver	1.06E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.19E-06	NA	ND
Sodium	1.43E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.58E-06	NA	ND
Thallium	2.85E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.14E-09	NA	ND
Vanadium	1.46E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.61E-07	NA	ND
Zinc	4.53E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.99E-07	NA	ND

TOTAL RISK 7.39E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL - HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD - 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.17E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.93E-04	NA	ND
Antimony	6.69E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.59E-07	2.40E-04	3.58E-03
Arsenic	5.72E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.35E-07	2.85E-04	2.58E-03
Barium	4.54E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.83E-06	3.50E-03	1.67E-03
Beryllium	1.31E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.68E-07	5.00E-04	3.36E-04
Cadmium	8.73E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.12E-07	NA	ND
Calcium	2.75E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.53E-02	NA	ND
Chromium	1.71E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.19E-06	1.00E-02	2.19E-04
Cobalt	5.43E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.98E-07	NA	ND
Copper	1.38E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.78E-05	NA	ND
Cyanide (total)	3.53E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.54E-07	1.40E-02	3.24E-05
Iron	1.05E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.35E-03	NA	ND
Lead	1.50E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.93E-06	NA	ND
Magnesium	4.38E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.63E-03	NA	ND
Manganese	4.55E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.85E-05	5.60E-03	1.04E-02
Mercury	1.19E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.52E-08	4.50E-05	3.39E-04
Nickel	1.42E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.83E-06	2.00E-03	9.14E-04
Potassium	7.63E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	9.80E-05	NA	ND
Selenium	2.76E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.54E-08	4.85E-03	7.30E-06
Silver	1.08E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.38E-07	5.00E-04	2.77E-04
Sodium	1.43E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.84E-05	NA	ND
Thallium	2.85E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.66E-08	8.00E-05	4.58E-04
Vanadium	1.46E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.88E-06	7.00E-05	2.69E-02
Zinc	4.53E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.82E-06	9.00E-02	6.47E-05

NA/ND - Not available / Not determined

TOTAL HAZARD 4.78E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.35E-05	0.83	24	350	6	15	25550	4.74E-06	NA	ND
Antimony	4.71E-08	0.83	24	350	6	15	25550	5.14E-09	NA	ND
Arsenic	4.03E-08	0.83	24	350	6	15	25550	4.40E-09	5.00E+01	2.20E-07
Barium	3.20E-07	0.83	24	350	6	15	25550	3.49E-08	NA	ND
Beryllium	9.22E-09	0.83	24	350	6	15	25550	1.01E-09	8.40E+00	8.46E-09
Cadmium	6.15E-09	0.83	24	350	6	15	25550	6.71E-10	6.10E+00	4.10E-09
Calcium	1.94E-03	0.83	24	350	6	15	25550	2.11E-04	NA	ND
Chromium	1.20E-07	0.83	24	350	6	15	25550	1.31E-08	4.20E+01	5.51E-07
Cobalt	3.83E-08	0.83	24	350	6	15	25550	4.18E-09	NA	ND
Copper	9.75E-07	0.83	24	350	6	15	25550	1.06E-07	NA	ND
Cyanide (total)	2.49E-08	0.83	24	350	6	15	25550	2.72E-09	NA	ND
Iron	7.38E-05	0.83	24	350	6	15	25550	8.05E-08	NA	ND
Lead	1.08E-07	0.83	24	350	6	15	25550	1.18E-08	NA	ND
Magnesium	3.09E-04	0.83	24	350	6	15	25550	3.37E-05	NA	ND
Manganese	3.21E-08	0.83	24	350	6	15	25550	3.50E-07	NA	ND
Mercury	8.36E-10	0.83	24	350	6	15	25550	9.12E-11	NA	ND
Nickel	1.00E-07	0.83	24	350	6	15	25550	1.09E-08	8.40E-01	9.19E-09
Potassium	5.38E-06	0.83	24	350	6	15	25550	5.87E-07	NA	ND
Selenium	1.94E-09	0.83	24	350	6	15	25550	2.12E-10	NA	ND
Silver	7.59E-09	0.83	24	350	6	15	25550	8.29E-10	NA	ND
Sodium	1.01E-06	0.83	24	350	6	15	25550	1.10E-07	NA	ND
Thallium	2.01E-09	0.83	24	350	6	15	25550	2.19E-10	NA	ND
Vanadium	1.03E-07	0.83	24	350	6	15	25550	1.13E-08	NA	ND
Zinc	3.19E-07	0.83	24	350	6	15	25550	3.48E-08	NA	ND
									TOTAL RISK	7.93E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.35E-05	0.83	24	350	6	15	2190	5.53E-05	NA	ND
Antimony	4.71E-06	0.83	24	350	6	15	2190	6.00E-06	NA	ND
Arsenic	4.03E-06	0.83	24	350	6	15	2190	5.13E-06	NA	ND
Barium	3.20E-07	0.83	24	350	6	15	2190	4.07E-07	1.00E-03	4.07E-04
Beryllium	9.22E-09	0.83	24	350	6	15	2190	1.17E-06	NA	ND
Cadmium	6.15E-09	0.83	24	350	6	15	2190	7.83E-09	NA	ND
Calcium	1.94E-03	0.83	24	350	6	15	2190	2.46E-03	NA	ND
Chromium	1.20E-07	0.83	24	350	6	15	2190	1.53E-07	NA	ND
Cobalt	3.69E-06	0.83	24	350	6	15	2190	4.67E-06	NA	ND
Copper	9.75E-07	0.83	24	350	6	15	2190	1.24E-06	NA	ND
Cyanide (total)	2.49E-06	0.83	24	350	6	15	2190	3.17E-06	NA	ND
Iron	7.38E-05	0.83	24	350	6	15	2190	9.40E-05	NA	ND
Lead	1.06E-07	0.83	24	350	6	15	2190	1.35E-07	NA	ND
Magnesium	3.09E-04	0.83	24	350	6	15	2190	3.93E-04	NA	ND
Manganese	3.21E-06	0.83	24	350	6	15	2190	4.08E-06	1.00E-04	4.08E-02
Mercury	6.36E-10	0.83	24	350	6	15	2190	1.06E-09	8.60E-05	1.24E-05
Nickel	1.00E-07	0.83	24	350	6	15	2190	1.28E-07	NA	ND
Potassium	5.36E-06	0.83	24	350	6	15	2190	6.85E-06	NA	ND
Selenium	1.94E-09	0.83	24	350	6	15	2190	2.47E-09	NA	ND
Silver	7.59E-09	0.83	24	350	6	15	2190	9.67E-09	NA	ND
Sodium	1.01E-06	0.83	24	350	6	15	2190	1.28E-06	NA	ND
Thallium	2.01E-09	0.83	24	350	6	15	2190	2.56E-09	NA	ND
Vanadium	1.03E-07	0.83	24	350	6	15	2190	1.31E-07	NA	ND
Zinc	3.19E-07	0.83	24	350	6	15	2190	4.06E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD **4.13E-02**

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.70E+03	50	1.0E-06	1.0	350	9	70	25550	3.26E-04	NA	ND
Antimony	2.64E+00	50	1.0E-06	1.0	350	9	70	25550	2.33E-07	NA	ND
Arsenic	2.41E+00	50	1.0E-06	1.0	350	9	70	25550	2.12E-07	1.60E+00	3.82E-07
Barium	1.70E+01	50	1.0E-06	1.0	350	9	70	25550	1.49E-06	NA	ND
Beryllium	4.56E-01	50	1.0E-06	1.0	350	9	70	25550	4.01E-08	4.30E+00	1.73E-07
Cadmium	4.70E-01	50	1.0E-06	1.0	350	9	70	25550	4.14E-08	NA	ND
Calcium	7.28E+04	50	1.0E-06	1.0	350	9	70	25550	6.41E-03	NA	ND
Chromium	4.77E+00	50	1.0E-06	1.0	350	9	70	25550	4.20E-07	NA	ND
Cobalt	2.10E+00	50	1.0E-06	1.0	350	9	70	25550	1.85E-07	NA	ND
Copper	1.21E+02	50	1.0E-06	1.0	350	9	70	25550	1.07E-05	NA	ND
Cyanide (total)	2.06E+00	50	1.0E-06	1.0	350	9	70	25550	1.81E-07	NA	ND
Iron	7.01E+03	50	1.0E-06	1.0	350	9	70	25550	6.18E-04	NA	ND
Lead	7.95E+00	50	1.0E-06	1.0	350	9	70	25550	7.00E-07	NA	ND
Magnesium	2.43E+04	50	1.0E-06	1.0	350	9	70	25550	2.14E-03	NA	ND
Manganese	2.84E+02	50	1.0E-06	1.0	350	9	70	25550	2.50E-05	NA	ND
Mercury	7.52E-02	50	1.0E-06	1.0	350	9	70	25550	6.62E-09	NA	ND
Nickel	8.23E+00	50	1.0E-06	1.0	350	9	70	25550	7.25E-07	NA	ND
Potassium	3.43E+02	50	1.0E-06	1.0	350	9	70	25550	3.02E-05	NA	ND
Selenium	1.30E-01	50	1.0E-06	1.0	350	9	70	25550	1.15E-08	NA	ND
Silver	4.41E-01	50	1.0E-06	1.0	350	9	70	25550	3.89E-08	NA	ND
Sodium	5.54E+01	50	1.0E-06	1.0	350	9	70	25550	4.88E-06	NA	ND
Thallium	1.44E-01	50	1.0E-06	1.0	350	9	70	25550	1.27E-08	NA	ND
Vanadium	7.24E+00	50	1.0E-06	1.0	350	9	70	25550	6.38E-07	NA	ND
Zinc	3.56E+01	50	1.0E-06	1.0	350	9	70	25550	3.14E-06	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 5.55E-07

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.70E+03	50	1.0E-06	1.0	350	9	70	3285	2.54E-03	1.00E+00	2.54E-03
Antimony	2.64E+00	50	1.0E-06	1.0	350	9	70	3285	1.81E-06	4.00E-04	4.52E-03
Arsenic	2.41E+00	50	1.0E-06	1.0	350	9	70	3285	1.65E-06	3.00E-04	5.50E-03
Barium	1.70E+01	50	1.0E-06	1.0	350	9	70	3285	1.18E-05	7.00E-02	1.66E-04
Beryllium	4.56E-01	50	1.0E-06	1.0	350	9	70	3285	3.12E-07	5.00E-03	6.25E-05
Cadmium	4.70E-01	50	1.0E-06	1.0	350	9	70	3285	3.22E-07	5.00E-04	6.44E-04
Calcium	7.28E+04	50	1.0E-06	1.0	350	9	70	3285	4.98E-02	NA	ND
Chromium	4.77E+00	50	1.0E-06	1.0	350	9	70	3285	3.27E-06	5.00E-03	6.54E-04
Cobalt	2.10E+00	50	1.0E-06	1.0	350	9	70	3285	1.44E-06	NA	ND
Copper	1.21E+02	50	1.0E-06	1.0	350	9	70	3285	8.29E-05	4.00E-02	2.07E-03
Cyanide (total)	2.06E+00	50	1.0E-06	1.0	350	9	70	3285	1.41E-06	2.00E-02	7.05E-05
Iron	7.01E+03	50	1.0E-06	1.0	350	9	70	3285	4.80E-03	NA	ND
Lead	7.95E+00	50	1.0E-06	1.0	350	9	70	3285	5.44E-06	NA	ND
Magnesium	2.43E+04	50	1.0E-06	1.0	350	9	70	3285	1.67E-02	NA	ND
Manganese	2.84E+02	50	1.0E-06	1.0	350	9	70	3285	1.94E-04	1.40E-01	1.39E-03
Mercury	7.52E-02	50	1.0E-06	1.0	350	9	70	3285	5.15E-08	3.00E-04	1.72E-04
Nickel	8.23E+00	50	1.0E-06	1.0	350	9	70	3285	5.64E-06	2.00E-02	2.82E-04
Potassium	3.43E+02	50	1.0E-06	1.0	350	9	70	3285	2.35E-04	NA	ND
Selenium	1.30E-01	50	1.0E-06	1.0	350	9	70	3285	8.91E-08	5.00E-03	1.78E-05
Silver	4.41E-01	50	1.0E-06	1.0	350	9	70	3285	3.02E-07	5.00E-03	6.05E-05
Sodium	5.54E+01	50	1.0E-06	1.0	350	9	70	3285	3.79E-05	NA	ND
Thallium	1.44E-01	50	1.0E-06	1.0	350	9	70	3285	9.86E-08	8.00E-05	1.23E-03
Vanadium	7.24E+00	50	1.0E-06	1.0	350	9	70	3285	4.96E-06	7.00E-03	7.08E-04
Zinc	3.56E+01	50	1.0E-06	1.0	350	9	70	3285	2.44E-05	3.00E-01	8.13E-05

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.02E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.70E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.16E-05	NA	ND
Antimony	2.64E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.56E-08	NA	ND
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.42E-08	1.88E+00	2.68E-08
Barium	1.70E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	9.99E-08	NA	ND
Beryllium	4.56E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.68E-09	4.30E+01	1.15E-07
Cadmium	4.70E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.77E-09	NA	ND
Calcium	7.28E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.28E-04	NA	ND
Chromium	4.77E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.81E-08	NA	ND
Cobalt	2.10E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.24E-08	NA	ND
Copper	1.21E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.13E-07	NA	ND
Cyanide (total)	2.06E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.21E-08	NA	ND
Iron	7.01E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.13E-05	NA	ND
Lead	7.95E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.68E-08	NA	ND
Magnesium	2.43E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.43E-04	NA	ND
Manganese	2.84E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.67E-06	NA	ND
Mercury	7.52E-02	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.43E-10	NA	ND
Nickel	6.23E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.85E-08	NA	ND
Potassium	3.43E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.02E-06	NA	ND
Selenium	1.30E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.66E-10	NA	ND
Silver	4.41E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.60E-09	NA	ND
Sodium	5.54E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.26E-07	NA	ND
Thallium	1.44E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	8.48E-10	NA	ND
Vanadium	7.24E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.26E-08	NA	ND
Zinc	3.56E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.10E-07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.42E-07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.70E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.70E-04	2.00E-01	8.48E-04
Antimony	2.64E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.21E-07	2.40E-04	5.04E-04
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.10E-07	2.85E-04	3.87E-04
Barium	1.70E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	7.76E-07	3.50E-03	2.22E-04
Beryllium	4.56E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.09E-08	5.00E-04	4.18E-05
Cadmium	4.70E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.15E-08	3.50E-05	6.15E-04
Calcium	7.28E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.33E-03	NA	ND
Chromium	4.77E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.18E-07	2.50E-03	8.74E-05
Cobalt	2.10E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	9.63E-08	NA	ND
Copper	1.21E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.54E-06	3.98E-02	1.40E-04
Cyanide (total)	2.06E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	9.42E-08	1.40E-02	6.73E-06
Iron	7.01E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.21E-04	NA	ND
Lead	7.95E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.64E-07	NA	ND
Magnesium	2.43E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.11E-03	NA	ND
Manganese	2.84E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.30E-05	5.60E-03	2.32E-03
Mercury	7.52E-02	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.44E-09	4.50E-05	7.65E-05
Nickel	8.23E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.77E-07	2.00E-03	1.88E-04
Potassium	3.43E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.57E-05	NA	ND
Selenium	1.30E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.96E-09	4.85E-03	1.23E-06
Silver	4.41E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.02E-08	5.00E-04	4.04E-05
Sodium	5.54E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.54E-06	NA	ND
Thallium	1.44E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.59E-09	6.00E-06	6.24E-04
Vanadium	7.24E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.32E-07	7.00E-05	4.74E-03
Zinc	3.56E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.63E-06	9.00E-02	1.81E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.11E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	2.81E-05	0.83	24	234	9	70	25550	8.12E-07	NA	ND
Antimony	1.86E-08	0.83	24	234	9	70	25550	4.37E-10	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	25550	3.98E-10	8.00E+01	1.99E-08
Barium	1.19E-07	0.83	24	234	9	70	25550	2.80E-09	NA	ND
Beryllium	3.21E-09	0.83	24	234	9	70	25550	7.53E-11	8.40E+00	6.33E-10
Cadmium	3.31E-09	0.83	24	234	9	70	25550	7.77E-11	6.10E+00	4.74E-10
Calcium	5.13E-04	0.83	24	234	9	70	25550	1.20E-05	NA	ND
Chromium	3.38E-08	0.83	24	234	9	70	25550	7.88E-10	4.20E+01	3.31E-08
Cobalt	1.48E-08	0.83	24	234	9	70	25550	3.47E-10	NA	ND
Copper	8.53E-07	0.83	24	234	9	70	25550	2.00E-08	NA	ND
Cyanide (total)	1.45E-08	0.83	24	234	9	70	25550	3.40E-10	NA	ND
Iron	4.94E-05	0.83	24	234	9	70	25550	1.16E-08	NA	ND
Lead	5.60E-08	0.83	24	234	9	70	25550	1.31E-09	NA	ND
Magnesium	1.71E-04	0.83	24	234	9	70	25550	4.02E-08	NA	ND
Manganese	2.00E-06	0.83	24	234	9	70	25550	4.69E-08	NA	ND
Mercury	5.30E-10	0.83	24	234	9	70	25550	1.24E-11	NA	ND
Nickel	5.80E-08	0.83	24	234	9	70	25550	1.36E-09	8.40E-01	1.14E-09
Potassium	2.42E-06	0.83	24	234	9	70	25550	5.67E-08	NA	ND
Selenium	9.17E-10	0.83	24	234	9	70	25550	2.15E-11	NA	ND
Silver	3.11E-09	0.83	24	234	9	70	25550	7.29E-11	NA	ND
Sodium	3.90E-07	0.83	24	234	9	70	25550	9.15E-09	NA	ND
Thallium	1.01E-09	0.83	24	234	9	70	25550	2.36E-11	NA	ND
Vanadium	5.10E-08	0.83	24	234	9	70	25550	1.20E-09	NA	ND
Zinc	2.51E-07	0.83	24	234	9	70	25550	5.89E-09	NA	ND

NA/ND -- Not available/ Not determined

TOTAL RISK 5.53E-08

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.61E-05	0.83	24	234	9	70	3285	4.76E-06	NA	ND
Antimony	1.86E-08	0.83	24	234	9	70	3285	3.40E-09	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	3285	3.10E-09	NA	ND
Barium	1.19E-07	0.83	24	234	9	70	3285	2.18E-08	1.00E-04	2.18E-04
Beryllium	3.21E-09	0.83	24	234	9	70	3285	5.88E-10	NA	ND
Cadmium	3.31E-09	0.83	24	234	9	70	3285	6.05E-10	NA	ND
Calcium	5.13E-04	0.83	24	234	9	70	3285	9.35E-05	NA	ND
Chromium	3.36E-08	0.83	24	234	9	70	3285	6.13E-09	NA	ND
Cobalt	1.48E-08	0.83	24	234	9	70	3285	2.70E-09	NA	ND
Copper	8.53E-07	0.83	24	234	9	70	3285	1.56E-07	NA	ND
Cyanide (total)	1.45E-08	0.83	24	234	9	70	3285	2.65E-09	NA	ND
Iron	4.94E-05	0.83	24	234	9	70	3285	9.01E-06	NA	ND
Lead	5.60E-08	0.83	24	234	9	70	3285	1.02E-08	NA	ND
Magnesium	1.71E-04	0.83	24	234	9	70	3285	3.13E-05	NA	ND
Manganese	2.00E-06	0.83	24	234	9	70	3285	3.65E-07	1.00E-04	3.65E-03
Mercury	5.30E-10	0.83	24	234	9	70	3285	9.67E-11	8.60E-05	1.12E-06
Nickel	5.80E-08	0.83	24	234	9	70	3285	1.06E-08	NA	ND
Potassium	2.42E-06	0.83	24	234	9	70	3285	4.41E-07	NA	ND
Selenium	9.17E-10	0.83	24	234	9	70	3285	1.67E-10	NA	ND
Silver	3.11E-09	0.83	24	234	9	70	3285	5.67E-10	NA	ND
Sodium	3.90E-07	0.83	24	234	9	70	3285	7.12E-08	NA	ND
Thallium	1.01E-09	0.83	24	234	9	70	3285	1.85E-10	NA	ND
Vanadium	5.10E-08	0.83	24	234	9	70	3285	9.31E-09	NA	ND
Zinc	2.51E-07	0.83	24	234	9	70	3285	4.58E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.86E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.70E+03	100	1.0E-06	1.0	350	6	15	25550	2.03E-03	NA	ND
Antimony	2.64E+00	100	1.0E-06	1.0	350	6	15	25550	1.45E-06	NA	ND
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	25550	1.32E-06	1.80E+00	2.38E-06
Barium	1.70E+01	100	1.0E-06	1.0	350	6	15	25550	9.29E-06	NA	ND
Beryllium	4.56E-01	100	1.0E-06	1.0	350	6	15	25550	2.50E-07	4.30E+00	1.07E-06
Cadmium	4.70E-01	100	1.0E-06	1.0	350	6	15	25550	2.58E-07	NA	ND
Calcium	7.26E+04	100	1.0E-06	1.0	350	6	15	25550	3.99E-02	NA	ND
Chromium	4.77E+00	100	1.0E-06	1.0	350	6	15	25550	2.61E-06	NA	ND
Cobalt	2.10E+00	100	1.0E-06	1.0	350	6	15	25550	1.15E-06	NA	ND
Copper	1.21E+02	100	1.0E-06	1.0	350	6	15	25550	6.63E-05	NA	ND
Cyanide (total)	2.06E+00	100	1.0E-06	1.0	350	6	15	25550	1.13E-06	NA	ND
Iron	7.01E+03	100	1.0E-06	1.0	350	6	15	25550	3.84E-03	NA	ND
Lead	7.95E+00	100	1.0E-06	1.0	350	6	15	25550	4.35E-06	NA	ND
Magnesium	2.43E+04	100	1.0E-06	1.0	350	6	15	25550	1.33E-02	NA	ND
Manganese	2.84E+02	100	1.0E-06	1.0	350	6	15	25550	1.55E-04	NA	ND
Mercury	7.52E-02	100	1.0E-06	1.0	350	6	15	25550	4.12E-08	NA	ND
Nickel	8.23E+00	100	1.0E-06	1.0	350	6	15	25550	4.51E-06	NA	ND
Potassium	3.43E+02	100	1.0E-06	1.0	350	6	15	25550	1.88E-04	NA	ND
Selenium	1.30E-01	100	1.0E-06	1.0	350	6	15	25550	7.13E-08	NA	ND
Silver	4.41E-01	100	1.0E-06	1.0	350	6	15	25550	2.42E-07	NA	ND
Sodium	5.54E+01	100	1.0E-06	1.0	350	6	15	25550	3.03E-05	NA	ND
Thallium	1.44E-01	100	1.0E-06	1.0	350	6	15	25550	7.89E-08	NA	ND
Vanadium	7.24E+00	100	1.0E-06	1.0	350	6	15	25550	3.97E-06	NA	ND
Zinc	3.56E+01	100	1.0E-06	1.0	350	6	15	25550	1.95E-05	NA	ND
										TOTAL RISK	3.45E-06

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL - HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD - AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.70E+03	100	1.0E-06	1.0	350	6	15	2190	2.37E-02	NA	ND
Antimony	2.64E+00	100	1.0E-06	1.0	350	6	15	2190	1.69E-05	4.00E-04	4.22E-02
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	2190	1.54E-05	3.00E-04	5.14E-02
Barium	1.70E+01	100	1.0E-06	1.0	350	6	15	2190	1.08E-04	7.00E-02	1.55E-03
Beryllium	4.56E-01	100	1.0E-06	1.0	350	6	15	2190	2.91E-06	5.00E-03	5.83E-04
Cadmium	4.70E-01	100	1.0E-06	1.0	350	6	15	2190	3.01E-06	NA	ND
Calcium	7.28E+04	100	1.0E-06	1.0	350	6	15	2190	4.65E-01	NA	ND
Chromium	4.77E+00	100	1.0E-06	1.0	350	6	15	2190	3.05E-05	2.00E-02	1.52E-03
Cobalt	2.10E+00	100	1.0E-06	1.0	350	6	15	2190	1.34E-05	NA	ND
Copper	1.21E+02	100	1.0E-06	1.0	350	6	15	2190	7.74E-04	NA	ND
Cyanide (total)	2.06E+00	100	1.0E-06	1.0	350	6	15	2190	1.32E-05	2.00E-02	6.58E-04
Iron	7.01E+03	100	1.0E-06	1.0	350	6	15	2190	4.48E-02	NA	ND
Lead	7.95E+00	100	1.0E-06	1.0	350	6	15	2190	5.08E-05	NA	ND
Magnesium	2.43E+04	100	1.0E-06	1.0	350	6	15	2190	1.55E-01	NA	ND
Manganese	2.84E+02	100	1.0E-06	1.0	350	6	15	2190	1.81E-03	1.40E-01	1.29E-02
Mercury	7.52E-02	100	1.0E-06	1.0	350	6	15	2190	4.81E-07	3.00E-04	1.60E-03
Nickel	8.23E+00	100	1.0E-06	1.0	350	6	15	2190	5.26E-05	2.00E-02	2.63E-03
Potassium	3.43E+02	100	1.0E-06	1.0	350	6	15	2190	2.19E-03	NA	ND
Selenium	1.30E-01	100	1.0E-06	1.0	350	6	15	2190	8.32E-07	5.00E-03	1.66E-04
Silver	4.41E-01	100	1.0E-06	1.0	350	6	15	2190	2.82E-06	5.00E-03	5.64E-04
Sodium	5.54E+01	100	1.0E-06	1.0	350	6	15	2190	3.54E-04	NA	ND
Thallium	1.44E-01	100	1.0E-06	1.0	350	6	15	2190	9.20E-07	8.00E-04	1.15E-03
Vanadium	7.24E+00	100	1.0E-06	1.0	350	6	15	2190	4.63E-05	7.00E-03	6.61E-03
Zinc	3.56E+01	100	1.0E-06	1.0	350	6	15	2190	2.28E-04	3.00E-01	7.59E-04

NA/ND - Not available/ Not determined

TOTAL HAZARD 1.24E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.70E+03	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.37E-05	NA	ND
Antimony	2.64E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.69E-08	NA	ND
Arsenic	2.41E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.55E-08	1.89E+00	2.92E-08
Barium	1.70E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.09E-07	NA	ND
Beryllium	4.56E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.92E-09	4.30E+01	1.26E-07
Cadmium	4.70E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.02E-09	NA	ND
Calcium	7.26E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.66E-04	NA	ND
Chromium	4.77E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.06E-08	NA	ND
Cobalt	2.10E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.35E-08	NA	ND
Copper	1.21E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	7.78E-07	NA	ND
Cyanide (total)	2.06E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.32E-08	NA	ND
Iron	7.01E+03	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.50E-05	NA	ND
Lead	7.95E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.09E-08	NA	ND
Magnesium	2.43E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.56E-04	NA	ND
Manganese	2.64E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.62E-06	NA	ND
Mercury	7.52E-02	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.82E-10	NA	ND
Nickel	8.23E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.26E-06	NA	ND
Potassium	3.43E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.20E-06	NA	ND
Selenium	1.30E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	8.34E-10	NA	ND
Silver	4.41E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.83E-09	NA	ND
Sodium	5.54E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.55E-07	NA	ND
Thallium	1.44E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	9.23E-10	NA	ND
Vanadium	7.24E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.64E-08	NA	ND
Zinc	3.56E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.28E-07	NA	ND

TOTAL RISK 1.55E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL - HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD - AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.70E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.77E-04 NA		ND
Antimony	2.64E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.98E-07	2.40E-04	8.23E-04
Arsenic	2.41E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.80E-07	2.85E-04	6.33E-04
Barium	1.70E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.27E-06	3.50E-03	3.62E-04
Beryllium	4.56E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.41E-08	5.00E-04	6.82E-05
Cadmium	4.70E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.52E-08 NA		ND
Calcium	7.28E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.44E-03 NA		ND
Chromium	4.77E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.57E-07	1.00E-02	3.57E-05
Cobalt	2.10E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.57E-07 NA		ND
Copper	1.21E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.06E-06 NA		ND
Cyanide (total)	2.06E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.54E-07	1.40E-02	1.10E-05
Iron	7.01E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.25E-04 NA		ND
Lead	7.95E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.94E-07 NA		ND
Magnesium	2.43E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.82E-03 NA		ND
Manganese	2.84E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.12E-05	5.80E-03	3.79E-03
Mercury	7.52E-02	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.62E-09	4.50E-05	1.25E-04
Nickel	8.23E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	8.16E-07	2.00E-03	3.08E-04
Potassium	3.43E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.56E-05 NA		ND
Selenium	1.30E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.73E-09	4.85E-03	2.01E-06
Silver	4.41E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.30E-08	5.00E-04	6.60E-05
Sodium	5.54E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.14E-06 NA		ND
Thallium	1.44E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.08E-08	8.00E-05	1.35E-04
Vanadium	7.24E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.42E-07	7.00E-05	7.74E-03
Zinc	3.56E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.66E-06	9.00E-02	2.96E-05

NA/ND - Not available / Not determined

TOTAL HAZARD 1.41E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	2.81E-05	0.83	24	234	6	15	25550	1.90E-08	NA	ND
Antimony	1.86E-06	0.83	24	234	6	15	25550	1.38E-09	NA	ND
Arsenic	1.70E-06	0.83	24	234	6	15	25550	1.24E-09	5.00E+01	6.20E-08
Barium	1.19E-07	0.83	24	234	6	15	25550	8.72E-09	NA	ND
Beryllium	3.21E-09	0.83	24	234	6	15	25550	2.34E-10	8.40E+00	1.97E-09
Cadmium	3.31E-09	0.83	24	234	6	15	25550	2.42E-10	6.10E+00	1.48E-09
Calcium	5.13E-04	0.83	24	234	6	15	25550	3.74E-05	NA	ND
Chromium	3.36E-06	0.83	24	234	6	15	25550	2.45E-09	4.20E+01	1.03E-07
Cobalt	1.48E-06	0.83	24	234	6	15	25550	1.08E-09	NA	ND
Copper	8.53E-07	0.83	24	234	6	15	25550	6.23E-08	NA	ND
Cyanide (total)	1.45E-06	0.83	24	234	6	15	25550	1.06E-09	NA	ND
Iron	4.94E-05	0.83	24	234	6	15	25550	3.61E-08	NA	ND
Lead	5.60E-06	0.83	24	234	6	15	25550	4.09E-09	NA	ND
Magnesium	1.71E-04	0.83	24	234	6	15	25550	1.25E-05	NA	ND
Manganese	2.00E-06	0.83	24	234	6	15	25550	1.46E-07	NA	ND
Mercury	5.30E-10	0.83	24	234	6	15	25550	3.87E-11	NA	ND
Nickel	5.80E-06	0.83	24	234	6	15	25550	4.23E-09	6.40E-01	3.56E-09
Potassium	2.42E-06	0.83	24	234	6	15	25550	1.76E-07	NA	ND
Selenium	9.17E-10	0.83	24	234	6	15	25550	6.69E-11	NA	ND
Silver	3.11E-09	0.83	24	234	6	15	25550	2.27E-10	NA	ND
Sodium	3.90E-07	0.83	24	234	6	15	25550	2.85E-08	NA	ND
Thallium	1.01E-09	0.83	24	234	6	15	25550	7.40E-11	NA	ND
Vanadium	5.10E-06	0.83	24	234	6	15	25550	3.72E-09	NA	ND
Zinc	2.51E-07	0.83	24	234	6	15	25550	1.83E-08	NA	ND
									TOTAL RISK	1.72E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.61E-05	0.83	24	234	6	15	2190	2.22E-05	NA	ND
Antimony	1.86E-08	0.83	24	234	6	15	2190	1.58E-08	NA	ND
Arsenic	1.70E-08	0.83	24	234	6	15	2190	1.45E-08	NA	ND
Barium	1.19E-07	0.83	24	234	6	15	2190	1.02E-07	1.00E-03	1.02E-04
Beryllium	3.21E-09	0.83	24	234	6	15	2190	2.73E-09	NA	ND
Cadmium	3.31E-09	0.83	24	234	6	15	2190	2.82E-09	NA	ND
Calcium	5.13E-04	0.83	24	234	6	15	2190	4.36E-04	NA	ND
Chromium	3.36E-08	0.83	24	234	6	15	2190	2.86E-08	NA	ND
Cobalt	1.48E-08	0.83	24	234	6	15	2190	1.26E-08	NA	ND
Copper	8.53E-07	0.83	24	234	6	15	2190	7.26E-07	NA	ND
Cyanide (total)	1.45E-08	0.83	24	234	6	15	2190	1.23E-08	NA	ND
Iron	4.94E-05	0.83	24	234	6	15	2190	4.21E-05	NA	ND
Lead	5.60E-08	0.83	24	234	6	15	2190	4.77E-08	NA	ND
Magnesium	1.71E-04	0.83	24	234	6	15	2190	1.46E-04	NA	ND
Manganese	2.00E-06	0.83	24	234	6	15	2190	1.70E-06	1.00E-04	1.70E-02
Mercury	5.30E-10	0.83	24	234	6	15	2190	4.51E-10	8.60E-05	5.25E-06
Nickel	5.60E-08	0.83	24	234	6	15	2190	4.94E-08	NA	ND
Potassium	2.42E-08	0.83	24	234	6	15	2190	2.06E-06	NA	ND
Selenium	9.17E-10	0.83	24	234	6	15	2190	7.80E-10	NA	ND
Silver	3.11E-09	0.83	24	234	6	15	2190	2.65E-09	NA	ND
Sodium	3.90E-07	0.83	24	234	6	15	2190	3.32E-07	NA	ND
Thallium	1.01E-09	0.83	24	234	6	15	2190	8.64E-10	NA	ND
Vanadium	5.10E-08	0.83	24	234	6	15	2190	4.34E-06	NA	ND
Zinc	2.51E-07	0.83	24	234	6	15	2190	2.14E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.71E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	8.09E+03	50	1.0E-06	1.0	350	9	70	25550	7.12E-04	NA	ND
Arsenic	3.90E+00	50	1.0E-06	1.0	350	9	70	25550	3.43E-07	1.60E+00	6.18E-07
Barium	4.39E+01	50	1.0E-06	1.0	350	9	70	25550	3.86E-06	NA	ND
Beryllium	6.72E-01	50	1.0E-06	1.0	350	9	70	25550	5.92E-08	4.30E+00	2.55E-07
Calcium	3.45E+04	50	1.0E-06	1.0	350	9	70	25550	3.04E-03	NA	ND
Chromium	1.02E+01	50	1.0E-06	1.0	350	9	70	25550	8.97E-07	NA	ND
Cobalt	5.28E+00	50	1.0E-06	1.0	350	9	70	25550	4.65E-07	NA	ND
Copper	1.47E+01	50	1.0E-06	1.0	350	9	70	25550	1.30E-06	NA	ND
Iron	1.34E+04	50	1.0E-06	1.0	350	9	70	25550	1.18E-03	NA	ND
Lead	1.21E+01	50	1.0E-06	1.0	350	9	70	25550	1.06E-06	NA	ND
Magnesium	1.50E+04	50	1.0E-06	1.0	350	9	70	25550	1.32E-03	NA	ND
Manganese	3.70E+02	50	1.0E-06	1.0	350	9	70	25550	3.26E-05	NA	ND
Nickel	1.29E+01	50	1.0E-06	1.0	350	9	70	25550	1.13E-06	NA	ND
Potassium	5.70E+02	50	1.0E-06	1.0	350	9	70	25550	5.02E-05	NA	ND
Sodium	9.15E+01	50	1.0E-06	1.0	350	9	70	25550	8.06E-06	NA	ND
Vanadium	1.67E+01	50	1.0E-06	1.0	350	9	70	25550	1.47E-06	NA	ND
Zinc	4.54E+01	50	1.0E-06	1.0	350	9	70	25550	3.99E-06	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK **8.73E-07**

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	8.09E+03	50	1.0E-06	1.0	350	9	70	3285	5.54E-03	1.00E+00	5.54E-03
Arsenic	3.90E+00	50	1.0E-06	1.0	350	9	70	3285	2.67E-06	3.00E-04	8.90E-03
Barium	4.39E+01	50	1.0E-06	1.0	350	9	70	3285	3.00E-05	7.00E-02	4.29E-04
Beryllium	6.72E-01	50	1.0E-06	1.0	350	9	70	3285	4.61E-07	5.00E-03	9.21E-05
Calcium	3.45E+04	50	1.0E-06	1.0	350	9	70	3285	2.36E-02	NA	ND
Chromium	1.02E+01	50	1.0E-06	1.0	350	9	70	3285	6.98E-06	5.00E-03	1.40E-03
Cobalt	5.26E+00	50	1.0E-06	1.0	350	9	70	3285	3.61E-06	NA	ND
Copper	1.47E+01	50	1.0E-06	1.0	350	9	70	3285	1.01E-05	4.00E-02	2.52E-04
Iron	1.34E+04	50	1.0E-06	1.0	350	9	70	3285	9.15E-03	NA	ND
Lead	1.21E+01	50	1.0E-06	1.0	350	9	70	3285	8.27E-06	NA	ND
Magnesium	1.50E+04	50	1.0E-06	1.0	350	9	70	3285	1.03E-02	NA	ND
Manganese	3.70E+02	50	1.0E-06	1.0	350	9	70	3285	2.53E-04	1.40E-01	1.81E-03
Nickel	1.29E+01	50	1.0E-06	1.0	350	9	70	3285	8.82E-06	2.00E-02	4.41E-04
Potassium	5.70E+02	50	1.0E-06	1.0	350	9	70	3285	3.91E-04	NA	ND
Sodium	9.15E+01	50	1.0E-06	1.0	350	9	70	3285	6.27E-05	NA	ND
Vanadium	1.67E+01	50	1.0E-06	1.0	350	9	70	3285	1.14E-05	7.00E-03	1.63E-03
Zinc	4.54E+01	50	1.0E-06	1.0	350	9	70	3285	3.11E-05	3.00E-01	1.04E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.06E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	8.09E+03	1.0E−06	5000	1.00	0.001	234	9	70	25550	4.76E−05	NA	ND
Arsenic	3.90E+00	1.0E−06	5000	1.00	0.001	234	9	70	25550	2.30E−06	1.89E+00	4.34E−06
Barium	4.39E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	2.58E−07	NA	ND
Beryllium	6.72E−01	1.0E−06	5000	1.00	0.001	234	9	70	25550	3.96E−09	4.30E+01	1.70E−07
Calcium	3.45E+04	1.0E−06	5000	1.00	0.001	234	9	70	25550	2.03E−04	NA	ND
Chromium	1.02E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	6.00E−06	NA	ND
Cobalt	5.28E+00	1.0E−06	5000	1.00	0.001	234	9	70	25550	3.11E−06	NA	ND
Copper	1.47E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	8.67E−06	NA	NO
Iron	1.34E+04	1.0E−06	5000	1.00	0.001	234	9	70	25550	7.86E−05	NA	ND
Lead	1.21E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	7.11E−06	NA	ND
Magnesium	1.50E+04	1.0E−06	5000	1.00	0.001	234	9	70	25550	8.83E−05	NA	ND
Manganese	3.70E+02	1.0E−06	5000	1.00	0.001	234	9	70	25550	2.18E−06	NA	ND
Nickel	1.29E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	7.58E−06	NA	ND
Potassium	5.70E+02	1.0E−06	5000	1.00	0.001	234	9	70	25550	3.36E−06	NA	ND
Sodium	9.15E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	5.39E−07	NA	ND
Vanadium	1.67E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	9.80E−06	NA	ND
Zinc	4.54E+01	1.0E−06	5000	1.00	0.001	234	9	70	25550	2.67E−07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.14E−07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	8.09E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.70E-04	2.00E-01	1.85E-03
Arsenic	3.90E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.79E-07	2.85E-04	6.27E-04
Barium	4.39E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.01E-06	3.50E-03	5.74E-04
Beryllium	6.72E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.08E-08	5.00E-04	6.16E-05
Calcium	3.45E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.58E-03	NA	ND
Chromium	1.02E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.67E-07	2.50E-03	1.87E-04
Cobalt	5.28E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.42E-07	NA	ND
Copper	1.47E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.74E-07	3.96E-02	1.70E-05
Iron	1.34E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.12E-04	NA	ND
Lead	1.21E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.53E-07	NA	ND
Magnesium	1.50E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.87E-04	NA	ND
Manganese	3.70E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.69E-05	5.60E-03	3.03E-03
Nickel	1.29E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.90E-07	2.00E-03	2.95E-04
Potassium	5.70E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.61E-05	NA	ND
Sodium	9.15E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.19E-06	NA	ND
Vanadium	1.87E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	7.82E-07	7.00E-05	1.09E-02
Zinc	4.54E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.08E-06	9.00E-02	2.31E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.76E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	5.70E-05	0.83	24	234	9	70	25550	1.34E-08	NA	ND
Arsenic	2.75E-08	0.83	24	234	9	70	25550	8.44E-10	5.00E+01	3.22E-08
Barium	3.09E-07	0.83	24	234	9	70	25550	7.25E-09	NA	ND
Beryllium	4.74E-09	0.83	24	234	9	70	25550	1.11E-10	8.40E+00	9.34E-10
Calcium	2.43E-04	0.83	24	234	9	70	25550	5.71E-08	NA	ND
Chromium	7.18E-08	0.83	24	234	9	70	25550	1.68E-09	4.20E+01	7.07E-08
Cobalt	3.72E-08	0.83	24	234	9	70	25550	8.72E-10	NA	ND
Copper	1.04E-07	0.83	24	234	9	70	25550	2.43E-09	NA	ND
Iron	9.41E-05	0.83	24	234	9	70	25550	2.21E-08	NA	ND
Lead	8.51E-08	0.83	24	234	9	70	25550	2.00E-09	NA	ND
Magnesium	1.06E-04	0.83	24	234	9	70	25550	2.48E-06	NA	ND
Manganese	2.61E-08	0.83	24	234	9	70	25550	6.11E-08	NA	ND
Nickel	9.07E-08	0.83	24	234	9	70	25550	2.13E-09	8.40E-01	1.79E-09
Potassium	4.02E-06	0.83	24	234	9	70	25550	9.42E-08	NA	ND
Sodium	6.45E-07	0.83	24	234	9	70	25550	1.51E-08	NA	ND
Vanadium	1.17E-07	0.83	24	234	9	70	25550	2.75E-09	NA	ND
Zinc	3.19E-07	0.83	24	234	9	70	25550	7.49E-09	NA	ND
									TOTAL RISK	1.06E-07

NA/ND – Not available/ Not determined

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	5.70E-05	0.83	24	234	9	70	3285	1.04E-05	NA	ND
Arsenic	2.75E-08	0.83	24	234	9	70	3285	5.01E-09	NA	ND
Barium	3.09E-07	0.83	24	234	9	70	3285	5.64E-06	1.00E-04	5.64E-04
Beryllium	4.74E-09	0.83	24	234	9	70	3285	8.64E-10	NA	ND
Calcium	2.43E-04	0.83	24	234	9	70	3285	4.44E-05	NA	ND
Chromium	7.18E-08	0.83	24	234	9	70	3285	1.31E-08	NA	ND
Cobalt	3.72E-08	0.83	24	234	9	70	3285	6.78E-09	NA	ND
Copper	1.04E-07	0.83	24	234	9	70	3285	1.89E-08	NA	ND
Iron	9.41E-05	0.83	24	234	9	70	3285	1.72E-05	NA	ND
Lead	8.51E-08	0.83	24	234	9	70	3285	1.55E-08	NA	ND
Magnesium	1.06E-04	0.83	24	234	9	70	3285	1.93E-05	NA	ND
Manganese	2.61E-06	0.83	24	234	9	70	3285	4.76E-07	1.00E-04	4.76E-03
Nickel	9.07E-08	0.83	24	234	9	70	3285	1.65E-08	NA	ND
Potassium	4.02E-06	0.83	24	234	9	70	3285	7.33E-07	NA	ND
Sodium	6.45E-07	0.83	24	234	9	70	3285	1.18E-07	NA	ND
Vanadium	1.17E-07	0.83	24	234	9	70	3285	2.14E-08	NA	ND
Zinc	3.19E-07	0.83	24	234	9	70	3285	5.83E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.32E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	8.09E+03	100	1.0E-06	1.0	350	6	15	25550	4.43E-03	NA	ND
Arsenic	3.90E+00	100	1.0E-06	1.0	350	6	15	25550	2.14E-06	1.60E+00	3.65E-06
Barium	4.39E+01	100	1.0E-06	1.0	350	6	15	25550	2.40E-05	NA	ND
Beryllium	8.72E-01	100	1.0E-06	1.0	350	6	15	25550	3.68E-07	4.30E+00	1.58E-06
Calcium	3.45E+04	100	1.0E-06	1.0	350	6	15	25550	1.89E-02	NA	ND
Chromium	1.02E+01	100	1.0E-06	1.0	350	6	15	25550	5.58E-06	NA	ND
Cobalt	5.28E+00	100	1.0E-06	1.0	350	6	15	25550	2.89E-06	NA	ND
Copper	1.47E+01	100	1.0E-06	1.0	350	6	15	25550	8.07E-06	NA	ND
Iron	1.34E+04	100	1.0E-06	1.0	350	6	15	25550	7.32E-03	NA	ND
Lead	1.21E+01	100	1.0E-06	1.0	350	6	15	25550	6.62E-06	NA	ND
Magnesium	1.50E+04	100	1.0E-06	1.0	350	6	15	25550	8.22E-03	NA	ND
Manganese	3.70E+02	100	1.0E-06	1.0	350	6	15	25550	2.03E-04	NA	ND
Nickel	1.29E+01	100	1.0E-06	1.0	350	6	15	25550	7.05E-06	NA	ND
Potassium	5.70E+02	100	1.0E-06	1.0	350	6	15	25550	3.12E-04	NA	ND
Sodium	9.15E+01	100	1.0E-06	1.0	350	6	15	25550	5.01E-05	NA	ND
Vanadium	1.67E+01	100	1.0E-06	1.0	350	6	15	25550	9.12E-06	NA	ND
Zinc	4.54E+01	100	1.0E-06	1.0	350	6	15	25550	2.48E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 5.43E-06

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	8.09E+03	100	1.0E-06	1.0	350	6	15	2190	5.17E-02	NA	ND
Arsenic	3.90E+00	100	1.0E-06	1.0	350	6	15	2190	2.49E-05	3.00E-04	8.31E-02
Barium	4.39E+01	100	1.0E-06	1.0	350	6	15	2190	2.80E-04	7.00E-02	4.00E-03
Beryllium	6.72E-01	100	1.0E-06	1.0	350	6	15	2190	4.30E-06	5.00E-03	8.60E-04
Calcium	3.45E+04	100	1.0E-06	1.0	350	6	15	2190	2.21E-01	NA	ND
Chromium	1.02E+01	100	1.0E-06	1.0	350	6	15	2190	6.51E-05	2.00E-02	3.26E-03
Cobalt	5.28E+00	100	1.0E-06	1.0	350	6	15	2190	3.37E-05	NA	ND
Copper	1.47E+01	100	1.0E-06	1.0	350	6	15	2190	9.41E-05	NA	ND
Iron	1.34E+04	100	1.0E-06	1.0	350	6	15	2190	8.54E-02	NA	ND
Lead	1.21E+01	100	1.0E-06	1.0	350	6	15	2190	7.72E-05	NA	ND
Magnesium	1.50E+04	100	1.0E-06	1.0	350	6	15	2190	9.59E-02	NA	ND
Manganese	3.70E+02	100	1.0E-06	1.0	350	6	15	2190	2.37E-03	1.40E-01	1.69E-02
Nickel	1.29E+01	100	1.0E-06	1.0	350	6	15	2190	8.23E-05	2.00E-02	4.12E-03
Potassium	5.70E+02	100	1.0E-06	1.0	350	6	15	2190	3.65E-03	NA	ND
Sodium	9.15E+01	100	1.0E-06	1.0	350	6	15	2190	5.85E-04	NA	ND
Vanadium	1.67E+01	100	1.0E-06	1.0	350	6	15	2190	1.06E-04	7.00E-03	1.52E-02
Zinc	4.54E+01	100	1.0E-06	1.0	350	6	15	2190	2.90E-04	3.00E-01	9.66E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.28E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.09E+03	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.19E-05	NA	ND
Arsenic	3.90E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.50E-06	1.89E+00	4.73E-06
Barium	4.39E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.61E-07	NA	ND
Beryllium	6.72E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.31E-09	4.30E+01	1.85E-07
Calcium	3.45E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.21E-04	NA	ND
Chromium	1.02E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	6.53E-06	NA	ND
Cobalt	5.26E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.38E-06	NA	ND
Copper	1.47E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	9.44E-06	NA	ND
Iron	1.34E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	8.56E-05	NA	ND
Lead	1.21E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	7.74E-06	NA	ND
Magnesium	1.50E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	9.61E-05	NA	ND
Manganese	3.70E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.37E-06	NA	ND
Nickel	1.29E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	8.25E-06	NA	ND
Potassium	5.70E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.66E-06	NA	ND
Sodium	9.15E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.87E-07	NA	ND
Vanadium	1.67E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.07E-07	NA	ND
Zinc	4.54E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.91E-07	NA	ND

TOTAL RISK 2.33E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	8.09E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.05E-04	NA	ND
Arsenic	3.90E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.92E-07	2.85E-04	1.02E-03
Barium	4.39E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.28E-06	3.50E-03	9.37E-04
Beryllium	6.72E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.03E-06	5.00E-04	1.01E-04
Calcium	3.45E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.58E-03	NA	ND
Chromium	1.02E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.62E-07	1.00E-02	7.62E-05
Cobalt	5.28E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.95E-07	NA	ND
Copper	1.47E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.10E-06	NA	ND
Iron	1.34E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.99E-04	NA	ND
Lead	1.21E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.03E-07	NA	ND
Magnesium	1.50E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.12E-03	NA	ND
Manganese	3.70E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.77E-05	5.60E-03	4.94E-03
Nickel	1.29E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.63E-07	2.00E-03	4.81E-04
Potassium	5.70E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.27E-05	NA	ND
Sodium	9.15E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.84E-06	NA	ND
Vanadium	1.67E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.25E-06	7.00E-05	1.78E-02
Zinc	4.54E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.39E-06	9.00E-02	3.77E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 2.54E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	5.70E-05	0.83	24	234	6	15	25550	4.16E-08	NA	ND
Arsenic	2.75E-08	0.83	24	234	6	15	25550	2.01E-09	5.00E+01	1.00E-07
Barium	3.09E-07	0.83	24	234	6	15	25550	2.25E-08	NA	ND
Beryllium	4.74E-09	0.83	24	234	6	15	25550	3.46E-10	8.40E+00	2.90E-09
Calcium	2.43E-04	0.83	24	234	6	15	25550	1.78E-05	NA	ND
Chromium	7.18E-08	0.83	24	234	6	15	25550	5.24E-09	4.20E+01	2.20E-07
Cobalt	3.72E-08	0.83	24	234	6	15	25550	2.71E-09	NA	ND
Copper	1.04E-07	0.83	24	234	6	15	25550	7.57E-09	NA	ND
Iron	9.41E-05	0.83	24	234	6	15	25550	6.87E-06	NA	ND
Lead	8.51E-08	0.83	24	234	6	15	25550	6.21E-09	NA	ND
Magnesium	1.06E-04	0.83	24	234	6	15	25550	7.71E-06	NA	ND
Manganese	2.61E-08	0.83	24	234	6	15	25550	1.90E-07	NA	ND
Nickel	9.07E-08	0.83	24	234	6	15	25550	6.62E-09	8.40E-01	5.56E-09
Potassium	4.02E-08	0.83	24	234	6	15	25550	2.93E-07	NA	ND
Sodium	8.45E-07	0.83	24	234	6	15	25550	4.70E-08	NA	ND
Vanadium	1.17E-07	0.83	24	234	6	15	25550	8.56E-09	NA	ND
Zinc	3.19E-07	0.83	24	234	6	15	25550	2.33E-08	NA	ND
									TOTAL RISK	3.20E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	5.70E-05	0.83	24	234	6	15	2190	4.85E-05	NA	ND
Arsenic	2.75E-06	0.83	24	234	6	15	2190	2.34E-06	NA	ND
Barium	3.09E-07	0.83	24	234	6	15	2190	2.63E-07	1.00E-03	2.63E-04
Beryllium	4.74E-09	0.83	24	234	6	15	2190	4.03E-09	NA	ND
Calcium	2.43E-04	0.83	24	234	6	15	2190	2.07E-04	NA	ND
Chromium	7.18E-06	0.83	24	234	6	15	2190	6.11E-06	NA	ND
Cobalt	3.72E-06	0.83	24	234	6	15	2190	3.16E-06	NA	ND
Copper	1.04E-07	0.83	24	234	6	15	2190	8.83E-08	NA	ND
Iron	9.41E-05	0.83	24	234	6	15	2190	8.01E-05	NA	ND
Lead	8.51E-06	0.83	24	234	6	15	2190	7.24E-06	NA	ND
Magnesium	1.06E-04	0.83	24	234	6	15	2190	8.99E-05	NA	ND
Manganese	2.61E-06	0.83	24	234	6	15	2190	2.22E-06	1.00E-04	2.22E-02
Nickel	9.07E-06	0.83	24	234	6	15	2190	7.72E-06	NA	ND
Potassium	4.02E-06	0.83	24	234	6	15	2190	3.42E-06	NA	ND
Sodium	6.45E-07	0.83	24	234	6	15	2190	5.49E-07	NA	ND
Vanadium	1.17E-07	0.83	24	234	6	15	2190	9.99E-08	NA	ND
Zinc	3.19E-07	0.83	24	234	6	15	2190	2.72E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.25E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.52E+04	100	1.0E-06	1.0	350	30	70	25550	8.92E-03	NA	ND
Arsenic	6.70E+00	100	1.0E-06	1.0	350	30	70	25550	3.93E-06	1.80E+00	7.08E-06
Barium	8.31E+01	100	1.0E-06	1.0	350	30	70	25550	4.88E-05	NA	ND
Beryllium	9.70E-01	100	1.0E-06	1.0	350	30	70	25550	5.69E-07	4.30E+00	2.45E-06
Calcium	9.47E+04	100	1.0E-06	1.0	350	30	70	25550	5.56E-02	NA	ND
Chromium	2.07E+01	100	1.0E-06	1.0	350	30	70	25550	1.22E-05	NA	ND
Cobalt	8.00E+00	100	1.0E-06	1.0	350	30	70	25550	4.70E-06	NA	ND
Copper	2.28E+01	100	1.0E-06	1.0	350	30	70	25550	1.34E-05	NA	ND
Iron	2.05E+04	100	1.0E-06	1.0	350	30	70	25550	1.20E-02	NA	ND
Lead	2.03E+01	100	1.0E-06	1.0	350	30	70	25550	1.19E-05	NA	ND
Magnesium	3.35E+04	100	1.0E-06	1.0	350	30	70	25550	1.97E-02	NA	ND
Manganese	8.87E+02	100	1.0E-06	1.0	350	30	70	25550	4.09E-04	NA	ND
Nickel	1.89E+01	100	1.0E-06	1.0	350	30	70	25550	1.11E-05	NA	ND
Potassium	1.12E+03	100	1.0E-06	1.0	350	30	70	25550	6.58E-04	NA	ND
Sodium	1.42E+02	100	1.0E-06	1.0	350	30	70	25550	8.34E-05	NA	ND
Vanadium	2.76E+01	100	1.0E-06	1.0	350	30	70	25550	1.63E-05	NA	ND
Zinc	7.73E+01	100	1.0E-06	1.0	350	30	70	25550	4.54E-05	NA	ND
										TOTAL RISK	9.53E-06

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	100	1.0E-06	1.0	350	30	70	10950	2.06E-02	1.00E+00	2.06E-02
Arsenic	6.70E+00	100	1.0E-06	1.0	350	30	70	10950	9.18E-06	3.00E-04	3.06E-02
Barium	8.31E+01	100	1.0E-06	1.0	350	30	70	10950	1.14E-04	7.00E-02	1.63E-03
Beryllium	9.70E-01	100	1.0E-06	1.0	350	30	70	10950	1.33E-06	5.00E-03	2.66E-04
Calcium	9.47E+04	100	1.0E-06	1.0	350	30	70	10950	1.30E-01	NA	NO
Chromium	2.07E+01	100	1.0E-06	1.0	350	30	70	10950	2.84E-05	5.00E-03	5.67E-03
Cobalt	8.00E+00	100	1.0E-06	1.0	350	30	70	10950	1.10E-05	NA	ND
Copper	2.28E+01	100	1.0E-06	1.0	350	30	70	10950	3.12E-05	4.00E-02	7.81E-04
Iron	2.05E+04	100	1.0E-06	1.0	350	30	70	10950	2.81E-02	NA	ND
Lead	2.03E+01	100	1.0E-06	1.0	350	30	70	10950	2.78E-05	NA	ND
Magnesium	3.35E+04	100	1.0E-06	1.0	350	30	70	10950	4.59E-02	NA	ND
Manganese	6.87E+02	100	1.0E-06	1.0	350	30	70	10950	9.41E-04	1.40E-01	6.72E-03
Nickel	1.89E+01	100	1.0E-06	1.0	350	30	70	10950	2.59E-05	2.00E-02	1.29E-03
Potassium	1.12E+03	100	1.0E-06	1.0	350	30	70	10950	1.53E-03	NA	ND
Sodium	1.42E+02	100	1.0E-06	1.0	350	30	70	10950	1.95E-04	NA	ND
Vanadium	2.78E+01	100	1.0E-06	1.0	350	30	70	10950	3.81E-05	7.00E-03	5.44E-03
Zinc	7.73E+01	100	1.0E-06	1.0	350	30	70	10950	1.06E-04	3.00E-01	3.53E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 7.36E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.52E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.18E-04	NA	ND
Arsenic	6.70E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.28E-07	1.69E+00	4.31E-07
Barium	8.31E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.83E-06	NA	ND
Beryllium	9.70E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.30E-08	4.30E+01	1.42E-08
Calcium	9.47E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.22E-03	NA	NO
Chromium	2.07E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.05E-07	NA	ND
Cobalt	8.00E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.72E-07	NA	ND
Copper	2.28E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.76E-07	NA	ND
Iron	2.05E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.98E-04	NA	ND
Lead	2.03E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.91E-07	NA	ND
Magnesium	3.35E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.14E-03	NA	ND
Manganese	6.87E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.34E-05	NA	ND
Nickel	1.89E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.44E-07	NA	ND
Potassium	1.12E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.81E-05	NA	ND
Sodium	1.42E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.84E-06	NA	ND
Vanadium	2.78E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.47E-07	NA	ND
Zinc	7.73E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.63E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.85E-06

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	6.04E-06	2.36E-07	3.68E-07	6.65E-06
Barium	ND	ND	ND	ND
Beryllium	3.31E-06	9.09E-09	1.92E-06	5.23E-06
Cadmium	ND	4.39E-09	ND	4.39E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.90E-07	ND	5.90E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	9.85E-09	ND	9.85E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	9.35E-06	8.49E-07	2.28E-06	1.25E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	8.45E-03	ND	2.45E-03	1.09E-02
Antimony	2.29E-02	ND	2.21E-03	2.51E-02
Arsenic	2.61E-02	ND	1.59E-03	2.77E-02
Barium	8.88E-04	8.72E-04	1.03E-03	2.79E-03
Beryllium	3.59E-04	ND	2.06E-04	5.67E-04
Cadmium	2.39E-03	ND	1.98E-03	4.37E-03
Calcium	ND	ND	ND	ND
Chromium	4.67E-03	ND	5.42E-04	5.22E-03
Cobalt	ND	ND	ND	ND
Copper	4.74E-03	ND	2.78E-04	5.02E-03
Cyanide (total)	2.42E-04	ND	2.00E-05	2.62E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.45E-03	8.75E-03	6.46E-03	1.97E-02
Mercury	5.42E-04	2.65E-06	2.09E-04	7.54E-04
Nickel	9.75E-04	ND	5.65E-04	1.54E-03
Potassium	ND	ND	ND	ND
Selenium	7.55E-05	ND	4.52E-06	8.00E-05
Silver	2.95E-04	ND	1.71E-04	4.67E-04
Sodium	ND	ND	ND	ND
Thallium	4.88E-03	ND	2.83E-03	7.71E-03
Vanadium	2.86E-03	ND	1.66E-02	1.95E-02
Zinc	2.07E-04	ND	4.00E-05	2.47E-04
TOTAL	8.50E-02	9.62E-03	3.72E-02	1.32E-01

NA/ND – Not applicable/Not determined

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.13E-05	2.20E-07	1.19E-07	1.16E-05
Barium	ND	ND	ND	ND
Beryllium	6.17E-06	8.46E-09	6.20E-07	6.80E-06
Cadmium	ND	4.10E-09	ND	4.10E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.51E-07	ND	5.51E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	9.19E-09	ND	9.19E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.74E-05	7.93E-07	7.39E-07	1.90E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	2.14E-01	ND	3.58E-03	2.17E-01
Arsenic	2.44E-01	ND	2.58E-03	2.46E-01
Barium	8.28E-03	4.07E-04	1.67E-03	1.04E-02
Beryllium	3.35E-03	ND	3.36E-04	3.68E-03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.09E-02	ND	2.19E-04	1.11E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	2.26E-03	ND	3.24E-05	2.29E-03
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.16E-02	4.06E-02	1.04E-02	9.28E-02
Mercury	5.06E-03	1.24E-05	3.39E-04	5.41E-03
Nickel	9.10E-03	ND	9.14E-04	1.00E-02
Potassium	ND	ND	ND	ND
Selenium	7.05E-04	ND	7.30E-06	7.12E-04
Silver	2.76E-03	ND	2.77E-04	3.03E-03
Sodium	ND	ND	ND	ND
Thallium	4.55E-03	ND	4.58E-04	5.01E-03
Vanadium	2.67E-02	ND	2.69E-02	5.36E-02
Zinc	1.93E-03	ND	6.47E-05	2.00E-03
TOTAL	5.75E-01	4.13E-02	4.78E-02	6.64E-01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	SOIL – INHALATION	SOIL – DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.00E-05	3.91E-07	6.11E-07	1.10E-05
Barium	ND	ND	ND	ND
Beryllium	4.04E-06	1.11E-08	2.34E-08	6.39E-06
Cadmium	ND	6.63E-08	ND	6.63E-08
Calcium	ND	ND	ND	ND
Chromium	ND	6.71E-07	ND	6.71E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.65E-08	ND	2.65E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.41E-05	1.17E-06	2.95E-06	1.82E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	SOIL – INHALATION	SOIL – DERMAL	TOTAL
Aluminum	2.49E-02	ND	7.23E-03	3.22E-02
Antimony	4.25E-02	ND	4.11E-03	4.66E-02
Arsenic	4.34E-02	ND	2.65E-03	4.60E-02
Barium	2.26E-03	2.21E-03	2.61E-03	7.07E-03
Beryllium	4.38E-04	ND	2.54E-04	6.93E-04
Cadmium	3.62E-02	ND	3.00E-02	6.61E-02
Calcium	ND	ND	ND	ND
Chromium	5.32E-03	ND	6.17E-04	5.93E-03
Cobalt	ND	ND	ND	ND
Copper	6.75E-02	ND	3.95E-03	7.14E-02
Cyanide (total)	1.48E-03	ND	1.23E-04	1.60E-03
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	9.78E-03	1.92E-02	1.42E-02	4.32E-02
Mercury	1.05E-02	5.14E-05	4.06E-03	1.46E-02
Nickel	2.62E-03	ND	1.52E-03	4.14E-03
Potassium	ND	ND	ND	ND
Selenium	1.21E-04	ND	7.21E-06	1.28E-04
Silver	4.93E-04	ND	2.86E-04	7.79E-04
Sodium	ND	ND	ND	ND
Thallium	7.19E-03	ND	4.17E-03	1.14E-02
Vanadium	6.61E-03	ND	3.84E-02	4.50E-02
Zinc	4.16E-04	ND	8.03E-05	4.96E-04
TOTAL	2.62E-01	2.15E-02	1.14E-01	3.97E-01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER ASPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.87E-05	3.65E-07	1.98E-07	1.93E-05
Barium	ND	ND	ND	ND
Beryllium	7.54E-06	1.03E-08	7.58E-07	8.31E-06
Cadmium	ND	6.19E-08	ND	6.19E-08
Calcium	ND	ND	ND	ND
Chromium	ND	6.27E-07	ND	6.27E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.47E-08	ND	2.47E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	2.62E-05	1.09E-06	9.55E-07	2.83E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	3.96E-01	ND	6.64E-03	4.03E-01
Arsenic	4.05E-01	ND	4.28E-03	4.09E-01
Barium	2.10E-02	1.03E-03	4.22E-03	2.63E-02
Beryllium	4.09E-03	ND	4.11E-04	4.50E-03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.24E-02	ND	2.49E-04	1.27E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	1.38E-02	ND	1.98E-04	1.40E-02
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	9.13E-02	8.97E-02	2.29E-02	2.04E-01
Mercury	9.80E-02	2.40E-04	6.57E-03	1.05E-01
Nickel	2.45E-02	ND	2.46E-03	2.69E-02
Potassium	ND	ND	ND	ND
Selenium	1.13E-03	ND	1.17E-05	1.14E-03
Silver	4.60E-03	ND	4.63E-04	5.07E-03
Sodium	ND	ND	ND	ND
Thallium	6.71E-03	ND	6.75E-04	7.39E-03
Vanadium	6.17E-02	ND	6.20E-02	1.24E-01
Zinc	3.88E-03	ND	1.30E-04	4.01E-03
TOTAL	1.14E+00	9.10E-02	1.11E-01	1.36E+00

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	3.82E-07	1.99E-08	2.69E-08	4.29E-07
Barium	ND	ND	ND	ND
Beryllium	1.73E-07	6.33E-10	1.15E-07	2.89E-07
Cadmium	ND	4.74E-10	ND	4.74E-10
Calcium	ND	ND	ND	ND
Chromium	ND	3.31E-08	ND	3.31E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	1.14E-09	ND	1.14E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	5.55E-07	5.53E-08	1.42E-07	7.52E-07

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.54E-03	ND	8.48E-04	3.38E-03
Antimony	4.52E-03	ND	5.04E-04	5.03E-03
Arsenic	5.50E-03	ND	3.87E-04	5.89E-03
Barium	1.68E-04	2.18E-04	2.22E-04	6.08E-04
Beryllium	6.25E-05	ND	4.18E-05	1.04E-04
Cadmium	6.44E-04	ND	6.15E-04	1.26E-03
Calcium	ND	ND	ND	ND
Chromium	6.54E-04	ND	8.74E-05	7.41E-04
Cobalt	ND	ND	ND	ND
Copper	2.07E-03	ND	1.40E-04	2.21E-03
Cyanide (total)	7.05E-05	ND	6.73E-06	7.72E-05
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.39E-03	3.65E-03	2.32E-03	7.35E-03
Mercury	1.72E-04	1.12E-06	7.66E-05	2.49E-04
Nickel	2.82E-04	ND	1.88E-04	4.70E-04
Potassium	ND	ND	ND	ND
Selenium	1.78E-05	ND	1.23E-06	1.91E-05
Silver	6.05E-05	ND	4.04E-05	1.01E-04
Sodium	ND	ND	ND	ND
Thallium	1.23E-03	ND	8.24E-04	2.06E-03
Vanadium	7.08E-04	ND	4.74E-03	5.45E-03
Zinc	8.13E-05	ND	1.81E-05	9.95E-05
TOTAL	2.02E-02	3.86E-03	1.11E-02	3.51E-02

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	2.38E-06	6.20E-08	2.92E-08	2.47E-06
Barium	ND	ND	ND	ND
Beryllium	1.07E-09	1.97E-09	1.26E-07	1.20E-06
Cadmium	ND	1.48E-09	ND	1.48E-09
Calcium	ND	ND	ND	ND
Chromium	ND	1.03E-07	ND	1.03E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	3.56E-09	ND	3.56E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	3.45E-06	1.72E-07	1.55E-07	3.78E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	4.22E-02	ND	8.23E-04	4.30E-02
Arsenic	5.14E-02	ND	6.33E-04	5.20E-02
Barium	1.55E-03	1.02E-04	3.62E-04	2.01E-03
Beryllium	5.83E-04	ND	6.82E-05	6.51E-04
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.52E-03	ND	3.57E-05	1.56E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	6.58E-04	ND	1.10E-05	6.69E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.29E-02	1.70E-02	3.79E-03	3.37E-02
Mercury	1.50E-03	5.25E-06	1.25E-04	1.73E-03
Nickel	2.63E-03	ND	3.08E-04	2.94E-03
Potassium	ND	ND	ND	ND
Selenium	1.66E-04	ND	2.01E-06	1.68E-04
Silver	5.64E-04	ND	6.60E-05	6.30E-04
Sodium	ND	ND	ND	ND
Thallium	1.15E-03	ND	1.35E-04	1.29E-03
Vanadium	6.61E-03	ND	7.74E-03	1.43E-02
Zinc	7.59E-04	ND	2.96E-05	7.89E-04
TOTAL	1.24E-01	1.71E-02	1.41E-02	1.56E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISK/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME MAXIMUM BACKGROUND CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	7.08E-08	2.76E-07	4.31E-07	7.79E-06
Barium	ND	ND	ND	ND
Beryllium	2.45E-06	6.71E-09	1.42E-06	3.88E-06
Calcium	ND	ND	ND	ND
Chromium	ND	7.16E-07	ND	7.16E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.31E-06	ND	1.31E-06
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	9.53E-06	1.01E-06	1.85E-06	1.24E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.08E-02	ND	8.04E-03	2.89E-02
Arsenic	3.08E-02	ND	1.67E-03	3.25E-02
Barium	1.63E-03	1.60E-03	1.89E-03	5.11E-03
Beryllium	2.66E-04	ND	1.54E-04	4.20E-04
Calcium	ND	ND	ND	ND
Chromium	5.67E-03	ND	6.58E-04	6.33E-03
Cobalt	ND	ND	ND	ND
Copper	7.81E-04	ND	4.57E-05	8.27E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	6.72E-03	1.32E-02	9.75E-03	2.97E-02
Nickel	1.29E-03	ND	7.51E-04	2.05E-03
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.44E-03	ND	3.16E-02	3.70E-02
Zinc	3.53E-04	ND	6.82E-05	4.21E-04
TOTAL	7.36E-02	1.46E-02	5.26E-02	1.41E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE -- RME MAXIMUM BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL			
	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	1.32E-05	2.96E-07	1.39E-07	1.38E-05
Barium	ND	ND	ND	ND
Beryllium	4.57E-06	6.27E-09	4.59E-07	5.04E-06
Calcium	ND	ND	ND	ND
Chromium	ND	6.69E-07	ND	6.69E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.22E-08	ND	1.22E-08
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.78E-05	9.45E-07	5.99E-07	1.93E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL			
	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	2.66E-01	ND	3.02E-03	2.69E-01
Barium	1.52E-02	7.46E-04	3.05E-03	1.90E-02
Beryllium	2.48E-03	ND	2.49E-04	2.73E-03
Calcium	ND	ND	ND	ND
Chromium	1.32E-02	ND	2.66E-04	1.35E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	6.27E-02	6.16E-02	1.58E-02	1.40E-01
Nickel	1.21E-02	ND	1.21E-03	1.33E-02
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.08E-02	ND	5.10E-02	1.02E-01
Zinc	3.29E-03	ND	1.10E-04	3.40E-03
TOTAL	4.46E-01	6.24E-02	7.47E-02	5.82E-01

NA/ND -- Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS			
	SOIL			
	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	3.85E-06	1.00E-07	4.73E-08	3.99E-06
Barium	ND	ND	ND	ND
Beryllium	1.58E-06	2.90E-09	1.85E-07	1.77E-06
Calcium	ND	ND	ND	ND
Chromium	ND	2.20E-07	ND	2.20E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	5.56E-09	ND	5.56E-09
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	5.43E-06	3.29E-07	2.33E-07	5.99E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS			
	SOIL			
	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	8.31E-02	ND	1.02E-03	8.41E-02
Barium	4.00E-03	2.63E-04	9.37E-04	5.20E-03
Beryllium	8.60E-04	ND	1.01E-04	9.60E-04
Calcium	ND	ND	ND	ND
Chromium	3.26E-03	ND	7.62E-05	3.33E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.69E-02	2.22E-02	4.94E-03	4.40E-02
Nickel	4.12E-03	ND	4.81E-04	4.60E-03
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.52E-02	ND	1.78E-02	3.30E-02
Zinc	9.66E-04	ND	3.77E-05	1.00E-03
TOTAL	1.28E-01	2.75E-02	2.54E-02	1.76E-01

NA/ND – Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

ADULT RISK

	EXPOSURE PATHWAYS			
	SOIL			
CHEMICAL	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	8.18E-07	3.22E-08	4.34E-08	8.94E-07
Barium	ND	ND	ND	ND
Beryllium	2.55E-07	9.34E-10	1.70E-07	4.26E-07
Calcium	ND	ND	ND	ND
Chromium	ND	7.07E-08	ND	7.07E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.79E-09	ND	1.79E-09
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	8.73E-07	1.09E-07	2.14E-07	1.19E-06

ADULT HAZARD

	EXPOSURE PATHWAYS			
	SOIL			
CHEMICAL	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	5.54E-03	ND	1.85E-03	7.39E-03
Arsenic	6.90E-03	ND	6.27E-04	9.58E-03
Barium	4.29E-04	5.64E-04	5.74E-04	1.57E-03
Beryllium	9.21E-05	ND	6.16E-05	1.54E-04
Calcium	ND	ND	ND	ND
Chromium	1.40E-03	ND	1.87E-04	1.58E-03
Cobalt	ND	ND	ND	ND
Copper	2.52E-04	ND	1.70E-05	2.69E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.81E-03	4.76E-03	3.03E-03	9.59E-03
Nickel	4.41E-04	ND	2.95E-04	7.36E-04
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.63E-03	ND	1.09E-02	1.25E-02
Zinc	1.04E-04	ND	2.31E-05	1.27E-04
TOTAL	2.06E-02	5.32E-03	1.76E-02	4.35E-02

NA/ND – Not applicable/Not determined

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RZ2.R05033.01.EP.017

March 14, 1996

ATKEARNEY

Mr. William Buller
U.S. Environmental Protection Agency
Region 5 - DRE-8J
77 W. Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W4-0006; REPA Work Assignment No. R05033; EPA ID No. IND044587848, Former Franklin Power Products/ Amphenol Facility, Franklin, Indiana; Indoor Air Risk Evaluation

Dear Mr. Buller:

As you requested, this letter presents a brief discussion on the indoor air risk evaluation that A.T. Kearney could prepare for the Forsythe Street residential basements. The risk evaluation would likely need to be based upon a number of default options, agreed upon prior to initiating the evaluation. In addition as you discussed with Mr. John Koehnen, it would most likely be beneficial to defer this study until the completion of the Forsythe Street investigation. The use of the resulting data would be useful in the development of the risk evaluation, since only limited data is currently available.

A.T. Kearney is experienced with the evaluation of health risks related to potential indoor air impacts from contaminated environmental media utilizing EPA approved techniques. Applicable methodologies are described in Air/Superfund National Technical Guidance Study Series: Assessing Potential Indoor Air Impacts for Superfund Sites (EPA-451/R-92-002, September 1992). This document describes a tiered approach ranging from simple to more sophisticated models intended to identify select sites where monitoring may be necessary or helpful. The confidence in analytical results increases with increasing sophistication in the modeling approach utilized.

A common application for vadose zone soil or groundwater contamination is the heuristic model developed and described by Johnston and Ettinger (Environmental Science and Technology, 25:1445-1452, 1991). This model can address various source media and be used to predict indoor air levels under several hypothetical building scenarios. The Johnson and Ettinger model is quite sensitive to the physical vadose zone soil environment, so depending on the sophistication required for an application, site-specific information regarding the effective diffusivity and soil permeability may be

NOTE

December 7, 1995

To: Bill Buller

From: Richard Mattick

Re: TCE Basement Exposure Scenario

Attached are reports generated from *SmartRisk* detailing the screening level risk assessment performed to evaluate potential risks to TCE in basements generated from the Amphenol site. Using extremely conservative fate and transport assumptions and exposure factors, the potential carcinogenic risk to an adult under a reasonable maximum exposure scenario was found to be 4.16E-05, while the non-cancer risk for the same exposure scenario resulted in a hazard index of 2.69.

The results of this assessment are based on the "screening-level assumption" that the concentration of TCE leaving the aquifer is the same concentration of TCE that will accumulate in a basement and expose an adult receptor. This assumption does not account for dilution of the TCE with basement and outside air and assumes that the concentration of TCE is not attenuated as it travels from the aquifer to the basement through soil. Since these conservative fate and transport assumptions and associated exposure scenarios generated unacceptable risks, it is my recommendation that a more "realistic" estimate of a TCE concentration that could accumulate in a basement be performed. This will likely be done through an indoor air model that takes into account mixing and dilution of TCE as it enters the basement. If you have any questions, please call me at 886-8093.

RISK REPORT
TOTAL NONCARCINOGENIC AND CARCINOGENIC RISK VIA ROUTE OF EXPOSURE - ADULT

Analyte	ADULT Hazard Index	ADULT Carcinogenic Risk
Scenario: RESIDENTIAL	**Media:** INDOOR AIR	
Route of Exposure: Inhalation of Indoor Air	**Receptor:** ALTERNATE	
Trichloroethylene	1.59	7.35 E-06
Total Risk:	**1.59**	**7.35 E-06**

DOCUMENTATION REPORT
EXPOSURE FACTORS - ADULT

Scenario: RESIDENTIAL
Media: INDOOR AIR
oute of Exposure: Inhalation of Indoor Air
Receptor: ALTERNATE
oxicity Value Applied: INHALATION

	Exposure Factor	*Units*
Intake Rate:	08333	m3/hour
Fraction from Contaminated Source:	1	unitless
Exposure Frequency:	275	days/year
Exposure Time:	18	hours/day
Exposure Duration:	9	years
Body Weight:	70	kg
Averaging Time:	3285	days
Averaging Time (carcinogenic):	25550	days
Human Intake Factor:	1.61 E-01	m3/kgday
Human Intake Factor (carcinogenic):	2.08 E-02	m3/kgday

	Source
Intake Rate:	EPA Region X. Suppl. Guidance for Superfund. 8/91.
Fraction from Contaminated Source:	Assumed
Exposure Frequency:	EPA Region X. Suppl. Guidance for Superfund. 8/91.
Exposure Time:	EPA Region X. Suppl. Guidance for Superfund. 8/91.
Exposure Duration:	EPA Region X. Suppl. Guidance for Superfund. 8/91.
Body Weight:	EPA Std. Default Exposure Factors, 4/91
Averaging Time:	EPA Region X. Suppl. Guidance for Superfund. 8/91
Averaging Time (carcinogenic):	EPA Std. Default Exposure Factors, 4/91

DOCUMENTATION REPORT
EXPOSURE FACTORS - ADULT

Scenario: RESIDENTIAL
Media: INDOOR AIR
Route of Exposure: Inhalation of Indoor Air
Receptor: RME
Toxicity Value Applied: INHALATION

	Exposure Factor	*Units*
Intake Rate:	1.1111	m3/hour
Fraction from Contaminated Source:	1	unitless
Exposure Frequency:	350	days/year
Exposure Time:	18	hours/day
Exposure Duration:	30	years
Body Weight:	70	kg
Averaging Time:	10950	days
Averaging Time (carcinogenic):	25550	days
Human Intake Factor:	2.74 E-01	m3/kgday
Human Intake Factor (carcinogenic):	1.17 E-01	m3/kgday

	Source
Intake Rate:	EPA Std. Default Exposure Factors, 4/91
Fraction from Contaminated Source:	Assumed
Exposure Frequency:	EPA Std. Default Exposure Factors, 4/91
Exposure Time:	EPA Std. Default Exposure Factors, 4/91
Exposure Duration:	EPA Std. Default Exposure Factors, 4/91
Body Weight:	EPA Std. Default Exposure Factors, 4/91
Averaging Time:	EPA Std. Default Exposure Factors, 4/91
Averaging Time (carcinogenic):	EPA Std. Default Exposure Factors, 4/91

RISK REPORT
TOTAL NONCARCINOGENIC AND CARCINOGENIC RISK VIA ROUTE OF EXPOSURE - ADULT

Analyte	ADULT Hazard Index	ADULT Carcinogenic Risk
Scenario: RESIDENTIAL	**Media:** INDOOR AIR	
Route of Exposure: Inhalation of Indoor Air	**Receptor:** RME	
Trichloroethylene	2.69	4.16 E-05
Total Risk:	**2.69**	**4.16 E-05**

RISK REPORT
TOTAL NONCARCINOGENIC AND CARCINOGENIC RISK - ADULT

Route of Exposure	Total Hazard Index	Total Carcinogenic Risk
Scenario: RESIDENTIAL	**Receptor:** ALTERNATE	
Inhalation of Indoor Air	1.59	7.35 E-06
Total Risk:	**1.59**	**7.35 E-06**

RISK REPORT
TOTAL NONCARCINOGENIC AND CARCINOGENIC RISK - ADULT

Route of Exposure	Total Hazard Index	Total Carcinogenic Risk
Scenario: RESIDENTIAL	**Receptor:** RME	
Inhalation of Indoor Air	2.69	4.16 E-05
Total Risk:	**2.69**	**4.16 E-05**

DOCUMENTATION REPORT
TOXICITY VALUE DATABASE

	Analyte	Class	Last Toxicity Value Update	Date Last Checked
9-01-6	Trichloroethylene	Voa	01/01/94	11/29/94

Oral Toxicity Values	Source
ubchronic RfD:	***No Value on IRIS, 1994 or HEAST, 1994***
Chronic RfD: 6.000 E-03	Ro 9 PRG Table - ECAO
Slope Factor: 1.100 E-02	Ro 9 PRG Table - ECAO

Inhalation Toxicity Values	
ubchronic RfD:	***No Value on IRIS, 1994 or HEAST, 1994***
Chronic RfD: 6.000 E-03	Ro 9 PRG Table - ECAO
Slope Factor: 6.000 E-03	Ro 9 PRG Table - ECAO

Dermal Toxicity Values	
ubchronic RfD:	
Chronic RfD:	
Slope Factor:	

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RZ2-R05033.01ID-007

ATKEARNEY

October 16, 1995

Mr. William Buller
U.S. Environmental Protection Agency
Region V - HRE-8J
77 W. Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W4-0006; REPA Work Assignment No. RO5033; EPA ID No. IND044587848, Former Franklin Power Products/ Amphenol Facility, Franklin, Indiana; Draft Inorganic Risk Evaluation and Calculations; Task 02 Deliverable

Dear Mr. Buller:

Please find enclosed a Task 02 deliverable for the above-referenced work assignment prepared in response to your Technical Directive Memo of September 1, 1995. Also enclosed is a diskette containing this information in Word Perfect 5.1 format.

As you requested, the A.T. Kearney Team has completed the risk evaluation for naturally occurring inorganic elements detected on-site and in background samples in order to provide a comparison between site-related risks and risks associated with background concentrations. Carcinogenic risks and noncancer hazard calculations were performed for the 24 naturally occurring inorganic elements detected in soil samples collected from the facility.

This evaluation of risk involved a presentation of calculations which identify the potential risk associated with the high (background) levels of inorganic constituents at the site. The resulting calculations should not be construed as a true "Risk Assessment" but are valuable to aid in defining the sitewide risks associated with the elevated background inorganics concentrations.

Presented in the attached report are the assumptions made, the findings obtained and recommendations. The submittal of this deliverable has been significantly delayed, partially due to questions regarding the scope of this assignment and also scheduling difficulties encountered during the completion of this deliverable once the scope issues were resolved. We apologize for any inconvenience that this may have caused and have taken corrective measures to ensure that this situation does not repeat itself.

Also note that preparation of this deliverable, performed per your request required greater LOE than were estimated for the risk assessment review included as an element of Task 02. The additional LOE will not have an impact upon the funding for this work assignment or the performance of all anticipated activities in the near future. However, depending upon the scope of future activities under this work assignment, additional funding may be required to complete all tasks.

Once again, we apologize for the delay in submitting this deliverable. Please contact me at 312/223-7088 or the A.T. Kearney Work Assignment Manager, Mr. John Koehnen, at 312/223-6253, if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5, w/o att.
W. Jordan, Central Files
J. Koehnen
A. Williams
T. Lentzen, M&E

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FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN , INDIANA
CORRECTIVE ACTION REVIEW AND FIELD OVERSIGHT
IND044587848

REVIEW COMMENTS ON
REVISED CMS REPORT DATED SEPTEMBER 1995

Submitted to:

Mr. William Buller
Work Assignment Manager
U.S. Environmental Protection Agency
Region 5
77 W. Jackson HRE-8J
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Submitted by:

A.T. Kearney, Inc.
222 W. Adams Street
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EPA Work Assignment No.	**: R05033**
Contract No.	**: 68-W4-0006**
A.T. Kearney WAM	**: John Koehnen**
Telephone No.	**: (312)223-6253**
EPA WAM	**: Mr. William Buller**
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October 16, 1995

FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN , INDIANA
CORRECTIVE ACTION REVIEW AND FIELD OVERSIGHT

Introduction

A risk evaluation was performed for naturally occurring inorganic elements detected on-site and in background samples in order to provide a comparison between site-related risks and risks associated with background concentrations. Carcinogenic risk and noncancer hazard calculations were performed for the 24 naturally occurring inorganic elements detected in soil collected from the former Amphenol site in Franklin, Indiana. Risk and hazard calculations were also performed for 17 of the 24 elements which were associated with background soil samples. The risk calculations are presented in Appendix A.

The risk evaluation is based on the following:

- U.S. EPA Risk Assessment Guidance for Superfund (RAGS),
- Volume I [Human Health Evaluation Manual (HHEM)] (U.S. EPA, 1989),
- U.S. EPA HHEM Supplemental Guidance for Standard Exposure Factors (U.S. EPA, 1991); and
- The U.S. EPA Dermal Exposure Assessment: Principles and Applications (U.S. EPA, 1992a).

A reasonable maximum exposure (RME) and a central tendency exposure (CTE) were evaluated. The RME is the maximum exposure reasonably expected to occur at the site (U.S. EPA 1989). The CTE is used to approximate the average estimate of exposure and is derived by using average values for exposure variables.

Data Evaluation Considerations and Uncertainties

The soil samples were collected from borings (monitoring well borings or soil borings) installed around the site. A total of 32 soil samples were collected, three of which were considered to represent background conditions. Samples were collected from depths ranging between 2 to 35 feet below ground surface (bgs). Surface soil (0 to 1 foot) was not sampled. Two of the background samples were collected at 6 feet bgs (MW-24 and MW-20) and the third background sample was collected at 12 feet bgs (MW-20). A comparison of the inorganic concentrations detected in site soil to the inorganic concentrations detected in background soil indicated that the concentrations were similar at the subsurface depths. The range of concentrations detected on-site overlap with the range of concentrations from background locations for most of the inorganic parameters. There is no clear separation between site and background concentrations for inorganics. However, it should also be noted that three background samples may not be sufficient to adequately represent accurate background conditions for the site.

The soil analytical data for the naturally occurring inorganics were provided to M&E in a summary table format. Information concerning sampling locations, data quality, and data qualifier descriptions was not included in the data summary table. M&E assumed that the data were of appropriate quality for use in the risk assessment, and that the types of qualifiers used to describe some of the data were as defined in the U.S. EPA's Contract Laboratory Program (CLP). Exhibit 5-4 of RAGS (U.S. EPA, 1989) was used to determine which data with qualifiers should be used in the risk assessment. Based on Exhibit 5-4 of RAGS, all data were used to determine exposure concentrations for the elements of (potential) concern. It should be noted here that the data with qualifiers indicated uncertainties in concentrations but not in identification.

The uncertainties which may have an impact on the estimates of exposure concentration are identified below:

- Use of subsurface soil samples most often at depths greater than six feet bgs to represent potential concentrations of chemicals of concern related to site history;
- Lack of information concerning soil boring locations which would be helpful to identify problem areas or "hotspots"; and
- Use of the data with qualifiers which indicate that the reported concentrations may be estimates.

Exposure Assumptions

A residential land-use scenario featuring an adult and a child resident is used to characterize potential future activities and exposure assumptions for the site. In such a scenario, exposure is assumed to occur through:

- Soil ingestion;
- Dermal contact with soil; and
- Inhalation of airborne particulates from soil.

The potential exposure to the adult receptor is examined from the perspective of a chronically exposed future resident who lives on-site for a total of 30 years. The child receptor is evaluated based on a six year period, or subchronic exposure duration. Table 1 provides the exposure assumptions.

In order to "bracket" the uncertainty associated with an estimate of exposure concentrations, three different concentration estimates are used for the risk evaluations:

- maximum concentration;
- average concentration; and
- 95 percent upper confidence level (UCL) (U.S. EPA, 1992b).

Table 2 provides a summary of the exposure concentrations. Air concentrations for particulates were predicted using conservative models (Exhibits A and B).

Toxicity Assessment

Toxicity data were obtained from the Integrated Risk Information System (IRIS, 1995) and Health Effects Assessment Summary Tables (HEAST, 1994), and U.S. EPA Environmental Criteria and Assessment Office (ECAO). Toxicity values for the chemicals of concern are provided in Table 3.

Risk Characterization

The risk characterization provides a comparison of the site-related and background risk estimates. The outcome of this comparison is used to determine whether the site-related chemical concentrations may be associated with higher risks than background concentrations. Table 4 provides a summary of the risk and hazard calculations for site-related and background risk evaluations.

Three different comparisons were made, as shown in Table 4, and the results of each comparison are discussed below.

Site 95% UCL vs. Background Maximum

For this comparison, the 95% UCL was used as the exposure concentration for site-related constituents, whereas the maximum concentrations were used for background constituents in conjunction with reasonable maximum exposure assumptions (Table 1). Because the background data contained only 3 sampling locations, spuriously high values resulted when the 95% UCL was derived for the background constituents (Table 2). Therefore, based on professional judgement, the 95% UCLs were considered inappropriate, and maximum concentrations were used instead. Overall, the results indicated that site 95% UCL concentrations were associated with slightly higher risks than background maximum concentrations.

For the residential adult, the site-related total risk was 1E-05, and the total hazard was 0.1. Background total risk was slightly lower at 8E-06, and total hazard was 0.1. For the residential child, the site-related total risk was 2E-05, and the total hazard was 0.7. Background total risk was slightly lower at 1E-05, and total hazard was 0.6.

Ingestion of arsenic and beryllium were associated with the excess carcinogenic risk, as shown in Tables 1 and 4 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related 95% UCL arsenic concentration of 5.8 mg/kg is higher than the background maximum concentration of 4.1 mg/kg. Also, the site-

related 95% UCL beryllium concentration of 1.3 mg/kg is higher than the background maximum beryllium concentration of 0.7 mg/kg.

Site Maximum vs. Background Maximum

For this comparison, the maximum concentrations of both the site-related and background constituents were used in conjunction with RME assumptions (Table 1). Overall, the results indicated that site-related maximum concentrations were associated with higher risks than background maximum concentrations.

For the residential adult, the site-related total risk was 2E-05, and the total hazard was 0.4. Background total risk was slightly lower at 8E-06, and total hazard was 0.1. For the residential child, the site-related total risk was 3E-05, and the total hazard was 1.0. Background total risk was slightly lower at 1E-05, and total hazard was 0.4.

Ingestion of arsenic and beryllium in soil were associated with the excess carcinogenic risk, as shown in Tables 2 and 4 of Attachment 1 of Appendix A. Maximum concentrations for these chemicals are provided in Table 2. The site-related maximum arsenic concentration of 9.5 mg/kg is higher than the background maximum concentration of 4.1 mg/kg. In addition, the site-related maximum beryllium concentration of 1.6 mg/kg is higher than the background maximum beryllium concentration of 0.7 mg/kg.

Site Average vs. Background Average

For this comparison, the average value was used as the exposure concentration for site-related and background constituents in conjunction with central tendency exposure assumptions (Table 1). Overall, the results indicated that the average concentration values for site-related and background concentrations were associated with very similar risks.

For the residential adult, the site-related total risk was 7E-07, and the total hazard was 0.04. Background total risk was slightly lower at 1E-06, and total hazard was 0.03. For the residential child, the site-related total risk was 4E-06, and the total hazard was 0.2. Background total risk was 5E-06, and total hazard was 0.1.

Ingestion of arsenic and beryllium was associated with the excess carcinogenic risk, as shown in Tables 3 and 5 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related average arsenic concentration is 2.4 mg/kg and the background average concentration is 2.9 mg/kg. Also, the site-related average beryllium concentration is 0.4 mg/kg and the background average beryllium concentration is 0.6 mg/kg.

Arsenic and Beryllium Assessment

A comparison of the arsenic and beryllium site-related and background concentrations to U.S. EPA Region 9 residential preliminary remediation goals (PRGs) (U.S. EPA, 1995) was also performed (Table 2). The PRGs for both of these inorganics were exceeded by all site-related and background concentrations.

A comparison of the regional arsenic and beryllium soil concentrations to site concentrations as shown below, indicate that the ranges of concentrations detected on-site are within the ranges determined for Indiana soils.

Element	Site-specific Concentration Range (mg/kg)	North American Soils Indiana Range (a) (mg/kg)
Arsenic	0.76 - 9.5	3.6 - 15 and 2.0 - 4.0
Beryllium	0.21 - 1.6	non-detect - 2.0

(a) Source: Dragun, James and Andrew Chiasson. Elements in North American Soils. Hazardous Materials Control Resources Institute. 1991.

REFERENCES

HEAST. 1994. U.S. Environmental Protection Agency. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-94/020 and supplements.

IRIS. 1995. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS). Office of Health and Environmental Assessment, Washington, DC.

U.S. EPA. 1989. U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual, Part A. Interim final. Office of Solid Waste and Emergency Response. Washington, DC. EPA/540/1-89/002.

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U.S. EPA. 1992a. U.S. Environmental Protection Agency. Dermal Exposure Assessment: Principles and Applications Office of Emergency and Remedial Response by the Office of Health and Environmental Assessment, Washington, DC., January 1992, EPA/600/8-91/011B.

U.S. EPA. 1992b. U.S. Environmental Protection Agency. Supplemental Guidance to RAGs: Calculating the Concentration Term. Office of Solid Waste and Emergency Response. Washington, DC. Publication 9285.7-081. May 1992.

U.S. EPA. 1995. U.S. Environmental Protection Agency. Region 9 Preliminary Remediation Goals (PRGs) First Half 1995, February 1995.

TABLES

Table 1 Summary of Exposure Parameter Values for the Risk Evaluation – Former Amphenol Site

PATHWAY	PARAMETER	UNITS	Residential			
			Child		Adult	
			RME (1)	CTE (2)	RME (1)	CTE (2)
General	Body weight	kg	15 a	15 a	70 a	70 a
	Exposure duration	years	6 c	6 c	30 a	9 a
	Averaging time – noncancer	days	2190 a	2190 a	10950 a	3285 a
	Averaging time – cancer	days	25550 a	25550 a	25550 a	25550 a
Soil Ingestion	Ingestion rate	mg/day	200 a	100 a	100 a	50 e
	Exposure frequency	days/year	350 a	350 a	350	350
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
	Exposure duration	years	6 a	6 a	30 a	9 a
Soil Dermal Contact	Skin surface area available	cm2/day	2010 b	1750 b	5800 b	5000 d
	Soil-to-skin adherence factor	mg/cm2	1 b	1 b	1 b	1 b
	Dermal absorption factor	none	**	**	**	**
	Exposure frequency	days/year	350 a	234 a	350 a	234 a
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
Fugitive Dust Inhalation	Inhalation rate	m3/day	20 d	20 d	20 d	20 d
	Exposure time	hours/day	24 a	24 e	24 a	24 e
	Exposure frequency	days/year	350 a	234 a	350 a	234 a

(1) Reasonable Maximum Exposure (RME) used in conjunction with the maxium and 95% UCL exposure concentrations

(2) Central Tendency Exposure (CTE) used in conjunction with the average exposure concentrations

**Chemical Specific

a. EPA 1993, Superfund's Standard Default Exposure Factors for the Central Tendancy and Reasonable Maximum Exposure of the ingestion rates for residential and commercial adults are for non-contact intensive activities (for contact intensive activities, different ingestion rates are recommended).
The ingestion rate for the residential adult assumes a 30 year chronic adult exposure duration.

b. EPA 1992a, Dermal Exposure Assessmement; for skin surface area during soil and sediment dermal contact, assumes 25% of total body surface area (pp.8-10 and 8-12 of EPA, 1992a)

c. EPA 1989a, Risk Assessment Guidance for Superfund Part A

d. EPA 1989b, Exposure Factors Handbook (EFH); for fugitive dust inhalation rates, values are consistent with EFH values

e. If guidance is not available for the CT but does exist for the RME, the RME value was adopted as the CT.

Table 2 Summary of Comparison of Concentrations Between Site-Specific and Background Data and USEPA Region IX PRGs

INORGANIC	COMPARISON OF CONCENTRATIONS (MG/KG)						USEPA REGION IX RESIDENTIAL PRG (a) (MG/KG)
	AVERAGE		MAXIMUM		95% UCL		
	Site-specific	Background	Site-specific	Background	Site-specific	Background	
Aluminum	3994.2	6273.3	18200.0	15200.0	6393.7	2.1E+10	77000
Antimony	2.6	ND	12.4	ND	6.6	ND	31
Arsenic	2.4	2.9	9.5	4.1	5.8	10.34	0.32
Barium	18.4	38.5	115.0	83.1	46.5	6.6E+08	5300
Beryllium	0.4	0.6	1.6	0.7	1.3	0.94	0.14
Cadmium	0.4	ND	13.2	ND	0.8	ND	38
Calcium	73231.9	36226.7	163000.0	66900.0	294215.8	2.5E+13	NA
Chromium	5.1	8.3	19.4	20.7	15.6	1.6E+15	210 (total), 30 (Cr 6+)
Cobalt	2.2	3.6	11.2	5.4	5.8	29.4	NA
Copper	111.2	10.4	1970.0	14.0	108.2	68.7	2800
Cyanide (total)	1.9	ND	21.6	ND	2.4	ND	1300
Iron	7467.2	10320.0	23000.0	20100.0	10910.9	5.1E+06	NA
Lead	8.0	9.3	52.9	16.5	14.5	470.2	400
Magnesium	24701.7	13606.7	59900.0	20100.0	44119.9	3.6E+07	NA
Manganese	290.4	240.3	1000.0	350.0	445.9	1484.8	380
Mercury	0.1	ND	2.3	ND	0.1	ND	23
Nickel	8.7	10.2	38.3	17.1	14.8	778.4	1500
Potassium	370.7	586.0	1470.0	1120.0	803.7	2.0E+05	NA
Selenium	0.1	ND	0.4	ND	0.3	ND	380
Silver	0.4	ND	1.8	ND	1.1	ND	380
Sodium	56.8	72.8	281.0	117.0	144.1	681.7	NA
Thallium	0.1	ND	0.4	ND	0.3	ND	6.1
Vanadium	7.8	13.1	33.8	27.8	14.8	1.9E+05	540
Zinc	36.8	39.6	91.0	77.3	44.8	15732.9	23000

NA – Not Applicable
ND – Not Detected
PRG – Preliminary Remediation Goal
(a) USEPA Region IX Preliminary Remediation Goals (PRGs) First Half 1995, February 1, 1995.

Table 3 Toxicity Values for Chemicals of Potential Concern at the Former Aliphenol Site

	NONCARCINOGENIC RfDs						CANCER SLOPE FACTORS			
	ORAL RfD (MG/KG/DAY)		ADJUSTED ORAL (DERMAL) (MG/KG/DAY) (a)		INHALATION RfD (MG/KG/DAY)		ORAL SLOPE FACTOR	ADJUSTED ORAL (DERMAL) SLOPE FACTOR (b)	INHALATION SLOPE FACTOR	ORAL ABSORPTION FACTOR
CHEMICAL	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC	(MG/KG/DAY) -1	(MG/KG/DAY) -1	(MG/KG/DAY) -1 (b)	(UNITLESS) (c)
Aluminum	NA	1.0E+00	NA	2.0E-01	NA	NA	NA	NA	NA	0.20
Antimony	4.0E-04	4.0E-04	2.4E-04	2.4E-04	NA	NA	NA	NA	NA	0.60
Arsenic	3.0E-04	3.0E-04	2.8E-04	2.8E-04	NA	NA	1.8E+00	1.9E+00	5.0E+01	0.95
Barium	7.0E-02	7.0E-02	3.5E-03	3.5E-03	1.0E-03	1.0E-04	NA	NA	NA	0.05
Beryllium	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	4.3E+00	4.3E+01	8.4E+00	0.10
Cadmium	NA	5.0E-04	NA	3.5E-05	NA	NA	NA	NA	6.1E+00	0.07
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Chromium (total)(e)	2.0E-02	5.0E-03	1.0E-02	2.5E-03	NA	NA	NA	NA	4.2E+01	0.50
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Copper	NA	4.0E-02	NA	4.0E-02	NA	NA	NA	NA	NA	0.99
Cyanide (total)	2.0E-02	2.0E-02	1.4E-02	1.4E-02	NA	NA	NA	NA	NA	0.70
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Manganese	1.4E-01	1.4E-01	5.6E-03	5.6E-03	1.0E-04	1.0E-04	NA	NA	NA	0.04
Mercury	3.0E-04	3.0E-04	4.5E-05	4.5E-05	8.6E-05	8.6E-05	NA	NA	NA	0.15
Nickel	2.0E-02	2.0E-02	2.0E-03	2.0E-03	NA	NA	NA	NA	8.4E-01	0.10
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Selenium	5.0E-03	5.0E-03	4.9E-03	4.9E-03	NA	NA	NA	NA	NA	0.97
Silver	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	NA	NA	NA	0.10
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Thallium (Thallium chloride)**	8.0E-04	8.0E-05	8.0E-05	8.0E-06	NA	NA	NA	NA	NA	0.10
Vanadium	7.0E-03	7.0E-03	7.0E-05	7.0E-05	NA	NA	NA	NA	NA	0.01
Zinc	3.0E-01	3.0E-01	9.0E-02	9.0E-02	NA	NA	NA	NA	NA	0.30

Sources: U.S. EPA. Integrated Risk Information System (IRIS) database accessed May 1995.
U.S. EPA Health Effects Assessment Tables (HEAST), Annual FY-1994 edition(Heast, 1994).

*Region IV default oral absorption factors were used when necessary and are as follows: VOCs – 0.80, SVOCs – 0.50, inorganics – 0.20.

**Toxicity values for thallium chloride were used to calculate risk and hazard values for thallium.

NA – Toxicity values (RfD/CSF) not available from IRIS, HEAST, scientific literature, USEPA nor OhioEPA for risk evaluation.

(a) Adjusted oral toxicity values used for calculation of dermal hazards.
Adjustment of an administered to an absorbed dose RfD:
(Administered RfD) x (Oral Absorption Factor) = Absorbed Dose RfD.

(b) Adjusted oral toxicity values used for calculation of dermal risks.
Adjustment of an administered to an absorbed dose CSF:
(Administered CSF) = 1 / (Oral Absorption Factor) = Absorbed Dose CSF

(c) Oral absorption factors from chemical-specific Toxicological Profiles, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service.

(d) As a conservative measure, total chromium utilizes hexavalent chromium toxicity values.

Table 4 Summary of Risk and Hazard Calculations for the Former Amphenol Site

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	9E-06	8E-02	6E-06	6E-02
	Dermal	2E-06	4E-02	1E-06	5E-02
	Inhalation	8E-07	9E-03	9E-07	8E-03
Total		1E-05	1E-01	8E-06	1E-01
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	2E-05	6E-01	1E-05	5E-01
	Dermal	7E-07	5E-02	4E-07	7E-02
	Inhalation	7E-07	4E-02	8E-07	3E-02
Total		2E-05	7E-01	1E-05	6E-01
RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	1E-05	3E-01	6E-06	6E-02
	Dermal	3E-06	1E-01	1E-06	5E-02
	Inhalation	1E-06	2E-02	9E-07	8E-03
Total		2E-05	4E-01	8E-06	1E-01
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-05	1E+00	1E-05	3E-01
	Dermal	1E-06	1E-01	4E-07	7E-02
	Inhalation	1E-06	9E-02	8E-07	3E-02
Total		3E-05	1E+00	1E-05	4E-01
RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	6E-07	2E-02	7E-07	2E-02
	Dermal	1E-07	1E-02	2E-07	1E-02
	Inhalation	6E-08	4E-03	8E-08	4E-03
Total		7E-07	4E-02	1E-06	3E-02
RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-06	1E-01	4E-06	1E-01
	Dermal	2E-07	1E-02	2E-07	2E-02
	Inhalation	2E-07	2E-02	3E-07	1E-02
Total		4E-06	2E-01	5E-06	1E-01

APPENDIX A

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.39E+03	100	1.0E-06	1.0	350	30	70	25550	3.75E-03	NA	ND
Antimony	6.55E+00	100	1.0E-06	1.0	350	30	70	25550	3.85E-06	NA	ND
Arsenic	5.76E+00	100	1.0E-06	1.0	350	30	70	25550	3.38E-06	1.80E+00	6.09E-06
Barium	4.65E+01	100	1.0E-06	1.0	350	30	70	25550	2.73E-05	NA	ND
Beryllium	1.28E+00	100	1.0E-06	1.0	350	30	70	25550	7.50E-07	4.30E+00	3.23E-06
Cadmium	7.58E-01	100	1.0E-06	1.0	350	30	70	25550	4.45E-07	NA	ND
Calcium	2.94E+05	100	1.0E-06	1.0	350	30	70	25550	1.73E-01	NA	ND
Chromium	1.56E+01	100	1.0E-06	1.0	350	30	70	25550	9.17E-06	NA	ND
Cobalt	5.77E+00	100	1.0E-06	1.0	350	30	70	25550	3.39E-06	NA	ND
Copper	1.08E+02	100	1.0E-06	1.0	350	30	70	25550	6.35E-05	NA	ND
Cyanide (total)	2.39E+00	100	1.0E-06	1.0	350	30	70	25550	1.40E-06	NA	ND
Iron	1.09E+04	100	1.0E-06	1.0	350	30	70	25550	6.41E-03	NA	ND
Lead	1.45E+01	100	1.0E-06	1.0	350	30	70	25550	8.53E-06	NA	ND
Magnesium	4.41E+04	100	1.0E-06	1.0	350	30	70	25550	2.59E-02	NA	ND
Manganese	4.46E+02	100	1.0E-06	1.0	350	30	70	25550	2.62E-04	NA	ND
Mercury	1.06E-01	100	1.0E-06	1.0	350	30	70	25550	6.23E-08	NA	ND
Nickel	1.48E+01	100	1.0E-06	1.0	350	30	70	25550	8.67E-06	NA	ND
Potassium	8.04E+02	100	1.0E-06	1.0	350	30	70	25550	4.72E-04	NA	ND
Selenium	2.69E-01	100	1.0E-06	1.0	350	30	70	25550	1.58E-07	NA	ND
Silver	1.09E+00	100	1.0E-06	1.0	350	30	70	25550	6.39E-07	NA	ND
Sodium	1.44E+02	100	1.0E-06	1.0	350	30	70	25550	8.46E-05	NA	ND
Thallium	2.87E-01	100	1.0E-06	1.0	350	30	70	25550	1.68E-07	NA	ND
Vanadium	1.48E+01	100	1.0E-06	1.0	350	30	70	25550	8.66E-06	NA	ND
Zinc	4.48E+01	100	1.0E-06	1.0	350	30	70	25550	2.63E-05	NA	ND
										TOTAL RISK	9.31E-06

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	100	1.0E-06	1.0	350	30	70	10950	8.76E-03	1.00E+00	8.76E-03
Antimony	6.55E+00	100	1.0E-06	1.0	350	30	70	10950	8.97E-06	4.00E-04	2.24E-02
Arsenic	5.76E+00	100	1.0E-06	1.0	350	30	70	10950	7.89E-06	3.00E-04	2.63E-02
Barium	4.65E+01	100	1.0E-06	1.0	350	30	70	10950	6.36E-05	7.00E-02	9.09E-04
Beryllium	1.28E+00	100	1.0E-06	1.0	350	30	70	10950	1.75E-06	5.00E-03	3.50E-04
Cadmium	7.58E-01	100	1.0E-06	1.0	350	30	70	10950	1.04E-06	5.00E-04	2.08E-03
Calcium	2.94E+05	100	1.0E-06	1.0	350	30	70	10950	4.03E-01	NA	ND
Chromium	1.56E+01	100	1.0E-06	1.0	350	30	70	10950	2.14E-05	5.00E-03	4.28E-03
Cobalt	5.77E+00	100	1.0E-06	1.0	350	30	70	10950	7.91E-06	NA	ND
Copper	1.08E+02	100	1.0E-06	1.0	350	30	70	10950	1.48E-04	4.00E-02	3.71E-03
Cyanide (total)	2.39E+00	100	1.0E-06	1.0	350	30	70	10950	3.27E-06	2.00E-02	1.64E-04
Iron	1.09E+04	100	1.0E-06	1.0	350	30	70	10950	1.49E-02	NA	ND
Lead	1.45E+01	100	1.0E-06	1.0	350	30	70	10950	1.99E-05	NA	ND
Magnesium	4.41E+04	100	1.0E-06	1.0	350	30	70	10950	6.04E-02	NA	ND
Manganese	4.46E+02	100	1.0E-06	1.0	350	30	70	10950	6.11E-04	1.40E-01	4.36E-03
Mercury	1.06E-01	100	1.0E-06	1.0	350	30	70	10950	1.45E-07	3.00E-04	4.84E-04
Nickel	1.48E+01	100	1.0E-06	1.0	350	30	70	10950	2.02E-05	2.00E-02	1.01E-03
Potassium	8.04E+02	100	1.0E-06	1.0	350	30	70	10950	1.10E-03	NA	ND
Selenium	2.69E-01	100	1.0E-06	1.0	350	30	70	10950	3.69E-07	5.00E-03	7.37E-05
Silver	1.09E+00	100	1.0E-06	1.0	350	30	70	10950	1.49E-06	5.00E-03	2.98E-04
Sodium	1.44E+02	100	1.0E-06	1.0	350	30	70	10950	1.97E-04	NA	ND
Thallium	2.87E-01	100	1.0E-06	1.0	350	30	70	10950	3.93E-07	8.00E-05	4.91E-03
Vanadium	1.48E+01	100	1.0E-06	1.0	350	30	70	10950	2.03E-05	7.00E-03	2.89E-03
Zinc	4.48E+01	100	1.0E-06	1.0	350	30	70	10950	6.14E-05	3.00E-01	2.05E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 8.32E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	6.39E+03	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.18E–04	NA	ND
Antimony	6.55E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.23E–07	NA	ND
Arsenic	5.76E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.96E–07	1.89E+00	3.71E–07
Barium	4.65E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.58E–06	NA	ND
Beryllium	1.28E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	4.35E–08	4.30E+01	1.87E–06
Cadmium	7.58E–01	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.58E–08	NA	ND
Calcium	2.94E+05	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.00E–02	NA	ND
Chromium	1.56E+01	1.0E–08	5800	1.00	0.001	350	30	70	25550	5.32E–07	NA	ND
Cobalt	5.77E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.97E–07	NA	ND
Copper	1.08E+02	1.0E–06	5800	1.00	0.001	350	30	70	25550	3.68E–06	NA	ND
Cyanide (total)	2.39E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	8.14E–08	NA	ND
Iron	1.09E+04	1.0E–08	5800	1.00	0.001	350	30	70	25550	3.72E–04	NA	ND
Lead	1.45E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	4.95E–07	NA	ND
Magnesium	4.41E+04	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.50E–03	NA	ND
Manganese	4.46E+02	1.0E–08	5800	1.00	0.001	350	30	70	25550	1.52E–05	NA	ND
Mercury	1.06E–01	1.0E–06	5800	1.00	0.001	350	30	70	25550	3.61E–09	NA	ND
Nickel	1.48E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	5.03E–07	NA	ND
Potassium	8.04E+02	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.74E–05	NA	ND
Selenium	2.69E–01	1.0E–06	5800	1.00	0.001	350	30	70	25550	9.16E–09	NA	ND
Silver	1.09E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	3.71E–08	NA	ND
Sodium	1.44E+02	1.0E–06	5800	1.00	0.001	350	30	70	25550	4.91E–06	NA	ND
Thallium	2.87E–01	1.0E–06	5800	1.00	0.001	350	30	70	25550	9.76E–09	NA	ND
Vanadium	1.48E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	5.04E–07	NA	ND
Zinc	4.48E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.53E–06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.24E–06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.08E-04	2.00E-01	2.54E-03
Antimony	6.55E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.20E-07	2.40E-04	2.17E-03
Arsenic	5.76E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.58E-07	2.85E-04	1.61E-03
Barium	4.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.69E-06	3.50E-03	1.05E-03
Beryllium	1.28E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.02E-07	5.00E-04	2.03E-04
Cadmium	7.58E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.02E-08	3.50E-05	1.72E-03
Calcium	2.94E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.34E-02	NA	ND
Chromium	1.56E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.24E-06	2.50E-03	4.96E-04
Cobalt	5.77E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.59E-07	NA	ND
Copper	1.08E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.60E-06	3.96E-02	2.17E-04
Cyanide (total)	2.39E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.90E-07	1.40E-02	1.36E-05
Iron	1.09E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.67E-04	NA	ND
Lead	1.45E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.15E-06	NA	ND
Magnesium	4.41E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.51E-03	NA	ND
Manganese	4.46E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.54E-05	5.60E-03	6.33E-03
Mercury	1.06E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.43E-09	4.50E-05	1.87E-04
Nickel	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.17E-06	2.00E-03	5.87E-04
Potassium	8.04E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.39E-05	NA	ND
Selenium	2.69E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.14E-08	4.85E-03	4.41E-06
Silver	1.09E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.65E-08	5.00E-04	1.73E-04
Sodium	1.44E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.15E-05	NA	ND
Thallium	2.87E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.28E-08	8.00E-06	2.85E-03
Vanadium	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.18E-06	7.00E-05	1.68E-02
Zinc	4.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.56E-06	9.00E-02	3.96E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 3.70E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.50E-05	0.83	24	350	30	70	25550	5.27E-06	NA	ND
Antimony	4.61E-08	0.83	24	350	30	70	25550	5.40E-09	NA	ND
Arsenic	4.06E-08	0.83	24	350	30	70	25550	4.75E-09	5.00E+01	2.37E-07
Barium	3.27E-07	0.83	24	350	30	70	25550	3.83E-08	NA	ND
Beryllium	9.01E-09	0.83	24	350	30	70	25550	1.05E-09	8.40E+00	8.85E-09
Cadmium	5.34E-09	0.83	24	350	30	70	25550	6.24E-10	6.10E+00	3.81E-09
Calcium	2.07E-03	0.83	24	350	30	70	25550	2.42E-04	NA	ND
Chromium	1.10E-07	0.83	24	350	30	70	25550	1.29E-08	4.20E+01	5.40E-07
Cobalt	4.07E-08	0.83	24	350	30	70	25550	4.76E-09	NA	ND
Copper	7.62E-07	0.83	24	350	30	70	25550	8.92E-08	NA	ND
Cyanide (total)	1.68E-08	0.83	24	350	30	70	25550	1.97E-09	NA	ND
Iron	7.69E-05	0.83	24	350	30	70	25550	8.99E-06	NA	ND
Lead	1.02E-07	0.83	24	350	30	70	25550	1.20E-08	NA	ND
Magnesium	3.11E-04	0.83	24	350	30	70	25550	3.64E-05	NA	ND
Manganese	3.14E-06	0.83	24	350	30	70	25550	3.67E-07	NA	ND
Mercury	7.47E-10	0.83	24	350	30	70	25550	8.74E-11	NA	ND
Nickel	1.04E-07	0.83	24	350	30	70	25550	1.22E-08	8.40E-01	1.02E-08
Potassium	5.66E-06	0.83	24	350	30	70	25550	6.62E-07	NA	ND
Selenium	1.90E-09	0.83	24	350	30	70	25550	2.22E-10	NA	ND
Silver	7.67E-09	0.83	24	350	30	70	25550	8.97E-10	NA	ND
Sodium	1.02E-08	0.83	24	350	30	70	25550	1.19E-07	NA	ND
Thallium	2.02E-09	0.83	24	350	30	70	25550	2.36E-10	NA	ND
Vanadium	1.04E-07	0.83	24	350	30	70	25550	1.22E-08	NA	ND
Zinc	3.16E-07	0.83	24	350	30	70	25550	3.69E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK **8.01E-07**

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.50E-05	0.83	24	350	30	70	10950	1.23E-05	NA	ND
Antimony	4.61E-08	0.83	24	350	30	70	10950	1.26E-08	NA	ND
Arsenic	4.06E-08	0.83	24	350	30	70	10950	1.11E-08	NA	ND
Barium	3.27E-07	0.83	24	350	30	70	10950	8.93E-08	1.00E-04	8.93E-04
Beryllium	9.01E-09	0.83	24	350	30	70	10950	2.46E-09	NA	ND
Cadmium	5.34E-09	0.83	24	350	30	70	10950	1.46E-09	NA	ND
Calcium	2.07E-03	0.83	24	350	30	70	10950	5.66E-04	NA	ND
Chromium	1.10E-07	0.83	24	350	30	70	10950	3.00E-08	NA	ND
Cobalt	4.07E-08	0.83	24	350	30	70	10950	1.11E-08	NA	ND
Copper	7.62E-07	0.83	24	350	30	70	10950	2.08E-07	NA	ND
Cyanide (total)	1.68E-08	0.83	24	350	30	70	10950	4.60E-09	NA	ND
Iron	7.69E-05	0.83	24	350	30	70	10950	2.10E-05	NA	ND
Lead	1.02E-07	0.83	24	350	30	70	10950	2.79E-08	NA	ND
Magnesium	3.11E-04	0.83	24	350	30	70	10950	8.48E-05	NA	ND
Manganese	3.14E-06	0.83	24	350	30	70	10950	8.57E-07	1.00E-04	8.57E-03
Mercury	7.47E-10	0.83	24	350	30	70	10950	2.04E-10	8.60E-05	2.37E-06
Nickel	1.04E-07	0.83	24	350	30	70	10950	2.84E-08	NA	ND
Potassium	5.66E-06	0.83	24	350	30	70	10950	1.55E-06	NA	ND
Selenium	1.90E-09	0.83	24	350	30	70	10950	5.17E-10	NA	ND
Silver	7.67E-09	0.83	24	350	30	70	10950	2.09E-09	NA	ND
Sodium	1.02E-06	0.83	24	350	30	70	10950	2.77E-07	NA	ND
Thallium	2.02E-09	0.83	24	350	30	70	10950	5.51E-10	NA	ND
Vanadium	1.04E-07	0.83	24	350	30	70	10950	2.84E-08	NA	ND
Zinc	3.16E-07	0.83	24	350	30	70	10950	8.62E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.47E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	6.39E+03	200	1.0E–06	1.0	350	6	15	25550	7.01E–03	NA	ND
Antimony	6.55E+00	200	1.0E–06	1.0	350	6	15	25550	7.18E–06	NA	ND
Arsenic	5.76E+00	200	1.0E–06	1.0	350	6	15	25550	6.31E–06	1.80E+00	1.14E–05
Barium	4.65E+01	200	1.0E–06	1.0	350	6	15	25550	5.09E–05	NA	ND
Beryllium	1.26E+00	200	1.0E–06	1.0	350	6	15	25550	1.40E–06	4.30E+00	6.02E–06
Cadmium	7.58E–01	200	1.0E–06	1.0	350	6	15	25550	8.30E–07	NA	ND
Calcium	2.94E+05	200	1.0E–06	1.0	350	6	15	25550	3.22E–01	NA	ND
Chromium	1.56E+01	200	1.0E–06	1.0	350	6	15	25550	1.71E–05	NA	ND
Cobalt	5.77E+00	200	1.0E–06	1.0	350	6	15	25550	6.33E–06	NA	ND
Copper	1.08E+02	200	1.0E–06	1.0	350	6	15	25550	1.19E–04	NA	ND
Cyanide (total)	2.39E+00	200	1.0E–06	1.0	350	6	15	25550	2.62E–06	NA	ND
Iron	1.09E+04	200	1.0E–06	1.0	350	6	15	25550	1.20E–02	NA	ND
Lead	1.45E+01	200	1.0E–06	1.0	350	6	15	25550	1.59E–05	NA	ND
Magnesium	4.41E+04	200	1.0E–06	1.0	350	6	15	25550	4.84E–02	NA	ND
Manganese	4.46E+02	200	1.0E–06	1.0	350	6	15	25550	4.89E–04	NA	ND
Mercury	1.06E–01	200	1.0E–06	1.0	350	6	15	25550	1.16E–07	NA	ND
Nickel	1.48E+01	200	1.0E–06	1.0	350	6	15	25550	1.62E–05	NA	ND
Potassium	8.04E+02	200	1.0E–06	1.0	350	6	15	25550	8.81E–04	NA	ND
Selenium	2.69E–01	200	1.0E–06	1.0	350	6	15	25550	2.95E–07	NA	ND
Silver	1.09E+00	200	1.0E–06	1.0	350	6	15	25550	1.19E–06	NA	ND
Sodium	1.44E+02	200	1.0E–06	1.0	350	6	15	25550	1.58E–04	NA	ND
Thallium	2.87E–01	200	1.0E–06	1.0	350	6	15	25550	3.14E–07	NA	ND
Vanadium	1.48E+01	200	1.0E–06	1.0	350	6	15	25550	1.62E–05	NA	ND
Zinc	4.48E+01	200	1.0E–06	1.0	350	6	15	25550	4.91E–05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.74E–05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	200	1.0E-06	1.0	350	6	15	2190	8.17E-02	NA	ND
Antimony	6.55E+00	200	1.0E-06	1.0	350	6	15	2190	8.37E-05	4.00E-04	2.09E-01
Arsenic	5.76E+00	200	1.0E-06	1.0	350	6	15	2190	7.36E-05	3.00E-04	2.45E-01
Barium	4.65E+01	200	1.0E-06	1.0	350	6	15	2190	5.94E-04	7.00E-02	8.49E-03
Beryllium	1.28E+00	200	1.0E-06	1.0	350	6	15	2190	1.63E-05	5.00E-03	3.27E-03
Cadmium	7.58E-01	200	1.0E-06	1.0	350	6	15	2190	9.69E-06	NA	ND
Calcium	2.94E+05	200	1.0E-06	1.0	350	6	15	2190	3.76E+00	NA	ND
Chromium	1.56E+01	200	1.0E-06	1.0	350	6	15	2190	2.00E-04	2.00E-02	9.98E-03
Cobalt	5.77E+00	200	1.0E-06	1.0	350	6	15	2190	7.38E-05	NA	ND
Copper	1.08E+02	200	1.0E-06	1.0	350	6	15	2190	1.38E-03	NA	ND
Cyanide (total)	2.39E+00	200	1.0E-06	1.0	350	6	15	2190	3.06E-05	2.00E-02	1.53E-03
Iron	1.09E+04	200	1.0E-06	1.0	350	6	15	2190	1.39E-01	NA	ND
Lead	1.45E+01	200	1.0E-06	1.0	350	6	15	2190	1.86E-04	NA	ND
Magnesium	4.41E+04	200	1.0E-06	1.0	350	6	15	2190	5.64E-01	NA	ND
Manganese	4.46E+02	200	1.0E-06	1.0	350	6	15	2190	5.70E-03	1.40E-01	4.07E-02
Mercury	1.06E-01	200	1.0E-06	1.0	350	6	15	2190	1.36E-06	3.00E-04	4.52E-03
Nickel	1.48E+01	200	1.0E-06	1.0	350	6	15	2190	1.89E-04	2.00E-02	9.44E-03
Potassium	8.04E+02	200	1.0E-06	1.0	350	6	15	2190	1.03E-02	NA	ND
Selenium	2.69E-01	200	1.0E-06	1.0	350	6	15	2190	3.44E-06	5.00E-03	6.88E-04
Silver	1.09E+00	200	1.0E-06	1.0	350	6	15	2190	1.39E-05	5.00E-03	2.79E-03
Sodium	1.44E+02	200	1.0E-06	1.0	350	6	15	2190	1.84E-03	NA	ND
Thallium	2.87E-01	200	1.0E-06	1.0	350	6	15	2190	3.67E-06	8.00E-04	4.58E-03
Vanadium	1.48E+01	200	1.0E-06	1.0	350	6	15	2190	1.89E-04	7.00E-03	2.70E-02
Zinc	4.48E+01	200	1.0E-06	1.0	350	6	15	2190	5.73E-04	3.00E-01	1.91E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.70E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.39E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	7.04E-05	NA	ND
Antimony	6.55E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	7.21E-08	NA	ND
Arsenic	5.76E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	6.34E-08	1.89E+00	1.20E-07
Barium	4.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.12E-07	NA	ND
Beryllium	1.28E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.41E-08	4.30E+01	6.05E-07
Cadmium	7.58E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	8.35E-09	NA	ND
Calcium	2.94E+05	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.24E-03	NA	ND
Chromium	1.56E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.72E-07	NA	ND
Cobalt	5.77E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	6.36E-08	NA	ND
Copper	1.08E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.19E-06	NA	ND
Cyanide (total)	2.39E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.63E-08	NA	ND
Iron	1.09E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.20E-04	NA	ND
Lead	1.45E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.60E-07	NA	ND
Magnesium	4.41E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.86E-04	NA	ND
Manganese	4.46E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.91E-06	NA	ND
Mercury	1.06E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.17E-09	NA	ND
Nickel	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.63E-07	NA	ND
Potassium	8.04E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	8.85E-06	NA	ND
Selenium	2.69E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.96E-09	NA	ND
Silver	1.09E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.20E-08	NA	ND
Sodium	1.44E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.59E-06	NA	ND
Thallium	2.87E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.16E-09	NA	ND
Vanadium	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.63E-07	NA	ND
Zinc	4.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.94E-07	NA	ND

TOTAL RISK 7.25E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RID (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.22E-04	NA	ND
Antimony	6.55E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.42E-07	2.40E-04	3.51E-03
Arsenic	5.76E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.40E-07	2.85E-04	2.60E-03
Barium	4.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.97E-06	3.50E-03	1.71E-03
Beryllium	1.28E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.64E-07	5.00E-04	3.28E-04
Cadmium	7.58E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	9.74E-08	NA	ND
Calcium	2.94E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.78E-02	NA	ND
Chromium	1.56E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.01E-06	1.00E-02	2.01E-04
Cobalt	5.77E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.42E-07	NA	ND
Copper	1.08E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.39E-05	NA	ND
Cyanide (total)	2.39E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.07E-07	1.40E-02	2.19E-05
Iron	1.09E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.40E-03	NA	ND
Lead	1.45E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.87E-06	NA	ND
Magnesium	4.41E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.67E-03	NA	ND
Manganese	4.46E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.73E-05	5.60E-03	1.02E-02
Mercury	1.06E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.36E-08	4.50E-05	3.03E-04
Nickel	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.90E-06	2.00E-03	9.49E-04
Potassium	8.04E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.03E-04	NA	ND
Selenium	2.69E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.46E-08	4.85E-03	7.13E-06
Silver	1.09E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.40E-07	5.00E-04	2.80E-04
Sodium	1.44E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.85E-05	NA	ND
Thallium	2.87E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.68E-08	8.00E-05	4.60E-04
Vanadium	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.90E-06	7.00E-05	2.72E-02
Zinc	4.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.76E-06	9.00E-02	6.40E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 4.78E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.50E-05	0.83	24	350	6	15	25550	4.92E-06 NA		ND
Antimony	4.61E-08	0.83	24	350	6	15	25550	5.04E-09 NA		ND
Arsenic	4.06E-08	0.83	24	350	6	15	25550	4.43E-09	5.00E+01	2.21E-07
Barium	3.27E-07	0.83	24	350	6	15	25550	3.57E-08 NA		ND
Beryllium	9.01E-09	0.83	24	350	6	15	25550	9.83E-10	8.40E+00	8.26E-09
Cadmium	5.34E-09	0.83	24	350	6	15	25550	5.83E-10	6.10E+00	3.55E-09
Calcium	2.07E-03	0.83	24	350	6	15	25550	2.26E-04 NA		ND
Chromium	1.10E-07	0.83	24	350	6	15	25550	1.20E-08	4.20E+01	5.04E-07
Cobalt	4.07E-08	0.83	24	350	6	15	25550	4.44E-09 NA		ND
Copper	7.62E-07	0.83	24	350	6	15	25550	8.32E-08 NA		ND
Cyanide (total)	1.68E-08	0.83	24	350	6	15	25550	1.84E-09 NA		ND
Iron	7.69E-05	0.83	24	350	6	15	25550	8.39E-06 NA		ND
Lead	1.02E-07	0.83	24	350	6	15	25550	1.12E-08 NA		ND
Magnesium	3.11E-04	0.83	24	350	6	15	25550	3.39E-05 NA		ND
Manganese	3.14E-06	0.83	24	350	6	15	25550	3.43E-07 NA		ND
Mercury	7.47E-10	0.83	24	350	6	15	25550	8.16E-11 NA		ND
Nickel	1.04E-07	0.83	24	350	6	15	25550	1.14E-08	8.40E-01	9.54E-09
Potassium	5.66E-06	0.83	24	350	6	15	25550	6.18E-07 NA		ND
Selenium	1.90E-09	0.83	24	350	6	15	25550	2.07E-10 NA		ND
Silver	7.67E-09	0.83	24	350	6	15	25550	8.38E-10 NA		ND
Sodium	1.02E-06	0.83	24	350	6	15	25550	1.11E-07 NA		ND
Thallium	2.02E-09	0.83	24	350	6	15	25550	2.20E-10 NA		ND
Vanadium	1.04E-07	0.83	24	350	6	15	25550	1.14E-08 NA		ND
Zinc	3.16E-07	0.83	24	350	6	15	25550	3.45E-08 NA		ND
									TOTAL RISK	7.47E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.50E-05	0.83	24	350	6	15	2190	5.74E-05	NA	ND
Antimony	4.61E-06	0.83	24	350	6	15	2190	5.88E-06	NA	ND
Arsenic	4.06E-06	0.83	24	350	6	15	2190	5.17E-06	NA	ND
Barium	3.27E-07	0.83	24	350	6	15	2190	4.17E-07	1.00E-03	4.17E-04
Beryllium	9.01E-09	0.83	24	350	6	15	2190	1.15E-06	NA	ND
Cadmium	5.34E-09	0.83	24	350	6	15	2190	6.80E-09	NA	ND
Calcium	2.07E-03	0.83	24	350	6	15	2190	2.64E-03	NA	ND
Chromium	1.10E-07	0.83	24	350	6	15	2190	1.40E-07	NA	ND
Cobalt	4.07E-06	0.83	24	350	6	15	2190	5.18E-06	NA	ND
Copper	7.62E-07	0.83	24	350	6	15	2190	9.71E-07	NA	ND
Cyanide (total)	1.68E-06	0.83	24	350	6	15	2190	2.14E-06	NA	ND
Iron	7.69E-05	0.83	24	350	6	15	2190	9.79E-05	NA	ND
Lead	1.02E-07	0.83	24	350	6	15	2190	1.30E-07	NA	ND
Magnesium	3.11E-04	0.83	24	350	6	15	2190	3.96E-04	NA	ND
Manganese	3.14E-06	0.83	24	350	6	15	2190	4.00E-06	1.00E-04	4.00E-02
Mercury	7.47E-10	0.83	24	350	6	15	2190	9.52E-10	8.60E-05	1.11E-05
Nickel	1.04E-07	0.83	24	350	6	15	2190	1.32E-07	NA	ND
Potassium	5.66E-06	0.83	24	350	6	15	2190	7.21E-06	NA	ND
Selenium	1.90E-09	0.83	24	350	6	15	2190	2.41E-09	NA	ND
Silver	7.67E-09	0.83	24	350	6	15	2190	9.77E-09	NA	ND
Sodium	1.02E-06	0.83	24	350	6	15	2190	1.29E-06	NA	ND
Thallium	2.02E-09	0.83	24	350	6	15	2190	2.57E-09	NA	ND
Vanadium	1.04E-07	0.83	24	350	6	15	2190	1.33E-07	NA	ND
Zinc	3.16E-07	0.83	24	350	6	15	2190	4.02E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 4.04E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	100	1.0E-06	1.0	350	30	70	25550	1.07E-02	NA	ND
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	25550	7.28E-06	NA	ND
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	25550	5.58E-06	1.80E+00	1.00E-05
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	25550	6.75E-05	NA	ND
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	25550	9.39E-07	4.30E+00	4.04E-06
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	25550	7.75E-06	NA	ND
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	25550	9.57E-02	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	25550	1.14E-05	NA	ND
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	25550	6.58E-06	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	25550	1.16E-03	NA	ND
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	25550	1.27E-05	NA	ND
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	25550	1.35E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	25550	3.11E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	25550	3.52E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	25550	5.87E-04	NA	ND
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	25550	1.35E-06	NA	ND
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	25550	2.25E-05	NA	ND
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	25550	8.63E-04	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	25550	2.58E-07	NA	ND
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	25550	1.06E-06	NA	ND
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	25550	1.65E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	25550	2.47E-07	NA	ND
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	25550	1.98E-05	NA	ND
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	25550	5.34E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.41E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	100	1.0E-06	1.0	350	30	70	10950	2.49E-02	1.00E+00	2.49E-02
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	10950	1.70E-05	4.00E-04	4.25E-02
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	10950	1.30E-05	3.00E-04	4.34E-02
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	10950	1.58E-04	7.00E-02	2.25E-03
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	10950	2.19E-06	5.00E-03	4.38E-04
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	10950	1.81E-05	5.00E-04	3.62E-02
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	10950	2.23E-01	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	10950	2.66E-05	5.00E-03	5.32E-03
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	10950	1.53E-05	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	10950	2.70E-03	4.00E-02	6.75E-02
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	10950	2.96E-05	2.00E-02	1.48E-03
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	10950	3.15E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	10950	7.25E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	10950	8.21E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	10950	1.37E-03	1.40E-01	9.78E-03
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	10950	3.15E-06	3.00E-04	1.05E-02
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	10950	5.25E-05	2.00E-02	2.62E-03
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	10950	2.01E-03	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	10950	6.03E-07	5.00E-03	1.21E-04
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	10950	2.47E-06	5.00E-03	4.93E-04
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	10950	3.85E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	10950	5.75E-07	8.00E-05	7.19E-03
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	10950	4.63E-05	7.00E-03	6.61E-03
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	10950	1.25E-04	3.00E-01	4.16E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.62E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.20E-04	NA	ND
Antimony	1.24E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.22E-07	NA	ND
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.23E-07	1.89E+00	6.11E-07
Barium	1.15E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.92E-06	NA	ND
Beryllium	1.60E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.45E-08	4.30E+01	2.34E-06
Cadmium	1.32E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.49E-07	NA	ND
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.55E-03	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.61E-07	NA	ND
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.81E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.71E-05	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.35E-07	NA	ND
Iron	2.30E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.83E-04	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.80E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.04E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.41E-05	NA	ND
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.83E-08	NA	ND
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.30E-06	NA	ND
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.01E-05	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.50E-08	NA	ND
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.13E-08	NA	ND
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.57E-06	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.43E-08	NA	ND
Vanadium	3.38E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.15E-06	NA	ND
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.10E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.95E-06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.45E-03	2.00E-01	7.23E-03
Antimony	1.24E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.85E-07	2.40E-04	4.11E-03
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.55E-07	2.85E-04	2.65E-03
Barium	1.15E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.14E-06	3.50E-03	2.61E-03
Beryllium	1.60E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.27E-07	5.00E-04	2.54E-04
Cadmium	1.32E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.05E-06	3.50E-05	3.00E-02
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.30E-02	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.54E-06	2.50E-03	6.17E-04
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.90E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.57E-04	3.98E-02	3.95E-03
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.72E-06	1.40E-02	1.23E-04
Iron	2.30E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-03	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.20E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.76E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.95E-05	5.60E-03	1.42E-02
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-07	4.50E-05	4.06E-03
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.04E-06	2.00E-03	1.52E-03
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.17E-04	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.50E-08	4.85E-03	7.21E-06
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.43E-07	5.00E-04	2.86E-04
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.23E-05	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.34E-08	8.00E-06	4.17E-03
Vanadium	3.38E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.69E-06	7.00E-05	3.84E-02
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.23E-06	9.00E-02	8.03E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.14E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.28E-04	0.83	24	350	30	70	25550	1.50E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	30	70	25550	1.02E-08	NA	ND
Arsenic	6.69E-08	0.83	24	350	30	70	25550	7.83E-09	5.00E+01	3.91E-07
Barium	8.10E-07	0.83	24	350	30	70	25550	9.47E-08	NA	ND
Beryllium	1.13E-08	0.83	24	350	30	70	25550	1.32E-09	8.40E+00	1.11E-08
Cadmium	9.30E-08	0.83	24	350	30	70	25550	1.09E-08	8.10E+00	8.83E-08
Calcium	1.15E-03	0.83	24	350	30	70	25550	1.34E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	25550	1.60E-08	4.20E+01	6.71E-07
Cobalt	7.89E-08	0.83	24	350	30	70	25550	9.23E-09	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	25550	1.62E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	25550	1.78E-08	NA	ND
Iron	1.62E-04	0.83	24	350	30	70	25550	1.89E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	25550	4.36E-08	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	25550	4.94E-05	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	25550	8.24E-07	NA	ND
Mercury	1.62E-08	0.83	24	350	30	70	25550	1.89E-09	NA	ND
Nickel	2.70E-07	0.83	24	350	30	70	25550	3.16E-08	8.40E-01	2.65E-08
Potassium	1.04E-05	0.83	24	350	30	70	25550	1.21E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	25550	3.63E-10	NA	ND
Silver	1.27E-08	0.83	24	350	30	70	25550	1.48E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	25550	2.32E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	25550	3.46E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	30	70	25550	2.78E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	25550	7.50E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK **1.17E-06**

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.28E-04	0.83	24	350	30	70	10950	3.50E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	30	70	10950	2.38E-08	NA	ND
Arsenic	6.69E-08	0.83	24	350	30	70	10950	1.83E-08	NA	ND
Barium	8.10E-07	0.83	24	350	30	70	10950	2.21E-07	1.00E-04	2.21E-03
Beryllium	1.13E-08	0.83	24	350	30	70	10950	3.08E-09	NA	ND
Cadmium	9.30E-08	0.83	24	350	30	70	10950	2.54E-08	NA	ND
Calcium	1.15E-03	0.83	24	350	30	70	10950	3.13E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	10950	3.73E-08	NA	ND
Cobalt	7.89E-08	0.83	24	350	30	70	10950	2.15E-08	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	10950	3.79E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	10950	4.15E-08	NA	ND
Iron	1.62E-04	0.83	24	350	30	70	10950	4.42E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	10950	1.02E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	10950	1.15E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	10950	1.92E-06	1.00E-04	1.92E-02
Mercury	1.62E-08	0.83	24	350	30	70	10950	4.42E-09	8.60E-05	5.14E-05
Nickel	2.70E-07	0.83	24	350	30	70	10950	7.36E-08	NA	ND
Potassium	1.04E-05	0.83	24	350	30	70	10950	2.83E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	10950	8.48E-10	NA	ND
Silver	1.27E-08	0.83	24	350	30	70	10950	3.46E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	10950	5.40E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	10950	8.07E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	30	70	10950	6.50E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	10950	1.75E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.15E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	200	1.0E-06	1.0	350	6	15	25550	1.99E-02	NA	ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	25550	1.36E-05	NA	ND
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	25550	1.04E-05	1.80E+00	1.87E-05
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	25550	1.26E-04	NA	ND
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	25550	1.75E-08	4.30E+00	7.54E-06
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	25550	1.45E-05	NA	ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	25550	1.79E-01	NA	ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	25550	2.13E-05	NA	ND
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	25550	1.23E-05	NA	ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	25550	2.16E-03	NA	ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	25550	2.37E-05	NA	ND
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	25550	2.52E-02	NA	ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	25550	5.80E-05	NA	ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	25550	6.56E-02	NA	ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	25550	1.10E-03	NA	ND
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	25550	2.52E-06	NA	ND
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	25550	4.20E-05	NA	ND
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	25550	1.61E-03	NA	ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	25550	4.82E-07	NA	ND
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	25550	1.97E-06	NA	ND
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	25550	3.08E-04	NA	ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	25550	4.80E-07	NA	ND
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	25550	3.70E-05	NA	ND
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	25550	9.97E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 2.63E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	200	1.0E-06	1.0	350	6	15	2190	2.33E-01 NA		ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	2190	1.59E-04	4.00E-04	3.96E-01
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	2190	1.21E-04	3.00E-04	4.05E-01
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	2190	1.47E-03	7.00E-02	2.10E-02
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	2190	2.05E-05	5.00E-03	4.09E-03
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	2190	1.69E-04 NA		ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	2190	2.08E+00 NA		ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	2190	2.48E-04	2.00E-02	1.24E-02
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	2190	1.43E-04 NA		ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	2190	2.52E-02 NA		ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	2190	2.76E-04	2.00E-02	1.38E-02
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	2190	2.94E-01 NA		ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	2190	6.76E-04 NA		ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	2190	7.66E-01 NA		ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	2190	1.28E-02	1.40E-01	9.13E-02
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	2190	2.94E-05	3.00E-04	9.60E-02
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	2190	4.90E-04	2.00E-02	2.45E-02
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	2190	1.88E-02 NA		ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	2190	5.63E-06	5.00E-03	1.13E-03
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	2190	2.30E-05	5.00E-03	4.60E-03
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	2190	3.59E-03 NA		ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	2190	5.37E-06	8.00E-04	6.71E-03
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	2190	4.32E-04	7.00E-03	6.17E-02
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	2190	1.16E-03	3.00E-01	3.88E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.14E+00

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	1.82E+04	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.00E–04	NA	ND
Antimony	1.24E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.37E–07	NA	ND
Arsenic	9.50E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.05E–07	1.89E+00	1.98E–07
Barium	1.15E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.27E–06	NA	ND
Beryllium	1.60E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.76E–08	4.30E+01	7.58E–07
Cadmium	1.32E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.45E–07	NA	ND
Calcium	1.63E+05	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.80E–03	NA	ND
Chromium	1.94E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.14E–07	NA	ND
Cobalt	1.12E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.23E–07	NA	ND
Copper	1.97E+03	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.17E–05	NA	ND
Cyanide (total)	2.16E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.38E–07	NA	ND
Iron	2.30E+04	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.53E–04	NA	ND
Lead	5.29E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	5.63E–07	NA	ND
Magnesium	5.99E+04	1.0E–06	2010	1.00	0.001	350	6	15	25550	6.60E–04	NA	ND
Manganese	1.00E+03	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.10E–05	NA	ND
Mercury	2.30E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.53E–08	NA	ND
Nickel	3.83E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.22E–07	NA	ND
Potassium	1.47E+03	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.62E–05	NA	ND
Selenium	4.40E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.85E–09	NA	ND
Silver	1.80E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.98E–08	NA	ND
Sodium	2.81E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	3.09E–06	NA	ND
Thallium	4.20E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.63E–09	NA	ND
Vanadium	3.38E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	3.72E–07	NA	ND
Zinc	9.10E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.00E–06	NA	ND
											TOTAL RISK	9.55E–07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.34E-03	NA	ND
Antimony	1.24E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.59E-06	2.40E-04	6.84E-03
Arsenic	9.50E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.22E-06	2.85E-04	4.28E-03
Barium	1.15E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.48E-05	3.50E-03	4.22E-03
Beryllium	1.60E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.06E-07	5.00E-04	4.11E-04
Cadmium	1.32E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.70E-06	NA	ND
Calcium	1.63E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.09E-02	NA	ND
Chromium	1.94E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.49E-06	1.00E-02	2.49E-04
Cobalt	1.12E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.44E-06	NA	ND
Copper	1.97E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.53E-04	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.78E-06	1.40E-02	1.98E-04
Iron	2.30E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-03	NA	ND
Lead	5.29E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.80E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.70E-03	NA	ND
Manganese	1.00E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.28E-04	5.60E-03	2.29E-02
Mercury	2.30E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-07	4.50E-05	6.57E-03
Nickel	3.83E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.92E-06	2.00E-03	2.46E-03
Potassium	1.47E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.89E-04	NA	ND
Selenium	4.40E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.65E-08	4.85E-03	1.17E-05
Silver	1.80E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.31E-07	5.00E-04	4.63E-04
Sodium	2.81E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.61E-05	NA	ND
Thallium	4.20E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.40E-08	8.00E-05	6.75E-04
Vanadium	3.38E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.34E-06	7.00E-05	6.20E-02
Zinc	9.10E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.17E-05	9.00E-02	1.30E-04

NA/ND – Not available / Not determined

TOTAL HAZARD 1.11E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.28E-04	0.83	24	350	6	15	25550	1.40E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	6	15	25550	9.54E-09	NA	ND
Arsenic	6.69E-08	0.83	24	350	6	15	25550	7.31E-09	5.00E+01	3.65E-07
Barium	8.10E-07	0.83	24	350	6	15	25550	8.84E-08	NA	ND
Beryllium	1.13E-08	0.83	24	350	6	15	25550	1.23E-09	8.40E+00	1.03E-08
Cadmium	9.30E-08	0.83	24	350	6	15	25550	1.02E-08	6.10E+00	6.19E-08
Calcium	1.15E-03	0.83	24	350	6	15	25550	1.25E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	6	15	25550	1.49E-08	4.20E+01	6.27E-07
Cobalt	7.89E-08	0.83	24	350	6	15	25550	8.61E-09	NA	ND
Copper	1.39E-05	0.83	24	350	6	15	25550	1.51E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	25550	1.66E-08	NA	ND
Iron	1.62E-04	0.83	24	350	6	15	25550	1.77E-05	NA	ND
Lead	3.73E-07	0.83	24	350	6	15	25550	4.07E-08	NA	ND
Magnesium	4.22E-04	0.83	24	350	6	15	25550	4.61E-05	NA	ND
Manganese	7.05E-06	0.83	24	350	6	15	25550	7.69E-07	NA	ND
Mercury	1.62E-08	0.83	24	350	6	15	25550	1.77E-09	NA	ND
Nickel	2.70E-07	0.83	24	350	6	15	25550	2.95E-08	8.40E-01	2.47E-08
Potassium	1.04E-05	0.83	24	350	6	15	25550	1.13E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	6	15	25550	3.38E-10	NA	ND
Silver	1.27E-06	0.83	24	350	6	15	25550	1.38E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	6	15	25550	2.16E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	6	15	25550	3.23E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	6	15	25550	2.60E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	6	15	25550	7.00E-08	NA	ND
									TOTAL RISK	1.09E-06

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.28E-04	0.83	24	350	6	15	2190	1.63E-04	NA	ND
Antimony	8.74E-08	0.83	24	350	6	15	2190	1.11E-07	NA	ND
Arsenic	6.69E-08	0.83	24	350	6	15	2190	8.52E-08	NA	ND
Barium	8.10E-07	0.83	24	350	6	15	2190	1.03E-06	1.00E-03	1.03E-03
Beryllium	1.13E-08	0.83	24	350	6	15	2190	1.44E-08	NA	ND
Cadmium	9.30E-08	0.83	24	350	6	15	2190	1.18E-07	NA	ND
Calcium	1.15E-03	0.83	24	350	6	15	2190	1.46E-03	NA	ND
Chromium	1.37E-07	0.83	24	350	6	15	2190	1.74E-07	NA	ND
Cobalt	7.89E-08	0.83	24	350	6	15	2190	1.00E-07	NA	ND
Copper	1.39E-05	0.83	24	350	6	15	2190	1.77E-05	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	2190	1.94E-07	NA	ND
Iron	1.62E-04	0.83	24	350	6	15	2190	2.06E-04	NA	ND
Lead	3.73E-07	0.83	24	350	6	15	2190	4.75E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	6	15	2190	5.37E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	6	15	2190	8.97E-06	1.00E-04	8.97E-02
Mercury	1.62E-08	0.83	24	350	6	15	2190	2.06E-08	8.60E-05	2.40E-04
Nickel	2.70E-07	0.83	24	350	6	15	2190	3.44E-07	NA	ND
Potassium	1.04E-05	0.83	24	350	6	15	2190	1.32E-05	NA	ND
Selenium	3.10E-09	0.83	24	350	6	15	2190	3.95E-09	NA	ND
Silver	1.27E-08	0.83	24	350	6	15	2190	1.61E-08	NA	ND
Sodium	1.98E-08	0.83	24	350	6	15	2190	2.52E-06	NA	ND
Thallium	2.96E-09	0.83	24	350	6	15	2190	3.77E-09	NA	ND
Vanadium	2.38E-07	0.83	24	350	6	15	2190	3.03E-07	NA	ND
Zinc	6.41E-07	0.83	24	350	6	15	2190	8.16E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.10E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	3.99E+03	50	1.0E−06	1.0	350	9	70	25550	3.52E−04 NA		ND
Antimony	2.60E+00	50	1.0E−06	1.0	350	9	70	25550	2.29E−07 NA		ND
Arsenic	2.41E+00	50	1.0E−06	1.0	350	9	70	25550	2.12E−07	1.80E+00	3.82E−07
Barium	1.84E+01	50	1.0E−06	1.0	350	9	70	25550	1.62E−06 NA		ND
Beryllium	4.48E−01	50	1.0E−06	1.0	350	9	70	25550	3.95E−08	4.30E+00	1.70E−07
Cadmium	4.28E−01	50	1.0E−06	1.0	350	9	70	25550	3.77E−08 NA		ND
Calcium	7.32E+04	50	1.0E−06	1.0	350	9	70	25550	6.45E−03 NA		ND
Chromium	5.08E+00	50	1.0E−06	1.0	350	9	70	25550	4.47E−07 NA		ND
Cobalt	2.18E+00	50	1.0E−06	1.0	350	9	70	25550	1.92E−07 NA		ND
Copper	1.11E+02	50	1.0E−06	1.0	350	9	70	25550	9.79E−06 NA		ND
Cyanide (total)	1.91E+00	50	1.0E−06	1.0	350	9	70	25550	1.68E−07 NA		ND
Iron	7.47E+03	50	1.0E−06	1.0	350	9	70	25550	6.58E−04 NA		ND
Lead	7.97E+00	50	1.0E−06	1.0	350	9	70	25550	7.01E−07 NA		ND
Magnesium	2.47E+04	50	1.0E−06	1.0	350	9	70	25550	2.18E−03 NA		ND
Manganese	2.90E+02	50	1.0E−06	1.0	350	9	70	25550	2.56E−05 NA		ND
Mercury	6.89E−02	50	1.0E−06	1.0	350	9	70	25550	6.07E−09 NA		ND
Nickel	8.73E+00	50	1.0E−06	1.0	350	9	70	25550	7.69E−07 NA		ND
Potassium	3.71E+02	50	1.0E−06	1.0	350	9	70	25550	3.26E−05 NA		ND
Selenium	1.26E−01	50	1.0E−06	1.0	350	9	70	25550	1.11E−08 NA		ND
Silver	4.22E−01	50	1.0E−06	1.0	350	9	70	25550	3.71E−08 NA		ND
Sodium	5.68E+01	50	1.0E−06	1.0	350	9	70	25550	5.00E−06 NA		ND
Thallium	1.40E−01	50	1.0E−06	1.0	350	9	70	25550	1.23E−08 NA		ND
Vanadium	7.84E+00	50	1.0E−06	1.0	350	9	70	25550	6.90E−07 NA		ND
Zinc	3.68E+01	50	1.0E−06	1.0	350	9	70	25550	3.24E−06 NA		ND

NA/ND – Not available/ Not determined

TOTAL RISK **5.52E−07**

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	50	1.0E-06	1.0	350	9	70	3285	2.74E-03	1.00E+00	2.74E-03
Antimony	2.60E+00	50	1.0E-06	1.0	350	9	70	3285	1.78E-06	4.00E-04	4.46E-03
Arsenic	2.41E+00	50	1.0E-06	1.0	350	9	70	3285	1.65E-06	3.00E-04	5.51E-03
Barium	1.84E+01	50	1.0E-06	1.0	350	9	70	3285	1.26E-05	7.00E-02	1.80E-04
Beryllium	4.48E-01	50	1.0E-06	1.0	350	9	70	3285	3.07E-07	5.00E-03	6.14E-05
Cadmium	4.28E-01	50	1.0E-06	1.0	350	9	70	3285	2.93E-07	5.00E-04	5.87E-04
Calcium	7.32E+04	50	1.0E-06	1.0	350	9	70	3285	5.02E-02	NA	ND
Chromium	5.08E+00	50	1.0E-06	1.0	350	9	70	3285	3.48E-06	5.00E-03	6.96E-04
Cobalt	2.18E+00	50	1.0E-06	1.0	350	9	70	3285	1.50E-06	NA	ND
Copper	1.11E+02	50	1.0E-06	1.0	350	9	70	3285	7.62E-05	4.00E-02	1.90E-03
Cyanide (total)	1.91E+00	50	1.0E-06	1.0	350	9	70	3285	1.31E-06	2.00E-02	6.53E-05
Iron	7.47E+03	50	1.0E-06	1.0	350	9	70	3285	5.11E-03	NA	ND
Lead	7.97E+00	50	1.0E-06	1.0	350	9	70	3285	5.46E-06	NA	ND
Magnesium	2.47E+04	50	1.0E-06	1.0	350	9	70	3285	1.69E-02	NA	ND
Manganese	2.90E+02	50	1.0E-06	1.0	350	9	70	3285	1.99E-04	1.40E-01	1.42E-03
Mercury	6.89E-02	50	1.0E-06	1.0	350	9	70	3285	4.72E-08	3.00E-04	1.57E-04
Nickel	8.73E+00	50	1.0E-06	1.0	350	9	70	3285	5.98E-06	2.00E-02	2.99E-04
Potassium	3.71E+02	50	1.0E-06	1.0	350	9	70	3285	2.54E-04	NA	ND
Selenium	1.26E-01	50	1.0E-06	1.0	350	9	70	3285	8.61E-08	5.00E-03	1.72E-05
Silver	4.22E-01	50	1.0E-06	1.0	350	9	70	3285	2.89E-07	5.00E-03	5.78E-05
Sodium	5.68E+01	50	1.0E-06	1.0	350	9	70	3285	3.89E-05	NA	ND
Thallium	1.40E-01	50	1.0E-06	1.0	350	9	70	3285	9.60E-08	8.00E-05	1.20E-03
Vanadium	7.84E+00	50	1.0E-06	1.0	350	9	70	3285	5.37E-06	7.00E-03	7.67E-04
Zinc	3.68E+01	50	1.0E-06	1.0	350	9	70	3285	2.52E-05	3.00E-01	8.40E-05

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.02E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.99E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.35E-05	NA	ND
Antimony	2.60E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.53E-08	NA	ND
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.42E-08	1.89E+00	2.68E-08
Barium	1.84E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.09E-07	NA	ND
Beryllium	4.48E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.64E-09	4.30E+01	1.13E-07
Cadmium	4.28E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.52E-09	NA	ND
Calcium	7.32E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.31E-04	NA	ND
Chromium	5.08E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.99E-08	NA	ND
Cobalt	2.18E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.29E-08	NA	ND
Copper	1.11E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.55E-07	NA	ND
Cyanide (total)	1.91E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.12E-08	NA	ND
Iron	7.47E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.40E-05	NA	ND
Lead	7.97E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.69E-08	NA	ND
Magnesium	2.47E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.45E-04	NA	ND
Manganese	2.90E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.71E-06	NA	ND
Mercury	6.89E-02	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.06E-10	NA	ND
Nickel	8.73E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	5.14E-08	NA	ND
Potassium	3.71E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.18E-06	NA	ND
Selenium	1.26E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.40E-10	NA	ND
Silver	4.22E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.48E-09	NA	ND
Sodium	5.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.35E-07	NA	ND
Thallium	1.40E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	8.25E-10	NA	ND
Vanadium	7.84E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.61E-08	NA	ND
Zinc	3.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.17E-07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.40E-07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.83E-04	2.00E-01	9.15E-04
Antimony	2.60E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.19E-07	2.40E-04	4.97E-04
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.10E-07	2.85E-04	3.87E-04
Barium	1.84E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	8.45E-07	3.50E-03	2.41E-04
Beryllium	4.48E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.05E-08	5.00E-04	4.10E-05
Cadmium	4.28E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.96E-08	3.50E-05	5.60E-04
Calcium	7.32E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.35E-03	NA	ND
Chromium	5.08E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.33E-07	2.50E-03	9.31E-05
Cobalt	2.18E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.00E-07	NA	ND
Copper	1.11E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.09E-06	3.96E-02	1.29E-04
Cyanide (total)	1.91E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	8.73E-08	1.40E-02	6.24E-06
Iron	7.47E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.42E-04	NA	ND
Lead	7.97E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.65E-07	NA	ND
Magnesium	2.47E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.13E-03	NA	ND
Manganese	2.90E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.33E-05	5.60E-03	2.37E-03
Mercury	6.89E-02	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.16E-09	4.50E-05	7.01E-05
Nickel	8.73E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.00E-07	2.00E-03	2.00E-04
Potassium	3.71E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.70E-05	NA	ND
Selenium	1.26E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.76E-09	4.85E-03	1.19E-06
Silver	4.22E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.93E-08	5.00E-04	3.86E-05
Sodium	5.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.60E-06	NA	ND
Thallium	1.40E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.42E-09	8.00E-06	8.02E-04
Vanadium	7.64E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.59E-07	7.00E-05	5.13E-03
Zinc	3.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.69E-06	9.00E-02	1.87E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.15E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	2.81E-05	0.83	24	234	9	70	25550	6.60E-07	NA	ND
Antimony	1.83E-08	0.83	24	234	9	70	25550	4.30E-10	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	25550	3.98E-10	5.00E+01	1.99E-08
Barium	1.30E-07	0.83	24	234	9	70	25550	3.05E-09	NA	ND
Beryllium	3.16E-09	0.83	24	234	9	70	25550	7.40E-11	8.40E+00	6.22E-10
Cadmium	3.02E-09	0.83	24	234	9	70	25550	7.08E-11	8.10E+00	4.32E-10
Calcium	5.16E-04	0.83	24	234	9	70	25550	1.21E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	9	70	25550	8.40E-10	4.20E+01	3.53E-08
Cobalt	1.54E-08	0.83	24	234	9	70	25550	3.61E-10	NA	ND
Copper	7.84E-07	0.83	24	234	9	70	25550	1.84E-08	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	9	70	25550	3.15E-10	NA	ND
Iron	5.26E-05	0.83	24	234	9	70	25550	1.23E-06	NA	ND
Lead	5.61E-08	0.83	24	234	9	70	25550	1.32E-09	NA	ND
Magnesium	1.74E-04	0.83	24	234	9	70	25550	4.08E-06	NA	ND
Manganese	2.05E-06	0.83	24	234	9	70	25550	4.80E-08	NA	ND
Mercury	4.86E-10	0.83	24	234	9	70	25550	1.14E-11	NA	ND
Nickel	6.15E-08	0.83	24	234	9	70	25550	1.44E-09	8.40E-01	1.21E-09
Potassium	2.61E-06	0.83	24	234	9	70	25550	8.13E-08	NA	ND
Selenium	8.86E-10	0.83	24	234	9	70	25550	2.08E-11	NA	ND
Silver	2.97E-09	0.83	24	234	9	70	25550	6.97E-11	NA	ND
Sodium	4.00E-07	0.83	24	234	9	70	25550	9.39E-09	NA	ND
Thallium	9.87E-10	0.83	24	234	9	70	25550	2.32E-11	NA	ND
Vanadium	5.52E-08	0.83	24	234	9	70	25550	1.30E-09	NA	ND
Zinc	2.59E-07	0.83	24	234	9	70	25550	6.08E-09	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 5.75E-08

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.81E-05	0.83	24	234	9	70	3285	5.13E-06	NA	ND
Antimony	1.83E-08	0.83	24	234	9	70	3285	3.35E-09	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	3285	3.10E-09	NA	ND
Barium	1.30E-07	0.83	24	234	9	70	3285	2.37E-08	1.00E-04	2.37E-04
Beryllium	3.16E-09	0.83	24	234	9	70	3285	5.76E-10	NA	ND
Cadmium	3.02E-09	0.83	24	234	9	70	3285	5.51E-10	NA	ND
Calcium	5.16E-04	0.83	24	234	9	70	3285	9.41E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	9	70	3285	6.53E-09	NA	ND
Cobalt	1.54E-08	0.83	24	234	9	70	3285	2.81E-09	NA	ND
Copper	7.84E-07	0.83	24	234	9	70	3285	1.43E-07	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	9	70	3285	2.45E-09	NA	ND
Iron	5.26E-05	0.83	24	234	9	70	3285	9.60E-06	NA	ND
Lead	5.61E-08	0.83	24	234	9	70	3285	1.02E-08	NA	ND
Magnesium	1.74E-04	0.83	24	234	9	70	3285	3.17E-05	NA	ND
Manganese	2.05E-06	0.83	24	234	9	70	3285	3.73E-07	1.00E-04	3.73E-03
Mercury	4.86E-10	0.83	24	234	9	70	3285	8.86E-11	8.60E-05	1.03E-06
Nickel	6.15E-08	0.83	24	234	9	70	3285	1.12E-08	NA	ND
Potassium	2.61E-06	0.83	24	234	9	70	3285	4.76E-07	NA	ND
Selenium	8.88E-10	0.83	24	234	9	70	3285	1.62E-10	NA	ND
Silver	2.97E-09	0.83	24	234	9	70	3285	5.42E-10	NA	ND
Sodium	4.00E-07	0.83	24	234	9	70	3285	7.30E-08	NA	ND
Thallium	9.87E-10	0.83	24	234	9	70	3285	1.80E-10	NA	ND
Vanadium	5.52E-08	0.83	24	234	9	70	3285	1.01E-08	NA	ND
Zinc	2.59E-07	0.83	24	234	9	70	3285	4.73E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.97E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	3.99E+03	100	1.0E-06	1.0	350	6	15	25550	2.19E-03	NA	ND
Antimony	2.60E+00	100	1.0E-06	1.0	350	6	15	25550	1.43E-06	NA	ND
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	25550	1.32E-06	1.60E+00	2.38E-06
Barium	1.84E+01	100	1.0E-06	1.0	350	6	15	25550	1.01E-05	NA	ND
Beryllium	4.48E-01	100	1.0E-06	1.0	350	6	15	25550	2.46E-07	4.30E+00	1.06E-06
Cadmium	4.28E-01	100	1.0E-06	1.0	350	6	15	25550	2.35E-07	NA	ND
Calcium	7.32E+04	100	1.0E-06	1.0	350	6	15	25550	4.01E-02	NA	ND
Chromium	5.08E+00	100	1.0E-06	1.0	350	6	15	25550	2.78E-06	NA	ND
Cobalt	2.18E+00	100	1.0E-06	1.0	350	6	15	25550	1.20E-06	NA	ND
Copper	1.11E+02	100	1.0E-06	1.0	350	6	15	25550	6.09E-05	NA	ND
Cyanide (total)	1.91E+00	100	1.0E-06	1.0	350	6	15	25550	1.05E-06	NA	ND
Iron	7.47E+03	100	1.0E-06	1.0	350	6	15	25550	4.09E-03	NA	ND
Lead	7.97E+00	100	1.0E-06	1.0	350	6	15	25550	4.36E-06	NA	ND
Magnesium	2.47E+04	100	1.0E-06	1.0	350	6	15	25550	1.35E-02	NA	ND
Manganese	2.90E+02	100	1.0E-06	1.0	350	6	15	25550	1.59E-04	NA	ND
Mercury	6.89E-02	100	1.0E-06	1.0	350	6	15	25550	3.78E-08	NA	ND
Nickel	8.73E+00	100	1.0E-06	1.0	350	6	15	25550	4.79E-06	NA	ND
Potassium	3.71E+02	100	1.0E-06	1.0	350	6	15	25550	2.03E-04	NA	ND
Selenium	1.26E-01	100	1.0E-06	1.0	350	6	15	25550	6.89E-08	NA	ND
Silver	4.22E-01	100	1.0E-06	1.0	350	6	15	25550	2.31E-07	NA	ND
Sodium	5.68E+01	100	1.0E-06	1.0	350	6	15	25550	3.11E-05	NA	ND
Thallium	1.40E-01	100	1.0E-06	1.0	350	6	15	25550	7.68E-08	NA	ND
Vanadium	7.84E+00	100	1.0E-06	1.0	350	6	15	25550	4.29E-06	NA	ND
Zinc	3.68E+01	100	1.0E-06	1.0	350	6	15	25550	2.02E-05	NA	ND
										TOTAL RISK	3.43E-06

NA/ND – Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RID (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	100	1.0E-06	1.0	350	6	15	2190	2.55E-02	NA	ND
Antimony	2.60E+00	100	1.0E-06	1.0	350	6	15	2190	1.66E-05	4.00E-04	4.16E-02
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	2190	1.54E-05	3.00E-04	5.14E-02
Barium	1.84E+01	100	1.0E-06	1.0	350	6	15	2190	1.18E-04	7.00E-02	1.68E-03
Beryllium	4.48E-01	100	1.0E-06	1.0	350	6	15	2190	2.86E-06	5.00E-03	5.73E-04
Cadmium	4.28E-01	100	1.0E-06	1.0	350	6	15	2190	2.74E-06	NA	ND
Calcium	7.32E+04	100	1.0E-06	1.0	350	6	15	2190	4.68E-01	NA	ND
Chromium	5.08E+00	100	1.0E-06	1.0	350	6	15	2190	3.25E-05	2.00E-02	1.62E-03
Cobalt	2.18E+00	100	1.0E-06	1.0	350	6	15	2190	1.40E-05	NA	ND
Copper	1.11E+02	100	1.0E-06	1.0	350	6	15	2190	7.11E-04	NA	ND
Cyanide (total)	1.91E+00	100	1.0E-06	1.0	350	6	15	2190	1.22E-05	2.00E-02	6.10E-04
Iron	7.47E+03	100	1.0E-06	1.0	350	6	15	2190	4.77E-02	NA	ND
Lead	7.97E+00	100	1.0E-06	1.0	350	6	15	2190	5.09E-05	NA	ND
Magnesium	2.47E+04	100	1.0E-06	1.0	350	6	15	2190	1.58E-01	NA	ND
Manganese	2.90E+02	100	1.0E-08	1.0	350	6	15	2190	1.86E-03	1.40E-01	1.33E-02
Mercury	6.89E-02	100	1.0E-06	1.0	350	6	15	2190	4.41E-07	3.00E-04	1.47E-03
Nickel	8.73E+00	100	1.0E-06	1.0	350	6	15	2190	5.58E-05	2.00E-02	2.79E-03
Potassium	3.71E+02	100	1.0E-08	1.0	350	6	15	2190	2.37E-03	NA	ND
Selenium	1.26E-01	100	1.0E-06	1.0	350	6	15	2190	8.04E-07	5.00E-03	1.61E-04
Silver	4.22E-01	100	1.0E-06	1.0	350	6	15	2190	2.70E-06	5.00E-03	5.39E-04
Sodium	5.68E+01	100	1.0E-06	1.0	350	6	15	2190	3.63E-04	NA	ND
Thallium	1.40E-01	100	1.0E-06	1.0	350	6	15	2190	8.96E-07	8.00E-04	1.12E-03
Vanadium	7.84E+00	100	1.0E-06	1.0	350	6	15	2190	5.01E-05	7.00E-03	7.16E-03
Zinc	3.68E+01	100	1.0E-06	1.0	350	6	15	2190	2.35E-04	3.00E-01	7.84E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.25E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	3.99E+03	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.56E−05	NA	ND
Antimony	2.60E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.67E−08	NA	ND
Arsenic	2.41E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.55E−08	1.89E+00	2.92E−08
Barium	1.84E+01	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.18E−07	NA	ND
Beryllium	4.48E−01	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.87E−09	4.30E+01	1.24E−07
Cadmium	4.28E−01	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.75E−09	NA	ND
Calcium	7.32E+04	1.0E−06	1750	1.00	0.001	234	6	15	25550	4.69E−04	NA	ND
Chromium	5.08E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	3.26E−08	NA	ND
Cobalt	2.18E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.40E−08	NA	ND
Copper	1.11E+02	1.0E−06	1750	1.00	0.001	234	6	15	25550	7.13E−07	NA	ND
Cyanide (total)	1.91E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.22E−08	NA	ND
Iron	7.47E+03	1.0E−06	1750	1.00	0.001	234	6	15	25550	4.79E−05	NA	ND
Lead	7.97E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	5.11E−06	NA	ND
Magnesium	2.47E+04	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.58E−04	NA	ND
Manganese	2.90E+02	1.0E−06	1750	1.00	0.001	234	6	15	25550	1.86E−06	NA	ND
Mercury	6.89E−02	1.0E−06	1750	1.00	0.001	234	6	15	25550	4.42E−10	NA	ND
Nickel	8.73E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	5.60E−08	NA	ND
Potassium	3.71E+02	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.38E−06	NA	ND
Selenium	1.26E−01	1.0E−06	1750	1.00	0.001	234	6	15	25550	8.06E−10	NA	ND
Silver	4.22E−01	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.70E−09	NA	ND
Sodium	5.68E+01	1.0E−06	1750	1.00	0.001	234	6	15	25550	3.64E−07	NA	ND
Thallium	1.40E−01	1.0E−06	1750	1.00	0.001	234	6	15	25550	8.98E−10	NA	ND
Vanadium	7.84E+00	1.0E−06	1750	1.00	0.001	234	6	15	25550	5.02E−08	NA	ND
Zinc	3.68E+01	1.0E−06	1750	1.00	0.001	234	6	15	25550	2.36E−07	NA	ND

TOTAL RISK 1.53E−07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.99E-04	NA	ND
Antimony	2.60E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.95E-07	2.40E-04	8.11E-04
Arsenic	2.41E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.80E-07	2.85E-04	6.33E-04
Barium	1.84E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.38E-06	3.50E-03	3.94E-04
Beryllium	4.48E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.35E-08	5.00E-04	6.70E-05
Cadmium	4.28E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.20E-08	NA	ND
Calcium	7.32E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.48E-03	NA	ND
Chromium	5.08E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.80E-07	1.00E-02	3.80E-05
Cobalt	2.18E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.63E-07	NA	ND
Copper	1.11E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	8.32E-06	NA	ND
Cyanide (total)	1.91E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.43E-07	1.40E-02	1.02E-05
Iron	7.47E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.59E-04	NA	ND
Lead	7.97E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.96E-07	NA	ND
Magnesium	2.47E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.85E-03	NA	ND
Manganese	2.90E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.17E-05	5.60E-03	3.88E-03
Mercury	6.89E-02	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.16E-09	4.50E-05	1.15E-04
Nickel	8.73E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.53E-07	2.00E-03	3.27E-04
Potassium	3.71E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.77E-05	NA	ND
Selenium	1.26E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.40E-09	4.85E-03	1.94E-06
Silver	4.22E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.15E-08	5.00E-04	6.31E-05
Sodium	5.68E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.25E-06	NA	ND
Thallium	1.40E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.05E-08	8.00E-05	1.31E-04
Vanadium	7.84E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.86E-07	7.00E-05	8.37E-03
Zinc	3.68E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.75E-06	9.00E-02	3.06E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.49E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL - HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK - SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	2.81E-05	0.83	24	234	6	15	25550	2.05E-06	NA	ND
Antimony	1.63E-08	0.83	24	234	6	15	25550	1.34E-09	NA	ND
Arsenic	1.70E-08	0.83	24	234	6	15	25550	1.24E-09	5.00E+01	8.20E-08
Barium	1.30E-07	0.83	24	234	6	15	25550	9.48E-09	NA	ND
Beryllium	3.16E-09	0.83	24	234	6	15	25550	2.30E-10	8.40E+00	1.94E-09
Cadmium	3.02E-09	0.83	24	234	6	15	25550	2.20E-10	6.10E+00	1.34E-09
Calcium	5.16E-04	0.83	24	234	6	15	25550	3.77E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	6	15	25550	2.61E-09	4.20E+01	1.10E-07
Cobalt	1.54E-08	0.83	24	234	6	15	25550	1.12E-09	NA	ND
Copper	7.84E-07	0.83	24	234	6	15	25550	5.72E-08	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	6	15	25550	9.81E-10	NA	ND
Iron	5.26E-05	0.83	24	234	6	15	25550	3.84E-06	NA	ND
Lead	5.61E-08	0.83	24	234	6	15	25550	4.10E-09	NA	ND
Magnesium	1.74E-04	0.83	24	234	6	15	25550	1.27E-05	NA	ND
Manganese	2.05E-06	0.83	24	234	6	15	25550	1.49E-07	NA	ND
Mercury	4.86E-10	0.83	24	234	6	15	25550	3.54E-11	NA	ND
Nickel	6.15E-08	0.83	24	234	6	15	25550	4.49E-09	8.40E-01	3.77E-09
Potassium	2.61E-06	0.83	24	234	6	15	25550	1.91E-07	NA	ND
Selenium	8.86E-10	0.83	24	234	6	15	25550	8.46E-11	NA	ND
Silver	2.97E-09	0.83	24	234	6	15	25550	2.17E-10	NA	ND
Sodium	4.00E-07	0.83	24	234	6	15	25550	2.92E-08	NA	ND
Thallium	9.87E-10	0.83	24	234	6	15	25550	7.20E-11	NA	ND
Vanadium	5.52E-08	0.83	24	234	6	15	25550	4.03E-09	NA	ND
Zinc	2.59E-07	0.83	24	234	6	15	25550	1.89E-08	NA	ND
									TOTAL RISK	1.79E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.81E-05	0.83	24	234	6	15	2190	2.40E-05	NA	ND
Antimony	1.83E-08	0.83	24	234	6	15	2190	1.56E-06	NA	ND
Arsenic	1.70E-08	0.83	24	234	6	15	2190	1.45E-06	NA	ND
Barium	1.30E-07	0.83	24	234	6	15	2190	1.11E-07	1.00E-03	1.11E-04
Beryllium	3.16E-09	0.83	24	234	6	15	2190	2.69E-09	NA	ND
Cadmium	3.02E-09	0.83	24	234	6	15	2190	2.57E-09	NA	ND
Calcium	5.16E-04	0.83	24	234	6	15	2190	4.39E-04	NA	ND
Chromium	3.58E-06	0.83	24	234	6	15	2190	3.05E-06	NA	ND
Cobalt	1.54E-06	0.83	24	234	6	15	2190	1.31E-06	NA	ND
Copper	7.84E-07	0.83	24	234	6	15	2190	6.67E-07	NA	ND
Cyanide (total)	1.34E-06	0.83	24	234	6	15	2190	1.14E-06	NA	ND
Iron	5.26E-05	0.83	24	234	6	15	2190	4.48E-05	NA	ND
Lead	5.61E-06	0.83	24	234	6	15	2190	4.78E-06	NA	ND
Magnesium	1.74E-04	0.83	24	234	6	15	2190	1.48E-04	NA	ND
Manganese	2.05E-06	0.83	24	234	6	15	2190	1.74E-06	1.00E-04	1.74E-02
Mercury	4.86E-10	0.83	24	234	6	15	2190	4.13E-10	8.60E-05	4.81E-06
Nickel	6.15E-06	0.83	24	234	6	15	2190	5.24E-06	NA	ND
Potassium	2.61E-06	0.83	24	234	6	15	2190	2.22E-06	NA	ND
Selenium	8.86E-10	0.83	24	234	6	15	2190	7.54E-10	NA	ND
Silver	2.97E-09	0.83	24	234	6	15	2190	2.53E-09	NA	ND
Sodium	4.00E-07	0.83	24	234	6	15	2190	3.41E-07	NA	ND
Thallium	9.87E-10	0.83	24	234	6	15	2190	8.40E-10	NA	ND
Vanadium	5.52E-06	0.83	24	234	6	15	2190	4.70E-06	NA	ND
Zinc	2.59E-07	0.83	24	234	6	15	2190	2.21E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.75E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	1.52E+04	100	1.0E–06	1.0	350	30	70	25550	8.92E–03	NA	ND
Arsenic	4.10E+00	100	1.0E–06	1.0	350	30	70	25550	2.41E–06	1.80E+00	4.33E–06
Barium	8.31E+01	100	1.0E–06	1.0	350	30	70	25550	4.88E–05	NA	ND
Beryllium	6.90E–01	100	1.0E–06	1.0	350	30	70	25550	4.05E–07	4.30E+00	1.74E–06
Calcium	6.69E+04	100	1.0E–06	1.0	350	30	70	25550	3.93E–02	NA	ND
Chromium	2.07E+01	100	1.0E–06	1.0	350	30	70	25550	1.22E–05	NA	ND
Cobalt	5.40E+00	100	1.0E–06	1.0	350	30	70	25550	3.17E–06	NA	ND
Copper	1.40E+01	100	1.0E–06	1.0	350	30	70	25550	8.22E–06	NA	ND
Iron	2.01E+04	100	1.0E–06	1.0	350	30	70	25550	1.18E–02	NA	ND
Lead	1.65E+01	100	1.0E–06	1.0	350	30	70	25550	9.69E–06	NA	ND
Magnesium	2.01E+04	100	1.0E–06	1.0	350	30	70	25550	1.18E–02	NA	ND
Manganese	3.50E+02	100	1.0E–06	1.0	350	30	70	25550	2.05E–04	NA	ND
Nickel	1.71E+01	100	1.0E–06	1.0	350	30	70	25550	1.00E–05	NA	ND
Potassium	1.12E+03	100	1.0E–06	1.0	350	30	70	25550	6.58E–04	NA	ND
Sodium	1.17E+02	100	1.0E–06	1.0	350	30	70	25550	6.87E–05	NA	ND
Vanadium	2.78E+01	100	1.0E–06	1.0	350	30	70	25550	1.63E–05	NA	ND
Zinc	7.73E+01	100	1.0E–06	1.0	350	30	70	25550	4.54E–05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK **6.07E–06**

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	100	1.0E-06	1.0	350	30	70	10950	2.08E-02	1.00E+00	2.08E-02
Arsenic	4.10E+00	100	1.0E-06	1.0	350	30	70	10950	5.62E-06	3.00E-04	1.87E-02
Barium	8.31E+01	100	1.0E-06	1.0	350	30	70	10950	1.14E-04	7.00E-02	1.63E-03
Beryllium	6.90E-01	100	1.0E-06	1.0	350	30	70	10950	9.45E-07	5.00E-03	1.89E-04
Calcium	6.69E+04	100	1.0E-06	1.0	350	30	70	10950	9.16E-02	NA	ND
Chromium	2.07E+01	100	1.0E-06	1.0	350	30	70	10950	2.84E-05	5.00E-03	5.67E-03
Cobalt	5.40E+00	100	1.0E-06	1.0	350	30	70	10950	7.40E-06	NA	ND
Copper	1.40E+01	100	1.0E-06	1.0	350	30	70	10950	1.92E-05	4.00E-02	4.79E-04
Iron	2.01E+04	100	1.0E-06	1.0	350	30	70	10950	2.75E-02	NA	ND
Lead	1.65E+01	100	1.0E-06	1.0	350	30	70	10950	2.26E-05	NA	ND
Magnesium	2.01E+04	100	1.0E-06	1.0	350	30	70	10950	2.75E-02	NA	ND
Manganese	3.50E+02	100	1.0E-06	1.0	350	30	70	10950	4.79E-04	1.40E-01	3.42E-03
Nickel	1.71E+01	100	1.0E-06	1.0	350	30	70	10950	2.34E-05	2.00E-02	1.17E-03
Potassium	1.12E+03	100	1.0E-06	1.0	350	30	70	10950	1.53E-03	NA	ND
Sodium	1.17E+02	100	1.0E-06	1.0	350	30	70	10950	1.60E-04	NA	ND
Vanadium	2.78E+01	100	1.0E-06	1.0	350	30	70	10950	3.81E-05	7.00E-03	5.44E-03
Zinc	7.73E+01	100	1.0E-06	1.0	350	30	70	10950	1.06E-04	3.00E-01	3.53E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.79E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.52E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.18E-04	NA	ND
Arsenic	4.10E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.40E-07	1.89E+00	2.64E-07
Barium	8.31E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.83E-06	NA	ND
Beryllium	6.90E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.35E-08	4.30E+01	1.01E-06
Calcium	6.69E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.28E-03	NA	ND
Chromium	2.07E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.05E-07	NA	ND
Cobalt	5.40E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.84E-07	NA	ND
Copper	1.40E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.77E-07	NA	ND
Iron	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.84E-04	NA	ND
Lead	1.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.62E-07	NA	ND
Magnesium	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.84E-04	NA	ND
Manganese	3.50E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.19E-05	NA	ND
Nickel	1.71E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.82E-07	NA	ND
Potassium	1.12E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.81E-05	NA	ND
Sodium	1.17E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.98E-06	NA	ND
Vanadium	2.78E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.47E-07	NA	ND
Zinc	7.73E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.63E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.27E-06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.21E-03	2.00E-01	6.04E-03
Arsenic	4.10E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.26E-07	2.85E-04	1.14E-03
Barium	8.31E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.60E-06	3.50E-03	1.89E-03
Beryllium	8.90E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.48E-08	5.00E-04	1.10E-04
Calcium	6.69E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.32E-03	NA	ND
Chromium	2.07E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.64E-06	2.50E-03	6.56E-04
Cobalt	5.40E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.29E-07	NA	ND
Copper	1.40E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.11E-06	3.96E-02	2.81E-05
Iron	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.60E-03	NA	ND
Lead	1.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.31E-06	NA	ND
Magnesium	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.60E-03	NA	ND
Manganese	3.50E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.78E-05	5.60E-03	4.97E-03
Nickel	1.71E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.36E-06	2.00E-03	6.79E-04
Potassium	1.12E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.90E-05	NA	ND
Sodium	1.17E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.30E-06	NA	ND
Vanadium	2.78E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.21E-06	7.00E-05	3.16E-02
Zinc	7.73E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.14E-06	9.00E-02	6.82E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 4.71E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	1.07E−04	0.83	24	350	30	70	25550	1.25E−05	NA	ND
Arsenic	2.89E−08	0.83	24	350	30	70	25550	3.38E−09	5.00E+01	1.69E−07
Barium	5.85E−07	0.83	24	350	30	70	25550	6.85E−08	NA	ND
Beryllium	4.86E−09	0.83	24	350	30	70	25550	5.66E−10	8.40E+00	4.76E−09
Calcium	4.71E−04	0.83	24	350	30	70	25550	5.51E−05	NA	ND
Chromium	1.46E−07	0.83	24	350	30	70	25550	1.71E−08	4.20E+01	7.16E−07
Cobalt	3.80E−08	0.83	24	350	30	70	25550	4.45E−09	NA	ND
Copper	9.86E−08	0.83	24	350	30	70	25550	1.15E−08	NA	ND
Iron	1.42E−04	0.83	24	350	30	70	25550	1.66E−05	NA	ND
Lead	1.16E−07	0.83	24	350	30	70	25550	1.36E−08	NA	ND
Magnesium	1.42E−04	0.83	24	350	30	70	25550	1.66E−05	NA	ND
Manganese	2.47E−06	0.83	24	350	30	70	25550	2.88E−07	NA	ND
Nickel	1.20E−07	0.83	24	350	30	70	25550	1.41E−08	8.40E−01	1.18E−08
Potassium	7.89E−06	0.83	24	350	30	70	25550	9.23E−07	NA	ND
Sodium	8.24E−07	0.83	24	350	30	70	25550	9.64E−08	NA	ND
Vanadium	1.96E−07	0.83	24	350	30	70	25550	2.29E−08	NA	ND
Zinc	5.45E−07	0.83	24	350	30	70	25550	6.37E−08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 9.02E−07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.07E-04	0.83	24	350	30	70	10950	2.92E-05	NA	ND
Arsenic	2.89E-08	0.83	24	350	30	70	10950	7.88E-09	NA	NO
Barium	5.85E-07	0.83	24	350	30	70	10950	1.60E-07	1.00E-04	1.60E-03
Beryllium	4.86E-09	0.83	24	350	30	70	10950	1.33E-09	NA	ND
Calcium	4.71E-04	0.83	24	350	30	70	10950	1.29E-04	NA	ND
Chromium	1.46E-07	0.83	24	350	30	70	10950	3.98E-08	NA	ND
Cobalt	3.80E-08	0.83	24	350	30	70	10950	1.04E-08	NA	ND
Copper	9.86E-08	0.83	24	350	30	70	10950	2.69E-08	NA	ND
Iron	1.42E-04	0.83	24	350	30	70	10950	3.86E-05	NA	ND
Lead	1.18E-07	0.83	24	350	30	70	10950	3.17E-08	NA	ND
Magnesium	1.42E-04	0.83	24	350	30	70	10950	3.86E-05	NA	ND
Manganese	2.47E-06	0.83	24	350	30	70	10950	6.73E-07	1.00E-04	6.73E-03
Nickel	1.20E-07	0.83	24	350	30	70	10950	3.29E-08	NA	ND
Potassium	7.89E-06	0.83	24	350	30	70	10950	2.15E-06	NA	ND
Sodium	8.24E-07	0.83	24	350	30	70	10950	2.25E-07	NA	ND
Vanadium	1.96E-07	0.83	24	350	30	70	10950	5.34E-08	NA	ND
Zinc	5.45E-07	0.83	24	350	30	70	10950	1.49E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 8.33E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.52E+04	200	1.0E-06	1.0	350	6	15	25550	1.67E-02	NA	ND
Arsenic	4.10E+00	200	1.0E-06	1.0	350	6	15	25550	4.49E-06	1.80E+00	8.09E-06
Barium	8.31E+01	200	1.0E-06	1.0	350	6	15	25550	9.11E-05	NA	ND
Beryllium	6.90E-01	200	1.0E-06	1.0	350	6	15	25550	7.56E-07	4.30E+00	3.25E-06
Calcium	6.69E+04	200	1.0E-06	1.0	350	6	15	25550	7.33E-02	NA	ND
Chromium	2.07E+01	200	1.0E-06	1.0	350	6	15	25550	2.27E-05	NA	ND
Cobalt	5.40E+00	200	1.0E-06	1.0	350	6	15	25550	5.92E-06	NA	ND
Copper	1.40E+01	200	1.0E-06	1.0	350	6	15	25550	1.53E-05	NA	ND
Iron	2.01E+04	200	1.0E-06	1.0	350	6	15	25550	2.20E-02	NA	ND
Lead	1.65E+01	200	1.0E-06	1.0	350	6	15	25550	1.81E-05	NA	ND
Magnesium	2.01E+04	200	1.0E-06	1.0	350	6	15	25550	2.20E-02	NA	ND
Manganese	3.50E+02	200	1.0E-06	1.0	350	6	15	25550	3.84E-04	NA	ND
Nickel	1.71E+01	200	1.0E-06	1.0	350	6	15	25550	1.87E-05	NA	ND
Potassium	1.12E+03	200	1.0E-06	1.0	350	6	15	25550	1.23E-03	NA	ND
Sodium	1.17E+02	200	1.0E-06	1.0	350	6	15	25550	1.28E-04	NA	ND
Vanadium	2.78E+01	200	1.0E-06	1.0	350	6	15	25550	3.05E-05	NA	ND
Zinc	7.73E+01	200	1.0E-06	1.0	350	6	15	25550	8.47E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.13E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	200	1.0E-06	1.0	350	6	15	2190	1.94E-01	NA	ND
Arsenic	4.10E+00	200	1.0E-06	1.0	350	6	15	2190	5.24E-05	3.00E-04	1.75E-01
Barium	6.31E+01	200	1.0E-06	1.0	350	6	15	2190	1.06E-03	7.00E-02	1.52E-02
Beryllium	6.90E-01	200	1.0E-06	1.0	350	6	15	2190	8.82E-06	5.00E-03	1.76E-03
Calcium	6.69E+04	200	1.0E-06	1.0	350	6	15	2190	8.55E-01	NA	NO
Chromium	2.07E+01	200	1.0E-06	1.0	350	6	15	2190	2.65E-04	2.00E-02	1.32E-02
Cobalt	5.40E+00	200	1.0E-06	1.0	350	6	15	2190	6.90E-05	NA	ND
Copper	1.40E+01	200	1.0E-06	1.0	350	6	15	2190	1.79E-04	NA	ND
Iron	2.01E+04	200	1.0E-06	1.0	350	6	15	2190	2.57E-01	NA	ND
Lead	1.65E+01	200	1.0E-06	1.0	350	6	15	2190	2.11E-04	NA	ND
Magnesium	2.01E+04	200	1.0E-06	1.0	350	6	15	2190	2.57E-01	NA	ND
Manganese	3.50E+02	200	1.0E-06	1.0	350	6	15	2190	4.47E-03	1.40E-01	3.20E-02
Nickel	1.71E+01	200	1.0E-06	1.0	350	6	15	2190	2.19E-04	2.00E-02	1.09E-02
Potassium	1.12E+03	200	1.0E-06	1.0	350	6	15	2190	1.43E-02	NA	ND
Sodium	1.17E+02	200	1.0E-06	1.0	350	6	15	2190	1.50E-03	NA	ND
Vanadium	2.76E+01	200	1.0E-06	1.0	350	6	15	2190	3.55E-04	7.00E-03	5.08E-02
Zinc	7.73E+01	200	1.0E-06	1.0	350	6	15	2190	9.88E-04	3.00E-01	3.29E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.02E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	1.52E+04	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.67E−04	NA	ND
Arsenic	4.10E+00	1.0E−06	2010	1.00	0.001	350	6	15	25550	4.52E−08	1.89E+00	8.53E−08
Barium	8.31E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	9.15E−07	NA	ND
Beryllium	6.90E−01	1.0E−06	2010	1.00	0.001	350	6	15	25550	7.60E−09	4.30E+01	3.27E−07
Calcium	6.69E+04	1.0E−06	2010	1.00	0.001	350	6	15	25550	7.37E−04	NA	ND
Chromium	2.07E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	2.28E−07	NA	ND
Cobalt	5.40E+00	1.0E−06	2010	1.00	0.001	350	6	15	25550	5.95E−08	NA	ND
Copper	1.40E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.54E−07	NA	ND
Iron	2.01E+04	1.0E−06	2010	1.00	0.001	350	6	15	25550	2.21E−04	NA	ND
Lead	1.65E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.82E−07	NA	ND
Magnesium	2.01E+04	1.0E−06	2010	1.00	0.001	350	6	15	25550	2.21E−04	NA	ND
Manganese	3.50E+02	1.0E−06	2010	1.00	0.001	350	6	15	25550	3.85E−06	NA	ND
Nickel	1.71E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.66E−07	NA	ND
Potassium	1.12E+03	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.23E−05	NA	ND
Sodium	1.17E+02	1.0E−06	2010	1.00	0.001	350	6	15	25550	1.29E−06	NA	ND
Vanadium	2.78E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	3.06E−07	NA	ND
Zinc	7.73E+01	1.0E−06	2010	1.00	0.001	350	6	15	25550	8.51E−07	NA	ND

TOTAL RISK 4.12E−07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.95E-03 NA		ND
Arsenic	4.10E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.27E-07	2.85E-04	1.85E-03
Barium	8.31E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.07E-05	3.50E-03	3.05E-03
Beryllium	6.90E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.87E-08	5.00E-04	1.77E-04
Calcium	6.69E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.60E-03 NA		ND
Chromium	2.07E+01	1.0E-06	2010	1.00	0.001	350	8	15	2190	2.66E-06	1.00E-02	2.66E-04
Cobalt	5.40E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.94E-07 NA		ND
Copper	1.40E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.80E-06 NA		ND
Iron	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.58E-03 NA		ND
Lead	1.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.12E-06 NA		ND
Magnesium	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.58E-03 NA		ND
Manganese	3.50E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.50E-05	5.60E-03	8.03E-03
Nickel	1.71E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.20E-06	2.00E-03	1.10E-03
Potassium	1.12E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.44E-04 NA		ND
Sodium	1.17E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.50E-05 NA		ND
Vanadium	2.78E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.57E-06	7.00E-05	5.10E-02
Zinc	7.73E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	9.93E-06	9.00E-02	1.10E-04

NA/ND – Not available / Not determined

TOTAL HAZARD 6.56E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	1.07E−04	0.83	24	350	6	15	25550	1.17E−05	NA	ND
Arsenic	2.89E−08	0.83	24	350	6	15	25550	3.15E−09	5.00E+01	1.58E−07
Barium	5.85E−07	0.83	24	350	6	15	25550	6.39E−08	NA	ND
Beryllium	4.88E−09	0.83	24	350	6	15	25550	5.31E−10	6.40E+00	4.46E−09
Calcium	4.71E−04	0.83	24	350	6	15	25550	5.14E−05	NA	ND
Chromium	1.48E−07	0.83	24	350	6	15	25550	1.59E−08	4.20E+01	6.69E−07
Cobalt	3.80E−08	0.83	24	350	6	15	25550	4.15E−09	NA	ND
Copper	9.86E−08	0.83	24	350	6	15	25550	1.08E−08	NA	ND
Iron	1.42E−04	0.83	24	350	6	15	25550	1.55E−05	NA	ND
Lead	1.16E−07	0.83	24	350	6	15	25550	1.27E−08	NA	ND
Magnesium	1.42E−04	0.83	24	350	6	15	25550	1.55E−05	NA	ND
Manganese	2.47E−06	0.83	24	350	6	15	25550	2.69E−07	NA	ND
Nickel	1.20E−07	0.83	24	350	6	15	25550	1.31E−08	8.40E−01	1.10E−08
Potassium	7.89E−06	0.83	24	350	6	15	25550	8.61E−07	NA	ND
Sodium	8.24E−07	0.83	24	350	6	15	25550	9.00E−08	NA	ND
Vanadium	1.96E−07	0.83	24	350	6	15	25550	2.14E−08	NA	ND
Zinc	5.45E−07	0.83	24	350	6	15	25550	5.94E−08	NA	ND
									TOTAL RISK	8.42E−07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.07E-04	0.83	24	350	6	15	2190	1.36E-04	NA	ND
Arsenic	2.89E-08	0.83	24	350	6	15	2190	3.68E-08	NA	ND
Barium	5.85E-07	0.83	24	350	6	15	2190	7.46E-07	1.00E-03	7.46E-04
Beryllium	4.86E-09	0.83	24	350	6	15	2190	6.19E-09	NA	ND
Calcium	4.71E-04	0.83	24	350	6	15	2190	6.00E-04	NA	ND
Chromium	1.46E-07	0.83	24	350	6	15	2190	1.86E-07	NA	ND
Cobalt	3.80E-08	0.83	24	350	6	15	2190	4.84E-08	NA	ND
Copper	9.86E-08	0.83	24	350	6	15	2190	1.26E-07	NA	ND
Iron	1.42E-04	0.83	24	350	6	15	2190	1.80E-04	NA	ND
Lead	1.16E-07	0.83	24	350	6	15	2190	1.48E-07	NA	ND
Magnesium	1.42E-04	0.83	24	350	6	15	2190	1.80E-04	NA	ND
Manganese	2.47E-06	0.83	24	350	6	15	2190	3.14E-06	1.00E-04	3.14E-02
Nickel	1.20E-07	0.83	24	350	6	15	2190	1.53E-07	NA	ND
Potassium	7.89E-06	0.83	24	350	6	15	2190	1.00E-05	NA	ND
Sodium	8.24E-07	0.83	24	350	6	15	2190	1.05E-06	NA	ND
Vanadium	1.96E-07	0.83	24	350	6	15	2190	2.49E-07	NA	ND
Zinc	5.45E-07	0.83	24	350	6	15	2190	6.93E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.21E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.27E+03	50	1.0E-06	1.0	350	9	70	25550	5.52E-04	NA	ND
Arsenic	2.87E+00	50	1.0E-06	1.0	350	9	70	25550	2.52E-07	1.80E+00	4.54E-07
Barium	3.85E+01	50	1.0E-06	1.0	350	9	70	25550	3.39E-06	NA	ND
Beryllium	6.13E-01	50	1.0E-06	1.0	350	9	70	25550	5.40E-06	4.30E+00	2.32E-07
Calcium	3.62E+04	50	1.0E-06	1.0	350	9	70	25550	3.19E-03	NA	ND
Chromium	8.30E+00	50	1.0E-06	1.0	350	9	70	25550	7.31E-07	NA	ND
Cobalt	3.63E+00	50	1.0E-06	1.0	350	9	70	25550	3.20E-07	NA	ND
Copper	1.04E+01	50	1.0E-06	1.0	350	9	70	25550	9.13E-07	NA	ND
Iron	1.03E+04	50	1.0E-06	1.0	350	9	70	25550	9.09E-04	NA	ND
Lead	9.30E+00	50	1.0E-06	1.0	350	9	70	25550	8.19E-07	NA	ND
Magnesium	1.36E+04	50	1.0E-06	1.0	350	9	70	25550	1.20E-03	NA	ND
Manganese	2.40E+02	50	1.0E-06	1.0	350	9	70	25550	2.12E-05	NA	ND
Nickel	1.02E+01	50	1.0E-06	1.0	350	9	70	25550	8.98E-07	NA	ND
Potassium	5.86E+02	50	1.0E-06	1.0	350	9	70	25550	5.16E-05	NA	ND
Sodium	7.28E+01	50	1.0E-06	1.0	350	9	70	25550	6.41E-06	NA	ND
Vanadium	1.31E+01	50	1.0E-06	1.0	350	9	70	25550	1.15E-06	NA	ND
Zinc	3.96E+01	50	1.0E-06	1.0	350	9	70	25550	3.49E-06	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 6.87E-07

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	50	1.0E-06	1.0	350	9	70	3285	4.30E-03	1.00E+00	4.30E-03
Arsenic	2.87E+00	50	1.0E-06	1.0	350	9	70	3285	1.96E-06	3.00E-04	8.54E-03
Barium	3.85E+01	50	1.0E-06	1.0	350	9	70	3285	2.64E-05	7.00E-02	3.77E-04
Beryllium	6.13E-01	50	1.0E-06	1.0	350	9	70	3285	4.20E-07	5.00E-03	8.40E-05
Calcium	3.62E+04	50	1.0E-06	1.0	350	9	70	3285	2.48E-02	NA	ND
Chromium	6.30E+00	50	1.0E-06	1.0	350	9	70	3285	5.68E-06	5.00E-03	1.14E-03
Cobalt	3.63E+00	50	1.0E-06	1.0	350	9	70	3285	2.49E-06	NA	ND
Copper	1.04E+01	50	1.0E-06	1.0	350	9	70	3285	7.10E-06	4.00E-02	1.78E-04
Iron	1.03E+04	50	1.0E-06	1.0	350	9	70	3285	7.07E-03	NA	ND
Lead	9.30E+00	50	1.0E-06	1.0	350	9	70	3285	8.37E-08	NA	ND
Magnesium	1.38E+04	50	1.0E-06	1.0	350	9	70	3285	9.32E-03	NA	ND
Manganese	2.40E+02	50	1.0E-06	1.0	350	9	70	3285	1.65E-04	1.40E-01	1.18E-03
Nickel	1.02E+01	50	1.0E-06	1.0	350	9	70	3285	6.99E-06	2.00E-02	3.49E-04
Potassium	5.86E+02	50	1.0E-06	1.0	350	9	70	3285	4.01E-04	NA	ND
Sodium	7.28E+01	50	1.0E-06	1.0	350	9	70	3285	4.99E-05	NA	ND
Vanadium	1.31E+01	50	1.0E-06	1.0	350	9	70	3285	8.95E-06	7.00E-03	1.28E-03
Zinc	3.96E+01	50	1.0E-06	1.0	350	9	70	3285	2.71E-05	3.00E-01	9.04E-05

NA/ND – Not available/ Not determined

TOTAL HAZARD **1.55E-02**

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.27E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.69E-05	NA	ND
Arsenic	2.87E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.69E-08	1.89E+00	3.19E-08
Barium	3.85E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.27E-07	NA	ND
Beryllium	6.13E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.61E-09	4.30E+01	1.55E-07
Calcium	3.62E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.13E-04	NA	ND
Chromium	8.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.89E-08	NA	ND
Cobalt	3.63E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.14E-08	NA	ND
Copper	1.04E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.10E-08	NA	ND
Iron	1.03E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.08E-05	NA	ND
Lead	9.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	5.48E-08	NA	ND
Magnesium	1.36E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	8.01E-05	NA	ND
Manganese	2.40E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.41E-06	NA	ND
Nickel	1.02E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.01E-08	NA	ND
Potassium	5.86E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.45E-06	NA	ND
Sodium	7.28E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.29E-07	NA	ND
Vanadium	1.31E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.69E-08	NA	ND
Zinc	3.96E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.33E-07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.87E-07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.87E-04	2.00E-01	1.44E-03
Arsenic	2.87E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.31E-07	2.85E-04	4.61E-04
Barium	3.85E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.76E-06	3.50E-03	5.04E-04
Beryllium	6.13E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.81E-08	5.00E-04	5.62E-05
Calcium	3.62E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.66E-03	NA	ND
Chromium	8.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.80E-07	2.50E-03	1.52E-04
Cobalt	3.63E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.66E-07	NA	ND
Copper	1.04E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.75E-07	3.96E-02	1.20E-05
Iron	1.03E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.73E-04	NA	ND
Lead	9.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.26E-07	NA	ND
Magnesium	1.36E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.23E-04	NA	ND
Manganese	2.40E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.10E-05	5.60E-03	1.97E-03
Nickel	1.02E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.67E-07	2.00E-03	2.34E-04
Potassium	5.86E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.68E-05	NA	ND
Sodium	7.28E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.34E-06	NA	ND
Vanadium	1.31E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.98E-07	7.00E-05	8.55E-03
Zinc	3.96E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.81E-06	9.00E-02	2.01E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.34E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	4.42E−05	0.83	24	234	9	70	25550	1.04E−06	NA	ND
Arsenic	2.02E−08	0.83	24	234	9	70	25550	4.74E−10	5.00E+01	2.37E−08
Barium	2.71E−07	0.83	24	234	9	70	25550	6.37E−09	NA	ND
Beryllium	4.32E−09	0.83	24	234	9	70	25550	1.01E−10	8.40E+00	8.51E−10
Calcium	2.55E−04	0.83	24	234	9	70	25550	5.99E−06	NA	ND
Chromium	5.85E−08	0.83	24	234	9	70	25550	1.37E−09	4.20E+01	5.76E−08
Cobalt	2.56E−08	0.83	24	234	9	70	25550	6.00E−10	NA	ND
Copper	7.30E−08	0.83	24	234	9	70	25550	1.71E−09	NA	ND
Iron	7.27E−05	0.83	24	234	9	70	25550	1.71E−06	NA	ND
Lead	6.55E−08	0.83	24	234	9	70	25550	1.54E−09	NA	ND
Magnesium	9.59E−05	0.83	24	234	9	70	25550	2.25E−06	NA	ND
Manganese	1.69E−06	0.83	24	234	9	70	25550	3.97E−08	NA	ND
Nickel	7.19E−08	0.83	24	234	9	70	25550	1.69E−09	8.40E−01	1.42E−09
Potassium	4.13E−06	0.83	24	234	9	70	25550	9.68E−08	NA	ND
Sodium	5.13E−07	0.83	24	234	9	70	25550	1.20E−08	NA	ND
Vanadium	9.21E−08	0.83	24	234	9	70	25550	2.16E−09	NA	ND
Zinc	2.79E−07	0.83	24	234	9	70	25550	6.54E−09	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 8.36E−08

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.42E-05	0.83	24	234	9	70	3285	8.06E-06	NA	ND
Arsenic	2.02E-08	0.83	24	234	9	70	3285	3.68E-09	NA	ND
Barium	2.71E-07	0.83	24	234	9	70	3285	4.95E-08	1.00E-04	4.95E-04
Beryllium	4.32E-09	0.83	24	234	9	70	3285	7.88E-10	NA	ND
Calcium	2.55E-04	0.83	24	234	9	70	3285	4.66E-05	NA	ND
Chromium	5.85E-08	0.83	24	234	9	70	3285	1.07E-08	NA	ND
Cobalt	2.56E-08	0.83	24	234	9	70	3285	4.67E-09	NA	ND
Copper	7.30E-08	0.83	24	234	9	70	3285	1.33E-08	NA	ND
Iron	7.27E-05	0.83	24	234	9	70	3285	1.33E-05	NA	ND
Lead	6.55E-08	0.83	24	234	9	70	3285	1.20E-08	NA	ND
Magnesium	9.59E-05	0.83	24	234	9	70	3285	1.75E-05	NA	ND
Manganese	1.69E-06	0.83	24	234	9	70	3285	3.09E-07	1.00E-04	3.09E-03
Nickel	7.19E-08	0.83	24	234	9	70	3285	1.31E-08	NA	ND
Potassium	4.13E-08	0.83	24	234	9	70	3285	7.53E-07	NA	ND
Sodium	5.13E-07	0.83	24	234	9	70	3285	9.36E-08	NA	ND
Vanadium	9.21E-08	0.83	24	234	9	70	3285	1.68E-08	NA	ND
Zinc	2.79E-07	0.83	24	234	9	70	3285	5.09E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD **3.58E-03**

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)--1	RISK
Aluminum	6.27E+03	100	1.0E-06	1.0	350	6	15	25550	3.44E-03	NA	ND
Arsenic	2.87E+00	100	1.0E-06	1.0	350	6	15	25550	1.57E-08	1.80E+00	2.83E-06
Barium	3.85E+01	100	1.0E-06	1.0	350	6	15	25550	2.11E-05	NA	ND
Beryllium	6.13E-01	100	1.0E-06	1.0	350	6	15	25550	3.36E-07	4.30E+00	1.45E-06
Calcium	3.62E+04	100	1.0E-06	1.0	350	6	15	25550	1.99E-02	NA	ND
Chromium	8.30E+00	100	1.0E-06	1.0	350	6	15	25550	4.55E-08	NA	ND
Cobalt	3.63E+00	100	1.0E-06	1.0	350	6	15	25550	1.99E-06	NA	ND
Copper	1.04E+01	100	1.0E-06	1.0	350	6	15	25550	5.68E-06	NA	ND
Iron	1.03E+04	100	1.0E-06	1.0	350	6	15	25550	5.65E-03	NA	ND
Lead	9.30E+00	100	1.0E-06	1.0	350	6	15	25550	5.10E-06	NA	ND
Magnesium	1.36E+04	100	1.0E-06	1.0	350	6	15	25550	7.46E-03	NA	ND
Manganese	2.40E+02	100	1.0E-06	1.0	350	6	15	25550	1.32E-04	NA	ND
Nickel	1.02E+01	100	1.0E-06	1.0	350	6	15	25550	5.59E-06	NA	ND
Potassium	5.66E+02	100	1.0E-06	1.0	350	6	15	25550	3.21E-04	NA	ND
Sodium	7.28E+01	100	1.0E-06	1.0	350	6	15	25550	3.99E-05	NA	ND
Vanadium	1.31E+01	100	1.0E-06	1.0	350	6	15	25550	7.16E-06	NA	ND
Zinc	3.96E+01	100	1.0E-06	1.0	350	6	15	25550	2.17E-05	NA	ND
										TOTAL RISK	4.27E-06

NA/ND -- Not available/ Not determined

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	100	1.0E-06	1.0	350	6	15	2190	4.01E-02	NA	ND
Arsenic	2.87E+00	100	1.0E-06	1.0	350	6	15	2190	1.63E-05	3.00E-04	6.11E-02
Barium	3.65E+01	100	1.0E-06	1.0	350	6	15	2190	2.46E-04	7.00E-02	3.52E-03
Beryllium	6.13E-01	100	1.0E-06	1.0	350	6	15	2190	3.92E-06	5.00E-03	7.84E-04
Calcium	3.62E+04	100	1.0E-06	1.0	350	6	15	2190	2.32E-01	NA	ND
Chromium	8.30E+00	100	1.0E-06	1.0	350	6	15	2190	5.31E-05	2.00E-02	2.65E-03
Cobalt	3.63E+00	100	1.0E-06	1.0	350	6	15	2190	2.32E-05	NA	ND
Copper	1.04E+01	100	1.0E-06	1.0	350	6	15	2190	6.63E-05	NA	ND
Iron	1.03E+04	100	1.0E-06	1.0	350	6	15	2190	6.60E-02	NA	ND
Lead	9.30E+00	100	1.0E-06	1.0	350	6	15	2190	5.95E-05	NA	ND
Magnesium	1.36E+04	100	1.0E-06	1.0	350	6	15	2190	6.70E-02	NA	ND
Manganese	2.40E+02	100	1.0E-06	1.0	350	6	15	2190	1.54E-03	1.40E-01	1.10E-02
Nickel	1.02E+01	100	1.0E-06	1.0	350	6	15	2190	6.52E-05	2.00E-02	3.26E-03
Potassium	5.86E+02	100	1.0E-06	1.0	350	6	15	2190	3.75E-03	NA	ND
Sodium	7.28E+01	100	1.0E-06	1.0	350	6	15	2190	4.66E-04	NA	ND
Vanadium	1.31E+01	100	1.0E-06	1.0	350	6	15	2190	8.35E-05	7.00E-03	1.19E-02
Zinc	3.96E+01	100	1.0E-06	1.0	350	6	15	2190	2.53E-04	3.00E-01	8.44E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.51E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	6.27E+03	1.0E–06	1750	1.00	0.001	234	6	15	25550	4.02E–05	NA	ND
Arsenic	2.87E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	1.84E–06	1.89E+00	3.47E–06
Barium	3.85E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.47E–07	NA	ND
Beryllium	6.13E–01	1.0E–06	1750	1.00	0.001	234	6	15	25550	3.93E–09	4.30E+01	1.69E–07
Calcium	3.62E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.32E–04	NA	ND
Chromium	8.30E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	5.32E–08	NA	ND
Cobalt	3.63E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.33E–08	NA	ND
Copper	1.04E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.65E–08	NA	ND
Iron	1.03E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.62E–05	NA	ND
Lead	9.30E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	5.96E–08	NA	ND
Magnesium	1.36E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	8.72E–05	NA	ND
Manganese	2.40E+02	1.0E–06	1750	1.00	0.001	234	6	15	25550	1.54E–06	NA	ND
Nickel	1.02E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.54E–08	NA	ND
Potassium	5.86E+02	1.0E–06	1750	1.00	0.001	234	6	15	25550	3.76E–06	NA	ND
Sodium	7.28E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	4.67E–07	NA	ND
Vanadium	1.31E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	8.38E–08	NA	ND
Zinc	3.96E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.54E–07	NA	ND

TOTAL RISK 2.04E–07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.69E-04 NA		ND
Arsenic	2.67E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.14E-07	2.85E-04	7.52E-04
Barium	3.85E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.88E-06	3.50E-03	8.23E-04
Beryllium	6.13E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.59E-08	5.00E-04	9.17E-05
Calcium	3.62E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.71E-03 NA		ND
Chromium	8.30E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.21E-07	1.00E-02	6.21E-05
Cobalt	3.63E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.72E-07 NA		ND
Copper	1.04E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.75E-07 NA		ND
Iron	1.03E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.72E-04 NA		ND
Lead	9.30E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.96E-07 NA		ND
Magnesium	1.36E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.02E-03 NA		ND
Manganese	2.40E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.80E-05	5.60E-03	3.21E-03
Nickel	1.02E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.63E-07	2.00E-03	3.61E-04
Potassium	5.86E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.38E-05 NA		ND
Sodium	7.28E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.45E-06 NA		ND
Vanadium	1.31E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.77E-07	7.00E-05	1.40E-02
Zinc	3.96E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.96E-06	9.00E-02	3.29E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.93E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.42E-05	0.83	24	234	6	15	25550	3.23E-06	NA	ND
Arsenic	2.02E-08	0.83	24	234	6	15	25550	1.47E-09	5.00E+01	7.37E-08
Barium	2.71E-07	0.83	24	234	6	15	25550	1.98E-08	NA	ND
Beryllium	4.32E-09	0.83	24	234	6	15	25550	3.15E-10	8.40E+00	2.65E-09
Calcium	2.55E-04	0.83	24	234	6	15	25550	1.86E-05	NA	ND
Chromium	5.85E-08	0.83	24	234	6	15	25550	4.27E-09	4.20E+01	1.79E-07
Cobalt	2.56E-08	0.83	24	234	6	15	25550	1.87E-09	NA	ND
Copper	7.30E-08	0.83	24	234	6	15	25550	5.33E-09	NA	ND
Iron	7.27E-05	0.83	24	234	6	15	25550	5.31E-06	NA	ND
Lead	6.55E-08	0.83	24	234	6	15	25550	4.78E-09	NA	ND
Magnesium	9.59E-05	0.83	24	234	6	15	25550	7.00E-06	NA	ND
Manganese	1.69E-06	0.83	24	234	6	15	25550	1.24E-07	NA	ND
Nickel	7.19E-08	0.83	24	234	6	15	25550	5.24E-09	8.40E-01	4.40E-09
Potassium	4.13E-06	0.83	24	234	6	15	25550	3.01E-07	NA	ND
Sodium	5.13E-07	0.83	24	234	6	15	25550	3.74E-08	NA	ND
Vanadium	9.21E-08	0.83	24	234	6	15	25550	6.72E-09	NA	ND
Zinc	2.79E-07	0.83	24	234	6	15	25550	2.04E-08	NA	ND
									TOTAL RISK	2.60E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.42E-05	0.83	24	234	6	15	2190	3.76E-05	NA	ND
Arsenic	2.02E-08	0.83	24	234	6	15	2190	1.72E-08	NA	ND
Barium	2.71E-07	0.83	24	234	6	15	2190	2.31E-07	1.00E-03	2.31E-04
Beryllium	4.32E-09	0.83	24	234	6	15	2190	3.68E-09	NA	ND
Calcium	2.55E-04	0.83	24	234	6	15	2190	2.17E-04	NA	ND
Chromium	5.85E-08	0.83	24	234	6	15	2190	4.98E-08	NA	ND
Cobalt	2.56E-08	0.83	24	234	6	15	2190	2.18E-08	NA	ND
Copper	7.30E-08	0.83	24	234	6	15	2190	6.22E-08	NA	ND
Iron	7.27E-05	0.83	24	234	6	15	2190	6.19E-05	NA	ND
Lead	6.55E-08	0.83	24	234	6	15	2190	5.58E-08	NA	ND
Magnesium	9.59E-05	0.83	24	234	6	15	2190	8.16E-05	NA	ND
Manganese	1.69E-06	0.83	24	234	6	15	2190	1.44E-06	1.00E-04	1.44E-02
Nickel	7.19E-08	0.83	24	234	6	15	2190	6.12E-08	NA	ND
Potassium	4.13E-06	0.83	24	234	6	15	2190	3.51E-06	NA	ND
Sodium	5.13E-07	0.83	24	234	6	15	2190	4.37E-07	NA	ND
Vanadium	9.21E-08	0.83	24	234	6	15	2190	7.84E-08	NA	ND
Zinc	2.79E-07	0.83	24	234	6	15	2190	2.38E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.46E-02

ATTACHMENT 1

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL INGESTION	SOIL INHALATION	SOIL DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	6.09E-06	2.37E-07	3.71E-07	6.69E-06
Barium	ND	ND	ND	ND
Beryllium	3.23E-06	8.85E-09	1.87E-06	5.11E-06
Cadmium	ND	3.81E-09	ND	3.81E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.40E-07	ND	5.40E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	1.02E-08	ND	1.02E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	9.31E-06	8.01E-07	2.24E-06	1.24E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL INGESTION	SOIL INHALATION	SOIL DERMAL	TOTAL
Aluminum	8.76E-03	ND	2.54E-03	1.13E-02
Antimony	2.24E-02	ND	2.17E-03	2.46E-02
Arsenic	2.63E-02	ND	1.61E-03	2.79E-02
Barium	9.09E-04	8.93E-04	1.05E-03	2.86E-03
Beryllium	3.50E-04	ND	2.03E-04	5.53E-04
Cadmium	2.08E-03	ND	1.72E-03	3.80E-03
Calcium	ND	ND	ND	ND
Chromium	4.28E-03	ND	4.96E-04	4.78E-03
Cobalt	ND	ND	ND	ND
Copper	3.71E-03	ND	2.17E-04	3.92E-03
Cyanide (total)	1.64E-04	ND	1.36E-05	1.77E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.36E-03	8.57E-03	6.33E-03	1.93E-02
Mercury	4.84E-04	2.37E-06	1.87E-04	6.74E-04
Nickel	1.01E-03	ND	5.87E-04	1.60E-03
Potassium	ND	ND	ND	ND
Selenium	7.37E-05	ND	4.41E-06	7.81E-05
Silver	2.98E-04	ND	1.73E-04	4.71E-04
Sodium	ND	ND	ND	ND
Thallium	4.91E-03	ND	2.85E-03	7.76E-03
Vanadium	2.89E-03	ND	1.68E-02	1.97E-02
Zinc	2.05E-04	ND	3.96E-05	2.44E-04
TOTAL	8.32E-02	9.47E-03	3.70E-02	1.30E-01

NA/ND – Not applicable/Not determined

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.14E-05	2.21E-07	1.20E-07	1.17E-05
Barium	ND	ND	ND	ND
Beryllium	6.02E-05	8.26E-09	6.05E-07	6.64E-06
Cadmium	ND	3.55E-09	ND	3.55E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.04E-07	ND	5.04E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	9.54E-09	ND	9.54E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.74E-05	7.47E-07	7.25E-07	1.89E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	2.09E-01	ND	3.51E-03	2.13E-01
Arsenic	2.45E-01	ND	2.60E-03	2.48E-01
Barium	8.49E-03	4.17E-04	1.71E-03	1.06E-02
Beryllium	3.27E-03	ND	3.28E-04	3.60E-03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	9.98E-03	ND	2.01E-04	1.02E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	1.53E-03	ND	2.19E-05	1.55E-03
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.07E-02	4.00E-02	1.02E-02	9.10E-02
Mercury	4.52E-03	1.11E-05	3.03E-04	4.83E-03
Nickel	9.44E-03	ND	9.49E-04	1.04E-02
Potassium	ND	ND	ND	ND
Selenium	6.88E-04	ND	7.13E-06	6.95E-04
Silver	2.79E-03	ND	2.80E-04	3.06E-03
Sodium	ND	ND	ND	ND
Thallium	4.58E-03	ND	4.60E-04	5.04E-03
Vanadium	2.70E-02	ND	2.72E-02	5.42E-02
Zinc	1.91E-03	ND	6.40E-05	1.97E-03
TOTAL	5.70E-01	4.04E-02	4.78E-02	6.58E-01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.00E−05	3.91E−07	6.11E−07	1.10E−05
Barium	ND	ND	ND	ND
Beryllium	4.04E−06	1.11E−08	2.34E−06	6.39E−06
Cadmium	ND	6.63E−08	ND	6.63E−08
Calcium	ND	ND	ND	ND
Chromium	ND	6.71E−07	ND	6.71E−07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.65E−08	ND	2.65E−08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.41E−05	1.17E−06	2.95E−06	1.82E−05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	2.49E−02	ND	7.23E−03	3.22E−02
Antimony	4.25E−02	ND	4.11E−03	4.66E−02
Arsenic	4.34E−02	ND	2.65E−03	4.60E−02
Barium	2.25E−03	2.21E−03	2.61E−03	7.07E−03
Beryllium	4.38E−04	ND	2.54E−04	6.93E−04
Cadmium	3.62E−02	ND	3.00E−02	6.61E−02
Calcium	ND	ND	ND	ND
Chromium	5.32E−03	ND	6.17E−04	5.93E−03
Cobalt	ND	ND	ND	ND
Copper	6.75E−02	ND	3.95E−03	7.14E−02
Cyanide (total)	1.48E−03	ND	1.23E−04	1.60E−03
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	9.78E−03	1.92E−02	1.42E−02	4.32E−02
Mercury	1.05E−02	5.14E−05	4.06E−03	1.46E−02
Nickel	2.62E−03	ND	1.52E−03	4.14E−03
Potassium	ND	ND	ND	ND
Selenium	1.21E−04	ND	7.21E−06	1.28E−04
Silver	4.93E−04	ND	2.86E−04	7.79E−04
Sodium	ND	ND	ND	ND
Thallium	7.19E−03	ND	4.17E−03	1.14E−02
Vanadium	6.61E−03	ND	3.84E−02	4.50E−02
Zinc	4.16E−04	ND	8.03E−05	4.96E−04
TOTAL	2.62E−01	2.15E−02	1.14E−01	3.97E−01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.87E−05	3.65E−07	1.98E−07	1.93E−05
Barium	ND	ND	ND	ND
Beryllium	7.54E−06	1.03E−08	7.58E−07	8.31E−06
Cadmium	ND	6.19E−08	ND	6.19E−08
Calcium	ND	ND	ND	ND
Chromium	ND	6.27E−07	ND	6.27E−07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.47E−08	ND	2.47E−08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	2.63E−05	1.09E−06	9.55E−07	2.83E−05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	ND	ND	ND	ND
Antimony	3.96E−01	ND	6.64E−03	4.03E−01
Arsenic	4.05E−01	ND	4.28E−03	4.09E−01
Barium	2.10E−02	1.03E−03	4.22E−03	2.63E−02
Beryllium	4.09E−03	ND	4.11E−04	4.50E−03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.24E−02	ND	2.49E−04	1.27E−02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	1.38E−02	ND	1.98E−04	1.40E−02
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	9.13E−02	8.97E−02	2.29E−02	2.04E−01
Mercury	9.80E−02	2.40E−04	6.57E−03	1.05E−01
Nickel	2.45E−02	ND	2.46E−03	2.69E−02
Potassium	ND	ND	ND	ND
Selenium	1.13E−03	ND	1.17E−05	1.14E−03
Silver	4.60E−03	ND	4.63E−04	5.07E−03
Sodium	ND	ND	ND	ND
Thallium	6.71E−03	ND	6.75E−04	7.39E−03
Vanadium	6.17E−02	ND	6.20E−02	1.24E−01
Zinc	3.88E−03	ND	1.30E−04	4.01E−03
TOTAL	1.14E+00	9.10E−02	1.11E−01	1.35E+00

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	3.82E-07	1.99E-08	2.68E-08	4.29E-07
Barium	ND	ND	ND	ND
Beryllium	1.70E-07	6.22E-10	1.13E-07	2.84E-07
Cadmium	ND	4.32E-10	ND	4.32E-10
Calcium	ND	ND	ND	ND
Chromium	ND	3.53E-08	ND	3.53E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	1.21E-09	ND	1.21E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	5.52E-07	5.75E-08	1.40E-07	7.50E-07

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS SOIL INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.74E-03	ND	9.15E-04	3.65E-03
Antimony	4.46E-03	ND	4.97E-04	4.95E-03
Arsenic	5.51E-03	ND	3.87E-04	5.89E-03
Barium	1.80E-04	2.37E-04	2.41E-04	6.59E-04
Beryllium	6.14E-05	ND	4.10E-05	1.02E-04
Cadmium	5.87E-04	ND	5.60E-04	1.15E-03
Calcium	ND	ND	ND	ND
Chromium	6.96E-04	ND	9.31E-05	7.89E-04
Cobalt	ND	ND	ND	ND
Copper	1.90E-03	ND	1.29E-04	2.03E-03
Cyanide (total)	6.53E-05	ND	6.24E-06	7.16E-05
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.42E-03	3.73E-03	2.37E-03	7.53E-03
Mercury	1.57E-04	1.03E-06	7.01E-05	2.29E-04
Nickel	2.99E-04	ND	2.00E-04	4.99E-04
Potassium	ND	ND	ND	ND
Selenium	1.72E-05	ND	1.19E-06	1.84E-05
Silver	5.78E-05	ND	3.86E-05	9.64E-05
Sodium	ND	ND	ND	ND
Thallium	1.20E-03	ND	8.02E-04	2.00E-03
Vanadium	7.67E-04	ND	5.13E-03	5.89E-03
Zinc	8.40E-05	ND	1.87E-05	1.03E-04
TOTAL	2.02E-02	3.97E-03	1.15E-02	3.57E-02

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	2.38E-06	6.20E-08	2.92E-08	2.47E-06
Barium	ND	ND	ND	ND
Beryllium	1.06E-06	1.94E-09	1.24E-07	1.18E-06
Cadmium	ND	1.34E-09	ND	1.34E-09
Calcium	ND	ND	ND	ND
Chromium	ND	1.10E-07	ND	1.10E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	3.77E-09	ND	3.77E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	2.43E-06	1.79E-07	1.53E-07	3.77E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	4.16E-02	ND	8.11E-04	4.24E-02
Arsenic	5.14E-02	ND	6.33E-04	5.20E-02
Barium	1.68E-03	1.11E-04	3.94E-04	2.19E-03
Beryllium	5.73E-04	ND	6.70E-05	6.40E-04
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.62E-03	ND	3.80E-05	1.66E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	6.10E-04	ND	1.02E-05	6.20E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.33E-02	1.74E-02	3.88E-03	3.46E-02
Mercury	1.47E-03	4.81E-06	1.15E-04	1.59E-03
Nickel	2.79E-03	ND	3.27E-04	3.12E-03
Potassium	ND	ND	ND	ND
Selenium	1.61E-04	ND	1.94E-06	1.63E-04
Silver	5.39E-04	ND	6.31E-05	6.02E-04
Sodium	ND	ND	ND	ND
Thallium	1.12E-03	ND	1.31E-04	1.25E-03
Vanadium	7.16E-03	ND	8.37E-03	1.55E-02
Zinc	7.84E-04	ND	3.06E-05	8.15E-04
TOTAL	1.25E-01	1.75E-02	1.49E-02	1.57E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME MAXIMUM BACKGROUND CONCENTRATIONS

ADULT RISK				
	EXPOSURE PATHWAYS			
	SOIL			
CHEMICAL	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	4.33E-06	1.69E-07	2.64E-07	4.77E-06
Barium	ND	ND	ND	ND
Beryllium	1.74E-06	4.78E-09	1.01E-06	2.76E-06
Calcium	ND	ND	ND	ND
Chromium	ND	7.16E-07	ND	7.16E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.18E-08	ND	1.18E-08
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	6.07E-06	9.02E-07	1.27E-06	8.25E-06

ADULT HAZARD				
	EXPOSURE PATHWAYS			
	SOIL			
CHEMICAL	INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.08E-02	ND	6.04E-03	2.69E-02
Arsenic	1.87E-02	ND	1.14E-03	1.99E-02
Barium	1.63E-03	1.60E-03	1.89E-03	5.11E-03
Beryllium	1.89E-04	ND	1.10E-04	2.99E-04
Calcium	ND	ND	ND	ND
Chromium	5.67E-03	ND	6.58E-04	6.33E-03
Cobalt	ND	ND	ND	ND
Copper	4.79E-04	ND	2.81E-05	5.08E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	3.42E-03	6.73E-03	4.97E-03	1.51E-02
Nickel	1.17E-03	ND	6.79E-04	1.85E-03
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.44E-03	ND	3.16E-02	3.70E-02
Zinc	3.53E-04	ND	6.82E-05	4.21E-04
TOTAL	5.79E-02	8.33E-03	4.71E-02	1.13E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME MAXIMUM BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	NO	ND	ND
Arsenic	8.09E-06	1.58E-07	8.53E-08	8.33E-06
Barium	NO	ND	ND	ND
Beryllium	3.25E-06	4.48E-09	3.27E-07	3.58E-06
Calcium	ND	ND	ND	ND
Chromium	ND	6.69E-07	ND	6.69E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	NO	ND
Magnesium	ND	NO	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.10E-08	ND	1.10E-08
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.13E-05	8.42E-07	4.12E-07	1.26E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	1.75E-01	ND	1.85E-03	1.77E-01
Barium	1.52E-02	7.46E-04	3.05E-03	1.90E-02
Beryllium	1.76E-03	ND	1.77E-04	1.94E-03
Calcium	ND	ND	ND	ND
Chromium	1.32E-02	ND	2.66E-04	1.35E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	3.20E-02	3.14E-02	8.03E-03	7.14E-02
Nickel	1.09E-02	ND	1.10E-03	1.20E-02
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.08E-02	NO	5.10E-02	1.02E-01
Zinc	3.29E-03	ND	1.10E-04	3.40E-03
TOTAL	3.02E-01	3.21E-02	6.56E-02	4.00E-01

NA/NO – Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	ND	ND	ND	ND
Arsenic	4.54E-07	2.37E-08	3.19E-08	5.10E-07
Barium	ND	ND	ND	ND
Beryllium	2.32E-07	8.51E-10	1.55E-07	3.88E-07
Calcium	ND	ND	ND	ND
Chromium	ND	5.76E-08	ND	5.76E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.42E-09	ND	1.42E-09
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	6.87E-07	8.36E-08	1.87E-07	9.57E-07

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	4.30E-03	ND	1.44E-03	5.73E-03
Arsenic	6.54E-03	ND	4.61E-04	7.01E-03
Barium	3.77E-04	4.95E-04	5.04E-04	1.38E-03
Beryllium	8.40E-05	ND	5.62E-05	1.40E-04
Calcium	ND	ND	ND	ND
Chromium	1.14E-03	ND	1.52E-04	1.29E-03
Cobalt	ND	ND	ND	ND
Copper	1.78E-04	ND	1.20E-05	1.89E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.18E-03	3.09E-03	1.97E-03	6.23E-03
Nickel	3.49E-04	ND	2.34E-04	5.83E-04
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.28E-03	ND	8.55E-03	9.83E-03
Zinc	9.04E-05	ND	2.01E-05	1.11E-04
TOTAL	1.55E-02	3.58E-03	1.34E-02	3.25E-02

NA/ND – Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	2.83E-06	7.37E-08	3.47E-08	2.94E-06
Barium	ND	ND	ND	ND
Beryllium	1.45E-06	2.65E-09	1.69E-07	1.62E-06
Calcium	ND	ND	ND	ND
Chromium	ND	1.79E-07	ND	1.79E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	4.40E-09	ND	4.40E-09
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	4.27E-06	2.60E-07	2.04E-07	4.74E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	6.11E-02	ND	7.52E-04	6.18E-02
Barium	3.52E-03	2.31E-04	8.23E-04	4.57E-03
Beryllium	7.84E-04	ND	9.17E-05	8.76E-04
Calcium	ND	ND	ND	ND
Chromium	2.65E-03	ND	6.21E-05	2.72E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.10E-02	1.44E-02	3.21E-03	2.86E-02
Nickel	3.26E-03	ND	3.81E-04	3.64E-03
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.19E-02	ND	1.40E-02	2.59E-02
Zinc	8.44E-04	ND	3.29E-05	8.77E-04
TOTAL	9.51E-02	1.46E-02	1.93E-02	1.29E-01

NA/ND – Not applicable/Not determined

A.T. Kearney, Inc.
222 West Adams Street
Chicago, Illinois 60606
312 6480111
Facsimile 312 223 6200

Management
Consultants

RZ2-R05033.01-ID-004

July 21, 1995

ATKEARNEY

Mr. William Buller
U.S. Environmental Protection Agency
Region V - HRE-8J
77 W. Jackson Boulevard
Chicago, IL 60604

D.3.1

Reference: EPA Contract No. 68-W4-0006; REPA Work Assignment No. RO5033; Corrective Measures Study Report; EPA ID No.IND044587848, Former Franklin Power Products/Amphenol, Franklin, Indiana; Review Comments for the Draft Corrective Measures Study (March 1995); Task 02 Deliverable

Dear Mr. Buller:

As requested, A.T. Kearney Team member, Metcalf & Eddy (M&E), has reviewed the March 1995 Draft Corrective Measures Study (CMS) submitted by Earth Tech, Amphenol Corporation's subcontractor. The attached report provides both general and specific comments regarding the Draft CMS. As requested, these comments are formatted to correspond with the initial comments provided to the Kearney Team as guidance in defining areas of concern. Where appropriate, additional information and/or comments are provided to assist in preparing a final Notice of Deficiencies. Additionally, if the initial comment adequately defined all deficiencies, this is noted and no additional information is requested. Accompanying this review is a diskette containing the review comments in Word Perfect 5.1 format.

Please contact me or the Kearney Work Assignment Manager, John Koehnen, at 312/223-6253, if you have any questions.

Sincerely,

Ann L. Anderson

Ann L. Anderson
Regional Manager

Enclosures

cc: F. Norling, EPA Region V, w/o att.
W. Jordan, Central Files
J. Koehnen
A. Williams
T. Lentzen, M&E

H:\WP51\DELIVERA\R05033CL.T2D

FRANKLIN POWER PRODUCTS/AMPHENOL COMPANY
DOCUMENT REVIEW/COMMUNITY RELATIONS
IND044587848

TASK 02 DELIVERABLE

Submitted to:

Mr. William Buller
U.S. Environmental Protection Agency
Region V - HRE-8J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

A.T. Kearney, Inc.
222 West Adams Street
Chicago, Illinois 60606

EPA Work Assignment No.	R05033
Contract No.	68-W4-0006
A.T. Kearney WAM:	John Koehnen
Telephone Number:	312/223-6253
EPA WAM:	William Buller
Telephone Number:	312/886-4568

August 11, 1995

Franklin Power Products/Amphenol Company
Review Comments Report
Draft Report Corrective Measures Study

Overall Comments on CMS

The Draft CMS Report prepared for Franklin Power Products (FPP) (formerly Amphenol facility), provided good alternatives for site remediation (Method 5). However, FPP should consider other methods to install the proposed soil vapor extraction/air sparge (SVE/AS) system. A potential alternative is horizontal SVE/AS. The advantages of installing a horizontal SVE/AS system include: minimizing disruption to site activities, decreasing the piping network (headers, well vaults), and increasing the radius of influence. Also, instead of many individual vertical SVE/AS points throughout the site, several points within the SVE/AS system can be installed in the same trench line.

The report does not address inorganics even though the site's history includes electroplating, machining, and assembling of manufactured components. Inorganics should be addressed as potential constituents of concern by: comparing the site analytical results against background analytical results, determining if the inorganics are naturally occurring, and determining if the contaminant levels are statistically significant. Once this has been determined, remediation techniques/alternatives should be discussed, if needed.

Results of soil probe investigations indicate elevated volatile organic compound (VOC) levels along Forsythe Street. The presence of VOCs in the subsurface should be verified further with the installation of soil borings/monitoring wells. Furthermore, the potential for volatile vapors to migrate into residential basements should be investigated.

Mud should not be used as a drilling fluid. The site geological profile consists of sands and silty sands with the lower portion of Unit B being saturated. Mud may block natural air flow pathways, dry, crack, and make new preferential pathways that would impede remediation. Hollow stem augers can be used in silty sands and sandy soils. If heaving sands are a concern, the augers can be filled with (tested) potable water to maintain a significant head on the sand so upwelling of sand ("blow back") into the augers is less likely to occur.

On page 23, it is unclear how VOC contaminants, found in PGP-6,7,10, and 13, were different from Amphenol's contamination. Further substantiation of this statement is necessary. What were the methodologies in determining this? Was chemical age dating used? Was the determination based upon comparing VOC analytical results of Amphenol's versus others' contamination?

The selected remediation system seems very localized in its treatment (treats the highly contaminated area). The system neglects to remediate a highly impacted area located immediately north of where the system is located. Plate 5A indicates an area of 500 micrograms per kilogram (µg/kg) soil contamination. Plate 5B indicates that soil VOCs are greater in their lateral extent than what the system indicates it can remediate.

General Comments:

1,2. Concur with EPA. Additional aquifer testing should occur in the recovery wells (RWs). Testing the maximum capability of the aquifer will help optimize the remediation system. Furthermore, knowing the capabilities of the aquifer and the remediation systems will assist in lowering the water level so that the storm sewer drain and the groundwater level will not intercept one another.

The pumping rate of the existing wells (3 total) should be increased to avoid groundwater contact with the sewer line invert. The distance below the tank invert, 0.21 feet, does not seem a great enough drawdown to deter groundwater from going into the storm sewer which ultimately drains into Hurricane Creek. A significant rain could cause a rise in the water level and potential subsurface contaminants could be carried to Hurricane Creek.

3. Concur with EPA. Soil probe investigation data indicate that VOC groundwater contamination exists in the area of Forsythe Street and extending beyond Ross Court (the subsurface beneath approximately 800 feet of Forsythe Street has been impacted. The VOCs of concern include: total VOCs, trichlorethene (TCE), trichloroethane (TCA), tetrachloroethylene (PCE), and to a lesser extent, dichloroethane (DCA). Monitoring wells should be installed to verify the presence of VOCs in the groundwater.

It is possible that only three monitoring wells would be insufficient to delineate the extent of the subsurface VOC plume in the surrounding residential area in addition to Forsythe Street. Once this plume has been identified, the installation of a remediation system, if necessary, should be conducted or adapted (i.e., added) to the one being installed at the site. The remediation system, when installed below the surface and in the residential area, should be capable of operation with minimal disruption to the surrounding area.

Restricted access in manholes indicates the presence of subsurficial vapors. Therefore, FPP should consider performing residential vapor monitoring in basements and

crawl spaces to assess the potential for harmful vapors to affect human health.

4. Identify the units/areas included within operable unit #2 and operable unit #3. Indicate the reasoning behind these operable units (i.e., is the segregation into operational units due to different contaminants or ease of remediation implementation)?

5. The CMS Report did address PCE, TCE, TCA, DCA, and inorganics in the groundwater (inorganics are not addressed as part of the remediation scheme). PCE and several inorganic were discussed in soil. The sediment discussion included various inorganic compounds. Surface water included discussion of VOCs.

   Analyses were performed for several VOC compounds, but the EPA Methodology was not provided. Were those chemicals with exceedances the only ones reported? If so, then VOC degradation products were probably noted but did not exceed any quantitation or regulatory limit. Therefore, they were not posted on the table. Indicate the rationale for the analytes included for each media and define the significance of the results.

6. The site's history of electroplating and machining may warrant consideration of inorganics as part of the investigation. Expand and include inorganics as part as the risk assessment, identifying appropriate cleanup alternatives.

7. Monitor groundwater zone D to ensure that the aquitard is competent and downward migration does not occur. This would determine whether the VOCs detected were part of the "carrying down" during drilling.

Specific Comments:

1. **Section 2.3 and Sheet 4A** - Concur with EPA. Unit C is approximately 26' thick (per map 4A) versus 30 - 35 ' thick (as stated in text). Unit D is approximately 16' thick (per map 4A) versus approximately 12' thick (as stated in text).

2. **Section 3.3.1** - If inorganic constituents exceeded ARARs but not background, a statistical analysis should be conducted (at a minimum) to determine the significance of these values. The natural occurrence of these constituents should be discussed with regard to their occurrences (unnatural) in the soil. If it is determined that the exceedance of background is statistically significant, then a discussion of remediation goals/criteria should be presented.

3. **Section 3.4.1** - The purpose of collecting filtered versus unfiltered samples is to determine the amount of constituents that are adsorbed to, or fixated upon, the soil particle. Turbidity refers to solids or organic matter that do not settle out of the groundwater. Removing the turbidity removes contaminants that cling to suspended solids. MCLs or other water regulations are based upon turbidity because solids in the water interfere with filtration and/or remediation.

   Acidification for filtered (dissolved) samples should occur <u>after</u> filtering. Acidification will aid in the determination of inorganic constituents in the water after most turbidity has been removed by use of a 0.45 μ (micron) filter. Revise as appropriate to ensure that these criteria are adhered to.

4. Concur with EPA.

5. Concur with EPA.

6. **Section 3.6.1** - Groundwater flow is toward the South/ Southeast for unit B and toward the South/Southwest for unit D (mostly a southern gradient). According to the groundwater contour elevations, PGP-6 and PGP-7 are considered upgradient for Unit B. But PGP-10 is not. Revise the text of the CMS accordingly.

7. Comment on EPA - Is Hurricane Creek a gaining or losing stream? If Hurricane Creek is a gaining stream (a stream that is supplemented by groundwater flowing into the creek), then groundwater flow or the sewer line intercepting the groundwater will pass its contamination toward and into Hurricane Creek. The potential to affect groundwater with a gaining stream is less than a losing stream. If Hurricane Creek is a losing stream (a stream that loses its water to the groundwater table), a greater potential exists that groundwater will be contaminated (the storm sewer may dispense contaminants to the creek and "recirculate" them to the groundwater). Groundwater will move toward an area of high groundwater potential to low groundwater potential.

8. Concur with EPA.

9. **Section 3.8.1, First Paragraph** - Please identify the unit under discussion. It is stated that a three to ten foot thick saturated layer is where chlorinated solvents are located. Is this unit A or unit B? The text indicates that it is unit B's three-foot saturated zone that is 12 to 15 feet thick and whose depth ranges from 5 to 8 feet below grade to 20 feet below grade. Clarify these discrepancies.

10. Concur with EPA.

11. Concur with EPA.

12. **Section 5.1** - Corrective measures should consider general VOCs and not be VOC-specific parameters. VOCs degrade into other constituents throughout their chemical lifetime.

    Remediation of VOCs should take into consideration mitigation of contamination to protect the environment. Revise the constituents of concern accordingly.

13. **Section 5.1, Last Paragraph** - Concur with EPA. Contamination, as detected by soil gas probes, indicates that the residential area is an area of concern.

14. Concur with EPA.

15. Concur with EPA.

16. Not able to comment. The AOC was not available for Kearney Team review.

17. Concur with EPA.

18. Concur with EPA.

19. Concur with EPA.

20. Concur with EPA.

21. Concur with EPA.

22. Concur with EPA.

23. Concur with EPA.

24. **Section 6.6.1** - The problem with reinfiltration is that it may increase the groundwater flow in an area where groundwater depression is desirable. Groundwater table depression is necessary so that the storm sewer does not transport contaminated groundwater to Hurricane Creek.

    Also, soil flushing methods, even though less expensive than Method 5, may take longer to remove VOCs from the soil column and groundwater.

    Anticipated remediation clean-up time (years and/or months) for each alternative were not provided. Estimating a time period for remediation will provide the owner/operator with a time frame that will assist in identifying potential future costs. Method 5 seems to "attack" the contamination

from more aspects (media) than Method 6 and will take a shorter time period to remediate the area. Also, Method 5 seems more adaptable and expandable, if needed.

25. Concur with EPA.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We make Indiana a cleaner, healthier place to live

Evan Bayh
Governor
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Commissioner

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March 24, 1995

D. 3.1

Ms. Uylaine McMahan, HRE-8J
U.S. EPA, Region V
77 West Jackson Blvd.
Chicago, Illinois 60604

Re: Corrective Measures Study Draft Report
Franklin Power Products
Franklin, Indiana
EPA I.D. No. IND 044587848

Dear Ms. McMahan:

The Indiana Department of Environmental Management (IDEM) has reviewed Franklin Power Products' March, 1995, Corrective Measures Study Draft Report and has the following comment:

> In Section 8.2, "Justification of the Recommended Corrective Measure Alternative", there is no discussion for recommending Alternative 5 over Alternative 6, even though both are considered to rank high in all areas of achieving the project goals, and Alternative 6 would be less expensive to implement.

If you have any questions regarding this matter, please contact Ms. Ruth Williams of my staff at 317/233-4623.

Sincerely,

Michael E. Sickels, Chief
Corrective Action Section
Hazardous Waste Management Branch
Solid and Hazardous Waste Management

cc: Mr. Joel Morbito, U.S.EPA, Region V
Mr. William Buller, U.S. EPA, Region V

RISK ASSESSMENT FOR FRANKLIN POWER PRODUCTS /AMPHENOL FACILITY
INORGANIC CONSTITUENTS IN SOILS

Developed by U.S. EPA
October, 1995

FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN , INDIANA
CORRECTIVE ACTION REVIEW AND FIELD OVERSIGHT

Introduction

A risk evaluation was performed for naturally occurring inorganic elements detected on-site and in background samples in order to provide a comparison between site-related risks and risks associated with background concentrations. Carcinogenic risk and noncancer hazard calculations were performed for the 24 naturally occurring inorganic elements detected in soil collected from the former Amphenol site in Franklin, Indiana. Risk and hazard calculations were also performed for 17 of the 24 elements which were associated with background soil samples. The risk calculations are presented in Appendix A.

The risk evaluation is based on the following:

- U.S. EPA Risk Assessment Guidance for Superfund (RAGS),
- Volume I [Human Health Evaluation Manual (HHEM)] (U.S. EPA. 1989).
- U.S. EPA HHEM Supplemental Guidance for Standard Exposure Factors (U.S. EPA, 1991); and
- The U.S. EPA Dermal Exposure Assessment: Principles and Applications (U.S. EPA, 1992a).

A reasonable maximum exposure (RME) and a central tendency exposure (CTE) were evaluated. The RME is the maximum exposure reasonably expected to occur at the site (U.S. EPA 1989). The CTE is used to approximate the average estimate of exposure and is derived by using average values for exposure variables.

Data Evaluation Considerations and Uncertainties

The soil samples were collected from borings (monitoring well borings or soil borings) installed around the site. A total of 32 soil samples were collected, three of which were considered to represent background conditions. Samples were collected from depths ranging between 2 to 35 feet below ground surface (bgs). Surface soil (0 to 1 foot) was not sampled. Two of the background samples were collected at 6 feet bgs (MW-24 and MW-20) and the third background sample was collected at 12 feet bgs (MW-20). A comparison of the inorganic concentrations detected in site soil to the inorganic concentrations detected in background soil indicated that the concentrations were similar at the subsurface depths. The range of concentrations detected on-site overlap with the range of concentrations from background locations for most of the inorganic parameters. There is no clear separation between site and background concentrations for inorganics. However, it should also be noted that three background samples may not be sufficient to adequately represent accurate background conditions for the site.

The soil analytical data for the naturally occurring inorganics were provided to M&E in a summary table format. Information concerning sampling locations, data quality, and data qualifier descriptions was not included in the data summary table. M&E assumed that the data were of appropriate quality for use in the risk assessment, and that the types of qualifiers used to describe some of the data were as defined in the U.S. EPA's Contract Laboratory Program (CLP). Exhibit 5-4 of RAGS (U.S. EPA, 1989) was used to determine which data with qualifiers should be used in the risk assessment. Based on Exhibit 5-4 of RAGS, all data were used to determine exposure concentrations for the elements of (potential) concern. It should be noted here that the data with qualifiers indicated uncertainties in concentrations but not in identification.

The uncertainties which may have an impact on the estimates of exposure concentration are identified below:

- Use of subsurface soil samples most often at depths greater than six feet bgs to represent potential concentrations of chemicals of concern related to site history;
- Lack of information concerning soil boring locations which would be helpful to identify problem areas or "hotspots"; and
- Use of the data with qualifiers which indicate that the reported concentrations may be estimates.

Exposure Assumptions

A residential land-use scenario featuring an adult and a child resident is used to characterize potential future activities and exposure assumptions for the site. In such a scenario, exposure is assumed to occur through:

- Soil ingestion;
- Dermal contact with soil; and
- Inhalation of airborne particulates from soil.

The potential exposure to the adult receptor is examined from the perspective of a chronically exposed future resident who lives on-site for a total of 30 years. The child receptor is evaluated based on a six year period, or subchronic exposure duration. Table 1 provides the exposure assumptions.

In order to "bracket" the uncertainty associated with an estimate of exposure concentrations, three different concentration estimates are used for the risk evaluations:

- maximum concentration;
- average concentration; and
- 95 percent upper confidence level (UCL) (U.S. EPA, 1992b).

related 95% UCL beryllium concentration of 1.3 mg/kg is higher than the background maximum beryllium concentration of 0.7 mg/kg.

Site Maximum vs. Background Maximum

For this comparison, the maximum concentrations of both the site-related and background constituents were used in conjunction with RME assumptions (Table 1). Overall, the results indicated that site-related maximum concentrations were associated with higher risks than background maximum concentrations.

For the residential adult, the site-related total risk was 2E-05, and the total hazard was 0.4. Background total risk was slightly lower at 8E-06, and total hazard was 0.1. For the residential child, the site-related total risk was 3E-05, and the total hazard was 1.0. Background total risk was slightly lower at 1E-05, and total hazard was 0.4.

Ingestion of arsenic and beryllium in soil were associated with the excess carcinogenic risk, as shown in Tables 2 and 4 of Attachment 1 of Appendix A. Maximum concentrations for these chemicals are provided in Table 2. The site-related maximum arsenic concentration of 9.5 mg/kg is higher than the background maximum concentration of 4.1 mg/kg. In addition, the site-related maximum beryllium concentration of 1.6 mg/kg is higher than the background maximum beryllium concentration of 0.7 mg/kg.

Site Average vs. Background Average

For this comparison, the average value was used as the exposure concentration for site-related and background constituents in conjunction with central tendency exposure assumptions (Table 1). Overall, the results indicated that the average concentration values for site-related and background concentrations were associated with very similar risks.

For the residential adult, the site-related total risk was 7E-07, and the total hazard was 0.04. Background total risk was slightly lower at 1E-06, and total hazard was 0.03. For the residential child, the site-related total risk was 4E-06, and the total hazard was 0.2. Background total risk was 5E-06, and total hazard was 0.1.

Ingestion of arsenic and beryllium was associated with the excess carcinogenic risk, as shown in Tables 3 and 5 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related average arsenic concentration is 2.4 mg/kg and the background average concentration is 2.9 mg/kg. Also, the site-related average beryllium concentration is 0.4 mg/kg and the background average beryllium concentration is 0.6 mg/kg.

Table 2 provides a summary of the exposure concentrations. Air concentrations for particulates were predicted using conservative models (Exhibits A and B).

Toxicity Assessment

Toxicity data were obtained from the Integrated Risk Information System (IRIS, 1995) and Health Effects Assessment Summary Tables (HEAST, 1994), and U.S. EPA Environmental Criteria and Assessment Office (ECAO). Toxicity values for the chemicals of concern are provided in Table 3.

Risk Characterization

The risk characterization provides a comparison of the site-related and background risk estimates. The outcome of this comparison is used to determine whether the site-related chemical concentrations may be associated with higher risks than background concentrations. Table 4 provides a summary of the risk and hazard calculations for site-related and background risk evaluations.

Three different comparisons were made, as shown in Table 4, and the results of each comparison are discussed below.

Site 95% UCL vs. Background Maximum

For this comparison, the 95% UCL was used as the exposure concentration for site-related constituents, whereas the maximum concentrations were used for background constituents in conjunction with reasonable maximum exposure assumptions (Table 1). Because the background data contained only 3 sampling locations, spuriously high values resulted when the 95% UCL was derived for the background constituents (Table 2). Therefore, based on professional judgement, the 95% UCLs were considered inappropriate, and maximum concentrations were used instead. Overall, the results indicated that site 95% UCL concentrations were associated with slightly higher risks than background maximum concentrations.

For the residential adult, the site-related total risk was 1E-05, and the total hazard was 0.1. Background total risk was slightly lower at 8E-06, and total hazard was 0.1. For the residential child, the site-related total risk was 2E-05, and the total hazard was 0.7. Background total risk was slightly lower at 1E-05, and total hazard was 0.6.

Ingestion of arsenic and beryllium were associated with the excess carcinogenic risk, as shown in Tables 1 and 4 in Attachment 1 of Appendix A. Exposure concentrations for these chemicals are provided in Table 2. The site-related 95% UCL arsenic concentration of 5.8 mg/kg is higher than the background maximum concentration of 4.1 mg/kg. Also, the site-

REFERENCES

HEAST. 1994. U.S. Environmental Protection Agency. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-94/020 and supplements.

IRIS. 1995. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS). Office of Health and Environmental Assessment, Washington, DC.

U.S. EPA. 1989. U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual, Part A. Interim final. Office of Solid Waste and Emergency Response. Washington, DC. EPA/540/1-89/002.

U.S. EPA. 1991. U.S. Environmental Protection Agency. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response. Washington, DC, OSWER Directive 9285.6-03.

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U.S. EPA. 1992b. U.S. Environmental Protection Agency. Supplemental Guidance to RAGs: Calculating the Concentration Term. Office of Solid Waste and Emergency Response. Washington, DC. Publication 9285.7-081. May 1992.

U.S. EPA. 1995. U.S. Environmental Protection Agency. Region 9 Preliminary Remediation Goals (PRGs) First Half 1995, February 1995.

TABLES

Table 1 Summary of Exposure Parameter Values for the Risk Evaluation – Former Amphenol Site

PATHWAY	PARAMETER	UNITS	Residential			
			Child		Adult	
			RME (1)	CTE (2)	RME (1)	CTE (2)
General	Body weight	kg	15 a	15 a	70 a	70 a
	Exposure duration	years	6 c	6 c	30 a	9 a
	Averaging time – noncancer	days	2190 a	2190 a	10950 a	3285 a
	Averaging time – cancer	days	25550 a	25550 a	25550 a	25550 a
Soil Ingestion	Ingestion rate	mg/day	200 a	100 a	100 a	50 e
	Exposure frequency	days/year	350 a	350 a	350	350
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
	Exposure duration	years	6 a	6 a	30 a	9 a
Soil Dermal Contact	Skin surface area available	cm2/day	2010 b	1750 b	5800 b	5000 d
	Soil-to-skin adherence factor	mg/cm2	1 b	1 b	1 b	1 b
	Dermal absorption factor	none	**	**	**	**
	Exposure frequency	days/year	350 a	234 a	350 a	234 a
	Units conversion	kg/mg	1.00E-06 –	1.00E-06 –	1.00E-06 –	1.00E-06 –
Fugitive Dust Inhalation	Inhalation rate	m3/day	20 d	20 d	20 d	20 d
	Exposure time	hours/day	24 a	24 e	24 a	24 e
	Exposure frequency	days/year	350 a	234 a	350 a	234 a

(1) Reasonable Maximum Exposure (RME) used in conjunction with the maxium and 95% UCL exposure concentrations

(2) Central Tendency Exposure (CTE) used in conjunction with the average exposure concentrations

**Chemical Specific

a. EPA 1993, Superfund's Standard Default Exposure Factors for the Central Tendancy and Reasonable Maximum Exposure of the ingestion rates for residential and commercial adults are for non-contact intensive activities (for contact intensive activities, different ingestion rates are recommended).
The ingestion rate for the residential adult assumes a 30 year chronic adult exposure duration.

b. EPA 1992a, Dermal Exposure Assessmement: for skin surface area during soil and sediment dermal contact, assumes 25% of total body surface area (pp.8-10 and 8-12 of EPA, 1992a)

c. EPA 1989a, Risk Assessment Guidance for Superfund Part A

d. EPA 1989b, Exposure Factors Handbook (EFH); for fugitive dust inhalation rates, values are consistent with EFH values

e. If guidance is not available for the CT but does exist for the RME, the RME value was adopted as the CT.

Table 2 Summary of Comparison of Concentrations Between Site–Specific and Background Data and USEPA Region IX PRGs

INORGANIC	COMPARISON OF CONCENTRATIONS (MG/KG) AVERAGE Site–specific	AVERAGE Background	MAXIMUM Site–specific	MAXIMUM Background	95% UCL Site–specific	95% UCL Background	USEPA REGION IX RESIDENTIAL PRG (a) (MG/KG)
Aluminum	3994.2	6273.3	18200.0	15200.0	6393.7	2.1E+10	77000
Antimony	2.6	ND	12.4	ND	6.6	ND	31
Arsenic	2.4	2.9	9.5	4.1	5.8	10.34	0.32
Barium	18.4	38.5	115.0	83.1	46.5	6.6E+08	5300
Beryllium	0.4	0.6	1.6	0.7	1.3	0.94	0.14
Cadmium	0.4	ND	13.2	ND	0.8	ND	38
Calcium	73231.9	36226.7	163000.0	66900.0	294215.8	2.5E+13	NA
Chromium	5.1	8.3	19.4	20.7	15.6	1.6E+15	210 (total), 30 (Cr 6+)
Cobalt	2.2	3.6	11.2	5.4	5.8	29.4	NA
Copper	111.2	10.4	1970.0	14.0	108.2	68.7	2800
Cyanide (total)	1.9	ND	21.6	ND	2.4	ND	1300
Iron	7467.2	10320.0	23000.0	20100.0	10910.9	5.1E+06	NA
Lead	8.0	9.3	52.9	16.5	14.5	470.2	400
Magnesium	24701.7	13606.7	59900.0	20100.0	44119.9	3.6E+07	NA
Manganese	290.4	240.3	1000.0	350.0	445.9	1484.8	380
Mercury	0.1	ND	2.3	ND	0.1	ND	23
Nickel	8.7	10.2	38.3	17.1	14.8	778.4	1500
Potassium	370.7	588.0	1470.0	1120.0	803.7	2.0E+05	NA
Selenium	0.1	ND	0.4	ND	0.3	ND	380
Silver	0.4	ND	1.8	ND	1.1	ND	380
Sodium	56.8	72.8	281.0	117.0	144.1	681.7	NA
Thallium	0.1	ND	0.4	ND	0.3	ND	6.1
Vanadium	7.8	13.1	33.8	27.8	14.8	1.9E+05	540
Zinc	36.8	39.6	91.0	77.3	44.8	15732.9	23000

NA – Not Applicable
ND – Not Detected
PRG – Preliminary Remediation Goal
(a) USEPA Region IX Preliminary Remediation Goals (PRGs) First Half 1995, February 1, 1995.

Table 3 Toxicity Values for Chemicals of Potential Concern at the Former Amphenol Site

	NONCARCINOGENIC RfDs						CANCER SLOPE FACTORS			
	ORAL RfD (MG/KG/DAY)		ADJUSTED ORAL (DERMAL) (MG/KG/DAY) (a)		INHALATION RfD (MG/KG/DAY)		ORAL SLOPE FACTOR (MG/KG/DAY)−1	ADJUSTED ORAL (DERMAL) SLOPE FACTOR (b) (MG/KG/DAY)−1	INHALATION SLOPE FACTOR (MG/KG/DAY)−1 (b)	ORAL ABSORPTION FACTOR (UNITLESS) (c)
CHEMICAL	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC	SUBCHRONIC	CHRONIC				
Aluminum	NA	1.0E+00	NA	2.0E-01	NA	NA	NA	NA	NA	0.20
Antimony	4.0E-04	4.0E-04	2.4E-04	2.4E-04	NA	NA	NA	NA	NA	0.60
Arsenic	3.0E-04	3.0E-04	2.8E-04	2.8E-04	NA	NA	1.8E+00	1.9E+00	5.0E+01	0.95
Barium	7.0E-02	7.0E-02	3.5E-03	3.5E-03	1.0E-03	1.0E-04	NA	NA	NA	0.07
Beryllium	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	4.3E+00	4.3E+01	8.4E+00	0.10
Cadmium	NA	5.0E-04	NA	3.5E-05	NA	NA	NA	NA	6.1E+00	0.07
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Chromium (total)(e)	2.0E-02	5.0E-03	1.0E-02	2.5E-03	NA	NA	NA	NA	4.2E+01	0.50
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Copper	NA	4.0E-02	NA	4.0E-02	NA	NA	NA	NA	NA	0.99
Cyanide (total)	2.0E-02	2.0E-02	1.4E-02	1.4E-02	NA	NA	NA	NA	NA	0.70
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Manganese	1.4E-01	1.4E-01	5.6E-03	5.6E-03	1.0E-04	1.0E-04	NA	NA	NA	0.04
Mercury	3.0E-04	3.0E-04	4.5E-05	4.5E-05	8.6E-05	8.6E-05	NA	NA	NA	0.15
Nickel	2.0E-02	2.0E-02	2.0E-03	2.0E-03	NA	NA	NA	NA	8.4E-01	0.10
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Selenium	5.0E-03	5.0E-03	4.9E-03	4.9E-03	NA	NA	NA	NA	NA	0.97
Silver	5.0E-03	5.0E-03	5.0E-04	5.0E-04	NA	NA	NA	NA	NA	0.10
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Thallium (Thallium chloride)**	8.0E-04	8.0E-05	8.0E-05	8.0E-06	NA	NA	NA	NA	NA	0.10
Vanadium	7.0E-03	7.0E-03	7.0E-05	7.0E-05	NA	NA	NA	NA	NA	0.01
Zinc	3.0E-01	3.0E-01	9.0E-02	9.0E-02	NA	NA	NA	NA	NA	0.30

Sources: U.S. EPA, Integrated Risk Information System (IRIS) database accessed May 1995.
U.S. EPA Health Effects Assessment Tables (HEAST), Annual FY−1994 edition (Heast, 1994).

*Region IV default oral absorption factors were used when necessary and are as follows: VOCs − 0.60, SVOCs − 0.50, Inorganics − 0.20.

** Toxicity values for thallium chloride were used to calculate risk and hazard values for thallium.

NA − Toxicity values (RfD/CSF) not available from IRIS, HEAST, scientific literature, USEPA nor OhioEPA for risk evaluation.

(a) Adjusted oral toxicity values used for calculation of dermal hazards.
Adjustment of an administered to an absorbed dose RfD:
(Administered RfD) x (Oral Absorption Factor) = Absorbed Dose RfD

(b) Adjusted oral toxicity values used for calculation of dermal risks
Adjustment of an administered to an absorbed dose CSF:
(Administered CSF) −1 / (Oral Absorption Factor) = Absorbed Dose CSF

(c) Oral absorption factors from chemical−specific Toxicological Profiles, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service.

(d) As a conservative measure, total chromium utilizes hexavalent chromium toxicity values.

Table 4 Summary of Risk and Hazard Calculations for the Former Amphenol Site

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	9E-06	8E-02	6E-06	6E-02
	Dermal	2E-06	4E-02	1E-06	5E-02
	Inhalation	8E-07	9E-03	9E-07	8E-03
Total		1E-05	1E-01	8E-06	1E-01

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	2E-05	6E-01	1E-05	5E-01
	Dermal	7E-07	5E-02	4E-07	7E-02
	Inhalation	7E-07	4E-02	8E-07	3E-02
Total		2E-05	7E-01	1E-05	6E-01

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	1E-05	3E-01	6E-06	6E-02
	Dermal	3E-06	1E-01	1E-06	5E-02
	Inhalation	1E-06	2E-02	9E-07	8E-03
Total		2E-05	4E-01	8E-06	1E-01

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-05	1E+00	1E-05	3E-01
	Dermal	1E-06	1E-01	4E-07	7E-02
	Inhalation	1E-06	9E-02	8E-07	3E-02
Total		3E-05	1E+00	1E-05	4E-01

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	6E-07	2E-02	7E-07	2E-02
	Dermal	1E-07	1E-02	2E-07	1E-02
	Inhalation	6E-08	4E-03	8E-08	4E-03
Total		7E-07	4E-02	1E-06	3E-02

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-06	1E-01	4E-06	1E-01
	Dermal	2E-07	1E-02	2E-07	2E-02
	Inhalation	2E-07	2E-02	3E-07	1E-02
Total		4E-06	2E-01	5E-06	1E-01

APPENDIX A

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	6.39E+03	100	1.0E–06	1.0	350	30	70	25550	3.75E–03 NA		ND
Antimony	6.55E+00	100	1.0E–06	1.0	350	30	70	25550	3.85E–06 NA		ND
Arsenic	5.78E+00	100	1.0E–06	1.0	350	30	70	25550	3.38E–06	1.60E+00	6.09E–06
Barium	4.65E+01	100	1.0E–06	1.0	350	30	70	25550	2.73E–05 NA		ND
Beryllium	1.28E+00	100	1.0E–06	1.0	350	30	70	25550	7.50E–07	4.30E+00	3.23E–06
Cadmium	7.58E–01	100	1.0E–06	1.0	350	30	70	25550	4.45E–07 NA		ND
Calcium	2.94E+05	100	1.0E–06	1.0	350	30	70	25550	1.73E–01 NA		ND
Chromium	1.56E+01	100	1.0E–06	1.0	350	30	70	25550	9.17E–06 NA		ND
Cobalt	5.77E+00	100	1.0E–06	1.0	350	30	70	25550	3.39E–06 NA		ND
Copper	1.08E+02	100	1.0E–06	1.0	350	30	70	25550	6.35E–05 NA		ND
Cyanide (total)	2.39E+00	100	1.0E–06	1.0	350	30	70	25550	1.40E–06 NA		ND
Iron	1.09E+04	100	1.0E–06	1.0	350	30	70	25550	6.41E–03 NA		ND
Lead	1.45E+01	100	1.0E–06	1.0	350	30	70	25550	8.53E–06 NA		ND
Magnesium	4.41E+04	100	1.0E–06	1.0	350	30	70	25550	2.59E–02 NA		ND
Manganese	4.46E+02	100	1.0E–06	1.0	350	30	70	25550	2.62E–04 NA		ND
Mercury	1.06E–01	100	1.0E–06	1.0	350	30	70	25550	6.23E–06 NA		ND
Nickel	1.48E+01	100	1.0E–06	1.0	350	30	70	25550	8.67E–06 NA		ND
Potassium	8.04E+02	100	1.0E–06	1.0	350	30	70	25550	4.72E–04 NA		ND
Selenium	2.69E–01	100	1.0E–06	1.0	350	30	70	25550	1.58E–07 NA		ND
Silver	1.09E+00	100	1.0E–06	1.0	350	30	70	25550	6.39E–07 NA		ND
Sodium	1.44E+02	100	1.0E–06	1.0	350	30	70	25550	8.46E–05 NA		ND
Thallium	2.87E–01	100	1.0E–06	1.0	350	30	70	25550	1.68E–07 NA		ND
Vanadium	1.48E+01	100	1.0E–06	1.0	350	30	70	25550	8.68E–06 NA		ND
Zinc	4.48E+01	100	1.0E–06	1.0	350	30	70	25550	2.63E–05 NA		ND

NA/ND – Not available/ Not determined

TOTAL RISK 9.31E–06

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	100	1.0E-06	1.0	350	30	70	10950	8.76E-03	1.00E+00	8.76E-03
Antimony	6.55E+00	100	1.0E-06	1.0	350	30	70	10950	8.97E-06	4.00E-04	2.24E-02
Arsenic	5.76E+00	100	1.0E-06	1.0	350	30	70	10950	7.89E-06	3.00E-04	2.63E-02
Barium	4.65E+01	100	1.0E-06	1.0	350	30	70	10950	6.36E-05	7.00E-02	9.09E-04
Beryllium	1.28E+00	100	1.0E-06	1.0	350	30	70	10950	1.75E-06	5.00E-03	3.50E-04
Cadmium	7.58E-01	100	1.0E-06	1.0	350	30	70	10950	1.04E-06	5.00E-04	2.08E-03
Calcium	2.94E+05	100	1.0E-06	1.0	350	30	70	10950	4.03E-01	NA	ND
Chromium	1.56E+01	100	1.0E-06	1.0	350	30	70	10950	2.14E-05	5.00E-03	4.28E-03
Cobalt	5.77E+00	100	1.0E-06	1.0	350	30	70	10950	7.91E-06	NA	ND
Copper	1.08E+02	100	1.0E-06	1.0	350	30	70	10950	1.48E-04	4.00E-02	3.71E-03
Cyanide (total)	2.39E+00	100	1.0E-06	1.0	350	30	70	10950	3.27E-06	2.00E-02	1.64E-04
Iron	1.09E+04	100	1.0E-06	1.0	350	30	70	10950	1.49E-02	NA	ND
Lead	1.45E+01	100	1.0E-06	1.0	350	30	70	10950	1.99E-05	NA	ND
Magnesium	4.41E+04	100	1.0E-06	1.0	350	30	70	10950	6.04E-02	NA	ND
Manganese	4.46E+02	100	1.0E-06	1.0	350	30	70	10950	6.11E-04	1.40E-01	4.36E-03
Mercury	1.06E-01	100	1.0E-06	1.0	350	30	70	10950	1.45E-07	3.00E-04	4.84E-04
Nickel	1.48E+01	100	1.0E-06	1.0	350	30	70	10950	2.02E-05	2.00E-02	1.01E-03
Potassium	8.04E+02	100	1.0E-06	1.0	350	30	70	10950	1.10E-03	NA	ND
Selenium	2.69E-01	100	1.0E-06	1.0	350	30	70	10950	3.69E-07	5.00E-03	7.37E-05
Silver	1.09E+00	100	1.0E-06	1.0	350	30	70	10950	1.49E-06	5.00E-03	2.98E-04
Sodium	1.44E+02	100	1.0E-06	1.0	350	30	70	10950	1.97E-04	NA	ND
Thallium	2.87E-01	100	1.0E-06	1.0	350	30	70	10950	3.93E-07	8.00E-05	4.91E-03
Vanadium	1.48E+01	100	1.0E-06	1.0	350	30	70	10950	2.03E-05	7.00E-03	2.89E-03
Zinc	4.48E+01	100	1.0E-06	1.0	350	30	70	10950	6.14E-05	3.00E-01	2.05E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 8.32E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	6.39E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.16E-04	NA	ND
Antimony	6.55E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.23E-07	NA	ND
Arsenic	5.76E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.96E-07	1.89E+00	3.71E-07
Barium	4.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.58E-06	NA	ND
Beryllium	1.28E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.35E-08	4.30E+01	1.87E-06
Cadmium	7.58E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.58E-08	NA	ND
Calcium	2.94E+05	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.00E-02	NA	ND
Chromium	1.56E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.32E-07	NA	ND
Cobalt	5.77E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.97E-07	NA	ND
Copper	1.08E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.68E-06	NA	ND
Cyanide (total)	2.39E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	8.14E-08	NA	ND
Iron	1.09E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.72E-04	NA	ND
Lead	1.45E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.95E-07	NA	ND
Magnesium	4.41E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.50E-03	NA	ND
Manganese	4.46E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.52E-05	NA	ND
Mercury	1.06E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.61E-09	NA	ND
Nickel	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.03E-07	NA	ND
Potassium	8.04E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.74E-05	NA	ND
Selenium	2.69E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.16E-09	NA	ND
Silver	1.09E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.71E-08	NA	ND
Sodium	1.44E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	4.91E-06	NA	ND
Thallium	2.87E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.76E-09	NA	ND
Vanadium	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.04E-07	NA	ND
Zinc	4.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.53E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.24E-06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.08E-04	2.00E-01	2.54E-03
Antimony	6.55E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.20E-07	2.40E-04	2.17E-03
Arsenic	5.76E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.58E-07	2.85E-04	1.61E-03
Barium	4.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.69E-06	3.50E-03	1.05E-03
Beryllium	1.26E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.02E-07	5.00E-04	2.03E-04
Cadmium	7.58E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.02E-08	3.50E-05	1.72E-03
Calcium	2.94E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.34E-02 NA		ND
Chromium	1.56E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.24E-06	2.50E-03	4.96E-04
Cobalt	5.77E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.59E-07 NA		ND
Copper	1.08E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.60E-06	3.96E-02	2.17E-04
Cyanide (total)	2.39E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.90E-07	1.40E-02	1.36E-05
Iron	1.09E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.67E-04 NA		ND
Lead	1.45E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.15E-06 NA		ND
Magnesium	4.41E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.51E-03 NA		ND
Manganese	4.46E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.54E-05	5.60E-03	6.33E-03
Mercury	1.06E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.43E-09	4.50E-05	1.87E-04
Nickel	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.17E-06	2.00E-03	5.87E-04
Potassium	8.04E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.39E-05 NA		ND
Selenium	2.69E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.14E-06	4.85E-03	4.41E-06
Silver	1.09E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.65E-06	5.00E-04	1.73E-04
Sodium	1.44E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.15E-05 NA		ND
Thallium	2.87E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.28E-06	8.00E-06	2.85E-03
Vanadium	1.48E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.18E-06	7.00E-05	1.68E-02
Zinc	4.46E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.56E-06	9.00E-02	3.96E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 3.70E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.50E-05	0.83	24	350	30	70	25550	5.27E-06	NA	ND
Antimony	4.61E-06	0.83	24	350	30	70	25550	5.40E-09	NA	ND
Arsenic	4.06E-06	0.83	24	350	30	70	25550	4.75E-09	5.00E+01	2.37E-07
Barium	3.27E-07	0.83	24	350	30	70	25550	3.83E-08	NA	ND
Beryllium	9.01E-09	0.83	24	350	30	70	25550	1.05E-09	8.40E+00	8.85E-09
Cadmium	5.34E-09	0.83	24	350	30	70	25550	6.24E-10	6.10E+00	3.81E-09
Calcium	2.07E-03	0.83	24	350	30	70	25550	2.42E-04	NA	ND
Chromium	1.10E-07	0.83	24	350	30	70	25550	1.29E-08	4.20E+01	5.40E-07
Cobalt	4.07E-06	0.83	24	350	30	70	25550	4.76E-09	NA	ND
Copper	7.62E-07	0.83	24	350	30	70	25550	8.92E-08	NA	ND
Cyanide (total)	1.66E-06	0.83	24	350	30	70	25550	1.97E-09	NA	ND
Iron	7.69E-05	0.83	24	350	30	70	25550	8.99E-06	NA	ND
Lead	1.02E-07	0.83	24	350	30	70	25550	1.20E-08	NA	ND
Magnesium	3.11E-04	0.83	24	350	30	70	25550	3.64E-05	NA	ND
Manganese	3.14E-06	0.83	24	350	30	70	25550	3.67E-07	NA	ND
Mercury	7.47E-10	0.83	24	350	30	70	25550	8.74E-11	NA	ND
Nickel	1.04E-07	0.83	24	350	30	70	25550	1.22E-08	8.40E-01	1.02E-08
Potassium	5.66E-06	0.83	24	350	30	70	25550	6.62E-07	NA	ND
Selenium	1.90E-09	0.83	24	350	30	70	25550	2.22E-10	NA	ND
Silver	7.67E-09	0.83	24	350	30	70	25550	8.97E-10	NA	ND
Sodium	1.02E-06	0.83	24	350	30	70	25550	1.19E-07	NA	ND
Thallium	2.02E-09	0.83	24	350	30	70	25550	2.36E-10	NA	ND
Vanadium	1.04E-07	0.83	24	350	30	70	25550	1.22E-08	NA	ND
Zinc	3.16E-07	0.83	24	350	30	70	25550	3.69E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 8.01E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.50E-05	0.83	24	350	30	70	10950	1.23E-05	NA	ND
Antimony	4.61E-08	0.83	24	350	30	70	10950	1.26E-08	NA	ND
Arsenic	4.06E-08	0.83	24	350	30	70	10950	1.11E-08	NA	ND
Barium	3.27E-07	0.83	24	350	30	70	10950	8.93E-08	1.00E-04	8.93E-04
Beryllium	9.01E-09	0.83	24	350	30	70	10950	2.46E-09	NA	ND
Cadmium	5.34E-09	0.83	24	350	30	70	10950	1.46E-09	NA	ND
Calcium	2.07E-03	0.83	24	350	30	70	10950	5.66E-04	NA	ND
Chromium	1.10E-07	0.83	24	350	30	70	10950	3.00E-08	NA	ND
Cobalt	4.07E-08	0.83	24	350	30	70	10950	1.11E-08	NA	ND
Copper	7.62E-07	0.83	24	350	30	70	10950	2.08E-07	NA	ND
Cyanide (total)	1.66E-08	0.83	24	350	30	70	10950	4.60E-09	NA	ND
Iron	7.69E-05	0.83	24	350	30	70	10950	2.10E-05	NA	ND
Lead	1.02E-07	0.83	24	350	30	70	10950	2.79E-08	NA	ND
Magnesium	3.11E-04	0.83	24	350	30	70	10950	8.48E-05	NA	ND
Manganese	3.14E-08	0.83	24	350	30	70	10950	8.57E-07	1.00E-04	8.57E-03
Mercury	7.47E-10	0.83	24	350	30.	70	10950	2.04E-10	8.60E-05	2.37E-06
Nickel	1.04E-07	0.83	24	350	30	70	10950	2.84E-08	NA	ND
Potassium	5.66E-06	0.83	24	350	30	70	10950	1.55E-06	NA	ND
Selenium	1.90E-09	0.83	24	350	30	70	10950	5.17E-10	NA	ND
Silver	7.87E-09	0.83	24	350	30	70	10950	2.09E-09	NA	ND
Sodium	1.02E-06	0.83	24	350	30	70	10950	2.77E-07	NA	ND
Thallium	2.02E-09	0.83	24	350	30	70	10950	5.51E-10	NA	ND
Vanadium	1.04E-07	0.83	24	350	30	70	10950	2.84E-08	NA	ND
Zinc	3.16E-07	0.83	24	350	30	70	10950	8.62E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.47E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.39E+03	200	1.0E-06	1.0	350	6	15	25550	7.01E-03	NA	ND
Antimony	6.55E+00	200	1.0E-06	1.0	350	6	15	25550	7.18E-08	NA	ND
Arsenic	5.76E+00	200	1.0E-06	1.0	350	6	15	25550	6.31E-06	1.80E+00	1.14E-05
Barium	4.65E+01	200	1.0E-06	1.0	350	6	15	25550	5.09E-05	NA	ND
Beryllium	1.28E+00	200	1.0E-06	1.0	350	6	15	25550	1.40E-06	4.30E+00	6.02E-06
Cadmium	7.58E-01	200	1.0E-06	1.0	350	6	15	25550	8.30E-07	NA	ND
Calcium	2.94E+05	200	1.0E-06	1.0	350	6	15	25550	3.22E-01	NA	ND
Chromium	1.56E+01	200	1.0E-06	1.0	350	6	15	25550	1.71E-05	NA	ND
Cobalt	5.77E+00	200	1.0E-06	1.0	350	6	15	25550	6.33E-06	NA	ND
Copper	1.08E+02	200	1.0E-06	1.0	350	6	15	25550	1.19E-04	NA	ND
Cyanide (total)	2.39E+00	200	1.0E-06	1.0	350	6	15	25550	2.62E-06	NA	ND
Iron	1.09E+04	200	1.0E-06	1.0	350	6	15	25550	1.20E-02	NA	ND
Lead	1.45E+01	200	1.0E-06	1.0	350	6	15	25550	1.59E-05	NA	ND
Magnesium	4.41E+04	200	1.0E-06	1.0	350	6	15	25550	4.84E-02	NA	ND
Manganese	4.46E+02	200	1.0E-06	1.0	350	6	15	25550	4.89E-04	NA	ND
Mercury	1.06E-01	200	1.0E-06	1.0	350	6	15	25550	1.16E-07	NA	ND
Nickel	1.48E+01	200	1.0E-06	1.0	350	6	15	25550	1.62E-05	NA	ND
Potassium	8.04E+02	200	1.0E-06	1.0	350	6	15	25550	8.81E-04	NA	ND
Selenium	2.69E-01	200	1.0E-06	1.0	350	6	15	25550	2.95E-07	NA	ND
Silver	1.09E+00	200	1.0E-06	1.0	350	6	15	25550	1.19E-06	NA	ND
Sodium	1.44E+02	200	1.0E-06	1.0	350	6	15	25550	1.58E-04	NA	ND
Thallium	2.87E-01	200	1.0E-06	1.0	350	6	15	25550	3.14E-07	NA	ND
Vanadium	1.48E+01	200	1.0E-06	1.0	350	6	15	25550	1.62E-05	NA	ND
Zinc	4.48E+01	200	1.0E-06	1.0	350	6	15	25550	4.91E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.74E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RID (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	200	1.0E-06	1.0	350	6	15	2190	8.17E-02	NA	ND
Antimony	6.55E+00	200	1.0E-06	1.0	350	6	15	2190	8.37E-05	4.00E-04	2.09E-01
Arsenic	5.76E+00	200	1.0E-06	1.0	350	6	15	2190	7.36E-05	3.00E-04	2.45E-01
Barium	4.65E+01	200	1.0E-06	1.0	350	6	15	2190	5.94E-04	7.00E-02	6.49E-03
Beryllium	1.26E+00	200	1.0E-06	1.0	350	6	15	2190	1.63E-05	5.00E-03	3.27E-03
Cadmium	7.58E-01	200	1.0E-06	1.0	350	6	15	2190	9.69E-06	NA	ND
Calcium	2.94E+05	200	1.0E-06	1.0	350	6	15	2190	3.76E+00	NA	ND
Chromium	1.56E+01	200	1.0E-06	1.0	350	6	15	2190	2.00E-04	2.00E-02	9.98E-03
Cobalt	5.77E+00	200	1.0E-06	1.0	350	6	15	2190	7.36E-05	NA	ND
Copper	1.08E+02	200	1.0E-06	1.0	350	6	15	2190	1.38E-03	NA	ND
Cyanide (total)	2.39E+00	200	1.0E-06	1.0	350	6	15	2190	3.06E-05	2.00E-02	1.53E-03
Iron	1.09E+04	200	1.0E-06	1.0	350	6	15	2190	1.39E-01	NA	ND
Lead	1.45E+01	200	1.0E-06	1.0	350	6	15	2190	1.86E-04	NA	ND
Magnesium	4.41E+04	200	1.0E-06	1.0	350	6	15	2190	5.64E-01	NA	ND
Manganese	4.46E+02	200	1.0E-06	1.0	350	6	15	2190	5.70E-03	1.40E-01	4.07E-02
Mercury	1.06E-01	200	1.0E-06	1.0	350	6	15	2190	1.36E-06	3.00E-04	4.52E-03
Nickel	1.48E+01	200	1.0E-06	1.0	350	6	15	2190	1.89E-04	2.00E-02	9.44E-03
Potassium	8.04E+02	200	1.0E-06	1.0	350	6	15	2190	1.03E-02	NA	ND
Selenium	2.69E-01	200	1.0E-06	1.0	350	6	15	2190	3.44E-06	5.00E-03	6.86E-04
Silver	1.09E+00	200	1.0E-06	1.0	350	6	15	2190	1.39E-05	5.00E-03	2.79E-03
Sodium	1.44E+02	200	1.0E-06	1.0	350	6	15	2190	1.84E-03	NA	ND
Thallium	2.87E-01	200	1.0E-06	1.0	350	6	15	2190	3.67E-06	8.00E-04	4.58E-03
Vanadium	1.48E+01	200	1.0E-06	1.0	350	6	15	2190	1.89E-04	7.00E-03	2.70E-02
Zinc	4.48E+01	200	1.0E-06	1.0	350	6	15	2190	5.73E-04	3.00E-01	1.91E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.70E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	6.39E+03	1.0E–06	2010	1.00	0.001	350	6	15	25550	7.04E–05	NA	ND
Antimony	6.55E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	7.21E–06	NA	ND
Arsenic	5.76E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	6.34E–06	1.69E+00	1.20E–07
Barium	4.65E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	5.12E–07	NA	ND
Beryllium	1.26E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.41E–06	4.30E+01	6.05E–07
Cadmium	7.58E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	8.35E–09	NA	ND
Calcium	2.94E+05	1.0E–06	2010	1.00	0.001	350	6	15	25550	3.24E–03	NA	ND
Chromium	1.56E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.72E–07	NA	ND
Cobalt	5.77E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	6.36E–06	NA	ND
Copper	1.06E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.19E–06	NA	ND
Cyanide (total)	2.39E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.63E–06	NA	ND
Iron	1.09E+04	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.20E–04	NA	ND
Lead	1.45E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.60E–07	NA	ND
Magnesium	4.41E+04	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.86E–04	NA	ND
Manganese	4.46E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.91E–06	NA	ND
Mercury	1.06E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.17E–09	NA	ND
Nickel	1.48E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.63E–07	NA	ND
Potassium	6.04E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	6.65E–06	NA	ND
Selenium	2.69E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	2.96E–09	NA	NO
Silver	1.09E+00	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.20E–06	NA	NO
Sodium	1.44E+02	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.59E–06	NA	NO
Thallium	2.87E–01	1.0E–06	2010	1.00	0.001	350	6	15	25550	3.16E–09	NA	ND
Vanadium	1.48E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	1.63E–07	NA	ND
Zinc	4.48E+01	1.0E–06	2010	1.00	0.001	350	6	15	25550	4.94E–07	NA	ND

TOTAL RISK 7.25E–07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – 95% UCL

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.39E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.22E-04 NA		ND
Antimony	6.55E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.42E-07	2.40E-04	3.51E-03
Arsenic	5.76E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.40E-07	2.85E-04	2.60E-03
Barium	4.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.97E-06	3.50E-03	1.71E-03
Beryllium	1.28E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.64E-07	5.00E-04	3.28E-04
Cadmium	7.58E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	9.74E-08 NA		ND
Calcium	2.94E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.78E-02 NA		ND
Chromium	1.56E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.01E-06	1.00E-02	2.01E-04
Cobalt	5.77E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.42E-07 NA		ND
Copper	1.06E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.39E-05 NA		ND
Cyanide (total)	2.39E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.07E-07	1.40E-02	2.19E-05
Iron	1.09E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.40E-03 NA		ND
Lead	1.45E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.87E-06 NA		ND
Magnesium	4.41E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.67E-03 NA		ND
Manganese	4.46E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.73E-05	5.60E-03	1.02E-02
Mercury	1.06E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.36E-06	4.50E-05	3.03E-04
Nickel	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.90E-06	2.00E-03	9.49E-04
Potassium	8.04E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.03E-04 NA		ND
Selenium	2.69E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.46E-06	4.85E-03	7.13E-06
Silver	1.09E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.40E-07	5.00E-04	2.80E-04
Sodium	1.44E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.85E-05 NA		ND
Thallium	2.87E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.68E-06	8.00E-05	4.60E-04
Vanadium	1.48E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.90E-06	7.00E-05	2.72E-02
Zinc	4.46E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.76E-06	9.00E-02	6.40E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 4.78E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.50E-05	0.83	24	350	6	15	25550	4.92E-06	NA	ND
Antimony	4.61E-08	0.83	24	350	6	15	25550	5.04E-09	NA	ND
Arsenic	4.06E-08	0.83	24	350	6	15	25550	4.43E-09	5.00E+01	2.21E-07
Barium	3.27E-07	0.83	24	350	6	15	25550	3.57E-08	NA	ND
Beryllium	9.01E-09	0.83	24	350	6	15	25550	9.83E-10	6.40E+00	6.26E-09
Cadmium	5.34E-09	0.83	24	350	6	15	25550	5.83E-10	6.10E+00	3.55E-09
Calcium	2.07E-03	0.83	24	350	6	15	25550	2.26E-04	NA	ND
Chromium	1.10E-07	0.83	24	350	6	15	25550	1.20E-08	4.20E+01	5.04E-07
Cobalt	4.07E-08	0.83	24	350	6	15	25550	4.44E-09	NA	ND
Copper	7.62E-07	0.83	24	350	6	15	25550	6.32E-08	NA	ND
Cyanide (total)	1.68E-08	0.83	24	350	6	15	25550	1.84E-09	NA	ND
Iron	7.69E-05	0.83	24	350	6	15	25550	8.39E-06	NA	ND
Lead	1.02E-07	0.83	24	350	6	15	25550	1.12E-08	NA	ND
Magnesium	3.11E-04	0.83	24	350	6	15	25550	3.39E-05	NA	ND
Manganese	3.14E-06	0.83	24	350	6	15	25550	3.43E-07	NA	ND
Mercury	7.47E-10	0.83	24	350	6	15	25550	8.16E-11	NA	ND
Nickel	1.04E-07	0.83	24	350	6	15	25550	1.14E-08	8.40E-01	9.54E-09
Potassium	5.66E-06	0.83	24	350	6	15	25550	6.18E-07	NA	ND
Selenium	1.90E-09	0.83	24	350	6	15	25550	2.07E-10	NA	ND
Silver	7.67E-09	0.83	24	350	6	15	25550	8.38E-10	NA	ND
Sodium	1.02E-06	0.83	24	350	6	15	25550	1.11E-07	NA	ND
Thallium	2.02E-09	0.83	24	350	6	15	25550	2.20E-10	NA	ND
Vanadium	1.04E-07	0.83	24	350	6	15	25550	1.14E-08	NA	ND
Zinc	3.16E-07	0.83	24	350	6	15	25550	3.45E-08	NA	ND
									TOTAL RISK	7.47E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – 95% UCL

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.50E-05	0.83	24	350	6	15	2190	5.74E-05	NA	ND
Antimony	4.61E-06	0.83	24	350	6	15	2190	5.88E-06	NA	ND
Arsenic	4.06E-06	0.83	24	350	6	15	2190	5.17E-06	NA	ND
Barium	3.27E-07	0.83	24	350	6	15	2190	4.17E-07	1.00E-03	4.17E-04
Beryllium	9.01E-09	0.83	24	350	6	15	2190	1.15E-06	NA	ND
Cadmium	5.34E-09	0.83	24	350	6	15	2190	6.80E-09	NA	ND
Calcium	2.07E-03	0.83	24	350	6	15	2190	2.64E-03	NA	ND
Chromium	1.10E-07	0.83	24	350	6	15	2190	1.40E-07	NA	ND
Cobalt	4.07E-06	0.83	24	350	6	15	2190	5.18E-06	NA	ND
Copper	7.62E-07	0.83	24	350	6	15	2190	9.71E-07	NA	ND
Cyanide (total)	1.66E-06	0.83	24	350	6	15	2190	2.14E-06	NA	ND
Iron	7.69E-05	0.83	24	350	6	15	2190	9.79E-05	NA	NO
Lead	1.02E-07	0.83	24	350	6	15	2190	1.30E-07	NA	NO
Magnesium	3.11E-04	0.83	24	350	6	15	2190	3.96E-04	NA	ND
Manganese	3.14E-06	0.83	24	350	6	15	2190	4.00E-06	1.00E-04	4.00E-02
Mercury	7.47E-10	0.83	24	350	6	15	2190	9.52E-10	8.60E-05	1.11E-05
Nickel	1.04E-07	0.83	24	350	6	15	2190	1.32E-07	NA	ND
Potassium	5.66E-06	0.83	24	350	6	15	2190	7.21E-06	NA	NO
Selenium	1.90E-09	0.83	24	350	6	15	2190	2.41E-09	NA	ND
Silver	7.67E-09	0.83	24	350	6	15	2190	9.77E-09	NA	ND
Sodium	1.02E-06	0.83	24	350	6	15	2190	1.29E-06	NA	NO
Thallium	2.02E-09	0.83	24	350	6	15	2190	2.57E-09	NA	ND
Vanadium	1.04E-07	0.83	24	350	6	15	2190	1.33E-07	NA	NO
Zinc	3.16E-07	0.83	24	350	6	15	2190	4.02E-07	NA	NO

NA/ND – Not available/ Not determined

TOTAL HAZARD 4.04E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.62E+04	100	1.0E-06	1.0	350	30	70	25550	1.07E-02	NA	ND
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	25550	7.26E-06	NA	ND
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	25550	5.58E-06	1.80E+00	1.00E-05
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	25550	6.75E-05	NA	ND
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	25550	9.39E-07	4.30E+00	4.04E-06
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	25550	7.75E-06	NA	ND
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	25550	9.57E-02	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	25550	1.14E-05	NA	ND
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	25550	6.58E-06	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	25550	1.16E-03	NA	ND
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	25550	1.27E-05	NA	ND
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	25550	1.35E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	25550	3.11E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	25550	3.52E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	25550	5.87E-04	NA	ND
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	25550	1.35E-06	NA	ND
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	25550	2.25E-05	NA	ND
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	25550	8.63E-04	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	25550	2.58E-07	NA	ND
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	25550	1.06E-06	NA	ND
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	25550	1.65E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	25550	2.47E-07	NA	ND
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	25550	1.98E-05	NA	ND
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	25550	5.34E-05	NA	ND

NA/ND -- Not available/ Not determined

TOTAL RISK 1.41E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	100	1.0E-06	1.0	350	30	70	10950	2.49E-02	1.00E+00	2.49E-02
Antimony	1.24E+01	100	1.0E-06	1.0	350	30	70	10950	1.70E-05	4.00E-04	4.25E-02
Arsenic	9.50E+00	100	1.0E-06	1.0	350	30	70	10950	1.30E-05	3.00E-04	4.34E-02
Barium	1.15E+02	100	1.0E-06	1.0	350	30	70	10950	1.58E-04	7.00E-02	2.25E-03
Beryllium	1.60E+00	100	1.0E-06	1.0	350	30	70	10950	2.19E-06	5.00E-03	4.38E-04
Cadmium	1.32E+01	100	1.0E-06	1.0	350	30	70	10950	1.81E-05	5.00E-04	3.62E-02
Calcium	1.63E+05	100	1.0E-06	1.0	350	30	70	10950	2.23E-01	NA	ND
Chromium	1.94E+01	100	1.0E-06	1.0	350	30	70	10950	2.66E-05	5.00E-03	5.32E-03
Cobalt	1.12E+01	100	1.0E-06	1.0	350	30	70	10950	1.53E-05	NA	ND
Copper	1.97E+03	100	1.0E-06	1.0	350	30	70	10950	2.70E-03	4.00E-02	6.75E-02
Cyanide (total)	2.16E+01	100	1.0E-06	1.0	350	30	70	10950	2.96E-05	2.00E-02	1.48E-03
Iron	2.30E+04	100	1.0E-06	1.0	350	30	70	10950	3.15E-02	NA	ND
Lead	5.29E+01	100	1.0E-06	1.0	350	30	70	10950	7.25E-05	NA	ND
Magnesium	5.99E+04	100	1.0E-06	1.0	350	30	70	10950	8.21E-02	NA	ND
Manganese	1.00E+03	100	1.0E-06	1.0	350	30	70	10950	1.37E-03	1.40E-01	9.78E-03
Mercury	2.30E+00	100	1.0E-06	1.0	350	30	70	10950	3.15E-06	3.00E-04	1.05E-02
Nickel	3.83E+01	100	1.0E-06	1.0	350	30	70	10950	5.25E-05	2.00E-02	2.62E-03
Potassium	1.47E+03	100	1.0E-06	1.0	350	30	70	10950	2.01E-03	NA	ND
Selenium	4.40E-01	100	1.0E-06	1.0	350	30	70	10950	6.03E-07	5.00E-03	1.21E-04
Silver	1.80E+00	100	1.0E-06	1.0	350	30	70	10950	2.47E-06	5.00E-03	4.93E-04
Sodium	2.81E+02	100	1.0E-06	1.0	350	30	70	10950	3.85E-04	NA	ND
Thallium	4.20E-01	100	1.0E-06	1.0	350	30	70	10950	5.75E-07	8.00E-05	7.19E-03
Vanadium	3.38E+01	100	1.0E-06	1.0	350	30	70	10950	4.63E-05	7.00E-03	6.61E-03
Zinc	9.10E+01	100	1.0E-06	1.0	350	30	70	10950	1.25E-04	3.00E-01	4.16E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.62E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	1.0E-08	5800	1.00	0.001	350	30	70	25550	6.20E-04	NA	ND
Antimony	1.24E+01	1.0E-08	5800	1.00	0.001	350	30	70	25550	4.22E-07	NA	ND
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.23E-07	1.89E+00	6.11E-07
Barium	1.15E+02	1.0E-08	5800	1.00	0.001	350	30	70	25550	3.92E-08	NA	ND
Beryllium	1.60E+00	1.0E-08	5800	1.00	0.001	350	30	70	25550	5.45E-08	4.30E+01	2.34E-06
Cadmium	1.32E+01	1.0E-08	5800	1.00	0.001	350	30	70	25550	4.49E-07	NA	ND
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.55E-03	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.61E-07	NA	ND
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.81E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.71E-05	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.35E-07	NA	ND
Iron	2.30E+04	1.0E-08	5800	1.00	0.001	350	30	70	25550	7.83E-04	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.80E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	25550	2.04E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.41E-05	NA	ND
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	7.83E-08	NA	ND
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.30E-06	NA	ND
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	25550	5.01E-05	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.50E-08	NA	ND
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	25550	6.13E-08	NA	ND
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	25550	9.57E-08	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.43E-08	NA	ND
Vanadium	3.38E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	1.15E-06	NA	ND
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	25550	3.10E-06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 2.95E-08

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.45E-03	2.00E-01	7.23E-03
Antimony	1.24E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.85E-07	2.40E-04	4.11E-03
Arsenic	9.50E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.55E-07	2.85E-04	2.65E-03
Barium	1.15E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.14E-06	3.50E-03	2.61E-03
Beryllium	1.60E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.27E-07	5.00E-04	2.54E-04
Cadmium	1.32E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.05E-06	3.50E-05	3.00E-02
Calcium	1.63E+05	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.30E-02	NA	ND
Chromium	1.94E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.54E-06	2.50E-03	6.17E-04
Cobalt	1.12E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.90E-07	NA	ND
Copper	1.97E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.57E-04	3.96E-02	3.95E-03
Cyanide (total)	2.16E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.72E-06	1.40E-02	1.23E-04
Iron	2.30E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-03	NA	ND
Lead	5.29E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.20E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.76E-03	NA	ND
Manganese	1.00E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.95E-05	5.60E-03	1.42E-02
Mercury	2.30E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.83E-07	4.50E-05	4.06E-03
Nickel	3.83E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.04E-06	2.00E-03	1.52E-03
Potassium	1.47E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.17E-04	NA	ND
Selenium	4.40E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.50E-08	4.85E-03	7.21E-06
Silver	1.80E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.43E-07	5.00E-04	2.86E-04
Sodium	2.81E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.23E-05	NA	ND
Thallium	4.20E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.34E-08	8.00E-06	4.17E-03
Vanadium	3.38E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.69E-08	7.00E-05	3.84E-02
Zinc	9.10E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	7.23E-06	9.00E-02	8.03E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.14E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	1.26E-04	0.83	24	350	30	70	25550	1.50E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	30	70	25550	1.02E-08	NA	ND
Arsenic	6.69E-08	0.83	24	350	30	70	25550	7.83E-09	5.00E+01	3.91E-07
Barium	8.10E-07	0.83	24	350	30	70	25550	9.47E-08	NA	ND
Beryllium	1.13E-08	0.83	24	350	30	70	25550	1.32E-09	8.40E+00	1.11E-08
Cadmium	9.30E-06	0.83	24	350	30	70	25550	1.09E-08	6.10E+00	6.63E-08
Calcium	1.15E-03	0.83	24	350	30	70	25550	1.34E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	25550	1.60E-08	4.20E+01	6.71E-07
Cobalt	7.89E-08	0.83	24	350	30	70	25550	9.23E-09	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	25550	1.62E-08	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	25550	1.78E-08	NA	ND
Iron	1.82E-04	0.83	24	350	30	70	25550	1.69E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	25550	4.36E-08	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	25550	4.94E-05	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	25550	8.24E-07	NA	ND
Mercury	1.62E-08	0.83	24	350	30	70	25550	1.89E-09	NA	ND
Nickel	2.70E-07	0.83	24	350	30	70	25550	3.16E-08	8.40E-01	2.65E-08
Potassium	1.04E-05	0.83	24	350	30	70	25550	1.21E-08	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	25550	3.63E-10	NA	ND
Silver	1.27E-08	0.83	24	350	30	70	25550	1.48E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	25550	2.32E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	25550	3.46E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	30	70	25550	2.78E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	25550	7.50E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.17E-06

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.28E-04	0.83	24	350	30	70	10950	3.50E-05	NA	ND
Antimony	8.74E-08	0.83	24	350	30	70	10950	2.38E-08	NA	ND
Arsenic	6.69E-08	0.83	24	350	30	70	10950	1.83E-08	NA	ND
Barium	8.10E-07	0.83	24	350	30	70	10950	2.21E-07	1.00E-04	2.21E-03
Beryllium	1.13E-08	0.83	24	350	30	70	10950	3.08E-09	NA	ND
Cadmium	9.30E-08	0.83	24	350	30	70	10950	2.54E-08	NA	ND
Calcium	1.15E-03	0.83	24	350	30	70	10950	3.13E-04	NA	ND
Chromium	1.37E-07	0.83	24	350	30	70	10950	3.73E-08	NA	ND
Cobalt	7.89E-08	0.83	24	350	30	70	10950	2.15E-08	NA	ND
Copper	1.39E-05	0.83	24	350	30	70	10950	3.79E-06	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	30	70	10950	4.15E-08	NA	ND
Iron	1.62E-04	0.83	24	350	30	70	10950	4.42E-05	NA	ND
Lead	3.73E-07	0.83	24	350	30	70	10950	1.02E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	30	70	10950	1.15E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	30	70	10950	1.92E-06	1.00E-04	1.92E-02
Mercury	1.62E-08	0.83	24	350	30	70	10950	4.42E-09	8.60E-05	5.14E-05
Nickel	2.70E-07	0.83	24	350	30	70	10950	7.36E-08	NA	ND
Potassium	1.04E-05	0.83	24	350	30	70	10950	2.83E-06	NA	ND
Selenium	3.10E-09	0.83	24	350	30	70	10950	8.46E-10	NA	ND
Silver	1.27E-08	0.83	24	350	30	70	10950	3.46E-09	NA	ND
Sodium	1.98E-06	0.83	24	350	30	70	10950	5.40E-07	NA	ND
Thallium	2.96E-09	0.83	24	350	30	70	10950	8.07E-10	NA	ND
Vanadium	2.38E-07	0.83	24	350	30	70	10950	6.50E-08	NA	ND
Zinc	6.41E-07	0.83	24	350	30	70	10950	1.75E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.15E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	200	1.0E-06	1.0	350	6	15	25550	1.99E-02	NA	ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	25550	1.36E-05	NA	ND
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	25550	1.04E-05	1.80E+00	1.87E-05
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	25550	1.26E-04	NA	ND
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	25550	1.75E-06	4.30E+00	7.54E-06
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	25550	1.45E-05	NA	ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	25550	1.79E-01	NA	ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	25550	2.13E-05	NA	ND
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	25550	1.23E-05	NA	ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	25550	2.16E-03	NA	ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	25550	2.37E-05	NA	ND
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	25550	2.52E-02	NA	ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	25550	5.80E-05	NA	ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	25550	6.56E-02	NA	ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	25550	1.10E-03	NA	ND
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	25550	2.52E-06	NA	ND
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	25550	4.20E-05	NA	ND
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	25550	1.61E-03	NA	ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	25550	4.82E-07	NA	ND
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	25550	1.97E-06	NA	ND
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	25550	3.08E-04	NA	ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	25550	4.60E-07	NA	ND
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	25550	3.70E-05	NA	ND
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	25550	9.97E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 2.63E-05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	200	1.0E-06	1.0	350	6	15	2190	2.33E-01 NA		ND
Antimony	1.24E+01	200	1.0E-06	1.0	350	6	15	2190	1.59E-04	4.00E-04	3.96E-01
Arsenic	9.50E+00	200	1.0E-06	1.0	350	6	15	2190	1.21E-04	3.00E-04	4.05E-01
Barium	1.15E+02	200	1.0E-06	1.0	350	6	15	2190	1.47E-03	7.00E-02	2.10E-02
Beryllium	1.60E+00	200	1.0E-06	1.0	350	6	15	2190	2.05E-05	5.00E-03	4.09E-03
Cadmium	1.32E+01	200	1.0E-06	1.0	350	6	15	2190	1.69E-04 NA		ND
Calcium	1.63E+05	200	1.0E-06	1.0	350	6	15	2190	2.08E+00 NA		ND
Chromium	1.94E+01	200	1.0E-06	1.0	350	6	15	2190	2.48E-04	2.00E-02	1.24E-02
Cobalt	1.12E+01	200	1.0E-06	1.0	350	6	15	2190	1.43E-04 NA		ND
Copper	1.97E+03	200	1.0E-06	1.0	350	6	15	2190	2.52E-02 NA		ND
Cyanide (total)	2.16E+01	200	1.0E-06	1.0	350	6	15	2190	2.76E-04	2.00E-02	1.38E-02
Iron	2.30E+04	200	1.0E-06	1.0	350	6	15	2190	2.94E-01 NA		ND
Lead	5.29E+01	200	1.0E-06	1.0	350	6	15	2190	6.76E-04 NA		ND
Magnesium	5.99E+04	200	1.0E-06	1.0	350	6	15	2190	7.66E-01 NA		ND
Manganese	1.00E+03	200	1.0E-06	1.0	350	6	15	2190	1.28E-02	1.40E-01	9.13E-02
Mercury	2.30E+00	200	1.0E-06	1.0	350	6	15	2190	2.94E-05	3.00E-04	9.80E-02
Nickel	3.83E+01	200	1.0E-06	1.0	350	6	15	2190	4.90E-04	2.00E-02	2.45E-02
Potassium	1.47E+03	200	1.0E-06	1.0	350	6	15	2190	1.88E-02 NA		ND
Selenium	4.40E-01	200	1.0E-06	1.0	350	6	15	2190	5.63E-06	5.00E-03	1.13E-03
Silver	1.80E+00	200	1.0E-06	1.0	350	6	15	2190	2.30E-05	5.00E-03	4.60E-03
Sodium	2.81E+02	200	1.0E-06	1.0	350	6	15	2190	3.59E-03 NA		ND
Thallium	4.20E-01	200	1.0E-06	1.0	350	6	15	2190	5.37E-06	8.00E-04	6.71E-03
Vanadium	3.38E+01	200	1.0E-06	1.0	350	6	15	2190	4.32E-04	7.00E-03	6.17E-02
Zinc	9.10E+01	200	1.0E-06	1.0	350	6	15	2190	1.16E-03	3.00E-01	3.88E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.14E+00

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.82E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.00E-04	NA	ND
Antimony	1.24E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.37E-07	NA	ND
Arsenic	9.50E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.05E-07	1.89E+00	1.98E-07
Barium	1.15E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.27E-06	NA	ND
Beryllium	1.60E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.76E-06	4.30E+01	7.58E-07
Cadmium	1.32E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.45E-07	NA	ND
Calcium	1.63E+05	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.80E-03	NA	ND
Chromium	1.94E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.14E-07	NA	ND
Cobalt	1.12E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.23E-07	NA	ND
Copper	1.97E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.17E-05	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.38E-07	NA	ND
Iron	2.30E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.53E-04	NA	ND
Lead	5.29E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.83E-07	NA	ND
Magnesium	5.99E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	8.60E-04	NA	ND
Manganese	1.00E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.10E-05	NA	ND
Mercury	2.30E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.53E-06	NA	ND
Nickel	3.83E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.22E-07	NA	ND
Potassium	1.47E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.62E-05	NA	ND
Selenium	4.40E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.85E-09	NA	ND
Silver	1.80E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.98E-06	NA	ND
Sodium	2.81E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.09E-06	NA	ND
Thallium	4.20E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.63E-09	NA	ND
Vanadium	3.38E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.72E-07	NA	ND
Zinc	9.10E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.00E-06	NA	ND

TOTAL RISK 9.55E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – SITE MAXIMUM

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.82E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.34E-03	NA	ND
Antimony	1.24E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.59E-06	2.40E-04	6.64E-03
Arsenic	9.50E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.22E-06	2.85E-04	4.28E-03
Barium	1.15E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.48E-05	3.50E-03	4.22E-03
Beryllium	1.60E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.06E-07	5.00E-04	4.11E-04
Cadmium	1.32E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.70E-06	NA	ND
Calcium	1.63E+05	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.09E-02	NA	ND
Chromium	1.94E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.49E-08	1.00E-02	2.49E-04
Cobalt	1.12E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.44E-06	NA	ND
Copper	1.97E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.53E-04	NA	ND
Cyanide (total)	2.16E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.78E-06	1.40E-02	1.98E-04
Iron	2.30E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-03	NA	ND
Lead	5.29E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.80E-06	NA	ND
Magnesium	5.99E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	7.70E-03	NA	ND
Manganese	1.00E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.28E-04	5.60E-03	2.29E-02
Mercury	2.30E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.96E-07	4.50E-05	6.57E-03
Nickel	3.83E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.92E-06	2.00E-03	2.46E-03
Potassium	1.47E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.89E-04	NA	ND
Selenium	4.40E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.65E-08	4.85E-03	1.17E-05
Silver	1.80E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.31E-07	5.00E-04	4.63E-04
Sodium	2.81E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.61E-05	NA	ND
Thallium	4.20E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.40E-08	6.00E-05	8.75E-04
Vanadium	3.38E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.34E-06	7.00E-05	6.20E-02
Zinc	9.10E+01	1.0E-06	2010	1.00	0.001	350	8	15	2190	1.17E-05	9.00E-02	1.30E-04

NA/ND – Not available / Not determined

TOTAL HAZARD 1.11E-01

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.28E-04	0.83	24	350	6	15	25550	1.40E-05 NA		ND
Antimony	8.74E-08	0.83	24	350	6	15	25550	9.54E-09 NA		ND
Arsenic	6.69E-08	0.83	24	350	6	15	25550	7.31E-09	5.00E+01	3.65E-07
Barium	8.10E-07	0.83	24	350	6	15	25550	8.84E-08 NA		ND
Beryllium	1.13E-08	0.83	24	350	6	15	25550	1.23E-09	8.40E+00	1.03E-08
Cadmium	9.30E-08	0.83	24	350	6	15	25550	1.02E-08	6.10E+00	6.19E-08
Calcium	1.15E-03	0.83	24	350	6	15	25550	1.25E-04 NA		ND
Chromium	1.37E-07	0.83	24	350	6	15	25550	1.49E-08	4.20E+01	6.27E-07
Cobalt	7.89E-08	0.83	24	350	6	15	25550	8.61E-09 NA		ND
Copper	1.39E-05	0.83	24	350	6	15	25550	1.51E-08 NA		ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	25550	1.66E-08 NA		ND
Iron	1.82E-04	0.83	24	350	6	15	25550	1.77E-05 NA		ND
Lead	3.73E-07	0.83	24	350	6	15	25550	4.07E-08 NA		ND
Magnesium	4.22E-04	0.83	24	350	6	15	25550	4.61E-05 NA		ND
Manganese	7.05E-08	0.83	24	350	6	15	25550	7.69E-07 NA		ND
Mercury	1.62E-08	0.83	24	350	6	15	25550	1.77E-09 NA		ND
Nickel	2.70E-07	0.83	24	350	6	15	25550	2.95E-08	8.40E-01	2.47E-08
Potassium	1.04E-05	0.83	24	350	6	15	25550	1.13E-08 NA		ND
Selenium	3.10E-09	0.83	24	350	6	15	25550	3.38E-10 NA		ND
Silver	1.27E-08	0.83	24	350	6	15	25550	1.38E-09 NA		ND
Sodium	1.98E-06	0.83	24	350	6	15	25550	2.16E-07 NA		ND
Thallium	2.96E-09	0.83	24	350	6	15	25550	3.23E-10 NA		ND
Vanadium	2.38E-07	0.83	24	350	6	15	25550	2.60E-08 NA		ND
Zinc	8.41E-07	0.83	24	350	6	15	25550	7.00E-08 NA		ND
									TOTAL RISK	1.09E-06

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – SITE MAXIMUM

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.26E-04	0.83	24	350	6	15	2190	1.83E-04	NA	ND
Antimony	8.74E-08	0.83	24	350	6	15	2190	1.11E-07	NA	ND
Arsenic	6.69E-08	0.83	24	350	6	15	2190	6.52E-08	NA	ND
Barium	6.10E-07	0.83	24	350	6	15	2190	1.03E-06	1.00E-03	1.03E-03
Beryllium	1.13E-08	0.83	24	350	6	15	2190	1.44E-08	NA	ND
Cadmium	9.30E-08	0.83	24	350	6	15	2190	1.18E-07	NA	ND
Calcium	1.15E-03	0.83	24	350	6	15	2190	1.46E-03	NA	ND
Chromium	1.37E-07	0.83	24	350	6	15	2190	1.74E-07	NA	ND
Cobalt	7.89E-08	0.83	24	350	6	15	2190	1.00E-07	NA	ND
Copper	1.39E-05	0.83	24	350	6	15	2190	1.77E-05	NA	ND
Cyanide (total)	1.52E-07	0.83	24	350	6	15	2190	1.94E-07	NA	ND
Iron	1.62E-04	0.83	24	350	6	15	2190	2.06E-04	NA	ND
Lead	3.73E-07	0.83	24	350	6	15	2190	4.75E-07	NA	ND
Magnesium	4.22E-04	0.83	24	350	6	15	2190	5.37E-04	NA	ND
Manganese	7.05E-06	0.83	24	350	6	15	2190	8.97E-06	1.00E-04	8.97E-02
Mercury	1.62E-06	0.83	24	350	6	15	2190	2.06E-06	8.60E-05	2.40E-04
Nickel	2.70E-07	0.83	24	350	6	15	2190	3.44E-07	NA	ND
Potassium	1.04E-05	0.83	24	350	6	15	2190	1.32E-05	NA	ND
Selenium	3.10E-09	0.83	24	350	6	15	2190	3.95E-09	NA	ND
Silver	1.27E-06	0.83	24	350	6	15	2190	1.61E-06	NA	ND
Sodium	1.96E-06	0.83	24	350	6	15	2190	2.52E-06	NA	ND
Thallium	2.96E-09	0.83	24	350	6	15	2190	3.77E-09	NA	ND
Vanadium	2.36E-07	0.83	24	350	6	15	2190	3.03E-07	NA	ND
Zinc	6.41E-07	0.83	24	350	6	15	2190	8.16E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.10E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	3.99E+03	50	1.0E–06	1.0	350	9	70	25550	3.52E–04	NA	ND
Antimony	2.60E+00	50	1.0E–06	1.0	350	9	70	25550	2.29E–07	NA	ND
Arsenic	2.41E+00	50	1.0E–06	1.0	350	9	70	25550	2.12E–07	1.80E+00	3.82E–07
Barium	1.84E+01	50	1.0E–06	1.0	350	9	70	25550	1.62E–06	NA	ND
Beryllium	4.48E–01	50	1.0E–06	1.0	350	9	70	25550	3.95E–08	4.30E+00	1.70E–07
Cadmium	4.28E–01	50	1.0E–06	1.0	350	9	70	25550	3.77E–08	NA	ND
Calcium	7.32E+04	50	1.0E–06	1.0	350	9	70	25550	6.45E–03	NA	ND
Chromium	5.08E+00	50	1.0E–06	1.0	350	9	70	25550	4.47E–07	NA	ND
Cobalt	2.18E+00	50	1.0E–06	1.0	350	9	70	25550	1.92E–07	NA	ND
Copper	1.11E+02	50	1.0E–06	1.0	350	9	70	25550	9.79E–06	NA	ND
Cyanide (total)	1.91E+00	50	1.0E–06	1.0	350	9	70	25550	1.68E–07	NA	ND
Iron	7.47E+03	50	1.0E–06	1.0	350	9	70	25550	6.58E–04	NA	ND
Lead	7.97E+00	50	1.0E–06	1.0	350	9	70	25550	7.01E–07	NA	ND
Magnesium	2.47E+04	50	1.0E–06	1.0	350	9	70	25550	2.18E–03	NA	ND
Manganese	2.90E+02	50	1.0E–06	1.0	350	9	70	25550	2.56E–05	NA	ND
Mercury	6.89E–02	50	1.0E–06	1.0	350	9	70	25550	6.07E–09	NA	ND
Nickel	8.73E+00	50	1.0E–06	1.0	350	9	70	25550	7.69E–07	NA	ND
Potassium	3.71E+02	50	1.0E–06	1.0	350	9	70	25550	3.26E–05	NA	ND
Selenium	1.26E–01	50	1.0E–06	1.0	350	9	70	25550	1.11E–08	NA	ND
Silver	4.22E–01	50	1.0E–06	1.0	350	9	70	25550	3.71E–08	NA	ND
Sodium	5.68E+01	50	1.0E–06	1.0	350	9	70	25550	5.00E–06	NA	ND
Thallium	1.40E–01	50	1.0E–06	1.0	350	9	70	25550	1.23E–08	NA	ND
Vanadium	7.84E+00	50	1.0E–06	1.0	350	9	70	25550	6.90E–07	NA	ND
Zinc	3.68E+01	50	1.0E–06	1.0	350	9	70	25550	3.24E–06	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 5.52E–07

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	50	1.0E-06	1.0	350	9	70	3285	2.74E-03	1.00E+00	2.74E-03
Antimony	2.60E+00	50	1.0E-06	1.0	350	9	70	3285	1.78E-06	4.00E-04	4.46E-03
Arsenic	2.41E+00	50	1.0E-06	1.0	350	9	70	3285	1.65E-06	3.00E-04	5.51E-03
Barium	1.84E+01	50	1.0E-06	1.0	350	9	70	3285	1.26E-05	7.00E-02	1.80E-04
Beryllium	4.48E-01	50	1.0E-06	1.0	350	9	70	3285	3.07E-07	5.00E-03	6.14E-05
Cadmium	4.28E-01	50	1.0E-06	1.0	350	9	70	3285	2.93E-07	5.00E-04	5.87E-04
Calcium	7.32E+04	50	1.0E-06	1.0	350	9	70	3285	5.02E-02	NA	ND
Chromium	5.08E+00	50	1.0E-06	1.0	350	9	70	3285	3.48E-06	5.00E-03	6.96E-04
Cobalt	2.18E+00	50	1.0E-06	1.0	350	9	70	3285	1.50E-06	NA	ND
Copper	1.11E+02	50	1.0E-06	1.0	350	9	70	3285	7.62E-05	4.00E-02	1.90E-03
Cyanide (total)	1.91E+00	50	1.0E-06	1.0	350	9	70	3285	1.31E-06	2.00E-02	6.53E-05
Iron	7.47E+03	50	1.0E-06	1.0	350	9	70	3285	5.11E-03	NA	ND
Lead	7.97E+00	50	1.0E-06	1.0	350	9	70	3285	5.46E-06	NA	ND
Magnesium	2.47E+04	50	1.0E-06	1.0	350	9	70	3285	1.69E-02	NA	ND
Manganese	2.90E+02	50	1.0E-06	1.0	350	9	70	3285	1.99E-04	1.40E-01	1.42E-03
Mercury	6.89E-02	50	1.0E-06	1.0	350	9	70	3285	4.72E-08	3.00E-04	1.57E-04
Nickel	8.73E+00	50	1.0E-06	1.0	350	9	70	3285	5.98E-06	2.00E-02	2.99E-04
Potassium	3.71E+02	50	1.0E-06	1.0	350	9	70	3285	2.54E-04	NA	ND
Selenium	1.26E-01	50	1.0E-06	1.0	350	9	70	3285	8.61E-08	5.00E-03	1.72E-05
Silver	4.22E-01	50	1.0E-06	1.0	350	9	70	3285	2.89E-07	5.00E-03	5.78E-05
Sodium	5.68E+01	50	1.0E-06	1.0	350	9	70	3285	3.89E-05	NA	ND
Thallium	1.40E-01	50	1.0E-06	1.0	350	9	70	3285	9.60E-08	8.00E-05	1.20E-03
Vanadium	7.84E+00	50	1.0E-06	1.0	350	9	70	3285	5.37E-06	7.00E-03	7.67E-04
Zinc	3.68E+01	50	1.0E-06	1.0	350	9	70	3285	2.52E-05	3.00E-01	8.40E-05

NA/ND – Not available/ Not determined

TOTAL HAZARD 2.02E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.99E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.35E-05	NA	ND
Antimony	2.60E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.53E-08	NA	ND
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.42E-08	1.89E+00	2.68E-08
Barium	1.84E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.09E-07	NA	ND
Beryllium	4.48E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.64E-09	4.30E+01	1.13E-07
Cadmium	4.28E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.52E-09	NA	ND
Calcium	7.32E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.31E-04	NA	ND
Chromium	5.08E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.99E-08	NA	ND
Cobalt	2.18E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.29E-08	NA	NO
Copper	1.11E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.55E-07	NA	ND
Cyanide (total)	1.91E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.12E-08	NA	ND
Iron	7.47E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.40E-05	NA	ND
Lead	7.97E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.69E-08	NA	ND
Magnesium	2.47E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.45E-04	NA	ND
Manganese	2.90E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.71E-06	NA	ND
Mercury	6.89E-02	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.06E-10	NA	ND
Nickel	8.73E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	5.14E-08	NA	ND
Potassium	3.71E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.18E-06	NA	ND
Selenium	1.26E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.40E-10	NA	ND
Silver	4.22E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.48E-09	NA	ND
Sodium	5.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.35E-07	NA	ND
Thallium	1.40E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	8.25E-10	NA	ND
Vanadium	7.84E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.61E-08	NA	ND
Zinc	3.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.17E-07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.40E-07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.83E-04	2.00E-01	9.15E-04
Antimony	2.60E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.19E-07	2.40E-04	4.97E-04
Arsenic	2.41E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.10E-07	2.65E-04	3.87E-04
Barium	1.84E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	8.45E-07	3.50E-03	2.41E-04
Beryllium	4.48E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.05E-08	5.00E-04	4.10E-05
Cadmium	4.26E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.96E-08	3.50E-05	5.60E-04
Calcium	7.32E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.35E-03	NA	ND
Chromium	5.08E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.33E-07	2.50E-03	9.31E-05
Cobalt	2.18E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.00E-07	NA	ND
Copper	1.11E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.09E-06	3.96E-02	1.29E-04
Cyanide (total)	1.91E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	8.73E-08	1.40E-02	6.24E-06
Iron	7.47E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.42E-04	NA	ND
Lead	7.97E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.65E-07	NA	ND
Magnesium	2.47E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.13E-03	NA	ND
Manganese	2.90E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.33E-05	5.60E-03	2.37E-03
Mercury	6.89E-02	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.16E-09	4.50E-05	7.01E-05
Nickel	8.73E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.00E-07	2.00E-03	2.00E-04
Potassium	3.71E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.70E-05	NA	ND
Selenium	1.26E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.76E-09	4.85E-03	1.19E-06
Silver	4.22E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.93E-08	5.00E-04	3.86E-05
Sodium	5.66E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.60E-06	NA	ND
Thallium	1.40E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.42E-09	8.00E-06	8.02E-04
Vanadium	7.84E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.59E-07	7.00E-05	5.13E-03
Zinc	3.68E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.69E-06	9.00E-02	1.87E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.15E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	2.81E-05	0.83	24	234	9	70	25550	6.60E-07	NA	ND
Antimony	1.83E-08	0.83	24	234	9	70	25550	4.30E-10	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	25550	3.98E-10	5.00E+01	1.99E-08
Barium	1.30E-07	0.83	24	234	9	70	25550	3.05E-09	NA	ND
Beryllium	3.16E-09	0.83	24	234	9	70	25550	7.40E-11	8.40E+00	6.22E-10
Cadmium	3.02E-09	0.83	24	234	9	70	25550	7.08E-11	6.10E+00	4.32E-10
Calcium	5.16E-04	0.83	24	234	9	70	25550	1.21E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	9	70	25550	8.40E-10	4.20E+01	3.53E-08
Cobalt	1.54E-08	0.83	24	234	9	70	25550	3.61E-10	NA	ND
Copper	7.84E-07	0.83	24	234	9	70	25550	1.84E-08	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	9	70	25550	3.15E-10	NA	ND
Iron	5.26E-05	0.83	24	234	9	70	25550	1.23E-06	NA	ND
Lead	5.61E-08	0.83	24	234	9	70	25550	1.32E-09	NA	ND
Magnesium	1.74E-04	0.83	24	234	9	70	25550	4.08E-06	NA	ND
Manganese	2.05E-08	0.83	24	234	9	70	25550	4.80E-08	NA	ND
Mercury	4.86E-10	0.83	24	234	9	70	25550	1.14E-11	NA	ND
Nickel	6.15E-08	0.83	24	234	9	70	25550	1.44E-09	8.40E-01	1.21E-09
Potassium	2.81E-08	0.83	24	234	9	70	25550	6.13E-08	NA	ND
Selenium	8.86E-10	0.83	24	234	9	70	25550	2.08E-11	NA	ND
Silver	2.97E-09	0.83	24	234	9	70	25550	6.97E-11	NA	ND
Sodium	4.00E-07	0.83	24	234	9	70	25550	9.39E-09	NA	ND
Thallium	9.87E-10	0.83	24	234	9	70	25550	2.32E-11	NA	ND
Vanadium	5.52E-08	0.83	24	234	9	70	25550	1.30E-09	NA	ND
Zinc	2.59E-07	0.83	24	234	9	70	25550	6.08E-09	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 5.75E-08

INHALATION OF FUGITIVE DUSTS FROM SOIL - HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD - SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.81E-05	0.83	24	234	9	70	3285	5.13E-06	NA	ND
Antimony	1.83E-08	0.83	24	234	9	70	3285	3.35E-09	NA	ND
Arsenic	1.70E-08	0.83	24	234	9	70	3285	3.10E-09	NA	ND
Barium	1.30E-07	0.83	24	234	9	70	3285	2.37E-08	1.00E-04	2.37E-04
Beryllium	3.16E-09	0.83	24	234	9	70	3285	5.76E-10	NA	ND
Cadmium	3.02E-09	0.83	24	234	9	70	3285	5.51E-10	NA	ND
Calcium	5.16E-04	0.83	24	234	9	70	3285	9.41E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	9	70	3285	6.53E-09	NA	ND
Cobalt	1.54E-08	0.83	24	234	9	70	3285	2.81E-09	NA	ND
Copper	7.84E-07	0.83	24	234	9	70	3285	1.43E-07	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	9	70	3285	2.45E-09	NA	ND
Iron	5.26E-05	0.83	24	234	9	70	3285	9.60E-06	NA	ND
Lead	5.81E-08	0.83	24	234	9	70	3285	1.02E-08	NA	ND
Magnesium	1.74E-04	0.83	24	234	9	70	3285	3.17E-05	NA	ND
Manganese	2.05E-06	0.83	24	234	9	70	3285	3.73E-07	1.00E-04	3.73E-03
Mercury	4.86E-10	0.83	24	234	9	70	3285	8.86E-11	8.60E-05	1.03E-06
Nickel	6.15E-08	0.83	24	234	9	70	3285	1.12E-08	NA	ND
Potassium	2.61E-06	0.83	24	234	9	70	3285	4.76E-07	NA	ND
Selenium	6.66E-10	0.83	24	234	9	70	3285	1.62E-10	NA	ND
Silver	2.97E-09	0.83	24	234	9	70	3285	5.42E-10	NA	ND
Sodium	4.00E-07	0.83	24	234	9	70	3285	7.30E-08	NA	ND
Thallium	9.87E-10	0.83	24	234	9	70	3285	1.80E-10	NA	ND
Vanadium	5.52E-08	0.83	24	234	9	70	3285	1.01E-08	NA	ND
Zinc	2.59E-07	0.83	24	234	9	70	3285	4.73E-08	NA	ND

NA/ND - Not available/ Not determined

TOTAL HAZARD 3.97E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.99E+03	100	1.0E-06	1.0	350	6	15	25550	2.19E-03	NA	ND
Antimony	2.60E+00	100	1.0E-06	1.0	350	6	15	25550	1.43E-06	NA	ND
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	25550	1.32E-06	1.80E+00	2.38E-06
Barium	1.84E+01	100	1.0E-06	1.0	350	6	15	25550	1.01E-05	NA	ND
Beryllium	4.48E-01	100	1.0E-06	1.0	350	6	15	25550	2.46E-07	4.30E+00	1.06E-06
Cadmium	4.28E-01	100	1.0E-06	1.0	350	6	15	25550	2.35E-07	NA	ND
Calcium	7.32E+04	100	1.0E-06	1.0	350	6	15	25550	4.01E-02	NA	ND
Chromium	5.08E+00	100	1.0E-06	1.0	350	6	15	25550	2.78E-06	NA	ND
Cobalt	2.18E+00	100	1.0E-06	1.0	350	6	15	25550	1.20E-06	NA	ND
Copper	1.11E+02	100	1.0E-06	1.0	350	6	15	25550	6.09E-05	NA	ND
Cyanide (total)	1.91E+00	100	1.0E-06	1.0	350	6	15	25550	1.05E-06	NA	ND
Iron	7.47E+03	100	1.0E-06	1.0	350	6	15	25550	4.09E-03	NA	ND
Lead	7.97E+00	100	1.0E-06	1.0	350	6	15	25550	4.36E-06	NA	ND
Magnesium	2.47E+04	100	1.0E-06	1.0	350	6	15	25550	1.35E-02	NA	ND
Manganese	2.90E+02	100	1.0E-06	1.0	350	6	15	25550	1.59E-04	NA	ND
Mercury	6.89E-02	100	1.0E-06	1.0	350	6	15	25550	3.78E-06	NA	ND
Nickel	8.73E+00	100	1.0E-06	1.0	350	6	15	25550	4.79E-06	NA	ND
Potassium	3.71E+02	100	1.0E-06	1.0	350	6	15	25550	2.03E-04	NA	ND
Selenium	1.26E-01	100	1.0E-06	1.0	350	6	15	25550	6.69E-08	NA	ND
Silver	4.22E-01	100	1.0E-06	1.0	350	6	15	25550	2.31E-07	NA	ND
Sodium	5.68E+01	100	1.0E-06	1.0	350	6	15	25550	3.11E-05	NA	ND
Thallium	1.40E-01	100	1.0E-06	1.0	350	6	15	25550	7.68E-06	NA	ND
Vanadium	7.84E+00	100	1.0E-06	1.0	350	6	15	25550	4.29E-06	NA	ND
Zinc	3.68E+01	100	1.0E-06	1.0	350	6	15	25550	2.02E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 3.43E-06

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	100	1.0E-06	1.0	350	6	15	2190	2.55E-02	NA	ND
Antimony	2.60E+00	100	1.0E-06	1.0	350	6	15	2190	1.66E-05	4.00E-04	4.16E-02
Arsenic	2.41E+00	100	1.0E-06	1.0	350	6	15	2190	1.54E-05	3.00E-04	5.14E-02
Barium	1.84E+01	100	1.0E-06	1.0	350	6	15	2190	1.18E-04	7.00E-02	1.68E-03
Beryllium	4.48E-01	100	1.0E-06	1.0	350	6	15	2190	2.86E-06	5.00E-03	5.73E-04
Cadmium	4.28E-01	100	1.0E-06	1.0	350	6	15	2190	2.74E-06	NA	ND
Calcium	7.32E+04	100	1.0E-06	1.0	350	6	15	2190	4.68E-01	NA	ND
Chromium	5.08E+00	100	1.0E-06	1.0	350	6	15	2190	3.25E-05	2.00E-02	1.62E-03
Cobalt	2.18E+00	100	1.0E-06	1.0	350	6	15	2190	1.40E-05	NA	ND
Copper	1.11E+02	100	1.0E-06	1.0	350	6	15	2190	7.11E-04	NA	ND
Cyanide (total)	1.91E+00	100	1.0E-06	1.0	350	6	15	2190	1.22E-05	2.00E-02	6.10E-04
Iron	7.47E+03	100	1.0E-06	1.0	350	6	15	2190	4.77E-02	NA	ND
Lead	7.97E+00	100	1.0E-06	1.0	350	6	15	2190	5.09E-05	NA	ND
Magnesium	2.47E+04	100	1.0E-06	1.0	350	6	15	2190	1.58E-01	NA	ND
Manganese	2.90E+02	100	1.0E-06	1.0	350	6	15	2190	1.86E-03	1.40E-01	1.33E-02
Mercury	6.89E-02	100	1.0E-06	1.0	350	6	15	2190	4.41E-07	3.00E-04	1.47E-03
Nickel	8.73E+00	100	1.0E-06	1.0	350	6	15	2190	5.58E-05	2.00E-02	2.79E-03
Potassium	3.71E+02	100	1.0E-06	1.0	350	6	15	2190	2.37E-03	NA	ND
Selenium	1.26E-01	100	1.0E-06	1.0	350	6	15	2190	8.04E-07	5.00E-03	1.61E-04
Silver	4.22E-01	100	1.0E-06	1.0	350	6	15	2190	2.70E-06	5.00E-03	5.39E-04
Sodium	5.68E+01	100	1.0E-06	1.0	350	6	15	2190	3.63E-04	NA	ND
Thallium	1.40E-01	100	1.0E-06	1.0	350	6	15	2190	8.96E-07	8.00E-04	1.12E-03
Vanadium	7.84E+00	100	1.0E-06	1.0	350	6	15	2190	5.01E-05	7.00E-03	7.16E-03
Zinc	3.68E+01	100	1.0E-06	1.0	350	6	15	2190	2.35E-04	3.00E-01	7.84E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.25E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	3.99E+03	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.56E-05	NA	ND
Antimony	2.60E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.67E-08	NA	ND
Arsenic	2.41E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.55E-08	1.89E+00	2.92E-08
Barium	1.84E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.18E-07	NA	ND
Beryllium	4.46E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.87E-09	4.30E+01	1.24E-07
Cadmium	4.26E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.75E-09	NA	ND
Calcium	7.32E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.69E-04	NA	ND
Chromium	5.08E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.26E-08	NA	ND
Cobalt	2.18E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.40E-08	NA	ND
Copper	1.11E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	7.13E-07	NA	ND
Cyanide (total)	1.91E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.22E-08	NA	ND
Iron	7.47E+03	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.79E-05	NA	ND
Lead	7.97E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.11E-08	NA	ND
Magnesium	2.47E+04	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.58E-04	NA	ND
Manganese	2.90E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	1.86E-06	NA	ND
Mercury	6.89E-02	1.0E-06	1750	1.00	0.001	234	6	15	25550	4.42E-10	NA	ND
Nickel	8.73E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.60E-08	NA	ND
Potassium	3.71E+02	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.36E-06	NA	ND
Selenium	1.26E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	8.06E-10	NA	ND
Silver	4.22E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.70E-09	NA	ND
Sodium	5.66E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	3.64E-07	NA	ND
Thallium	1.40E-01	1.0E-06	1750	1.00	0.001	234	6	15	25550	8.98E-10	NA	ND
Vanadium	7.84E+00	1.0E-06	1750	1.00	0.001	234	6	15	25550	5.02E-08	NA	ND
Zinc	3.66E+01	1.0E-06	1750	1.00	0.001	234	6	15	25550	2.36E-07	NA	ND

TOTAL RISK 1.53E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE CONCENTRATION

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	3.99E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.99E-04	NA	ND
Antimony	2.60E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.95E-07	2.40E-04	8.11E-04
Arsenic	2.41E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.80E-07	2.85E-04	6.33E-04
Barium	1.84E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.38E-06	3.50E-03	3.94E-04
Beryllium	4.46E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.35E-08	5.00E-04	6.70E-05
Cadmium	4.28E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.20E-08	NA	ND
Calcium	7.32E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.48E-03	NA	ND
Chromium	5.08E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.80E-07	1.00E-02	3.80E-05
Cobalt	2.18E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.63E-07	NA	ND
Copper	1.11E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	8.32E-06	NA	ND
Cyanide (total)	1.91E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.43E-07	1.40E-02	1.02E-05
Iron	7.47E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.59E-04	NA	ND
Lead	7.97E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.96E-07	NA	ND
Magnesium	2.47E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.85E-03	NA	ND
Manganese	2.90E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.17E-05	5.60E-03	3.88E-03
Mercury	6.89E-02	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.16E-09	4.50E-05	1.15E-04
Nickel	6.73E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.53E-07	2.00E-03	3.27E-04
Potassium	3.71E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.77E-05	NA	ND
Selenium	1.26E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.40E-09	4.85E-03	1.94E-06
Silver	4.22E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	3.15E-08	5.00E-04	6.31E-05
Sodium	5.68E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.25E-06	NA	ND
Thallium	1.40E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.05E-08	8.00E-05	1.31E-04
Vanadium	7.64E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.86E-07	7.00E-05	8.37E-03
Zinc	3.88E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.75E-06	9.00E-02	3.06E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.49E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	2.81E-05	0.83	24	234	6	15	25550	2.05E-06	NA	ND
Antimony	1.83E-08	0.83	24	234	6	15	25550	1.34E-09	NA	ND
Arsenic	1.70E-08	0.83	24	234	6	15	25550	1.24E-09	5.00E+01	6.20E-08
Barium	1.30E-07	0.83	24	234	6	15	25550	9.48E-09	NA	ND
Beryllium	3.18E-09	0.83	24	234	6	15	25550	2.30E-10	6.40E+00	1.94E-09
Cadmium	3.02E-09	0.83	24	234	6	15	25550	2.20E-10	6.10E+00	1.34E-09
Calcium	5.16E-04	0.83	24	234	6	15	25550	3.77E-05	NA	ND
Chromium	3.58E-08	0.83	24	234	6	15	25550	2.61E-09	4.20E+01	1.10E-07
Cobalt	1.54E-08	0.83	24	234	6	15	25550	1.12E-09	NA	ND
Copper	7.84E-07	0.83	24	234	6	15	25550	5.72E-08	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	6	15	25550	9.81E-10	NA	ND
Iron	5.26E-05	0.83	24	234	6	15	25550	3.84E-06	NA	ND
Lead	5.61E-08	0.83	24	234	6	15	25550	4.10E-09	NA	ND
Magnesium	1.74E-04	0.83	24	234	6	15	25550	1.27E-05	NA	ND
Manganese	2.05E-06	0.83	24	234	6	15	25550	1.49E-07	NA	ND
Mercury	4.86E-10	0.83	24	234	6	15	25550	3.54E-11	NA	ND
Nickel	8.15E-08	0.83	24	234	6	15	25550	4.49E-09	8.40E-01	3.77E-09
Potassium	2.61E-06	0.83	24	234	6	15	25550	1.91E-07	NA	ND
Selenium	8.86E-10	0.83	24	234	6	15	25550	8.46E-11	NA	ND
Silver	2.97E-09	0.83	24	234	6	15	25550	2.17E-10	NA	ND
Sodium	4.00E-07	0.83	24	234	6	15	25550	2.92E-08	NA	ND
Thallium	9.87E-10	0.83	24	234	6	15	25550	7.20E-11	NA	ND
Vanadium	5.52E-08	0.83	24	234	6	15	25550	4.03E-09	NA	ND
Zinc	2.59E-07	0.83	24	234	6	15	25550	1.89E-08	NA	ND
									TOTAL RISK	1.79E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM HAZARD – SITE AVERAGE CONCENTRATION

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	2.81E-05	0.83	24	234	6	15	2190	2.40E-05	NA	ND
Antimony	1.83E-08	0.83	24	234	6	15	2190	1.56E-08	NA	ND
Arsenic	1.70E-08	0.83	24	234	6	15	2190	1.45E-08	NA	ND
Barium	1.30E-07	0.83	24	234	6	15	2190	1.11E-07	1.00E-03	1.11E-04
Beryllium	3.16E-09	0.83	24	234	6	15	2190	2.69E-09	NA	ND
Cadmium	3.02E-09	0.83	24	234	6	15	2190	2.57E-09	NA	ND
Calcium	5.16E-04	0.83	24	234	6	15	2190	4.39E-04	NA	ND
Chromium	3.58E-08	0.83	24	234	6	15	2190	3.05E-06	NA	ND
Cobalt	1.54E-06	0.83	24	234	6	15	2190	1.31E-06	NA	ND
Copper	7.64E-07	0.83	24	234	6	15	2190	6.67E-07	NA	ND
Cyanide (total)	1.34E-08	0.83	24	234	6	15	2190	1.14E-08	NA	ND
Iron	5.28E-05	0.83	24	234	6	15	2190	4.48E-05	NA	ND
Lead	5.61E-08	0.83	24	234	6	15	2190	4.78E-08	NA	ND
Magnesium	1.74E-04	0.83	24	234	6	15	2190	1.48E-04	NA	ND
Manganese	2.05E-06	0.83	24	234	6	15	2190	1.74E-06	1.00E-04	1.74E-02
Mercury	4.86E-10	0.83	24	234	6	15	2190	4.13E-10	8.60E-05	4.81E-06
Nickel	6.15E-08	0.83	24	234	6	15	2190	5.24E-08	NA	ND
Potassium	2.61E-06	0.83	24	234	6	15	2190	2.22E-06	NA	ND
Selenium	8.66E-10	0.83	24	234	6	15	2190	7.54E-10	NA	ND
Silver	2.97E-09	0.83	24	234	6	15	2190	2.53E-09	NA	ND
Sodium	4.00E-07	0.83	24	234	6	15	2190	3.41E-07	NA	ND
Thallium	9.87E-10	0.83	24	234	6	15	2190	8.40E-10	NA	ND
Vanadium	5.52E-08	0.83	24	234	6	15	2190	4.70E-08	NA	ND
Zinc	2.59E-07	0.83	24	234	6	15	2190	2.21E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.75E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	1.52E+04	100	1.0E-06	1.0	350	30	70	25550	8.92E-03	NA	ND
Arsenic	4.10E+00	100	1.0E-06	1.0	350	30	70	25550	2.41E-06	1.80E+00	4.33E-06
Barium	8.31E+01	100	1.0E-06	1.0	350	30	70	25550	4.88E-05	NA	ND
Beryllium	8.90E-01	100	1.0E-06	1.0	350	30	70	25550	4.05E-07	4.30E+00	1.74E-06
Calcium	6.69E+04	100	1.0E-06	1.0	350	30	70	25550	3.93E-02	NA	ND
Chromium	2.07E+01	100	1.0E-06	1.0	350	30	70	25550	1.22E-05	NA	ND
Cobalt	5.40E+00	100	1.0E-06	1.0	350	30	70	25550	3.17E-06	NA	ND
Copper	1.40E+01	100	1.0E-06	1.0	350	30	70	25550	8.22E-06	NA	ND
Iron	2.01E+04	100	1.0E-06	1.0	350	30	70	25550	1.18E-02	NA	ND
Lead	1.65E+01	100	1.0E-06	1.0	350	30	70	25550	9.69E-06	NA	ND
Magnesium	2.01E+04	100	1.0E-06	1.0	350	30	70	25550	1.18E-02	NA	ND
Manganese	3.50E+02	100	1.0E-06	1.0	350	30	70	25550	2.05E-04	NA	ND
Nickel	1.71E+01	100	1.0E-06	1.0	350	30	70	25550	1.00E-05	NA	ND
Potassium	1.12E+03	100	1.0E-06	1.0	350	30	70	25550	6.58E-04	NA	ND
Sodium	1.17E+02	100	1.0E-06	1.0	350	30	70	25550	8.67E-05	NA	ND
Vanadium	2.78E+01	100	1.0E-06	1.0	350	30	70	25550	1.63E-05	NA	ND
Zinc	7.73E+01	100	1.0E-06	1.0	350	30	70	25550	4.54E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 6.07E-06

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	100	1.0E-06	1.0	350	30	70	10950	2.08E-02	1.00E+00	2.08E-02
Arsenic	4.10E+00	100	1.0E-06	1.0	350	30	70	10950	5.62E-06	3.00E-04	1.87E-02
Barium	8.31E+01	100	1.0E-06	1.0	350	30	70	10950	1.14E-04	7.00E-02	1.63E-03
Beryllium	6.90E-01	100	1.0E-06	1.0	350	30	70	10950	9.45E-07	5.00E-03	1.89E-04
Calcium	6.69E+04	100	1.0E-06	1.0	350	30	70	10950	9.16E-02	NA	ND
Chromium	2.07E+01	100	1.0E-06	1.0	350	30	70	10950	2.84E-05	5.00E-03	5.67E-03
Cobalt	5.40E+00	100	1.0E-06	1.0	350	30	70	10950	7.40E-06	NA	ND
Copper	1.40E+01	100	1.0E-06	1.0	350	30	70	10950	1.92E-05	4.00E-02	4.79E-04
Iron	2.01E+04	100	1.0E-06	1.0	350	30	70	10950	2.75E-02	NA	ND
Lead	1.65E+01	100	1.0E-06	1.0	350	30	70	10950	2.26E-05	NA	ND
Magnesium	2.01E+04	100	1.0E-06	1.0	350	30	70	10950	2.75E-02	NA	ND
Manganese	3.50E+02	100	1.0E-06	1.0	350	30	70	10950	4.79E-04	1.40E-01	3.42E-03
Nickel	1.71E+01	100	1.0E-06	1.0	350	30	70	10950	2.34E-05	2.00E-02	1.17E-03
Potassium	1.12E+03	100	1.0E-06	1.0	350	30	70	10950	1.53E-03	NA	ND
Sodium	1.17E+02	100	1.0E-06	1.0	350	30	70	10950	1.60E-04	NA	ND
Vanadium	2.78E+01	100	1.0E-06	1.0	350	30	70	10950	3.81E-05	7.00E-03	5.44E-03
Zinc	7.73E+01	100	1.0E-06	1.0	350	30	70	10950	1.06E-04	3.00E-01	3.53E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 5.79E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	1.52E+04	1.0E–06	5800	1.00	0.001	350	30	70	25550	5.18E–04	NA	ND
Arsenic	4.10E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.40E–07	1.89E+00	2.64E–07
Barium	8.31E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.83E–06	NA	ND
Beryllium	6.90E–01	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.35E–08	4.30E+01	1.01E–06
Calcium	6.69E+04	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.28E–03	NA	ND
Chromium	2.07E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	7.05E–07	NA	ND
Cobalt	5.40E+00	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.84E–07	NA	ND
Copper	1.40E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	4.77E–07	NA	ND
Iron	2.01E+04	1.0E–06	5800	1.00	0.001	350	30	70	25550	6.84E–04	NA	ND
Lead	1.65E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	5.62E–07	NA	ND
Magnesium	2.01E+04	1.0E–06	5800	1.00	0.001	350	30	70	25550	6.84E–04	NA	ND
Manganese	3.50E+02	1.0E–06	5800	1.00	0.001	350	30	70	25550	1.19E–05	NA	ND
Nickel	1.71E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	5.82E–07	NA	ND
Potassium	1.12E+03	1.0E–06	5800	1.00	0.001	350	30	70	25550	3.81E–05	NA	ND
Sodium	1.17E+02	1.0E–06	5800	1.00	0.001	350	30	70	25550	3.98E–06	NA	ND
Vanadium	2.78E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	9.47E–07	NA	ND
Zinc	7.73E+01	1.0E–06	5800	1.00	0.001	350	30	70	25550	2.63E–06	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.27E–06

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.21E-03	2.00E-01	6.04E-03
Arsenic	4.10E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	3.26E-07	2.85E-04	1.14E-03
Barium	8.31E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.60E-06	3.50E-03	1.89E-03
Beryllium	8.90E-01	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.48E-06	5.00E-04	1.10E-04
Calcium	6.69E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	5.32E-03	NA	ND
Chromium	2.07E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.64E-06	2.50E-03	6.56E-04
Cobalt	5.40E+00	1.0E-06	5800	1.00	0.001	350	30	70	10950	4.29E-07	NA	ND
Copper	1.40E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.11E-06	3.96E-02	2.81E-05
Iron	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.60E-03	NA	ND
Lead	1.65E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.31E-06	NA	ND
Magnesium	2.01E+04	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.60E-03	NA	ND
Manganese	3.50E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.78E-05	5.60E-03	4.97E-03
Nickel	1.71E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	1.36E-06	2.00E-03	6.79E-04
Potassium	1.12E+03	1.0E-06	5800	1.00	0.001	350	30	70	10950	8.90E-05	NA	ND
Sodium	1.17E+02	1.0E-06	5800	1.00	0.001	350	30	70	10950	9.30E-06	NA	ND
Vanadium	2.78E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	2.21E-06	7.00E-05	3.16E-02
Zinc	7.73E+01	1.0E-06	5800	1.00	0.001	350	30	70	10950	6.14E-06	9.00E-02	6.82E-05

NA/ND -- Not available / Not determined

TOTAL HAZARD 4.71E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.07E-04	0.83	24	350	30	70	25550	1.25E-05	NA	ND
Arsenic	2.89E-08	0.83	24	350	30	70	25550	3.38E-09	5.00E+01	1.69E-07
Barium	5.85E-07	0.83	24	350	30	70	25550	6.85E-08	NA	ND
Beryllium	4.86E-09	0.83	24	350	30	70	25550	5.68E-10	8.40E+00	4.78E-09
Calcium	4.71E-04	0.83	24	350	30	70	25550	5.51E-05	NA	ND
Chromium	1.46E-07	0.83	24	350	30	70	25550	1.71E-08	4.20E+01	7.16E-07
Cobalt	3.80E-08	0.83	24	350	30	70	25550	4.45E-09	NA	ND
Copper	9.86E-08	0.83	24	350	30	70	25550	1.15E-08	NA	ND
Iron	1.42E-04	0.83	24	350	30	70	25550	1.66E-05	NA	ND
Lead	1.16E-07	0.83	24	350	30	70	25550	1.36E-08	NA	ND
Magnesium	1.42E-04	0.83	24	350	30	70	25550	1.66E-05	NA	ND
Manganese	2.47E-06	0.83	24	350	30	70	25550	2.88E-07	NA	ND
Nickel	1.20E-07	0.83	24	350	30	70	25550	1.41E-08	8.40E-01	1.18E-08
Potassium	7.89E-08	0.83	24	350	30	70	25550	9.23E-07	NA	ND
Sodium	8.24E-07	0.83	24	350	30	70	25550	9.64E-08	NA	ND
Vanadium	1.96E-07	0.83	24	350	30	70	25550	2.29E-08	NA	ND
Zinc	5.45E-07	0.83	24	350	30	70	25550	6.37E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 9.02E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.07E-04	0.83	24	350	30	70	10950	2.92E-05	NA	ND
Arsenic	2.89E-08	0.83	24	350	30	70	10950	7.88E-09	NA	ND
Barium	5.85E-07	0.83	24	350	30	70	10950	1.60E-07	1.00E-04	1.60E-03
Beryllium	4.86E-09	0.83	24	350	30	70	10950	1.33E-09	NA	ND
Calcium	4.71E-04	0.83	24	350	30	70	10950	1.29E-04	NA	ND
Chromium	1.46E-07	0.83	24	350	30	70	10950	3.98E-08	NA	ND
Cobalt	3.80E-08	0.83	24	350	30	70	10950	1.04E-08	NA	ND
Copper	9.86E-08	0.83	24	350	30	70	10950	2.69E-08	NA	ND
Iron	1.42E-04	0.83	24	350	30	70	10950	3.88E-05	NA	ND
Lead	1.16E-07	0.83	24	350	30	70	10950	3.17E-08	NA	ND
Magnesium	1.42E-04	0.83	24	350	30	70	10950	3.86E-05	NA	ND
Manganese	2.47E-06	0.83	24	350	30	70	10950	6.73E-07	1.00E-04	6.73E-03
Nickel	1.20E-07	0.83	24	350	30	70	10950	3.29E-08	NA	ND
Potassium	7.89E-06	0.83	24	350	30	70	10950	2.15E-06	NA	ND
Sodium	8.24E-07	0.83	24	350	30	70	10950	2.25E-07	NA	ND
Vanadium	1.96E-07	0.83	24	350	30	70	10950	5.34E-08	NA	ND
Zinc	5.45E-07	0.83	24	350	30	70	10950	1.49E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 8.33E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)−1	RISK
Aluminum	1.52E+04	200	1.0E−06	1.0	350	6	15	25550	1.67E−02	NA	ND
Arsenic	4.10E+00	200	1.0E−06	1.0	350	6	15	25550	4.49E−06	1.80E+00	8.09E−06
Barium	8.31E+01	200	1.0E−06	1.0	350	6	15	25550	9.11E−05	NA	ND
Beryllium	6.90E−01	200	1.0E−06	1.0	350	6	15	25550	7.56E−07	4.30E+00	3.25E−06
Calcium	6.69E+04	200	1.0E−06	1.0	350	6	15	25550	7.33E−02	NA	ND
Chromium	2.07E+01	200	1.0E−06	1.0	350	6	15	25550	2.27E−05	NA	ND
Cobalt	5.40E+00	200	1.0E−06	1.0	350	6	15	25550	5.92E−06	NA	ND
Copper	1.40E+01	200	1.0E−06	1.0	350	6	15	25550	1.53E−05	NA	ND
Iron	2.01E+04	200	1.0E−06	1.0	350	6	15	25550	2.20E−02	NA	ND
Lead	1.65E+01	200	1.0E−06	1.0	350	6	15	25550	1.81E−05	NA	ND
Magnesium	2.01E+04	200	1.0E−06	1.0	350	6	15	25550	2.20E−02	NA	ND
Manganese	3.50E+02	200	1.0E−06	1.0	350	6	15	25550	3.84E−04	NA	ND
Nickel	1.71E+01	200	1.0E−06	1.0	350	6	15	25550	1.87E−05	NA	ND
Potassium	1.12E+03	200	1.0E−06	1.0	350	6	15	25550	1.23E−03	NA	ND
Sodium	1.17E+02	200	1.0E−06	1.0	350	6	15	25550	1.28E−04	NA	ND
Vanadium	2.78E+01	200	1.0E−06	1.0	350	6	15	25550	3.05E−05	NA	ND
Zinc	7.73E+01	200	1.0E−06	1.0	350	6	15	25550	8.47E−05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 1.13E−05

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	200	1.0E-06	1.0	350	6	15	2190	1.94E-01	NA	ND
Arsenic	4.10E+00	200	1.0E-06	1.0	350	6	15	2190	5.24E-05	3.00E-04	1.75E-01
Barium	8.31E+01	200	1.0E-06	1.0	350	6	15	2190	1.06E-03	7.00E-02	1.52E-02
Beryllium	6.90E-01	200	1.0E-06	1.0	350	6	15	2190	8.82E-06	5.00E-03	1.76E-03
Calcium	6.69E+04	200	1.0E-06	1.0	350	6	15	2190	8.55E-01	NA	ND
Chromium	2.07E+01	200	1.0E-06	1.0	350	6	15	2190	2.65E-04	2.00E-02	1.32E-02
Cobalt	5.40E+00	200	1.0E-06	1.0	350	6	15	2190	6.90E-05	NA	ND
Copper	1.40E+01	200	1.0E-06	1.0	350	6	15	2190	1.79E-04	NA	ND
Iron	2.01E+04	200	1.0E-06	1.0	350	6	15	2190	2.57E-01	NA	ND
Lead	1.65E+01	200	1.0E-06	1.0	350	6	15	2190	2.11E-04	NA	ND
Magnesium	2.01E+04	200	1.0E-06	1.0	350	6	15	2190	2.57E-01	NA	ND
Manganese	3.50E+02	200	1.0E-06	1.0	350	6	15	2190	4.47E-03	1.40E-01	3.20E-02
Nickel	1.71E+01	200	1.0E-06	1.0	350	6	15	2190	2.19E-04	2.00E-02	1.09E-02
Potassium	1.12E+03	200	1.0E-06	1.0	350	6	15	2190	1.43E-02	NA	ND
Sodium	1.17E+02	200	1.0E-06	1.0	350	6	15	2190	1.50E-03	NA	ND
Vanadium	2.78E+01	200	1.0E-06	1.0	350	6	15	2190	3.55E-04	7.00E-03	5.08E-02
Zinc	7.73E+01	200	1.0E-06	1.0	350	6	15	2190	9.88E-04	3.00E-01	3.29E-03

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.02E-01

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.52E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.67E-04	NA	ND
Arsenic	4.10E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	4.52E-08	1.89E+00	8.53E-08
Barium	8.31E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	9.15E-07	NA	ND
Beryllium	6.90E-01	1.0E-06	2010	1.00	0.001	350	6	15	25550	7.60E-09	4.30E+01	3.27E-07
Calcium	6.69E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	7.37E-04	NA	ND
Chromium	2.07E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.28E-07	NA	ND
Cobalt	5.40E+00	1.0E-06	2010	1.00	0.001	350	6	15	25550	5.95E-08	NA	ND
Copper	1.40E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.54E-07	NA	ND
Iron	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.21E-04	NA	ND
Lead	1.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.82E-07	NA	ND
Magnesium	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	25550	2.21E-04	NA	ND
Manganese	3.50E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.85E-06	NA	ND
Nickel	1.71E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.88E-07	NA	ND
Potassium	1.12E+03	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.23E-05	NA	ND
Sodium	1.17E+02	1.0E-06	2010	1.00	0.001	350	6	15	25550	1.29E-06	NA	ND
Vanadium	2.78E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	3.06E-07	NA	ND
Zinc	7.73E+01	1.0E-06	2010	1.00	0.001	350	6	15	25550	8.51E-07	NA	ND

TOTAL RISK 4.12E-07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.52E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.95E-03	NA	ND
Arsenic	4.10E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	5.27E-07	2.85E-04	1.85E-03
Barium	8.31E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.07E-05	3.50E-03	3.05E-03
Beryllium	6.90E-01	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.87E-08	5.00E-04	1.77E-04
Calcium	6.69E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	8.60E-03	NA	ND
Chromium	2.07E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.66E-06	1.00E-02	2.66E-04
Cobalt	5.40E+00	1.0E-06	2010	1.00	0.001	350	6	15	2190	6.94E-07	NA	ND
Copper	1.40E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.80E-06	NA	ND
Iron	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.58E-03	NA	ND
Lead	1.65E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.12E-06	NA	ND
Magnesium	2.01E+04	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.58E-03	NA	ND
Manganese	3.50E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	4.50E-05	5.60E-03	8.03E-03
Nickel	1.71E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	2.20E-06	2.00E-03	1.10E-03
Potassium	1.12E+03	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.44E-04	NA	ND
Sodium	1.17E+02	1.0E-06	2010	1.00	0.001	350	6	15	2190	1.50E-05	NA	ND
Vanadium	2.76E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	3.57E-06	7.00E-05	5.10E-02
Zinc	7.73E+01	1.0E-06	2010	1.00	0.001	350	6	15	2190	9.93E-06	9.00E-02	1.10E-04

NA/ND – Not available / Not determined

TOTAL HAZARD 8.56E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	1.07E-04	0.83	24	350	6	15	25550	1.17E-05	NA	ND
Arsenic	2.89E-08	0.83	24	350	6	15	25550	3.15E-09	5.00E+01	1.58E-07
Barium	5.85E-07	0.83	24	350	6	15	25550	6.39E-08	NA	ND
Beryllium	4.86E-09	0.83	24	350	6	15	25550	5.31E-10	8.40E+00	4.46E-09
Calcium	4.71E-04	0.83	24	350	6	15	25550	5.14E-05	NA	ND
Chromium	1.46E-07	0.83	24	350	6	15	25550	1.59E-08	4.20E+01	6.69E-07
Cobalt	3.80E-08	0.83	24	350	6	15	25550	4.15E-09	NA	ND
Copper	9.86E-08	0.83	24	350	6	15	25550	1.08E-08	NA	ND
Iron	1.42E-04	0.83	24	350	6	15	25550	1.55E-05	NA	ND
Lead	1.16E-07	0.83	24	350	6	15	25550	1.27E-08	NA	ND
Magnesium	1.42E-04	0.83	24	350	6	15	25550	1.55E-05	NA	ND
Manganese	2.47E-06	0.83	24	350	6	15	25550	2.69E-07	NA	ND
Nickel	1.20E-07	0.83	24	350	6	15	25550	1.31E-08	8.40E-01	1.10E-08
Potassium	7.89E-06	0.83	24	350	6	15	25550	8.61E-07	NA	ND
Sodium	8.24E-07	0.83	24	350	6	15	25550	9.00E-08	NA	ND
Vanadium	1.96E-07	0.83	24	350	6	15	25550	2.14E-08	NA	ND
Zinc	5.45E-07	0.83	24	350	6	15	25550	5.94E-08	NA	ND
									TOTAL RISK	8.42E-07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – MAXIMUM BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	1.07E-04	0.83	24	350	6	15	2190	1.36E-04	NA	ND
Arsenic	2.69E-08	0.83	24	350	6	15	2190	3.68E-08	NA	ND
Barium	5.65E-07	0.83	24	350	6	15	2190	7.46E-07	1.00E-03	7.46E-04
Beryllium	4.68E-09	0.83	24	350	6	15	2190	6.19E-09	NA	ND
Calcium	4.71E-04	0.83	24	350	6	15	2190	6.00E-04	NA	ND
Chromium	1.46E-07	0.83	24	350	6	15	2190	1.88E-07	NA	ND
Cobalt	3.80E-08	0.83	24	350	6	15	2190	4.84E-08	NA	ND
Copper	9.86E-08	0.83	24	350	6	15	2190	1.26E-07	NA	ND
Iron	1.42E-04	0.83	24	350	6	15	2190	1.80E-04	NA	ND
Lead	1.16E-07	0.83	24	350	6	15	2190	1.48E-07	NA	ND
Magnesium	1.42E-04	0.83	24	350	6	15	2190	1.80E-04	NA	ND
Manganese	2.47E-08	0.83	24	350	6	15	2190	3.14E-08	1.00E-04	3.14E-02
Nickel	1.20E-07	0.83	24	350	6	15	2190	1.53E-07	NA	ND
Potassium	7.89E-06	0.83	24	350	6	15	2190	1.00E-05	NA	ND
Sodium	8.24E-07	0.83	24	350	6	15	2190	1.05E-06	NA	ND
Vanadium	1.96E-07	0.83	24	350	6	15	2190	2.49E-07	NA	ND
Zinc	5.45E-07	0.83	24	350	6	15	2190	6.93E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.21E-02

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.27E+03	50	1.0E-06	1.0	350	9	70	25550	5.52E-04	NA	ND
Arsenic	2.87E+00	50	1.0E-06	1.0	350	9	70	25550	2.52E-07	1.80E+00	4.54E-07
Barium	3.85E+01	50	1.0E-06	1.0	350	9	70	25550	3.39E-06	NA	ND
Beryllium	6.13E-01	50	1.0E-06	1.0	350	9	70	25550	5.40E-08	4.30E+00	2.32E-07
Calcium	3.62E+04	50	1.0E-06	1.0	350	9	70	25550	3.19E-03	NA	ND
Chromium	8.30E+00	50	1.0E-06	1.0	350	9	70	25550	7.31E-07	NA	ND
Cobalt	3.63E+00	50	1.0E-06	1.0	350	9	70	25550	3.20E-07	NA	ND
Copper	1.04E+01	50	1.0E-06	1.0	350	9	70	25550	9.13E-07	NA	ND
Iron	1.03E+04	50	1.0E-06	1.0	350	9	70	25550	9.09E-04	NA	ND
Lead	9.30E+00	50	1.0E-06	1.0	350	9	70	25550	8.19E-07	NA	ND
Magnesium	1.36E+04	50	1.0E-06	1.0	350	9	70	25550	1.20E-03	NA	ND
Manganese	2.40E+02	50	1.0E-06	1.0	350	9	70	25550	2.12E-05	NA	ND
Nickel	1.02E+01	50	1.0E-06	1.0	350	9	70	25550	8.96E-07	NA	ND
Potassium	5.86E+02	50	1.0E-06	1.0	350	9	70	25550	5.16E-05	NA	ND
Sodium	7.28E+01	50	1.0E-06	1.0	350	9	70	25550	6.41E-06	NA	ND
Vanadium	1.31E+01	50	1.0E-06	1.0	350	9	70	25550	1.15E-06	NA	ND
Zinc	3.96E+01	50	1.0E-06	1.0	350	9	70	25550	3.49E-06	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 6.87E-07

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	50	1.0E-06	1.0	350	9	70	3285	4.30E-03	1.00E+00	4.30E-03
Arsenic	2.87E+00	50	1.0E-06	1.0	350	9	70	3285	1.96E-06	3.00E-04	6.54E-03
Barium	3.85E+01	50	1.0E-06	1.0	350	9	70	3285	2.64E-05	7.00E-02	3.77E-04
Beryllium	6.13E-01	50	1.0E-06	1.0	350	9	70	3285	4.20E-07	5.00E-03	8.40E-05
Calcium	3.82E+04	50	1.0E-06	1.0	350	9	70	3285	2.48E-02	NA	ND
Chromium	8.30E+00	50	1.0E-06	1.0	350	9	70	3285	5.68E-06	5.00E-03	1.14E-03
Cobalt	3.63E+00	50	1.0E-06	1.0	350	9	70	3285	2.49E-06	NA	ND
Copper	1.04E+01	50	1.0E-06	1.0	350	9	70	3285	7.10E-06	4.00E-02	1.78E-04
Iron	1.03E+04	50	1.0E-06	1.0	350	9	70	3285	7.07E-03	NA	ND
Lead	9.30E+00	50	1.0E-06	1.0	350	9	70	3285	6.37E-06	NA	ND
Magnesium	1.36E+04	50	1.0E-06	1.0	350	9	70	3285	9.32E-03	NA	ND
Manganese	2.40E+02	50	1.0E-06	1.0	350	9	70	3285	1.65E-04	1.40E-01	1.18E-03
Nickel	1.02E+01	50	1.0E-06	1.0	350	9	70	3285	6.99E-06	2.00E-02	3.49E-04
Potassium	5.86E+02	50	1.0E-06	1.0	350	9	70	3285	4.01E-04	NA	ND
Sodium	7.28E+01	50	1.0E-06	1.0	350	9	70	3285	4.99E-05	NA	ND
Vanadium	1.31E+01	50	1.0E-06	1.0	350	9	70	3285	8.95E-06	7.00E-03	1.28E-03
Zinc	3.96E+01	50	1.0E-06	1.0	350	9	70	3285	2.71E-05	3.00E-01	9.04E-05

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.55E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	6.27E+03	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.69E-05	NA	ND
Arsenic	2.87E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.69E-08	1.89E+00	3.19E-08
Barium	3.85E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.27E-07	NA	ND
Beryllium	8.13E-01	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.61E-09	4.30E+01	1.55E-07
Calcium	3.62E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.13E-04	NA	ND
Chromium	8.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.89E-08	NA	ND
Cobalt	3.83E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.14E-08	NA	ND
Copper	1.04E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.10E-08	NA	ND
Iron	1.03E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.08E-05	NA	ND
Lead	9.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	25550	5.48E-08	NA	ND
Magnesium	1.36E+04	1.0E-06	5000	1.00	0.001	234	9	70	25550	8.01E-05	NA	ND
Manganese	2.40E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	1.41E-06	NA	ND
Nickel	1.02E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	6.01E-08	NA	ND
Potassium	5.86E+02	1.0E-06	5000	1.00	0.001	234	9	70	25550	3.45E-06	NA	ND
Sodium	7.28E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	4.29E-07	NA	ND
Vanadium	1.31E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	7.69E-08	NA	ND
Zinc	3.96E+01	1.0E-06	5000	1.00	0.001	234	9	70	25550	2.33E-07	NA	ND

NA/ND – Not available / Not determined

TOTAL RISK 1.87E-07

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	8.27E+03	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.87E-04	2.00E-01	1.44E-03
Arsenic	2.87E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.31E-07	2.85E-04	4.61E-04
Barium	3.85E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.76E-06	3.50E-03	5.04E-04
Beryllium	8.13E-01	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.81E-08	5.00E-04	5.62E-05
Calcium	3.62E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.66E-03	NA	ND
Chromium	8.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.80E-07	2.50E-03	1.52E-04
Cobalt	3.83E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.66E-07	NA	ND
Copper	1.04E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.75E-07	3.96E-02	1.20E-05
Iron	1.03E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.73E-04	NA	ND
Lead	9.30E+00	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.26E-07	NA	ND
Magnesium	1.38E+04	1.0E-06	5000	1.00	0.001	234	9	70	3285	6.23E-04	NA	ND
Manganese	2.40E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.10E-05	5.60E-03	1.97E-03
Nickel	1.02E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	4.67E-07	2.00E-03	2.34E-04
Potassium	5.86E+02	1.0E-06	5000	1.00	0.001	234	9	70	3285	2.68E-05	NA	ND
Sodium	7.28E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	3.34E-06	NA	ND
Vanadium	1.31E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	5.98E-07	7.00E-05	8.55E-03
Zinc	3.96E+01	1.0E-06	5000	1.00	0.001	234	9	70	3285	1.81E-06	9.00E-02	2.01E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.34E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)-1	RISK
Aluminum	4.42E-05	0.83	24	234	9	70	25550	1.04E-06	NA	ND
Arsenic	2.02E-08	0.83	24	234	9	70	25550	4.74E-10	5.00E+01	2.37E-08
Barium	2.71E-07	0.83	24	234	9	70	25550	6.37E-09	NA	ND
Beryllium	4.32E-09	0.83	24	234	9	70	25550	1.01E-10	8.40E+00	8.51E-10
Calcium	2.55E-04	0.83	24	234	9	70	25550	5.99E-06	NA	ND
Chromium	5.85E-08	0.83	24	234	9	70	25550	1.37E-09	4.20E+01	5.76E-08
Cobalt	2.58E-08	0.83	24	234	9	70	25550	6.00E-10	NA	ND
Copper	7.30E-08	0.83	24	234	9	70	25550	1.71E-09	NA	ND
Iron	7.27E-05	0.83	24	234	9	70	25550	1.71E-08	NA	ND
Lead	6.55E-08	0.83	24	234	9	70	25550	1.54E-09	NA	ND
Magnesium	9.59E-05	0.83	24	234	9	70	25550	2.25E-08	NA	ND
Manganese	1.69E-06	0.83	24	234	9	70	25550	3.97E-08	NA	ND
Nickel	7.19E-08	0.83	24	234	9	70	25550	1.69E-09	8.40E-01	1.42E-09
Potassium	4.13E-06	0.83	24	234	9	70	25550	9.68E-08	NA	ND
Sodium	5.13E-07	0.83	24	234	9	70	25550	1.20E-08	NA	ND
Vanadium	9.21E-08	0.83	24	234	9	70	25550	2.16E-09	NA	ND
Zinc	2.79E-07	0.83	24	234	9	70	25550	6.54E-09	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 8.36E-08

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL LONG TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	4.42E-05	0.83	24	234	9	70	3285	8.06E-06	NA	ND
Arsenic	2.02E-08	0.83	24	234	9	70	3285	3.68E-09	NA	ND
Barium	2.71E-07	0.83	24	234	9	70	3285	4.95E-08	1.00E-04	4.95E-04
Beryllium	4.32E-09	0.83	24	234	9	70	3285	7.88E-10	NA	ND
Calcium	2.55E-04	0.83	24	234	9	70	3285	4.66E-05	NA	ND
Chromium	5.85E-08	0.83	24	234	9	70	3285	1.07E-08	NA	ND
Cobalt	2.56E-08	0.83	24	234	9	70	3285	4.67E-09	NA	ND
Copper	7.30E-08	0.83	24	234	9	70	3285	1.33E-08	NA	ND
Iron	7.27E-05	0.83	24	234	9	70	3285	1.33E-05	NA	ND
Lead	6.55E-08	0.83	24	234	9	70	3285	1.20E-08	NA	ND
Magnesium	9.59E-05	0.83	24	234	9	70	3285	1.75E-05	NA	ND
Manganese	1.69E-06	0.83	24	234	9	70	3285	3.09E-07	1.00E-04	3.09E-03
Nickel	7.19E-08	0.83	24	234	9	70	3285	1.31E-08	NA	ND
Potassium	4.13E-06	0.83	24	234	9	70	3285	7.53E-07	NA	ND
Sodium	5.13E-07	0.83	24	234	9	70	3285	9.36E-08	NA	ND
Vanadium	9.21E-08	0.83	24	234	9	70	3285	1.68E-08	NA	ND
Zinc	2.79E-07	0.83	24	234	9	70	3285	5.09E-08	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 3.58E-03

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY)–1	RISK
Aluminum	8.27E+03	100	1.0E-06	1.0	350	6	15	25550	3.44E-03	NA	ND
Arsenic	2.87E+00	100	1.0E-06	1.0	350	6	15	25550	1.57E-06	1.80E+00	2.83E-06
Barium	3.85E+01	100	1.0E-06	1.0	350	6	15	25550	2.11E-05	NA	ND
Beryllium	6.13E-01	100	1.0E-06	1.0	350	6	15	25550	3.36E-07	4.30E+00	1.45E-06
Calcium	3.62E+04	100	1.0E-06	1.0	350	6	15	25550	1.99E-02	NA	ND
Chromium	8.30E+00	100	1.0E-06	1.0	350	6	15	25550	4.55E-06	NA	ND
Cobalt	3.63E+00	100	1.0E-06	1.0	350	6	15	25550	1.99E-06	NA	ND
Copper	1.04E+01	100	1.0E-06	1.0	350	6	15	25550	5.68E-06	NA	ND
Iron	1.03E+04	100	1.0E-06	1.0	350	6	15	25550	5.65E-03	NA	ND
Lead	9.30E+00	100	1.0E-06	1.0	350	6	15	25550	5.10E-06	NA	ND
Magnesium	1.36E+04	100	1.0E-06	1.0	350	6	15	25550	7.46E-03	NA	ND
Manganese	2.40E+02	100	1.0E-06	1.0	350	6	15	25550	1.32E-04	NA	ND
Nickel	1.02E+01	100	1.0E-06	1.0	350	6	15	25550	5.59E-06	NA	ND
Potassium	5.66E+02	100	1.0E-06	1.0	350	6	15	25550	3.21E-04	NA	ND
Sodium	7.28E+01	100	1.0E-06	1.0	350	6	15	25550	3.99E-05	NA	ND
Vanadium	1.31E+01	100	1.0E-06	1.0	350	6	15	25550	7.16E-06	NA	ND
Zinc	3.96E+01	100	1.0E-06	1.0	350	6	15	25550	2.17E-05	NA	ND

NA/ND – Not available/ Not determined

TOTAL RISK 4.27E-06

INGESTION OF CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	IR (MG/DAY)	CF (KG/MG)	FI (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	100	1.0E-06	1.0	350	6	15	2190	4.01E-02 NA		ND
Arsenic	2.87E+00	100	1.0E-06	1.0	350	6	15	2190	1.83E-05	3.00E-04	6.11E-02
Barium	3.85E+01	100	1.0E-06	1.0	350	6	15	2190	2.46E-04	7.00E-02	3.52E-03
Beryllium	6.13E-01	100	1.0E-06	1.0	350	6	15	2190	3.92E-06	5.00E-03	7.84E-04
Calcium	3.62E+04	100	1.0E-06	1.0	350	6	15	2190	2.32E-01 NA		ND
Chromium	8.30E+00	100	1.0E-06	1.0	350	6	15	2190	5.31E-05	2.00E-02	2.65E-03
Cobalt	3.63E+00	100	1.0E-06	1.0	350	6	15	2190	2.32E-05 NA		ND
Copper	1.04E+01	100	1.0E-06	1.0	350	6	15	2190	6.63E-05 NA		ND
Iron	1.03E+04	100	1.0E-06	1.0	350	6	15	2190	6.60E-02 NA		ND
Lead	9.30E+00	100	1.0E-06	1.0	350	6	15	2190	5.95E-05 NA		ND
Magnesium	1.36E+04	100	1.0E-06	1.0	350	6	15	2190	8.70E-02 NA		ND
Manganese	2.40E+02	100	1.0E-06	1.0	350	6	15	2190	1.54E-03	1.40E-01	1.10E-02
Nickel	1.02E+01	100	1.0E-06	1.0	350	6	15	2190	6.52E-05	2.00E-02	3.26E-03
Potassium	5.86E+02	100	1.0E-06	1.0	350	6	15	2190	3.75E-03 NA		ND
Sodium	7.26E+01	100	1.0E-06	1.0	350	6	15	2190	4.66E-04 NA		ND
Vanadium	1.31E+01	100	1.0E-06	1.0	350	6	15	2190	8.35E-05	7.00E-03	1.19E-02
Zinc	3.96E+01	100	1.0E-06	1.0	350	6	15	2190	2.53E-04	3.00E-01	8.44E-04

NA/ND – Not available/ Not determined

TOTAL HAZARD 9.51E-02

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL RISK – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	6.27E+03	1.0E–06	1750	1.00	0.001	234	6	15	25550	4.02E–05	NA	ND
Arsenic	2.67E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	1.64E–06	1.89E+00	3.47E–06
Barium	3.85E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.47E–07	NA	ND
Beryllium	6.13E–01	1.0E–06	1750	1.00	0.001	234	6	15	25550	3.93E–09	4.30E+01	1.69E–07
Calcium	3.62E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.32E–04	NA	ND
Chromium	8.30E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	5.32E–06	NA	ND
Cobalt	3.63E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.33E–06	NA	ND
Copper	1.04E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.65E–06	NA	ND
Iron	1.03E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.62E–05	NA	ND
Lead	9.30E+00	1.0E–06	1750	1.00	0.001	234	6	15	25550	5.96E–06	NA	ND
Magnesium	1.36E+04	1.0E–06	1750	1.00	0.001	234	6	15	25550	8.72E–05	NA	ND
Manganese	2.40E+02	1.0E–06	1750	1.00	0.001	234	6	15	25550	1.54E–06	NA	ND
Nickel	1.02E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	6.54E–06	NA	ND
Potassium	5.86E+02	1.0E–06	1750	1.00	0.001	234	6	15	25550	3.76E–06	NA	ND
Sodium	7.26E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	4.67E–07	NA	ND
Vanadium	1.31E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	8.38E–06	NA	ND
Zinc	3.96E+01	1.0E–06	1750	1.00	0.001	234	6	15	25550	2.54E–07	NA	ND

TOTAL RISK 2.04E–07

NA/ND – Not available / Not determined

DERMAL CONTACT WITH CHEMICALS IN SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CS (MG/KG)	CF (KG/MG)	SA (CM2/EVENT)	AF (MG/CM2)	ABS (UNITLESS)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RfD (MG/KG/DAY)	HAZARD
Aluminum	6.27E+03	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.69E-04 NA		ND
Arsenic	2.67E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.14E-07	2.85E-04	7.52E-04
Barium	3.65E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.88E-06	3.50E-03	8.23E-04
Beryllium	6.13E-01	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.59E-06	5.00E-04	9.17E-05
Calcium	3.62E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.71E-03 NA		ND
Chromium	8.30E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.21E-07	1.00E-02	6.21E-05
Cobalt	3.63E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.72E-07 NA		ND
Copper	1.04E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.75E-07 NA		ND
Iron	1.03E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.72E-04 NA		ND
Lead	9.30E+00	1.0E-06	1750	1.00	0.001	234	6	15	2190	6.96E-07 NA		ND
Magnesium	1.36E+04	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.02E-03 NA		ND
Manganese	2.40E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	1.80E-05	5.60E-03	3.21E-03
Nickel	1.02E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	7.63E-07	2.00E-03	3.81E-04
Potassium	5.88E+02	1.0E-06	1750	1.00	0.001	234	6	15	2190	4.38E-05 NA		ND
Sodium	7.28E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	5.45E-06 NA		ND
Vanadium	1.31E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	9.77E-07	7.00E-05	1.40E-02
Zinc	3.96E+01	1.0E-06	1750	1.00	0.001	234	6	15	2190	2.96E-06	9.00E-02	3.29E-05

NA/ND – Not available / Not determined

TOTAL HAZARD 1.93E-02

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE CHILD RESIDENTIAL SHORT TERM RISK – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	CSF (MG/KG/DAY) – 1	RISK
Aluminum	4.42E–05	0.83	24	234	6	15	25550	3.23E–08	NA	ND
Arsenic	2.02E–08	0.83	24	234	6	15	25550	1.47E–09	5.00E+01	7.37E–08
Barium	2.71E–07	0.83	24	234	6	15	25550	1.98E–08	NA	ND
Beryllium	4.32E–09	0.83	24	234	6	15	25550	3.15E–10	8.40E+00	2.65E–09
Calcium	2.55E–04	0.83	24	234	6	15	25550	1.86E–05	NA	ND
Chromium	5.85E–08	0.83	24	234	6	15	25550	4.27E–09	4.20E+01	1.79E–07
Cobalt	2.56E–08	0.83	24	234	6	15	25550	1.87E–09	NA	ND
Copper	7.30E–08	0.83	24	234	6	15	25550	5.33E–09	NA	ND
Iron	7.27E–05	0.83	24	234	6	15	25550	5.31E–08	NA	ND
Lead	6.55E–08	0.83	24	234	6	15	25550	4.78E–09	NA	ND
Magnesium	9.59E–05	0.83	24	234	6	15	25550	7.00E–08	NA	ND
Manganese	1.69E–06	0.83	24	234	6	15	25550	1.24E–07	NA	ND
Nickel	7.19E–08	0.83	24	234	6	15	25550	5.24E–09	8.40E–01	4.40E–09
Potassium	4.13E–06	0.83	24	234	6	15	25550	3.01E–07	NA	ND
Sodium	5.13E–07	0.83	24	234	6	15	25550	3.74E–08	NA	ND
Vanadium	9.21E–08	0.83	24	234	6	15	25550	6.72E–09	NA	ND
Zinc	2.79E–07	0.83	24	234	6	15	25550	2.04E–08	NA	ND
									TOTAL RISK	2.60E–07

INHALATION OF FUGITIVE DUSTS FROM SOIL – HYPOTHETICAL FUTURE ADULT RESIDENTIAL SHORT TERM HAZARD – AVERAGE BACKGROUND DATA

ANALYTE	CA (MG/M3)	IR (M3/HR)	ET (HR/DAY)	EF (DAY/YR)	ED (YR)	BW (KG)	AT (DAYS)	INTAKE (MG/KG/DAY)	RID (MG/KG/DAY)	HAZARD
Aluminum	4.42E-05	0.83	24	234	6	15	2190	3.76E-05	NA	ND
Arsenic	2.02E-08	0.83	24	234	6	15	2190	1.72E-08	NA	ND
Barium	2.71E-07	0.83	24	234	6	15	2190	2.31E-07	1.00E-03	2.31E-04
Beryllium	4.32E-09	0.83	24	234	6	15	2190	3.68E-09	NA	ND
Calcium	2.55E-04	0.83	24	234	6	15	2190	2.17E-04	NA	ND
Chromium	5.85E-08	0.83	24	234	6	15	2190	4.98E-08	NA	ND
Cobalt	2.56E-08	0.83	24	234	6	15	2190	2.18E-08	NA	ND
Copper	7.30E-08	0.83	24	234	6	15	2190	6.22E-08	NA	ND
Iron	7.27E-05	0.83	24	234	6	15	2190	6.19E-05	NA	ND
Lead	6.55E-08	0.83	24	234	6	15	2190	5.58E-08	NA	ND
Magnesium	9.59E-05	0.83	24	234	6	15	2190	8.16E-05	NA	ND
Manganese	1.69E-06	0.83	24	234	6	15	2190	1.44E-06	1.00E-04	1.44E-02
Nickel	7.19E-08	0.83	24	234	6	15	2190	6.12E-08	NA	ND
Potassium	4.13E-06	0.83	24	234	6	15	2190	3.51E-06	NA	ND
Sodium	5.13E-07	0.83	24	234	6	15	2190	4.37E-07	NA	ND
Vanadium	9.21E-08	0.83	24	234	6	15	2190	7.84E-08	NA	ND
Zinc	2.79E-07	0.83	24	234	6	15	2190	2.38E-07	NA	ND

NA/ND – Not available/ Not determined

TOTAL HAZARD 1.46E-02

ATTACHMENT 1

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	6.09E-06	2.37E-07	3.71E-07	6.69E-06
Barium	ND	ND	ND	ND
Beryllium	3.23E-06	8.85E-09	1.87E-06	5.11E-06
Cadmium	ND	3.81E-09	ND	3.81E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.40E-07	ND	5.40E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	1.02E-08	ND	1.02E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	9.31E-06	8.01E-07	2.24E-06	1.24E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	8.76E-03	ND	2.54E-03	1.13E-02
Antimony	2.24E-02	ND	2.17E-03	2.46E-02
Arsenic	2.63E-02	ND	1.61E-03	2.79E-02
Barium	9.09E-04	8.93E-04	1.05E-03	2.86E-03
Beryllium	3.50E-04	ND	2.03E-04	5.53E-04
Cadmium	2.08E-03	ND	1.72E-03	3.80E-03
Calcium	ND	ND	ND	ND
Chromium	4.28E-03	ND	4.98E-04	4.78E-03
Cobalt	ND	ND	ND	ND
Copper	3.71E-03	ND	2.17E-04	3.92E-03
Cyanide (total)	1.64E-04	ND	1.38E-05	1.77E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.36E-03	8.57E-03	6.33E-03	1.93E-02
Mercury	4.84E-04	2.37E-06	1.87E-04	6.74E-04
Nickel	1.01E-03	ND	5.87E-04	1.60E-03
Potassium	ND	ND	ND	ND
Selenium	7.37E-05	ND	4.41E-06	7.81E-05
Silver	2.98E-04	ND	1.73E-04	4.71E-04
Sodium	ND	ND	ND	ND
Thallium	4.91E-03	ND	2.85E-03	7.76E-03
Vanadium	2.69E-03	ND	1.68E-02	1.97E-02
Zinc	2.05E-04	ND	3.96E-05	2.44E-04
TOTAL	8.32E-02	9.47E-03	3.70E-02	1.30E-01

NA/ND – Not applicable/Not determined

TABLE 1 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE 95% UCL

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	SOIL – INHALATION	SOIL – DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.14E-05	2.21E-07	1.20E-07	1.17E-05
Barium	ND	ND	ND	ND
Beryllium	6.02E-06	8.26E-09	6.05E-07	6.64E-06
Cadmium	ND	3.55E-09	ND	3.55E-09
Calcium	ND	ND	ND	ND
Chromium	ND	5.04E-07	ND	5.04E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	9.54E-09	ND	9.54E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.74E-05	7.47E-07	7.25E-07	1.89E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	SOIL – INHALATION	SOIL – DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	2.09E-01	ND	3.51E-03	2.13E-01
Arsenic	2.45E-01	ND	2.60E-03	2.46E-01
Barium	8.49E-03	4.17E-04	1.71E-03	1.06E-02
Beryllium	3.27E-03	ND	3.28E-04	3.60E-03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	9.98E-03	ND	2.01E-04	1.02E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	1.53E-03	ND	2.19E-05	1.55E-03
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	4.07E-02	4.00E-02	1.02E-02	9.10E-02
Mercury	4.52E-03	1.11E-05	3.03E-04	4.83E-03
Nickel	9.44E-03	ND	9.49E-04	1.04E-02
Potassium	ND	ND	ND	ND
Selenium	6.88E-04	ND	7.13E-06	6.95E-04
Silver	2.79E-03	ND	2.80E-04	3.06E-03
Sodium	ND	ND	ND	ND
Thallium	4.58E-03	ND	4.60E-04	5.04E-03
Vanadium	2.70E-02	ND	2.72E-02	5.42E-02
Zinc	1.91E-03	ND	6.40E-05	1.97E-03
TOTAL	5.70E-01	4.04E-02	4.78E-02	6.58E-01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.00E-05	3.91E-07	6.11E-07	1.10E-05
Barium	ND	ND	ND	ND
Beryllium	4.04E-06	1.11E-08	2.34E-06	6.39E-06
Cadmium	ND	6.63E-08	ND	6.63E-08
Calcium	ND	ND	ND	ND
Chromium	ND	6.71E-07	ND	6.71E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	NO	ND	ND	ND
Magnesium	NO	NO	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.65E-08	ND	2.65E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.41E-05	1.17E-06	2.95E-06	1.82E-05

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.49E-02	ND	7.23E-03	3.22E-02
Antimony	4.25E-02	ND	4.11E-03	4.66E-02
Arsenic	4.34E-02	ND	2.65E-03	4.60E-02
Barium	2.25E-03	2.21E-03	2.81E-03	7.07E-03
Beryllium	4.38E-04	ND	2.54E-04	6.93E-04
Cadmium	3.62E-02	ND	3.00E-02	6.61E-02
Calcium	ND	ND	ND	ND
Chromium	5.32E-03	ND	6.17E-04	5.93E-03
Cobalt	ND	ND	ND	ND
Copper	6.75E-02	NO	3.85E-03	7.14E-02
Cyanide (total)	1.46E-03	ND	1.23E-04	1.60E-03
Iron	ND	ND	ND	ND
Lead	NO	ND	ND	ND
Magnesium	NO	ND	ND	ND
Manganese	9.78E-03	1.92E-02	1.42E-02	4.32E-02
Mercury	1.05E-02	5.14E-05	4.06E-03	1.46E-02
Nickel	2.62E-03	ND	1.52E-03	4.14E-03
Potassium	ND	ND	ND	ND
Selenium	1.21E-04	ND	7.21E-06	1.28E-04
Silver	4.93E-04	ND	2.86E-04	7.79E-04
Sodium	ND	NO	ND	ND
Thallium	7.19E-03	ND	4.17E-03	1.14E-02
Vanadium	6.61E-03	ND	3.84E-02	4.50E-02
Zinc	4.18E-04	ND	8.03E-05	4.98E-04
TOTAL	2.62E-01	2.15E-02	1.14E-01	3.97E-01

NA/ND – Not applicable/Not determined

TABLE 2 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME SITE MAXIMUM CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	1.87E-05	3.65E-07	1.98E-07	1.93E-05
Barium	ND	ND	ND	ND
Beryllium	7.54E-06	1.03E-08	7.58E-07	8.31E-06
Cadmium	ND	6.19E-08	ND	6.19E-08
Calcium	ND	ND	ND	ND
Chromium	ND	6.27E-07	ND	6.27E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	2.47E-08	ND	2.47E-08
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	2.63E-05	1.09E-06	9.55E-07	2.83E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	3.96E-01	ND	6.64E-03	4.03E-01
Arsenic	4.05E-01	ND	4.28E-03	4.09E-01
Barium	2.10E-02	1.03E-03	4.22E-03	2.63E-02
Beryllium	4.09E-03	ND	4.11E-04	4.50E-03
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.24E-02	ND	2.49E-04	1.27E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	1.38E-02	ND	1.98E-04	1.40E-02
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	9.13E-02	8.97E-02	2.29E-02	2.04E-01
Mercury	9.80E-02	2.40E-04	6.57E-03	1.05E-01
Nickel	2.45E-02	ND	2.46E-03	2.69E-02
Potassium	ND	ND	ND	ND
Selenium	1.13E-03	ND	1.17E-05	1.14E-03
Silver	4.60E-03	ND	4.63E-04	5.07E-03
Sodium	ND	ND	ND	ND
Thallium	6.71E-03	ND	6.75E-04	7.39E-03
Vanadium	5.17E-02	ND	6.20E-02	1.24E-01
Zinc	3.86E-03	ND	1.30E-04	4.01E-03
TOTAL	1.14E+00	9.10E-02	1.11E-01	1.35E+00

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Alummum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	3.62E-07	1.99E-08	2.68E-08	4.29E-07
Barium	ND	ND	ND	ND
Beryllium	1.70E-07	6.22E-10	1.13E-07	2.84E-07
Cadmium	ND	4.32E-10	ND	4.32E-10
Calcium	ND	ND	ND	ND
Chromium	ND	3.53E-08	ND	3.53E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	1.21E-09	ND	1.21E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	5.52E-07	5.75E-08	1.40E-07	7.50E-07

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	2.74E-03	ND	9.15E-04	3.65E-03
Antimony	4.46E-03	ND	4.97E-04	4.95E-03
Arsenic	5.51E-03	ND	3.87E-04	5.89E-03
Barium	1.80E-04	2.37E-04	2.41E-04	6.59E-04
Beryllium	6.14E-05	NO	4.10E-05	1.02E-04
Cadmium	5.87E-04	ND	5.60E-04	1.15E-03
Calcium	ND	ND	ND	ND
Chromium	6.96E-04	ND	9.31E-05	7.89E-04
Cobalt	ND	ND	ND	ND
Copper	1.90E-03	ND	1.29E-04	2.03E-03
Cyanide (total)	6.53E-05	ND	6.24E-06	7.16E-05
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.42E-03	3.73E-03	2.37E-03	7.53E-03
Mercury	1.57E-04	1.03E-06	7.01E-05	2.29E-04
Nickel	2.99E-04	ND	2.00E-04	4.99E-04
Potassium	ND	ND	ND	ND
Selenium	1.72E-05	ND	1.19E-06	1.84E-05
Silver	5.78E-05	ND	3.86E-05	9.64E-05
Sodium	ND	ND	ND	ND
Thallium	1.20E-03	ND	8.02E-04	2.00E-03
Vanadium	7.67E-04	NO	5.13E-03	5.89E-03
Zinc	8.40E-05	ND	1.87E-05	1.03E-04
TOTAL	2.02E-02	3.97E-03	1.15E-02	3.57E-02

NA/ND – Not applicable/Not determined

TABLE 3 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE SITE AVERAGE CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	ND	ND	ND	ND
Arsenic	2.38E-06	6.20E-08	2.92E-08	2.47E-06
Barium	ND	ND	ND	ND
Beryllium	1.06E-06	1.94E-09	1.24E-07	1.18E-06
Cadmium	ND	1.34E-09	ND	1.34E-09
Calcium	ND	ND	ND	ND
Chromium	ND	1.10E-07	ND	1.10E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	3.77E-09	ND	3.77E-09
Potassium	ND	ND	ND	ND
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	3.43E-06	1.79E-07	1.53E-07	3.77E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Antimony	4.16E-02	ND	8.11E-04	4.24E-02
Arsenic	5.14E-02	ND	6.33E-04	5.20E-02
Barium	1.68E-03	1.11E-04	3.94E-04	2.19E-03
Beryllium	5.73E-04	ND	6.70E-05	6.40E-04
Cadmium	ND	ND	ND	ND
Calcium	ND	ND	ND	ND
Chromium	1.62E-03	ND	3.80E-05	1.66E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Cyanide (total)	6.10E-04	ND	1.02E-05	6.20E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.33E-02	1.74E-02	3.88E-03	3.46E-02
Mercury	1.47E-03	4.81E-05	1.15E-04	1.59E-03
Nickel	2.79E-03	ND	3.27E-04	3.12E-03
Potassium	ND	ND	ND	ND
Selenium	1.61E-04	ND	1.94E-06	1.63E-04
Silver	5.39E-04	ND	6.31E-05	6.02E-04
Sodium	ND	ND	ND	ND
Thallium	1.12E-03	ND	1.31E-04	1.25E-03
Vanadium	7.16E-03	ND	8.37E-03	1.55E-02
Zinc	7.84E-04	ND	3.06E-05	8.15E-04
TOTAL	1.25E-01	1.75E-02	1.49E-02	1.57E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME MAXIMUM BACKGROUND CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	ND	ND	ND	ND
Arsenic	4.33E-06	1.69E-07	2.64E-07	4.77E-06
Barium	ND	ND	ND	ND
Beryllium	1.74E-06	4.78E-09	1.01E-06	2.76E-06
Calcium	ND	ND	ND	ND
Chromium	ND	7.16E-07	ND	7.16E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.18E-08	ND	1.18E-08
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	6.07E-06	9.02E-07	1.27E-06	8.25E-06

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL			TOTAL
	INGESTION	INHALATION	DERMAL	
Aluminum	2.08E-02	ND	6.04E-03	2.69E-02
Arsenic	1.57E-02	ND	1.14E-03	1.69E-02
Barium	1.63E-03	1.60E-03	1.89E-03	5.11E-03
Beryllium	1.89E-04	ND	1.10E-04	2.99E-04
Calcium	ND	ND	ND	ND
Chromium	5.67E-03	ND	6.58E-04	6.33E-03
Cobalt	ND	ND	ND	ND
Copper	4.79E-04	ND	2.51E-05	5.08E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	3.42E-03	6.73E-03	4.97E-03	1.51E-02
Nickel	1.17E-03	ND	5.79E-04	1.85E-03
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.44E-03	ND	3.16E-02	3.70E-02
Zinc	3.53E-04	ND	6.82E-05	4.21E-04
TOTAL	5.79E-02	8.33E-03	4.71E-02	1.13E-01

NA/ND – Not applicable/Not determined

TABLE 4 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – RME MAXIMUM BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	8.09E-06	1.58E-07	8.53E-08	8.33E-06
Barium	ND	ND	ND	ND
Beryllium	3.25E-08	4.46E-09	3.27E-07	3.58E-06
Calcium	ND	ND	ND	ND
Chromium	ND	6.69E-07	ND	6.69E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.10E-08	ND	1.10E-08
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	1.13E-05	8.42E-07	4.12E-07	1.26E-05

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	1.75E-01	ND	1.85E-03	1.77E-01
Barium	1.52E-02	7.46E-04	3.05E-03	1.90E-02
Beryllium	1.76E-03	ND	1.77E-04	1.94E-03
Calcium	ND	ND	ND	ND
Chromium	1.32E-02	ND	2.66E-04	1.35E-02
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	3.20E-02	3.14E-02	8.03E-03	7.14E-02
Nickel	1.09E-02	ND	1.10E-03	1.20E-02
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	5.08E-02	ND	5.10E-02	1.02E-01
Zinc	3.29E-03	ND	1.10E-04	3.40E-03
TOTAL	3.02E-01	3.21E-02	6.56E-02	4.00E-01

NA/ND – Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

ADULT RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	4.54E-07	2.37E-08	3.19E-08	5.10E-07
Barium	ND	ND	ND	ND
Beryllium	2.32E-07	8.51E-10	1.55E-07	3.88E-07
Calcium	ND	ND	ND	ND
Chromium	ND	5.76E-08	ND	5.76E-08
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	1.42E-09	ND	1.42E-09
Potassium	ND	ND	NO	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	6.87E-07	8.36E-08	1.87E-07	9.57E-07

ADULT HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	4.30E-03	ND	1.44E-03	5.73E-03
Arsenic	6.54E-03	ND	4.61E-04	7.01E-03
Barium	3.77E-04	4.95E-04	5.04E-04	1.38E-03
Beryllium	8.40E-05	ND	5.62E-05	1.40E-04
Calcium	ND	ND	ND	ND
Chromium	1.14E-03	ND	1.52E-04	1.29E-03
Cobalt	ND	ND	ND	ND
Copper	1.78E-04	ND	1.20E-05	1.89E-04
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.18E-03	3.09E-03	1.97E-03	6.23E-03
Nickel	3.49E-04	ND	2.34E-04	5.83E-04
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.28E-03	ND	8.55E-03	9.83E-03
Zinc	9.04E-05	ND	2.01E-05	1.11E-04
TOTAL	1.55E-02	3.88E-03	1.34E-02	3.25E-02

NA/ND – Not applicable/Not determined

TABLE 5 SUMMARY OF RISKS/HAZARDS ASSOCIATED WITH DAILY EXPOSURE TO THE LEVELS OF CONSTITUENTS OF CONCERN IN THE SOIL AT THE FORMER AMPHENOL SITE – CTE AVERAGE BACKGROUND CONCENTRATIONS

CHILD RISK

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	2.83E-06	7.37E-08	3.47E-08	2.94E-06
Barium	ND	ND	ND	ND
Beryllium	1.45E-06	2.65E-09	1.69E-07	1.62E-06
Calcium	ND	ND	ND	ND
Chromium	NO	1.79E-07	ND	1.79E-07
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	ND	ND	ND	ND
Nickel	ND	4.40E-09	NO	4.40E-09
Potassium	ND	ND	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND
Zinc	ND	ND	ND	ND
TOTAL	4.27E-06	2.60E-07	2.04E-07	4.74E-06

CHILD HAZARD

CHEMICAL	EXPOSURE PATHWAYS: SOIL – INGESTION	INHALATION	DERMAL	TOTAL
Aluminum	ND	ND	ND	ND
Arsenic	6.11E-02	ND	7.52E-04	6.18E-02
Barium	3.52E-03	2.31E-04	8.23E-04	4.57E-03
Beryllium	7.84E-04	ND	9.17E-05	8.76E-04
Calcium	ND	ND	ND	ND
Chromium	2.65E-03	ND	6.21E-05	2.72E-03
Cobalt	ND	ND	ND	ND
Copper	ND	ND	ND	ND
Iron	ND	ND	ND	ND
Lead	ND	ND	ND	ND
Magnesium	ND	ND	ND	ND
Manganese	1.10E-02	1.44E-02	3.21E-03	2.88E-02
Nickel	3.26E-03	NO	3.81E-04	3.64E-03
Potassium	ND	NO	ND	ND
Sodium	ND	ND	ND	ND
Vanadium	1.19E-02	ND	1.40E-02	2.59E-02
Zinc	8.44E-04	ND	3.29E-05	8.77E-04
TOTAL	9.51E-02	1.46E-02	1.93E-02	1.29E-01

NA/ND – Not applicable/Not determined