

APPENDIX D

HUMAN HEALTH RISK ASSESSMENT SUPPORTING INFORMATION AND CALCULATIONS

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D1 Introduction

This appendix to the RFI Report for the Former GM Delco Plant 5 site located in Kokomo, Indiana provides information and calculations that support the discussion of the human health risk assessment in Section 5. The methods used in the risk assessment are based on USEPA risk assessment guidance and are consistent with agreements between USEPA and ENVIRON on methodologies to streamline the risk assessment (ENVIRON 2009).

The information in this appendix is organized in sections that correspond to the potentially exposed populations discussed in Section 5.3 and summarized in Table 5.1:

- Routine Workers
- Maintenance Workers
- Construction Workers
- Trespassers
- Residents

The toxicity values used in the risk assessment were compiled from USEPA's hierarchy of sources (USEPA 2003). Route-to-route extrapolation of toxicity values was made following USEPA guidance (USEPA 2004b, 2009). The toxicity values and physical and chemical properties used in the risk calculations are provided in Attachment D1. The toxicity values used in this risk assessment are current as of August 2009.

D2 Risk Estimation Methodology

For the ingestion and dermal exposure routes, estimates of cancer risk and noncancer hazard quotients (HQ) are calculated as follows:

$$Risk = LADD \cdot SF$$

$$HQ = \frac{ADD}{RfD}$$

where *LADD* is the lifetime average daily dose, *SF* is the cancer slope factor, *ADD* is the average daily dose, and *RfD* is the reference dose.

For the inhalation route, the inhalation cancer risk and noncancer HQ are calculated using the constituent concentration in air (C_{air}), as follows:

$$Risk = C_{air} \cdot URF \cdot \frac{ET \cdot ED \cdot EF}{AT_c}$$

$$HQ = \frac{C_{air}}{RfC} \cdot \frac{ET \cdot ED \cdot EF}{AT_{nc}}$$

where *URF* is the inhalation unit risk, *RfC* is the reference concentration, *ET* is the exposure time, *EF* is the exposure frequency, *ED* is the exposure duration, *AT_c* is the averaging time for carcinogens and *AT_{nc}* is the averaging time for non-carcinogens. The exposure factors used in the risk calculations and their bases are provided in Attachment D1.

In this risk assessment, unit risks and unit HQs were calculated for a unit concentration (*C_{unit}*). *C_{unit}* is 1 mg/kg for soil and 1 mg/L for groundwater. Because risk estimates scale directly with the source concentration, these unit risks and unit HQs can be calculated once and combined with the concentrations for several areas to calculate risk estimates in each area. The unit risks and unit HQs for all routes (incidental ingestion, dermal contact, vapor inhalation, and/or particulate inhalation) are summed to produce a single unit risk and unit HQ for each constituent. The cancer risk and noncancer HQ for each constituent *i* is calculated as follows:

$$Risk_i = \frac{C_i \cdot UnitRisk_i}{C_{unit}}$$

$$HQ_i = \frac{C_i \cdot UnitHQ_i}{C_{unit}}$$

The cumulative cancer risk and noncancer HI for exposure to a combination of constituents were conservatively estimated according to USEPA guidance (1989), as follows:

$$Cumulative\ Risk = \sum_i Risk_i$$

$$HI = \sum_i HQ_i$$

In this risk assessment, upper-bound estimates of cumulative cancer risk and HI were calculated using the highest detected concentration of each constituent in surface or subsurface soil at each of the 174 boring locations at the Site where soil characterization data were collected. The procedure for ensuring conservative estimation of the highest concentrations in soil at each boring location is shown in Attachment D2. The use of unit risk and unit HQ to calculate the cumulative risk and HI is presented for one example location (SB-0634).

As discussed in Section 5 of the RFI Report, for a location with an upper-bound risk estimate that exceeds an acceptable limit for reasonable maximum exposure (RME) risk, a less high-biased estimate of the RME risk may be calculated by forming a more realistic hypothetical

exposure unit including that boring location. The area-weighted estimates are calculated as follows:

$$\text{area-weighted risk} = \frac{\sum_j \text{Risk}_j \cdot A_j}{\sum_j A_j}$$

$$\text{area-weighted HI} = \frac{\sum_j \text{HI}_j \cdot A_j}{\sum_j A_j}$$

where Risk_j and HI_j are the cumulative cancer risk and HI, respectively, for the soil boring location j , and A_j is the area of the portion of the Thiessen polygon for each boring j that falls within the exposure unit.

As discussed in Section 5 of the RFI Report, area-weighted soil lead concentrations were calculated around boring location SB-0506, as shown on Table 5.5 and Figure 5.3. The area-weighted soil lead concentrations are calculated using the following equation:

$$\text{area-weighted concentration} = \frac{\sum_j C_j \cdot A_j}{\sum_j A_j}$$

where C_j is the soil lead concentration for each boring location.

D3 Routine Workers

The risk assessment evaluated the potential exposure of routine workers to constituents in soil during outdoor activities and via volatilization into indoor and outdoor air from soil and groundwater. The computation of risk estimates associated with exposure to soil during outdoor activities is discussed in Section D3.1, the computation of risk estimates associated with exposure to soil and groundwater via volatilization into indoor air is discussed in Section D3.2, and the computation of risk estimates associated with exposure to soil and groundwater via volatilization into outdoor air is discussed in Section D3.3.

D3.1 Potential Exposure to Soil during Outdoor Activities

Routine workers could be exposed to outdoor surface soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during routine activities. Risk estimates are calculated using the approach discussed in Section D2. The receptor specific calculations are discussed in this Section.

The LADD for soil ingestion ($LADD_{ing}$) and soil dermal contact ($LADD_{derm}$) are calculated as follows using the exposures factors for routine worker soil contact shown in Attachment D1:

$$LADD_{ing} = C_{soil} \cdot \frac{IR \cdot FC \cdot EF \cdot ED}{BW \cdot AT_c}$$

$$LADD_{derm} = C_{soil} \cdot \frac{SA \cdot AF \cdot ABS_{derm} \cdot FC \cdot EF \cdot ED}{BW \cdot AT_c}$$

where C_{soil} is the constituent concentration in soil, IR is the ingestion rate, FC is the fraction contacted, EF is the exposure frequency, ED is the exposure duration, BW is the body weight, AT is the averaging time, SA is the surface area, AF is the adherence factor, and ABS_{derm} is the chemical-specific dermal absorption factor.

The ADDs for soil ingestion (ADD_{ing}) and soil dermal contact (ADD_{derm}) are calculated as follows:

$$ADD_{ing} = C_{soil} \cdot \frac{IR \cdot FC \cdot EF \cdot ED}{BW \cdot AT_{nc}}$$

$$ADD_{derm} = C_{soil} \cdot \frac{SA \cdot AF \cdot ABS_{derm} \cdot FC \cdot EF \cdot ED}{BW \cdot AT_{nc}}$$

For the inhalation route, the air concentrations of vapors and particulates from soil are calculated as follows:

$$C_{air} = J \cdot C / Q$$

where J is the normalized average vapor or particulate flux, and the C/Q term is a normalized air concentration.

The normalized average vapor flux J_v of a constituent from unsaturated soil is conservatively estimated using an unsteady-state model derived by Jury et al. (1983) that USEPA has adapted for screening-level analysis (USEPA 1996). This model conservatively assumes that volatile constituents are present in the soil to an infinite depth. The equation for J_v is given by:

$$J_v = 2 C_{s,0} \rho_b \sqrt{\frac{D_E}{\pi T}}$$

$$D_E = \frac{D_G H + D_L}{\rho_b K_d + \theta_w + \theta_a H}$$

$$D_G = D_{air} \cdot \frac{\theta_a^{10/3}}{n^2}$$

$$D_L = D_{water} \cdot \frac{\theta_w^{10/3}}{n^2}$$

Derivation of this equation and definition of the equation parameters can be found in the Jury et al. 1983 journal article and in USEPA guidance (1996), and therefore, is not repeated here. The calculation of J_v was performed using values for chemical-specific parameters and default soil parameters recommended in the USEPA guidance (2004a), based on the assumption that the soil type is silty clay, which is the predominant soil type in the vadose zone, with the site-specific average measured moisture content. The moisture content, calculated as the average of the mean moisture contents in soil samples from each AOI and depth interval on the Site, is 0.123 by weight or 0.170 by volume. The calculation of J_v is shown in Attachment D3.

At soil boring location SB-0775, where the source concentration of TCE was deeper than 10 ft and was vertically delineated by significantly lower concentrations of TCE and significantly lower PID readings from 0-10 ft bgs, the risk estimates for inhalation of TCE vapors were refined using a more realistic version of the Jury model (Jury et al 1990). This version assumes the contamination is initially present from a depth of 10 ft bgs to 20 ft bgs (the depth of the S1 unit), and that the top 10 ft of soil is initially uncontaminated. The vapor flux is calculated as follows:

$$J_v = \frac{C_{s,0}}{T} \left(2 \left(\exp\left(\frac{-Z_1^2}{4D_E T}\right) - \exp\left(\frac{-Z_2^2}{4D_E T}\right) \right) \sqrt{\frac{D_E T}{\pi}} - Z_1 \operatorname{erfc}\left(\frac{Z_1}{2\sqrt{D_E T}}\right) + Z_2 \operatorname{erfc}\left(\frac{Z_2}{2\sqrt{D_E T}}\right) \right)$$

where Z_1 is 10 ft, Z_2 is 20 ft, and other terms are as defined in Jury et al. (1983, 1990).

The risk estimates for all other chemicals and for the ingestion, dermal contact, and particulate emission routes are unchanged. The refined estimates of cumulative cancer risk and HI for SB-0775 are shown in Attachment D3.

The normalized average particulate flux $J_{10,w}$ of a constituent from soil is conservatively estimated using the “unlimited reservoir” model that USEPA has adapted for screening-level analysis of particulate emissions from soil (USEPA 1996). This model assumes that particulate emissions are created by wind erosion. The equation for $J_{10,w}$ is given by:

$$J_{10,w} = 0.036 \cdot (1 - G) \cdot \left(\frac{u_m}{u_t} \right)^3 \cdot F(x) \cdot \frac{g}{m^2 hr} \cdot \frac{hr}{60^2 \text{ sec}} \cdot \frac{10^{-3} kg}{g}$$

where G is fraction of ground/vegetative cover, u_m is the mean annual wind speed for the nearest weather station, located in Indianapolis, Indiana (NOAA 2004), u_t is the equivalent threshold wind speed at the anemometer height at which u_m was measured in Indianapolis, Indiana, and $F(x)$ is a function dependent on u_m/u_t . The details of this model can be found in USEPA guidance (1996), and are not repeated here. The default parameter values recommended in the 1996 USEPA guidance were used with site-specific wind speed in calculating $J_{10,w}$.

The C/Q term was estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), assuming a source area of 10.5 acres, the approximate area of the Site, and using the correlation coefficients for Chicago, Illinois, which is the closest city for which correlation coefficients are available. Derivation of the empirical correlation for C/Q can be found in Appendix D of the USEPA 2002 Supplemental Soil Screening Guidance, and therefore, is not repeated here.

The unit risk calculations, and the computation of cumulative cancer risk and HI for example location SB-0634, are shown in Attachment D3.

As discussed in Section 5.5.3.1, the maximum lead concentration within USEPA's recommended range of 750 mg/kg to 1750 mg/kg for assessing worker exposure to lead in soil at boring SB-0506, so an average lead concentration was calculated over a more realistic exposure unit. This area-weighted lead concentration was calculated for three different exposure areas, each consisting of SB-0506 and one of the three neighboring sub-areas. As shown in Attachment D3, each of these average concentrations was below 750 mg/kg, so any exposure unit containing any sub-area other than SB-0506 would have an average lead concentration below the range.

D3.2 Volatilization into Indoor Air

D3.2.1 Soil

For the vapor intrusion exposure pathway, estimates of cancer risk and noncancer HQ are calculated as follows:

$$Risk = C_{building} \cdot URF \cdot \frac{ET \cdot EF \cdot ED}{AT_c}$$

$$HQ = \frac{C_{building}}{RfC} \cdot \frac{ET \cdot EF \cdot ED}{AT_{nc}}$$

where $C_{building}$ is concentration in indoor air, C_{soil} is concentration in soil, and ET is a exposure time. For assessing routine worker exposures, chronic $RfCs$ were used. The indoor air

concentration is based on the modeling approach and input parameter values discussed below.

The indoor air concentrations are estimated using the following relationships described by Johnson and Ettinger (1991):

$$C_{building} = \alpha C_{source}$$

where $C_{building}$ is the indoor air concentration, α is an attenuation coefficient, and C_{source} is the source vapor concentration that is given by the following equation:

$$C_{source} = C_{soil} \left(\frac{K_d}{H} + \frac{\theta_w}{\rho_b H} + \frac{\theta_a}{\rho_b} \right)^{-1}$$

where K_d is the equilibrium-partitioning coefficient, H is the Henry's law constant, θ_w is the water-filled soil porosity, ρ_b is the soil bulk density, and θ_a is the air-filled soil porosity. In estimating RMEs via inhalation of vapors in indoor air, the vapor-phase concentration of PCBs estimated from its concentration in soil is capped at PCBs' vapor saturation concentration to avoid using concentrations that are not possible.

The attenuation coefficient, assuming that volatile constituents are present in the soil at constant concentrations, is given by the following equation:

$$\alpha = \frac{\left[\frac{D_T^{eff} A_B}{Q_{building} L_T} \right] \exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}} \right)}{\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}} \right) + \left[\frac{D_T^{eff} A_B}{Q_{building} L_T} \right] + \left[\frac{D_T^{eff} A_B}{Q_{soil} L_T} \right] \left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}} \right) - 1 \right]}$$

Derivation of this equation and definition of the equation parameters can be found in Johnson and Ettinger's 1991 journal article, and therefore, are not repeated here.

For vapor intrusion from soil, the soil properties of dry sand (USEPA 2004a) are used to calculate the effective diffusion coefficient term D_T^{eff} and crack soil diffusivity D^{crack} . This is conservative because sand contains more pore space for vapor transport than the native silty clay. These parameters are shown in Attachment D3.

The distance between contaminated soil and a building foundation L_T is assumed to be 0.15 m, which is a default value used by the Michigan Department of Environmental Quality (MDEQ 2002) in deriving the Michigan Part 201 generic vapor intrusion criteria for soil.

The remaining parameters in the equation for the attenuation coefficient α , which relate to building characteristics, are based on default values that MDEQ (2002) used in deriving the Michigan Part 201 generic vapor intrusion criteria for commercial/industrial sites. The MDEQ building characteristics are considered conservative because industrial buildings are generally larger in size than the commercial building assumed in the MDEQ guidance. These

assumptions are used because neither IDEM nor USEPA vapor intrusion guidance provide default assumptions for commercial/industrial building characteristics. The values used in the calculations are shown in Attachment D3; their bases are discussed in MDEQ guidance (1998).

The soil vapor intrusion calculations included a mass balance check to ensure that the assumed mass of a constituent infiltrating into the building over the assumed exposure period does not exceed an upper-bound estimate of the constituent's mass in the vadose zone underlying the building. The upper-bound estimate of the constituent's mass in the vadose zone was conservatively estimated using the highest concentration of the constituent from any depth at the location and assuming that this concentration represents the soil concentration from ground surface to the water table. The attenuation coefficient α_{ML} used in the mass balance check is given by the following equation:

$$\alpha_{ML} = \left(\frac{\rho_b \cdot K_d}{H} + \frac{\theta_w}{H} + \theta_a \right) \cdot \left(\frac{A_B \cdot \Delta H}{Q_{building} \cdot ED} \right)$$

where K_d is the equilibrium-partitioning coefficient, H is the Henry's law constant, θ_w is the water-filled soil porosity, ρ_b is the soil bulk density, θ_a is the air-filled soil porosity, A_B is the area of the building, ΔH is the contaminant thickness (conservatively assumed to be 5.8 meters, the thickness of the native soil above the S1 groundwater unit), $Q_{building}$ is the air flow rate through the building, and ED is exposure duration. These parameters are based on the soil properties of the native silty clay (USEPA 2004a) with the site-specific measured moisture content and organic carbon fraction. The remaining parameters used in calculating α_{ML} are the same as those used in calculating α .

The unit risk calculations, and the computation of cumulative cancer risk and HI for example location SB-0634, are shown in Attachment D3.

As discussed in Section 5.5.3.1, at 15 of the 16 sub-areas with potentially significant upper-bound risk estimates for vapor intrusion exposure (and many neighboring areas), the concentrations mainly contributing to the cumulative risk estimates were vertically delineated to below 10 ft bgs by significantly lower concentrations of TCE and/or significantly lower PID readings. Refined vapor intrusion risk estimates were calculated for these areas. These estimates are calculated in the same manner as discussed above, except the diffusion distance L_T is 2.9 m (the distance from the foundation slab to 10 ft bgs) and the contaminant thickness ΔH is 3.0 m (from 10 ft bgs to the groundwater at 20 ft bgs). The resulting cumulative cancer risk and HI estimates are shown in Attachment D3.

The 10 remaining sub-areas with potentially significant risk estimates for vapor intrusion exposure have areas ranging from 350 – 1,100 ft², which is an unrealistically small area for a commercial or industrial building in which workers would spend 8 hours per day for 250 days per year. Risk estimates are calculated for hypothetical industrial buildings with an area of approximately 370 m² (4000 ft² or 0.09 acre), the default area for commercial/industrial buildings (MDEQ 2002) used in the risk assessment. Ten hypothetical buildings are considered, each centered on the sub-area of one of the locations with potentially significant

risk estimates. The risk used for each sub-area is the risk based on a source of 10 feet for the sub-areas where concentrations were delineated above 10 feet, and the upper-bound risk for all other sub-areas. The risk estimates for these hypothetical buildings are shown on Table 5.4.

D3.2.2 Groundwater

The chemical-specific cancer risk and HQ estimates for vapor intrusion from groundwater were calculated in a manner analogous to the approach discussed in Section D2.2.1, except for the source vapor concentration and effective diffusion coefficient.

The source vapor concentration for a constituent in groundwater is calculated from the constituent's concentration in groundwater C_{gw} using Henry's law as follows:

$$C_{source} = C_{gw} \cdot H$$

where H is the Henry's law constant, adjusted to a subsurface temperature of 12.5 °C.

The effective diffusion coefficient term D_T^{eff} is calculated based on the soil properties of silty clay (USEPA 2004a) and the site-specific average measured moisture content, as discussed in Section D2.1.

The computation of the single-chemical cancer risk and HQ estimates for on-site areas, which were summed to estimate the cumulative cancer risk and HI, is shown in Attachment D3.

D3.3 Volatilization into Outdoor Air

D3.3.1 Groundwater

The concentration (C_{air}) of groundwater constituents that migrate through the vadose zone to outdoor air is calculated as follows:

$$C_{air} = J \cdot C / Q$$

where J is the vapor flux, and C/Q is the normalized, annual-average, air concentration at ground level (as discussed in Section D2.1).

The vapor flux J is calculated by using the steady-state diffusion equation in one-dimension with a constant source concentration and the maximum concentration gradient, as follows:

$$J = D_e \cdot \frac{C_v}{L}$$

where D_e is the effective diffusion coefficient of the chemical in the vapor phase, C_v is the vapor concentration in equilibrium with the groundwater concentration, and L is the distance

from groundwater to the ground surface. The equilibrium vapor concentration in the above equations is calculated using Henry's law as discussed in Section D2.2.2.

The effective diffusion coefficient for the vapor phase D_e is calculated as follows:

$$D_e = D_G + \frac{D_L}{H}$$

where D_G is the gas phase diffusion coefficient, D_L is the liquid phase diffusion coefficient, and H is the Henry's law constant (which is adjusted to a subsurface temperature of 12.5 °C). The gas and liquid-phase diffusion coefficients are calculated using the Millington-Quirk tortuosity model, as follows:

$$D_G = D_{air} \cdot \frac{\theta_a^{10/3}}{n^2}$$
$$D_L = D_{water} \cdot \frac{\theta_w^{10/3}}{n^2}$$

where D_{air} is the diffusion coefficient in air, D_{water} is the diffusion coefficient in water, θ_a is the air-filled soil porosity, θ_w is the water-filled soil porosity, and n is the total soil porosity. The values of the porosities used in these calculations are the same as those discussed in Section D2.1 for calculating vapor flux from the vadose zone soil.

The estimated outdoor air concentrations are used in the inhalation risk equations discussed in Section D2.1 to calculate single-chemical inhalation cancer risk and HQ. The computation of the single-chemical cancer risk and HQ estimates, which were summed to estimate the cumulative cancer risk and HI, is shown in Attachment D3.

D4 Maintenance Workers

The computation of risk estimates for potential exposure of maintenance workers to soil and groundwater are discussed in Sections D3.1 and D3.2, respectively.

D4.1 Exposure to Soil during Maintenance Activities

The computation of risk estimates for worker exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during maintenance activities is analogous to the computations discussed in Section D2.1 for routine workers, except the soil exposure factors for maintenance workers are used, as presented in Attachment D2, and the airborne dust concentrations are estimated as 50 ug/m³, as discussed in Section 5.3.5.

The unit risks for maintenance worker exposure to soil are summarized in Attachment D4. The computation of cumulative cancer risk and HI for example location SB-0634 is also shown in Attachment D4.

D4.2 Exposure to Groundwater during Maintenance Activities

As discussed in Section 5.5.3.2 of the RFI Report, maintenance workers could be exposed to groundwater via incidental ingestion, dermal contact, and inhalation of vapors during excavations that extend to the S1 groundwater unit or perched groundwater. The cancer risk and HQ estimates for the ingestion and inhalation routes are calculated using unit risk estimates in a manner analogous to the method discussed in Section D3.1, with exposure factors for maintenance workers presented in Attachment D1 and vapor flux discussed below.

The ADD and LADD for groundwater dermal contact are calculated as follows using the exposure factors for maintenance worker groundwater contact shown in Attachment D1:

$$LADD_{derm} = C_{gw} \cdot \frac{DA_{event} \cdot SA \cdot EV \cdot EF \cdot ED}{BW \cdot AT_c}$$

$$ADD_{derm} = C_{gw} \cdot \frac{DA_{event} \cdot SA \cdot EV \cdot EF \cdot ED}{BW \cdot AT_{nc}}$$

where C_{gw} is the constituent concentration in soil, DA_{event} is the absorbed dose per event, EV is the event frequency, and other parameters are as defined in Section D3.1.

The chemical-specific absorbed dose per event for inorganic chemicals is based on the permeability coefficients published by USEPA (USEPA 2004b). The dermal absorption factor for organic chemicals is estimated using a nonsteady-state approach (USEPA 2004b), which is more conservative than the steady-state approach (USEPA 1989), particularly for hydrophobic chemicals. The details of the nonsteady-state absorption are provided by USEPA (USEPA 2004b) and not repeated here.

The normalized vapor flux J of a chemical is estimated using an overall mass transfer coefficient that is recommended by USEPA (1995):

$$K_L = \left(\frac{1}{k_l} + \frac{1}{H k_g} \right)^{-1} \left(\frac{m}{10^2 cm} \right) \left(\frac{10^3 L}{m^3} \right)$$

where H is the Henry's law constant (which is adjusted to a subsurface temperature of 12.5 °C), and k_l and k_g are the liquid-phase and gas-phase mass transfer coefficients given by the following:

$$k_l = \left(\frac{MW_o}{MW} \right)^{0.5} \left(\frac{T}{298K} \right) k_{l,o}$$

$$k_g = \left(\frac{MW_w}{MW} \right)^{0.335} \left(\frac{T}{298K} \right)^{1.005} k_{g,w}$$

where MW , MW_o , and MW_w are the molecular weights of the chemical, oxygen, and water, T is the absolute temperature of water, $k_{l,o}$ is the liquid-phase mass transfer coefficient for oxygen (0.002 cm/s), and $k_{g,w}$ is the gas-phase mass transfer coefficient for water vapor (0.833 cm/s).

The unit risks for maintenance worker exposure to groundwater are summarized in Attachment D4. The computation of the single-chemical cancer risk and HQ estimates for on- and off-site areas, which were summed to estimate the cumulative cancer risk and HI, is shown in Attachment D4.

D5 Construction Workers

The computation of risk estimates for potential exposure of construction workers to soil and groundwater are discussed in Sections D4.1 and D4.2, respectively.

D5.1 Exposure to Soil during Construction Activities

The computation of risk estimates for worker exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during construction activities is analogous to the computations discussed in Section D2.1 for routine workers, except the soil exposure factors for construction workers are used, as presented in Attachment D1, subchronic noncancer toxicity values are used, and the airborne dust concentrations are estimated as 50 ug/m³, as discussed in Section 5.3.5.

The unit risks for construction worker exposure to soil are summarized in Attachment D5. The computation of cumulative cancer risk and HI for example location SB-0634 is also shown in Attachment D5.

As discussed in Section 5.5.4.2, per request by USEPA Region 5, calculations were performed using a soil ingestion rate of 330 mg/day as a sensitivity analysis. Cumulative cancer risk and HI estimates that were calculated using a soil ingestion rate of 330 mg/day are included in Attachment D5.

Upper-bound HI estimates for the boring locations SB-0775 and SB-0757 exceeded USEPA limits, and HI estimates were calculated for a number of hypothetical exposure units around these areas as discussed in Section 5.5.3.3,. These exposure units are centered on the sub-areas of SB-0775 and SB-0757 and extend to fixed distances (ranging from 10 feet to 750 feet) in all directions, but not beyond the Facility boundary. HI estimates for these hypothetical exposure units (including the sensitivity analysis with a soil ingestion rate of 330 mg/day) are shown in Attachment D5.

D5.2 Exposure to Groundwater during Construction Activities

As discussed in Section 5.5.3.3 of the RFI Report, construction workers could be exposed to groundwater via incidental ingestion, dermal contact, and inhalation of vapors during excavations that extend to the S1 groundwater unit or perched groundwater.

Construction worker exposures to groundwater in this risk assessment are evaluated using exposure estimates for maintenance workers, as discussed in Section D3.2. Use of an indirect evaluation streamlines the risk assessment and is realistic because construction worker exposures to groundwater would be no greater than maintenance worker exposures.

D6 Trespassers

Potential exposure of trespassers is possible currently and in the future. While on-site, trespassers could come into contact with soil in unpaved areas. Potential routes of exposure would include incidental ingestion, dermal contact, and inhalation of soil vapor and airborne particulates. Trespassers also could be exposed via inhalation of constituents from the subsurface soil or shallow groundwater if the constituents were to volatilize and migrate into outdoor air.

Trespasser exposures in this risk assessment are indirectly and conservatively evaluated using exposure estimates for routine workers, as discussed in Section D2. Use of an indirect evaluation streamlines the risk assessment and is conservative because trespasser exposures to soil and groundwater would be much lower than routine worker exposures to these media.

D7 Residents

The risk assessment evaluated the potential exposure of residents to constituents in soil that are transported off-site by wind erosion or vapors that migrate off-site, and to constituents in groundwater and via volatilization into indoor and outdoor air. The computation of risk estimates associated with exposures to soil during outdoor activities is discussed in Section D6.1 and the computation of risk estimates associated with exposure to groundwater via volatilization into indoor air and outdoor air is discussed in Sections D6.2 and D6.3, respectively.

D7.1 Exposure to Soil during Outdoor Activities

The computation of upper-bound risk estimates for residential exposure to on-site soil via inhalation of vapors and particulates is analogous to the computations discussed in Section D2.1, except for the soil exposure factors for residents are used, as presented in Attachment D1. As discussed in Section 5.3.3.5, these risk estimates are highly conservative as they assume that for each sub-area, the maximum soil concentrations are assumed to be initially present over the entire 10.5-acre site from the surface to an infinite depth, and that the resident off-site breathes the same concentration as the routine worker on-site.

The locations with potentially significant risk estimates based on the upper-bound risk calculations all had TCE concentrations delineated to below 10 ft bgs. The refined risk estimates for these locations used the version of the Jury model with a buried source layer from 10 to 20 ft bgs, as discussed in Section D2.1. The normalized air concentration C/Q for the refined estimates is estimated using USEPA's SCREEN3 air dispersion model (USEPA

1995b), using a square source area of 10.5 acres and a receptor at ground level 20 meters downwind of the source area. This distance, the approximate width of Washington Street, is the shortest distance between the Facility boundary and any residential property. The normalized air concentration 20 meters from the source boundary is approximately 45% lower than the normalized air concentration on-site, as shown in Attachment D6.

D7.2 Exposure to Groundwater via Volatilization into Indoor Air

The chemical-specific cancer risk and HQ estimates for evaluating vapor intrusion from groundwater into off-site residential buildings were calculated in a manner analogous to the approach discussed in Section D2.2.2 except for the exposure factors and building parameters. The exposure factors for residents, as presented in Attachment D1, and the MDEQ default parameters for residential slab-on-grade buildings rather than those for industrial buildings (MDEQ 1998) are used.

The groundwater unit risk calculations for residents are shown in Attachment D6. The computation of the single-chemical cancer risk and HQ estimates for off-site areas, which were summed to estimate the cumulative cancer risk and HI, is shown in Attachment D6.

D7.3 Exposure to Groundwater via Volatilization into Outdoor Air

The chemical-specific cancer risk and HQ estimates for evaluating volatilization from groundwater into outdoor air were calculated in a manner analogous to the approach discussed in D2.3.1, except the exposure factors for residents are used, as presented in Attachment D1. The computation of the single-chemical cancer risk and HQ estimates for off-site areas, which were summed to estimate the cumulative cancer risk and HI, is shown in Attachment D6.

D8 References

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Attachment D1
Toxicity Values, Physical and Chemical Properties,
and Exposure Factors

Attachment D1 Table of Contents

Toxicity Values

References and Notes for Toxicity Values

Physical and Chemical Properties

References and Notes for Physical and Chemical Properties

Temperature-Adjusted Henry's Law Constant

High-End Exposure Factors

**Attachment D1: References and Notes for Toxicity Values
Former Delco Plant 5, Kokomo, Indiana**

References:

1	USEPA. Integrated Risk Information System (IRIS). On-line database.
2	USEPA. 1997. Health Effects Assessment Summary Tables (HEAST). FY-1997 Update. EPA 540/R-97-036. July.
10	USEPA. 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/2-93/089. July.
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52	USEPA. 57 FR 31776, July 17, 1992. National Primary Drinking Water Regulations -- Synthetic Organic Chemicals and Inorganic Chemicals; National Primary Drinking Water Regulations Implementation. Final Rule.
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78	USEPA. NCEA. 1999. Risk Assessment Paper for: The Derivation of a Provisional Oral Subchronic RfD for Carbon Tetrachloride [CASRN 56-23-5]. June 14.
100	USEPA. Region 8. 2002. Derivation of Acute and Subchronic Oral Reference Doses for Inorganic Arsenic. August.
109	USEPA. NCEA. 1997. Risk Assessment Issue Paper for: Derivation of a Provisional RfC for Tetrachloroethylene (perchloroethylene, PERC) [CASRN 127-18-4]. June 20.
117	USEPA. NCEA. 2003. Risk Assessment Issue Paper for: Derivation of Provisional Subchronic and Chronic RfCs for Chloroform [CASRN 67-66-3]. January 23.
122	USEPA. NCEA. 1998. Risk Assessment Issue Paper for: Derivation of Provisional Subchronic RfC for Cadmium [CASRN 7440-43-9]. June 14.
126	Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) Database.
129	ATSDR. 2008. Minimal Risk Levels. December.
131	CalEPA. ARB. 2009. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. February 9.
132	USEPA. NCEA, Superfund Technical Support Center. 1994. Risk Assessment Issue Paper: Status of Inhalation Cancer Unit Risk for Benzo[a]pyrene. December.

**Attachment D1: References and Notes for Toxicity Values
Former Delco Plant 5, Kokomo, Indiana**

Notes:

2	USEPA adopted chronic value as subchronic value.
3	HEAST Alternate Method.
5	Based on potency relative to Benzo(a)pyrene [CASRN 50-32-8], as described in the indicated reference.
6	Under review, according to IRIS.
8	ENVIRON used Chromium VI [CASRN 18540-29-9] value from the indicated reference as a surrogate.
18	Not verifiable, according to IRIS.
20	ENVIRON used Pyrene [CASRN 129-00-0] value from the indicated reference as a surrogate.
30	Upper-bound slope factor.
32	High risk & persistence tier for: food chain exposure; sediment/soil ingestion; dust/aerosol inhalation; dermal exposure, if an absorption factor is applied; presence of dioxin-like, tumor-promoting/persistent congeners; and all early life exposures.
45	ENVIRON derived inhalation URF from Inhalation Slope Factor value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
49	ENVIRON derived oral RfD from adverse health effect level value presented in the indicated reference.
51	ENVIRON used Mercuric Chloride [CASRN 7487-94-7] value from the indicated reference as a surrogate.
59	This RfD is for particulates. The RfD for chromic acid mists and dissolved Chromium VI aerosols is 0.000008 mg/m3.
60	IRIS provides a range of 2.2E-6 to 7.8E-6 (ug/m3)-1 as the inhalation URF for Benzene.
62	ENVIRON used chronic value as a surrogate for the subchronic value.
68	IRIS provides a range of 1.5E-2 to 5.5E-2 (mg/kg/d)-1 as the oral Slope Factor for Benzene.
72	ENVIRON used Aroclor 1254 [CASRN 11097-69-1] value from the indicated reference as a surrogate for PCBs [CASRN 1336-36-3].
78	IRIS recommends an oral Slope Factor for Vinyl Chloride of 7.2E-1 (mg/kg/d)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 1.4 (mg/kg/d)-1 is recommended to account for continuous exposure from birth.
79	IRIS recommends an inhalation URF for Vinyl Chloride of 4.4E-6 (ug/m3)-1 to account for continuous lifetime exposure during adulthood; a twofold increase to 8.8E-6 (ug/m3)-1 is recommended to account for continuous exposure from birth.
87	ENVIRON removed the uncertainty factor (UF) applied by USEPA to account for subchronic to chronic exposure.
90	Inadequate data exist to derive a toxicity value, according to the indicated reference.
93	Personal communication with NCEA indicated the HEAST LOAEL of 1000 mg and the subchronic RfD of 7E-1mg/kg-day both appear to be incorrect and recommended using the IRIS RfD of 3E-1 as the subchronic RfD.
94	Two provisional RfC values are presented in the indicated reference (4E-1 and 6E-1 mg/m3). Personal communication with NCEA indicated that either RfC is acceptable and the RfC should be chosen on a case-by-case basis.
95	This RfD is used to evaluate dietary exposures. A RfD of 0.0005 mg/kg/day is used to evaluate water ingestion exposures.
97	ENVIRON used withdrawn source.
98	Route-to-route extrapolation is not appropriate, according to the indicated reference.
102	USEPA applied a dose equivalency factor of 4.5 to the chronic RfC to derive the subchronic RfC.
110	The value is based on discussion in the indicated reference regarding the principal study USEPA used in extrapolating from subchronic to chronic.
111	Value as published is an MRL in the indicated reference.
116	ENVIRON used subchronic value as a surrogate for the chronic value.
118	Alternate subchronic RfC of 0.1 mg/m3 is also provided in the reference.
133	ENVIRON used the value for cis-1,2-Dichloroethene [CASRN 156-59-2] from the indicated reference as a surrogate.
140	Value based on cobalt sulfate (soluble).

Attachment D1: References and Notes For Physical and Chemical Properties Former Delco Plant 5, Kokomo, Indiana

References:

1	USEPA. 1992. Handbook of RCRA Ground-Water Monitoring Constituents. Chemical and Physical Properties (40 CFR Part 264, Appendix IX). EPA-530-R-92-022. September.
35	Baes III, C.F., R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Released Radionuclides through Agriculture (AD-89-T-2-A-106) (formerly EPA078-D-X0304), Oak Ridge National Laboratory, ORNL-5786.
38	USEPA. Region IV. 1994. Comments to TGPL on Draft HSL Screening Methodology document. December 27.
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40	Research Triangle Institute, Center for Environmental Analysis. 1995. Supplemental Technical Support Document for Hazardous Waste Identification Rule: Risk Assessment for Human and Ecological Receptors--Volume 1, TABLE A-1. November 1995.
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46	Lide et al. 1991. CRC Handbook of Chemistry and Physics.
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68	PHYSPROP data base. Syracuse Research Corporation.
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70	USEPA. 2003. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. June 19.
71	USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December.

**Attachment D1: References and Notes For Physical and Chemical Properties
Former Delco Plant 5, Kokomo, Indiana**

Notes:

43	The value is associated with pH 6.8.
45	ENVIRON used the value for Chromium VI [CASRN 18540-29-9] presented in indicated reference as a surrogate.
48	Not Available or Not Applicable
60	Hydrolyzes
61	Insoluble
82	ENVIRON used Equation (70) from Reference 44 to calculate Koc value using Log Kow value from indicated reference.
92	Indicated source cites CHEMFATE.
93	Indicated source cites FATE.
94	Indicated source cites LIVECHEM.
110	ENVIRON used the value for 4-Chlorobiphenyl [CASRN 2051-62-9] from the indicated reference as a surrogate.
111	ENVIRON used Equation (71) from Reference 44 to calculate Koc value using Log Kow value from indicated reference.
114	A value of 1 is conservatively used because EPA guidance does not provide a default value.
115	ENVIRON calculated Kp value using equation 3.8 (p.3-7) in reference 62 with log Kow from the indicated reference and the MW presented in table.
116	ENVIRON used the value for Aroclor-1254 [CASRN 11097-69-1] from the indicated reference as a surrogate.
117	ENVIRON derived the FA based on Exhibit A-4 in the indicated reference.
118	From the 2001 Fact Sheet, "Correcting the Henry's Law Constant for Soil Temperature".
123	Value has been assigned a default reference temperature.
133	ENVIRON used the value for cis-1,2-Dichloroethene [CASRN 156-59-2] from the indicated reference as a surrogate.

**Attachment D1: Physical and Chemical Information - Temperature-Adjusted Henry's Law Constant
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	$\Delta H_{v,b}$ (cal/mol)	T _C (K)	T _B (K)	H Ref Temp (K)	Source H (unitless)	T _B /T _C Ratio	Exponent n	$\Delta H_{v,ts}$ (cal/mol)	Henry Extrapolation Multiplier	Adjusted H (unitless)
VOC	Acetone	67-64-1	6.96E+03	5.08E+02	3.29E+02	298.15	1.59E-03	6.48E-01	3.63E-01	7.53E+03	5.99E-01	9.52E-04
VOC	Benzene	71-43-2	7.34E+03	5.62E+02	3.53E+02	298.15	2.28E-01	6.28E-01	3.49E-01	8.10E+03	5.74E-01	1.31E-01
VOC	Bromodichloromethane	75-27-4	7.80E+03	5.86E+02	3.63E+02	298.15	6.56E-02	6.20E-01	3.43E-01	8.64E+03	5.51E-01	3.62E-02
VOC	2-Butanone	78-93-3	7.48E+03	5.37E+02	3.53E+02	293.15	2.28E-03	6.57E-01	3.70E-01	8.39E+03	7.03E-01	1.61E-03
VOC	Carbon Disulfide	75-15-0	6.39E+03	5.52E+02	3.19E+02	298.15	1.24E+00	5.78E-01	3.12E-01	6.66E+03	6.38E-01	7.91E-01
VOC	Carbon Tetrachloride	56-23-5	7.13E+03	5.57E+02	3.50E+02	298.15	1.25E+00	6.29E-01	3.49E-01	7.83E+03	5.85E-01	7.32E-01
VOC	Chlorobenzene	108-90-7	8.41E+03	6.32E+02	4.05E+02	298.15	1.52E-01	6.40E-01	3.58E-01	9.78E+03	5.07E-01	7.71E-02
VOC	Chloroethane	75-00-3	5.88E+03	4.60E+02	2.85E+02	293.15	3.60E-01	6.20E-01	3.43E-01	5.88E+03	7.88E-01	2.84E-01
VOC	Chloroform	67-66-3	6.99E+03	5.36E+02	3.34E+02	298.15	1.50E-01	6.23E-01	3.45E-01	7.53E+03	5.99E-01	8.98E-02
VOC	Chloromethane	74-87-3	5.11E+03	4.16E+02	2.49E+02	293.15	3.60E-01	5.98E-01	3.27E-01	4.72E+03	8.30E-01	2.99E-01
VOC	2-Chlorotoluene	95-49-8				298.15	1.46E-01					8.58E-02
VOC	Cumene	98-82-8	1.03E+04	6.31E+02	4.26E+02	298.15	5.32E-01	6.74E-01	3.83E-01	1.26E+04	4.11E-01	2.19E-01
VOC	Cyclohexane	110-82-7				293.15	7.97E+00					4.69E+00
VOC	Dibromochloromethane	124-48-1	5.90E+03	6.78E+02	4.16E+02	298.15	3.21E-02	6.14E-01	3.38E-01	6.76E+03	6.33E-01	2.03E-02
VOC	1,1-Dichloroethane	75-34-3	6.90E+03	5.23E+02	3.31E+02	298.15	2.30E-01	6.32E-01	3.52E-01	7.42E+03	6.03E-01	1.39E-01
VOC	1,1-Dichloroethene	75-35-4	6.25E+03	5.76E+02	3.05E+02	298.15	1.07E+00	5.29E-01	3.00E-01	6.38E+03	6.52E-01	6.97E-01
VOC	1,2-Dichloroethene (total)	540-59-0	7.19E+03	5.44E+02	3.34E+02	293.15	1.67E-01	6.13E-01	3.38E-01	7.71E+03	7.25E-01	1.21E-01
VOC	cis-1,2-Dichloroethene	156-59-2	7.19E+03	5.44E+02	3.34E+02	298.15	1.67E-01	6.13E-01	3.38E-01	7.71E+03	5.91E-01	9.86E-02
VOC	trans-1,2-Dichloroethene	156-60-5	6.72E+03	5.17E+02	3.21E+02	298.15	3.85E-01	6.21E-01	3.44E-01	7.11E+03	6.17E-01	2.38E-01
VOC	Ethyl Benzene	100-41-4	8.50E+03	6.17E+02	4.09E+02	298.15	3.23E-01	6.63E-01	3.75E-01	1.01E+04	4.94E-01	1.60E-01
VOC	Methyl Acetate	79-20-9	7.26E+03	5.07E+02	3.30E+02	298.15	3.71E-03	6.51E-01	3.66E-01	7.88E+03	5.83E-01	2.16E-03
VOC	4-Methyl-2-pentanone	108-10-1	8.24E+03	5.71E+02	3.90E+02	293.15	5.64E-03	6.82E-01	3.89E-01	9.83E+03	6.59E-01	3.72E-03
VOC	Methylcyclohexane	108-87-2	7.47E+03	5.72E+02	3.74E+02	298.15	1.76E+01	6.53E-01	3.68E-01	8.56E+03	5.55E-01	9.74E+00
VOC	Methylene Chloride	75-09-2	6.71E+03	5.10E+02	3.13E+02	298.15	8.98E-02	6.14E-01	3.38E-01	7.01E+03	6.22E-01	5.59E-02
VOC	Styrene	100-42-5	8.74E+03	6.36E+02	4.18E+02	298.15	1.13E-01	6.58E-01	3.71E-01	1.04E+04	4.83E-01	5.46E-02
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.00E+03	6.61E+02	4.20E+02	298.15	1.41E-02	6.35E-01	3.54E-01	1.05E+04	4.80E-01	6.77E-03
VOC	Tetrachloroethene	127-18-4	8.29E+03	6.20E+02	3.94E+02	298.15	7.54E-01	6.36E-01	3.55E-01	9.53E+03	5.16E-01	3.89E-01
VOC	Toluene	108-88-3	7.93E+03	5.92E+02	3.84E+02	298.15	2.72E-01	6.49E-01	3.64E-01	9.13E+03	5.32E-01	1.45E-01
VOC	1,1,1-Trichloroethane	71-55-6	7.14E+03	5.45E+02	3.47E+02	298.15	7.05E-01	6.37E-01	3.55E-01	7.86E+03	5.84E-01	4.12E-01
VOC	1,1,2-Trichloroethane	79-00-5	8.32E+03	6.02E+02	3.86E+02	298.15	3.74E-02	6.41E-01	3.59E-01	9.54E+03	5.16E-01	1.93E-02
VOC	Trichloroethene	79-01-6	7.51E+03	5.44E+02	3.60E+02	298.15	4.22E-01	6.62E-01	3.74E-01	8.53E+03	5.56E-01	2.35E-01
VOC	Trichlorofluoromethane	75-69-4	6.00E+03	4.71E+02	2.97E+02	293.15	3.96E+00	6.30E-01	3.50E-01	6.13E+03	7.79E-01	3.09E+00
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.46E+03	4.87E+02	3.21E+02	293.15	1.97E+01	6.58E-01	3.71E-01	6.94E+03	7.51E-01	1.48E+01
VOC	1,2,4-Trimethylbenzene	95-63-6	9.37E+03	6.49E+02	4.42E+02	298.15	2.52E-01	6.81E-01	3.88E-01	1.17E+04	4.41E-01	1.11E-01
VOC	Vinyl Chloride	75-01-4	5.25E+03	4.32E+02	2.59E+02	298.15	1.11E+00	6.00E-01	3.28E-01	4.97E+03	7.23E-01	8.02E-01
VOC	Xylenes (total)	1330-20-7	8.57E+03	6.21E+02	4.14E+02	298.15	2.76E-01	6.66E-01	3.77E-01	1.03E+04	4.89E-01	1.35E-01
SVOC	Acenaphthene	83-32-9	1.22E+04	8.03E+02	5.51E+02	298.15	6.36E-03	6.85E-01	3.91E-01	1.61E+04	3.18E-01	2.02E-03
SVOC	Benzo(a)anthracene	56-55-3	1.60E+04	1.00E+03	7.08E+02	298.15	1.37E-04	7.05E-01	4.06E-01	2.29E+04	1.92E-01	2.63E-05
SVOC	Benzo(a)pyrene	50-32-8	1.90E+04	9.69E+02	7.16E+02	298.15	4.63E-05	7.39E-01	4.10E-01	2.85E+04	1.27E-01	5.87E-06
SVOC	Benzo(b)fluoranthene	205-99-2	1.70E+04	9.69E+02	7.16E+02	298.15	4.55E-03	7.39E-01	4.10E-01	2.55E+04	1.58E-01	7.20E-04
SVOC	Benzo(g,h,i)perylene	191-24-2	1.90E+04	9.69E+02	7.16E+02	293.15	5.76E-06	7.39E-01	4.10E-01	2.85E+04	2.84E-01	1.63E-06
SVOC	Benzo(k)fluoranthene	207-08-9	1.80E+04	1.02E+03	7.53E+02	298.15	3.40E-05	7.39E-01	4.10E-01	2.73E+04	1.39E-01	4.74E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.60E+04	8.06E+02	6.57E+02	298.15	4.18E-06	8.15E-01	4.10E-01	2.67E+04	1.45E-01	6.06E-07
SVOC	Butylbenzylphthalate	85-68-7	1.40E+04	8.40E+02	6.61E+02	298.15	5.17E-05	7.87E-01	4.10E-01	2.22E+04	2.02E-01	1.04E-05

**Attachment D1: Physical and Chemical Information - Temperature-Adjusted Henry's Law Constant
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	$\Delta H_{v,b}$ (cal/mol)	T_C (K)	T_B (K)	H Ref Temp (K)	Source H (unitless)	T_B/T_C Ratio	Exponent n	$\Delta H_{v,ts}$ (cal/mol)	Henry Extrapolation Multiplier	Adjusted H (unitless)
SVOC	Chrysene	218-01-9	1.65E+04	9.79E+02	7.14E+02	298.15	3.88E-03	7.29E-01	4.10E-01	2.44E+04	1.72E-01	6.67E-04
SVOC	Dibenz(a,h)anthracene	53-70-3	3.00E+04	9.90E+02	7.43E+02	298.15	6.03E-07	7.50E-01	4.10E-01	4.61E+04	3.47E-02	2.09E-08
SVOC	Dibenzofuran	132-64-9	6.64E+04	8.24E+02	5.60E+02	293.15	5.15E-04	6.80E-01	3.87E-01	8.75E+04	1.99E-02	1.02E-05
SVOC	Di-n-butylphthalate	84-74-2	1.48E+04	7.99E+02	6.13E+02	298.15	3.85E-08	7.68E-01	4.10E-01	2.24E+04	2.00E-01	7.69E-09
SVOC	Di-n-octylphthalate	117-84-0	1.40E+04	8.62E+02	7.04E+02	298.15	2.74E-03	8.17E-01	4.10E-01	2.38E+04	1.80E-01	4.93E-04
SVOC	Fluoranthene	206-44-0	1.38E+04	9.05E+02	6.56E+02	298.15	6.60E-04	7.25E-01	4.10E-01	2.01E+04	2.37E-01	1.56E-04
SVOC	Fluorene	86-73-7	1.27E+04	8.70E+02	5.70E+02	298.15	2.61E-03	6.56E-01	3.69E-01	1.62E+04	3.15E-01	8.23E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.90E+04	1.08E+03	8.09E+02	298.15	6.56E-05	7.50E-01	4.10E-01	2.96E+04	1.17E-01	7.70E-06
SVOC	2-Methylnaphthalene	91-57-6	1.26E+04	7.61E+02	5.14E+02	293.15	2.12E-02	6.76E-01	3.84E-01	1.62E+04	4.94E-01	1.05E-02
SVOC	Naphthalene	91-20-3	1.04E+04	7.48E+02	4.91E+02	298.15	1.98E-02	6.56E-01	3.70E-01	1.29E+04	4.03E-01	7.98E-03
SVOC	Phenanthrene	85-01-8				293.15	9.52E-04					1.87E-04
SVOC	Phenol	108-95-2	1.09E+04	6.94E+02	4.55E+02	298.15	1.63E-05	6.55E-01	3.69E-01	1.33E+04	3.91E-01	6.37E-06
SVOC	Pyrene	129-00-0	1.44E+04	9.36E+02	6.68E+02	298.15	4.51E-04	7.14E-01	4.10E-01	2.07E+04	2.27E-01	1.02E-04
PCB	PCBs (total)	1336-36-3				293.15	8.17E-02					1.60E-02
INORG	Arsenic	7440-38-2				293.15						
INORG	Barium	7440-39-3				293.15						
INORG	Beryllium	7440-41-7				293.15						
INORG	Cadmium	7440-43-9				293.15						
INORG	Chromium (total)	7440-47-3				293.15						
INORG	Cobalt	7440-48-4				293.15						
INORG	Copper	7440-50-8				293.15						
INORG	Cyanide (total)	57-12-5				293.15						
INORG	Manganese	7439-96-5				293.15						
INORG	Mercury	7439-97-6	1.41E+04	1.75E+03	6.30E+02	293.15	2.90E-01	0.359931	0.3	1.53E+04	5.15E-01	1.49E-01
INORG	Nickel	7440-02-0				293.15						
INORG	Selenium	7782-49-2				293.15						
INORG	Thallium	7440-28-0				293.15						
INORG	Vanadium	7440-62-2				293.15						
INORG	Zinc	7440-66-6				293.15						
	Subsurface temperature:	12.5 °C										
	Subsurface temperature:	285.65 K										
	Gas constant	1.9872 cal/mol K										

Attachment D1: High-End Exposure Factors Former Delco Plant 5, Kokomo, Indiana							
		Resident		Routine Worker		Maintenance Worker	Construction Worker
Soil Ingestion							
Ingestion Rate (mg/d)	IR			50	b	100	e
Fraction Contacted (unitless)	FC			1.0		1.0	
Exposure Frequency (d/yr)	EF			250	b	30	e
Exposure Duration (yr)	ED			25	b	10	e
Body Weight (kg-bw)	BW			70	a	70	a
Averaging Time, carc (d)	AT _c			25,550	a	25,550	a
Averaging Time, noncarc (d)	AT _{nc}			9,125	a	3,650	a
Soil Dermal Contact							
Adherence Factor (mg/cm ²)	AD			0.2	c	0.2	c
Skin Surface Area (cm ² /d)	SA			3,300	c	3,300	c
Fraction Contacted (unitless)	FC			1.0		1.0	
Exposure Frequency (d/yr)	EF			250	b	30	e
Exposure Duration (yr)	ED			25	b	10	e
Body Weight (kg-bw)	BW			70	b	70	a
Averaging Time, carc (d)	AT _c			25,550	a	25,550	a
Averaging Time, noncarc (d)	AT _{nc}			9,125	a	3,650	a
Indoor or Outdoor Air Inhalation							
Exposure Frequency (d/yr)	EF	350	b	250	b	30	e
Exposure Duration (yr)	ED	30	b	25	b	10	e
Exposure Time (h/d)	ET	24	d	8	d	8	d
Averaging Time, carc (h)	AT _c	613,200	a	613,200	a	613,200	a
Averaging Time, noncarc (h)	AT _{nc}	210,240	a	219,000	a	87,600	a
Incidental Groundwater Ingestion							
Drinking Rate (L/hr per event)	DR					0.005	e
Exposure Time (h)	ET					2	e
Exposure Frequency (d/yr)	EF					5	e
Exposure Duration (yr)	ED					10	e
Body Weight (kg-bw)	BW					70	a
Averaging Time, carc (d)	AT _c					25,550	a
Averaging Time, noncarc (d)	AT _{nc}					3,650	a
Groundwater Dermal Contact							
Event Time (hr)	t					2	e
Skin Surface Area (cm ²)	SA					3,300	c
Events per Day (event/d)	EV					1	e
Exposure Frequency (d/yr)	EF					5	e
Exposure Duration (yr)	ED					10	e
Body Weight (kg)	BW					70	a
Averaging Time, cancer (days)	AT _c					25,550	a
Averaging Time, noncancer (days)	AT _{nc}					3,650	a
Inhalation of Vapors from Exposed Groundwater in Excavations							
Exposure Frequency (d/yr)	EF					5	e
Exposure Duration (yr)	ED					10	e
Exposure Time (h/d)	ET					8	d
Averaging Time, carc (h)	AT _c					613,200	a
Averaging Time, noncarc (h)	AT _{nc}					87,600	a
References:							
a. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) Interim Final (EPA 1989)							
b. Standard default exposure factors. OSWER Directive 9285.6-03 (EPA 1991)							
c. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual: Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Final (EPA 2001)							
d. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual: Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA 2009)							
e. GM Responses to EPA Region 5 July 29, 2008 Recommendations on GM Streamlined Risk Assessment Methodology. April.							

Attachment D2
Single-Point Hypothetical Exposure Unit Approach
for Soil Risk Estimation

Attachment D2

Single-Point Hypothetical Exposure Unit Approach for Soil Risk Estimation

This attachment describes the methodology for calculating the single-point hypothetical exposure unit (“point-by-point”) upper-bound cumulative cancer and noncancer risk estimates for exposure to soil.

1. Identify key chemicals. Calculate for each soil exposure scenario the site-related cancer risk and HQ for all chemicals detected in soil at the Site using the highest site-related concentrations detected in soil at any soil boring location and at any depth, and the unit risks for soil exposure presented in Attachments D3 through D6. From the calculations for each scenario, rank the estimates of cancer risk from low to high and sum the lowest estimates until the sum reaches 10^{-5} . Similarly, sum the lowest HQs until the sum reaches 0.1. The chemicals not included in any of the sums for any of the exposure scenarios are designated as key chemicals. A list of the key chemicals identified for this site is shown in the table below.
2. Tessellate the Site with Thiessen polygons for each key chemical. The concentrations of the key chemicals at any depth and in surface soil were separately interpolated across the entire Site by using the nearest neighbor method (i.e., the concentration at an unsampled location is assigned the concentration from the nearest sampled location). The results of this interpolation can be represented as Thiessen polygon tessellations.
3. Determine the exposure point concentrations in surface soil for each location. If soil samples were collected from the surface at a particular location, the highest detected concentrations were used. If a chemical was not detected in the surface soil at a particular location but was detected elsewhere at the Site, half the sample quantitation limit (SQL) was used as a surrogate for that location. If a key chemical was not analyzed in the surface soil at a particular location, the nearest surface concentration (which can be identified from the Thiessen polygon tessellations) was used as a surrogate for that location. If a surface sample was not collected at a particular location, the concentration of each key chemical from the nearest surface sample was used as a surrogate for that location.
4. Determine the exposure point concentrations at any depth for each location. If soil samples were collected from multiple depths at a particular location, the highest concentration detected at any depth was used. If a chemical was not detected at a particular location but was detected elsewhere at the Site, half the sample quantitation limit (SQL) was used as a surrogate for that location. If a key chemical was not analyzed at a particular location, the nearest detected concentration (which can be identified from the Thiessen polygon tessellations) was used as a surrogate for that location. If no subsurface sample was collected at a particular location, the concentration of each key chemical from the surface sample, or from the nearest location where the chemical was analyzed in the subsurface sample, was used as a surrogate for that particular location.
5. Calculate the site-related cumulative cancer risk and HI for each location. The exposure factors, toxicity values, and physical/chemical property data used in these calculations are the same as those used in the calculations for identifying the key chemicals in step 1.

Attachment D2: Key Chemicals Former GM Delco Plant 5, Kokomo, Indiana		
Chem Group	Chemical	CASRN
VOC	Carbon Tetrachloride	56-23-5
VOC	cis-1,2-Dichloroethene	156-59-2
VOC	Tetrachloroethene	127-18-4
VOC	Trichloroethene	79-01-6
VOC	Vinyl Chloride	75-01-4
PCB	PCBs (total)	1336-36-3
INORG	Lead	7439-92-1
INORG	Manganese	7439-96-5
INORG	Thallium	7440-28-0

Attachment D3
Risk Calculations for Routine Workers

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Single-Chemical Risk Estimates for Routine Worker Exposure to Shallow Groundwater

Attachment D3: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
VOC	Acetone	67-64-1	5.81E-01		9.52E-04	1.07E+00	9.85E-05	1.73E-01	9.46E-02	1.15E-06	5.28E-04	4.34E-06
VOC	Benzene	71-43-2	5.82E+01		1.31E-01	7.60E-01	8.47E-05	4.84E-01	6.72E-02	9.91E-07	1.82E-02	2.54E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.62E-02	2.57E-01	9.16E-05	4.40E-01	2.27E-02	1.07E-06	1.87E-03	8.17E-06
VOC	2-Butanone	78-93-3	2.00E+00		1.61E-03	6.98E-01	8.47E-05	1.80E-01	6.17E-02	9.91E-07	5.57E-04	4.45E-06
VOC	Carbon Disulfide	75-15-0	4.59E+01		7.91E-01	8.99E-01	8.64E-05	6.32E-01	7.94E-02	1.01E-06	9.94E-02	5.95E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		7.32E-01	6.74E-01	7.60E-05	1.21E+00	5.95E-02	8.90E-07	3.59E-02	3.57E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.71E-02	6.31E-01	7.52E-05	1.23E+00	5.57E-02	8.80E-07	3.50E-03	1.12E-05
VOC	Chloroethane	75-00-3	1.62E+01		2.84E-01	2.34E+00	9.94E-05	3.34E-01	2.07E-01	1.16E-06	1.76E-01	7.91E-05
VOC	Chloroform	67-66-3	3.97E+01		8.98E-02	8.99E-01	8.64E-05	3.84E-01	7.94E-02	1.01E-06	1.86E-02	2.57E-05
VOC	Chloromethane	74-87-3	3.97E+01		2.99E-01	1.09E+00	5.62E-05	4.49E-01	9.62E-02	6.57E-07	6.40E-02	4.77E-05
VOC	2-Chlorotoluene	95-49-8	6.12E+02		8.58E-02	5.43E-01	7.52E-05	3.07E+00	4.79E-02	8.80E-07	1.34E-03	6.91E-06
VOC	Cumene	98-82-8	7.05E+02		2.19E-01	5.62E-01	6.13E-05	3.55E+00	4.96E-02	7.18E-07	3.06E-03	1.04E-05
VOC	Cyclohexane	110-82-7	6.35E+02		4.69E+00	7.25E-01	7.86E-05	4.61E+00	6.40E-02	9.20E-07	6.51E-02	4.82E-05
VOC	Dibromochloromethane	124-48-1	6.26E+01		2.03E-02	1.69E-01	9.07E-05	4.70E-01	1.50E-02	1.06E-06	6.49E-04	4.81E-06
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.39E-01	6.41E-01	9.07E-05	3.60E-01	5.66E-02	1.06E-06	2.18E-02	2.79E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		6.97E-01	7.78E-01	8.99E-05	6.60E-01	6.87E-02	1.05E-06	7.26E-02	5.08E-05
VOC	1,2-Dichloroethene (total)	540-59-0	3.56E+01		1.21E-01	6.36E-01	9.76E-05	3.74E-01	5.62E-02	1.14E-06	1.82E-02	2.54E-05
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		9.86E-02	6.36E-01	9.76E-05	3.67E-01	5.62E-02	1.14E-06	1.51E-02	2.32E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		2.38E-01	6.11E-01	1.03E-04	4.89E-01	5.40E-02	1.20E-06	2.62E-02	3.06E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.60E-01	6.48E-01	6.74E-05	1.94E+00	5.72E-02	7.89E-07	4.70E-03	1.29E-05
VOC	Methyl Acetate	79-20-9	1.66E+00		2.16E-03	8.27E-01	9.50E-05	1.78E-01	7.30E-02	1.11E-06	8.93E-04	5.64E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		3.72E-03	6.48E-01	6.74E-05	2.20E-01	5.72E-02	7.89E-07	9.70E-04	5.88E-06
VOC	Methylcyclohexane	108-87-2	2.66E+02		9.74E+00	6.35E-01	7.36E-05	4.45E+00	5.61E-02	8.62E-07	1.23E-01	6.61E-05
VOC	Methylene Chloride	75-09-2	1.17E+01		5.59E-02	8.73E-01	1.01E-04	2.42E-01	7.71E-02	1.18E-06	1.78E-02	2.52E-05
VOC	Styrene	100-42-5	7.77E+02		5.46E-02	6.13E-01	6.91E-05	3.83E+00	5.42E-02	8.09E-07	7.73E-04	5.24E-06
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.35E+01		6.77E-03	6.13E-01	6.83E-05	6.11E-01	5.42E-02	7.99E-07	6.02E-04	4.63E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.89E-01	6.22E-01	7.08E-05	1.02E+00	5.49E-02	8.29E-07	2.09E-02	2.73E-05
VOC	Toluene	108-88-3	1.80E+02		1.45E-01	7.52E-01	7.43E-05	1.06E+00	6.64E-02	8.70E-07	9.05E-03	1.80E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		4.12E-01	6.74E-01	7.60E-05	8.15E-01	5.95E-02	8.90E-07	3.01E-02	3.27E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.93E-02	6.74E-01	7.60E-05	4.12E-01	5.95E-02	8.90E-07	2.79E-03	9.97E-06
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.03E+00	6.03E-02	9.20E-07	1.37E-02	2.21E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		3.09E+00	7.52E-01	8.38E-05	1.70E+00	6.64E-02	9.81E-07	1.21E-01	6.56E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		1.48E+01	6.74E-01	7.08E-05	6.55E+00	5.95E-02	8.29E-07	1.34E-01	6.91E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	1.18E+03		1.11E-01	5.24E-01	6.84E-05	5.74E+00	4.62E-02	8.01E-07	8.95E-04	5.64E-06

Attachment D3: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
VOC	Vinyl Chloride	75-01-4	1.85E+01		8.02E-01	9.16E-01	1.06E-04	5.06E-01	8.09E-02	1.24E-06	1.28E-01	6.76E-05
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.35E-01	6.74E-01	7.56E-05	2.02E+00	5.95E-02	8.84E-07	3.97E-03	1.19E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		2.02E-03	3.64E-01	6.64E-05	3.37E+01	3.21E-02	7.78E-07	1.95E-06	2.64E-07
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		2.63E-05	4.41E-01	7.78E-05	1.88E+03	3.89E-02	9.10E-07	1.03E-09	6.05E-09
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		5.87E-06	3.72E-01	7.78E-05	4.76E+03	3.28E-02	9.10E-07	2.32E-10	2.87E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		7.20E-04	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	2.22E-09	8.90E-09
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		1.63E-06	1.88E-01	4.54E-05	6.01E+04	1.66E-02	5.32E-07	9.30E-12	5.75E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		4.74E-06	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	1.10E-10	1.98E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		6.06E-07	3.03E-01	3.16E-05	7.04E+04	2.68E-02	3.70E-07	5.49E-12	4.42E-10
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		1.04E-05	1.50E-01	4.17E-05	2.69E+02	1.33E-02	4.88E-07	2.33E-09	9.11E-09
SVOC	Chrysene	218-01-9	4.01E+05		6.67E-04	2.14E-01	5.37E-05	1.88E+03	1.89E-02	6.28E-07	7.04E-09	1.58E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		2.09E-08	1.75E-01	4.48E-05	1.77E+04	1.54E-02	5.24E-07	2.96E-11	1.03E-09
SVOC	Dibenzofuran	132-64-9	2.07E+04		1.02E-05	2.06E-01	5.18E-05	9.72E+01	1.82E-02	6.07E-07	8.16E-09	1.70E-08
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		7.69E-09	3.78E-01	6.79E-05	1.60E+02	3.34E-02	7.95E-07	4.97E-09	1.33E-08
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		4.93E-04	1.30E-01	3.09E-05	3.93E+05	1.15E-02	3.62E-07	1.54E-11	7.40E-10
SVOC	Fluoranthene	206-44-0	1.08E+05		1.56E-04	2.61E-01	5.49E-05	5.07E+02	2.30E-02	6.42E-07	8.38E-09	1.73E-08
SVOC	Fluorene	86-73-7	1.38E+04		8.23E-04	3.14E-01	6.81E-05	6.47E+01	2.77E-02	7.97E-07	3.64E-07	1.14E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		7.70E-06	1.64E-01	4.89E-05	1.62E+04	1.45E-02	5.72E-07	4.23E-11	1.23E-09
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.05E-02	4.51E-01	6.70E-05	2.94E+01	3.98E-02	7.84E-07	1.42E-05	7.11E-07
SVOC	Naphthalene	91-20-3	2.01E+03		7.98E-03	5.10E-01	6.48E-05	9.60E+00	4.50E-02	7.58E-07	3.75E-05	1.16E-06
SVOC	Phenanthrene	85-01-8	2.42E+04		1.87E-04	3.24E-01	6.45E-05	1.14E+02	2.86E-02	7.55E-07	5.35E-08	4.37E-08
SVOC	Phenol	108-95-2	2.88E+01		6.37E-06	7.08E-01	7.86E-05	3.05E-01	6.26E-02	9.20E-07	4.33E-06	3.92E-07
SVOC	Pyrene	129-00-0	1.06E+05		1.02E-04	2.35E-01	6.26E-05	4.95E+02	2.08E-02	7.32E-07	5.76E-09	1.43E-08
PCB	PCBs (total)	1336-36-3	2.45E+06		1.60E-02	1.75E-01	4.32E-05	1.15E+04	1.54E-02	5.06E-07	2.15E-08	2.77E-08
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.49E-01	2.65E-01	5.44E-05	1.38E+03	2.34E-02	6.37E-07	2.54E-06	3.00E-07
INORG	Nickel	7440-02-0		6.50E+01								

Attachment D3: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes: The flux is calculated at a unit soil concentration of 1 mg/kg.												
	Soil bulk density	kg/L	ρ _b	1.38	<i>Silty-Clay</i>							
	Soil porosity	L/L-soil	θ	0.48	<i>Silty Clay</i>							
	Soil water content	L/L-soil	θ _w	0.17	<i>Measured</i>							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	<i>porosity-water content</i>							
	Soil organic carbon fraction	unitless	f _{oc}	0.0034	<i>Measured</i>							
	Averaging period	year	ED	25								
		s	ED	7.9E+08								

Attachment D3: Soil PM10 Emission from Wind Erosion Former Delco Plant 5, Kokomo, Indiana			
Unlimited Reservoir Model			
Aerodynamic particle size multiplier			0.036
Ground cover fraction		G	0.5
Mode of aggregate size distribution	mm		0.53
Threshold friction velocity	m/s	u'_t	0.50
Corrected friction velocity	m/s	u*_t	0.6247634
Roughness height	m	z₀	0.005
Friction velocity at 7 m	m/s	u_t	11.3
Mean annual wind speed	mph	u_m	9.6
Mean annual wind speed	m/s	u_m	4.29158
$x = 0.886 u_t/u_m$			2.34
F(x)			0.100
Annual average PM ₁₀ flux	kg-soil/m ² -s	J_{10,w}	2.72E-11

Attachment D3: Cancer Risk Calculations for Exposure of Routine Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	1.75E-07							7.32E-05	5.97E-06			4.60E-10	3.75E-11			
VOC	Benzene	71-43-2	A	1.75E-07	5.5E-02	9.6E-09			5.5E-02		4.30E-04	3.50E-05	7.8E-03	2.7E-07	4.60E-10	3.75E-11	7.8E-03	2.9E-13	2.8E-07
VOC	Bromodichloromethane	75-27-4	B2	1.75E-07	6.2E-02	1.1E-08			6.2E-02		1.38E-04	1.12E-05			4.60E-10	3.75E-11			1.1E-08
VOC	2-Butanone	78-93-3	ID	1.75E-07							7.52E-05	6.13E-06			4.60E-10	3.75E-11			
VOC	Carbon Disulfide	75-15-0		1.75E-07							1.00E-03	8.19E-05			4.60E-10	3.75E-11			
VOC	Carbon Tetrachloride	56-23-5	B2	1.75E-07	1.3E-01	2.3E-08			1.3E-01		6.04E-04	4.92E-05	1.5E-02	7.4E-07	4.60E-10	3.75E-11	1.5E-02	5.6E-13	7.6E-07
VOC	Chlorobenzene	108-90-7	D	1.75E-07							1.88E-04	1.54E-05			4.60E-10	3.75E-11			
VOC	Chloroethane	75-00-3	LC	1.75E-07							1.34E-03	1.09E-04			4.60E-10	3.75E-11			
VOC	Chloroform	67-66-3	B2	1.75E-07							4.34E-04	3.54E-05	2.3E-02	8.1E-07	4.60E-10	3.75E-11	2.3E-02	8.6E-13	8.1E-07
VOC	Chloromethane	74-87-3	D	1.75E-07							8.06E-04	6.58E-05			4.60E-10	3.75E-11			
VOC	2-Chlorotoluene	95-49-8		1.75E-07							1.17E-04	9.52E-06			4.60E-10	3.75E-11			
VOC	Cumene	98-82-8	D	1.75E-07							1.76E-04	1.44E-05			4.60E-10	3.75E-11			
VOC	Cyclohexane	110-82-7	ID	1.75E-07							8.13E-04	6.63E-05			4.60E-10	3.75E-11			
VOC	Dibromochloromethane	124-48-1	C	1.75E-07	8.4E-02	1.5E-08			8.4E-02		8.12E-05	6.62E-06			4.60E-10	3.75E-11			1.5E-08
VOC	1,1-Dichloroethane	75-34-3	SC	1.75E-07							4.71E-04	3.84E-05	1.6E-03	6.1E-08	4.60E-10	3.75E-11	1.6E-03	6.0E-14	6.1E-08
VOC	1,1-Dichloroethene	75-35-4	C	1.75E-07							8.59E-04	7.00E-05			4.60E-10	3.75E-11			
VOC	1,2-Dichloroethene (total)	540-59-0		1.75E-07							4.30E-04	3.50E-05			4.60E-10	3.75E-11			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.75E-07							3.91E-04	3.19E-05			4.60E-10	3.75E-11			
VOC	trans-1,2-Dichloroethene	156-60-5		1.75E-07							5.16E-04	4.21E-05			4.60E-10	3.75E-11			
VOC	Ethyl Benzene	100-41-4	D	1.75E-07							2.19E-04	1.78E-05			4.60E-10	3.75E-11			
VOC	Methyl Acetate	79-20-9		1.75E-07							9.52E-05	7.76E-06			4.60E-10	3.75E-11			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.75E-07							9.93E-05	8.09E-06			4.60E-10	3.75E-11			
VOC	Methylcyclohexane	108-87-2		1.75E-07							1.12E-03	9.10E-05			4.60E-10	3.75E-11			
VOC	Methylene Chloride	75-09-2	B2	1.75E-07	7.5E-03	1.3E-09			7.5E-03		4.25E-04	3.47E-05	4.7E-04	1.6E-08	4.60E-10	3.75E-11	4.7E-04	1.8E-14	1.8E-08
VOC	Styrene	100-42-5		1.75E-07							8.86E-05	7.22E-06			4.60E-10	3.75E-11			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		1.75E-07							7.82E-05	6.37E-06			4.60E-10	3.75E-11			
VOC	Tetrachloroethene	127-18-4	C-B2	1.75E-07	5.2E-02	9.1E-09			5.2E-02		4.61E-04	3.76E-05	3.1E-03	1.2E-07	4.60E-10	3.75E-11	3.1E-03	1.1E-13	1.2E-07
VOC	Toluene	108-88-3	ID	1.75E-07							3.03E-04	2.47E-05			4.60E-10	3.75E-11			
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.75E-07							5.53E-04	4.51E-05			4.60E-10	3.75E-11			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.75E-07	5.7E-02	1.0E-08			5.7E-02		1.68E-04	1.37E-05	1.6E-02	2.2E-07	4.60E-10	3.75E-11	1.6E-02	6.0E-13	2.3E-07
VOC	Trichloroethene	79-01-6	C-B2	1.75E-07	1.1E-02	1.9E-09			1.1E-02		3.74E-04	3.05E-05	1.7E-03	5.2E-08	4.60E-10	3.75E-11	1.7E-03	6.4E-14	5.4E-08
VOC	Trichlorofluoromethane	75-69-4		1.75E-07							1.11E-03	9.03E-05			4.60E-10	3.75E-11			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.75E-07							1.17E-03	9.52E-05			4.60E-10	3.75E-11			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.75E-07							9.53E-05	7.77E-06			4.60E-10	3.75E-11			
VOC	Vinyl Chloride	75-01-4	A	1.75E-07	1.4E+00	2.4E-07			1.4E+00		1.14E-03	9.31E-05	8.8E-03	8.2E-07	4.60E-10	3.75E-11	8.8E-03	3.3E-13	1.1E-06
VOC	Xylenes (total)	1330-20-7	ID	1.75E-07							2.01E-04	1.64E-05			4.60E-10	3.75E-11			
SVOC	Acenaphthene	83-32-9		1.75E-07			1.30E-01	3.00E-07			4.45E-06	3.63E-07			4.60E-10	3.75E-11			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.75E-07	7.3E-01	1.3E-07	1.30E-01	3.00E-07	7.3E-01	2.2E-07	1.02E-07	8.33E-09	8.8E-02	7.3E-10	4.60E-10	3.75E-11	8.8E-02	3.3E-12	3.5E-07
SVOC	Benzo(a)pyrene	50-32-8	B2	1.75E-07	7.3E+00	1.3E-06	1.30E-01	3.00E-07	7.3E+00	2.2E-06	4.85E-08	3.95E-09	8.8E-01	3.5E-09	4.60E-10	3.75E-11	8.8E-01	3.3E-11	3.5E-06
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.75E-07	7.3E-01	1.3E-07	1.30E-01	3.00E-07	7.3E-01	2.2E-07	1.50E-07	1.23E-08	8.8E-02	1.1E-09	4.60E-10	3.75E-11	8.8E-02	3.3E-12	3.5E-07
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.75E-07			1.30E-01	3.00E-07			9.72E-09	7.93E-10			4.60E-10	3.75E-11			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.75E-07	7.3E-02	1.3E-08	1.30E-01	3.00E-07	7.3E-02	2.2E-08	3.35E-08	2.73E-09	8.8E-03	2.4E-11	4.60E-10	3.75E-11	8.8E-03	3.3E-13	3.5E-08
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.75E-07	1.4E-02	2.4E-09	1.00E-01	2.31E-07	1.4E-02	3.2E-09	7.47E-09	6.09E-10	2.4E-03	1.5E-12	4.60E-10	3.75E-11	2.4E-03	9.0E-14	5.7E-09
SVOC	Butylbenzylphthalate	85-68-7	C	1.75E-07	1.9E-03	3.3E-10	1.00E-01	2.31E-07	1.9E-03	4.4E-10	1.54E-07	1.25E-08			4.60E-10	3.75E-11			7.7E-10
SVOC	Chrysene	218-01-9	B2	1.75E-07	7.3E-03	1.3E-09	1.30E-01	3.00E-07	7.3E-03	2.2E-09	2.67E-07	2.18E-08	8.8E-04	1.9E-11	4.60E-10	3.75E-11	8.8E-04	3.3E-14	3.5E-09
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.75E-07	7.3E+00	1.3E-06	1.30E-01	3.00E-07	7.3E+00	2.2E-06	1.73E-08	1.41E-09	8.8E-01	1.2E-09	4.60E-10	3.75E-11	8.8E-01	3.3E-11	3.5E-06

Attachment D3: Cancer Risk Calculations for Exposure of Routine Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Dibenzofuran	132-64-9	D	1.75E-07			1.00E-01	2.31E-07			2.88E-07	2.35E-08			4.60E-10	3.75E-11			
SVOC	Di-n-butylphthalate	84-74-2	D	1.75E-07			1.00E-01	2.31E-07			2.25E-07	1.83E-08			4.60E-10	3.75E-11			
SVOC	Di-n-octylphthalate	117-84-0		1.75E-07			1.00E-01	2.31E-07			1.25E-08	1.02E-09			4.60E-10	3.75E-11			
SVOC	Fluoranthene	206-44-0	D	1.75E-07			1.30E-01	3.00E-07			2.92E-07	2.38E-08			4.60E-10	3.75E-11			
SVOC	Fluorene	86-73-7	D	1.75E-07			1.30E-01	3.00E-07			1.92E-06	1.57E-07			4.60E-10	3.75E-11			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.75E-07	7.3E-01	1.3E-07	1.30E-01	3.00E-07	7.3E-01	2.2E-07	2.07E-08	1.69E-09	8.8E-02	1.5E-10	4.60E-10	3.75E-11	8.8E-02	3.3E-12	3.5E-07
SVOC	2-Methylnaphthalene	91-57-6	ID	1.75E-07			1.00E-01	2.31E-07			1.20E-05	9.79E-07			4.60E-10	3.75E-11			
SVOC	Naphthalene	91-20-3	C	1.75E-07			1.30E-01	3.00E-07			1.95E-05	1.59E-06	3.4E-02	5.4E-08	4.60E-10	3.75E-11	3.4E-02	1.3E-12	5.4E-08
SVOC	Phenanthrene	85-01-8	D	1.75E-07			1.30E-01	3.00E-07			7.37E-07	6.01E-08			4.60E-10	3.75E-11			
SVOC	Phenol	108-95-2	ID	1.75E-07			1.00E-01	2.31E-07			6.63E-06	5.40E-07			4.60E-10	3.75E-11			
SVOC	Pyrene	129-00-0	NC	1.75E-07			1.30E-01	3.00E-07			2.42E-07	1.97E-08			4.60E-10	3.75E-11			
PCB	PCBs (total)	1336-36-3	B2	1.75E-07	2.0E+00	3.5E-07	1.40E-01	3.23E-07	2.0E+00	6.5E-07	4.67E-07	3.81E-08	5.7E-01	2.2E-08	4.60E-10	3.75E-11	5.7E-01	2.1E-11	1.0E-06
INORG	Arsenic	7440-38-2	A	1.75E-07	1.5E+00	2.6E-07	3.00E-02	6.92E-08	1.5E+00	1.0E-07			4.3E+00		4.60E-10	3.75E-11	4.3E+00	1.6E-10	3.7E-07
INORG	Barium	7440-39-3	NC	1.75E-07											4.60E-10	3.75E-11			
INORG	Beryllium	7440-41-7	B1	1.75E-07									2.4E+00		4.60E-10	3.75E-11	2.4E+00	9.0E-11	9.0E-11
INORG	Cadmium	7440-43-9	B1	1.75E-07			1.00E-03	2.31E-09					1.8E+00		4.60E-10	3.75E-11	1.8E+00	6.8E-11	6.8E-11
INORG	Chromium (total)	7440-47-3		1.75E-07									1.2E+01		4.60E-10	3.75E-11	1.2E+01	4.5E-10	4.5E-10
INORG	Cobalt	7440-48-4	LC	1.75E-07									9.0E+00		4.60E-10	3.75E-11	9.0E+00	3.4E-10	3.4E-10
INORG	Copper	7440-50-8	D	1.75E-07											4.60E-10	3.75E-11			
INORG	Cyanide (total)	57-12-5	D	1.75E-07											4.60E-10	3.75E-11			
INORG	Manganese	7439-96-5	D	1.75E-07											4.60E-10	3.75E-11			
INORG	Mercury	7439-97-6	D	1.75E-07							5.07E-06	4.14E-07			4.60E-10	3.75E-11			
INORG	Nickel	7440-02-0	A	1.75E-07									2.4E-01		4.60E-10	3.75E-11	2.4E-01	9.0E-12	9.0E-12
INORG	Selenium	7782-49-2	D	1.75E-07											4.60E-10	3.75E-11			
INORG	Thallium	7440-28-0		1.75E-07											4.60E-10	3.75E-11			
INORG	Vanadium	7440-62-2		1.75E-07											4.60E-10	3.75E-11			
INORG	Zinc	7440-66-6	ID	1.75E-07											4.60E-10	3.75E-11			
Notes:																			
Unit risks are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire Facility) and region-specific meteorological parameters.																			

Attachment D3: Noncancer HQ Calculations for Exposure of Routine Workers to Soil
Former Delco Plant 5, Kokomo, Indiana

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	4.89E-07	9.0E-01	5.4E-07			9.0E-01		7.32E-05	1.67E-05	3.1E+01	5.4E-07	4.60E-10	1.05E-10	3.1E+01	3.4E-12	1.1E-06
VOC	Benzene	71-43-2	A	4.89E-07	4.0E-03	1.2E-04			4.0E-03		4.30E-04	9.81E-05	3.0E-02	3.3E-03	4.60E-10	1.05E-10	3.0E-02	3.5E-09	3.4E-03
VOC	Bromodichloromethane	75-27-4	B2	4.89E-07	2.0E-02	2.4E-05			2.0E-02		1.38E-04	3.15E-05			4.60E-10	1.05E-10			2.4E-05
VOC	2-Butanone	78-93-3	ID	4.89E-07	6.0E-01	8.2E-07			6.0E-01		7.52E-05	1.72E-05	5.0E+00	3.4E-06	4.60E-10	1.05E-10	5.0E+00	2.1E-11	4.3E-06
VOC	Carbon Disulfide	75-15-0		4.89E-07	1.0E-01	4.9E-06			1.0E-01		1.00E-03	2.29E-04	7.0E-01	3.3E-04	4.60E-10	1.05E-10	7.0E-01	1.5E-10	3.3E-04
VOC	Carbon Tetrachloride	56-23-5	B2	4.89E-07	7.0E-04	7.0E-04			7.0E-04		6.04E-04	1.38E-04	1.9E-01	7.3E-04	4.60E-10	1.05E-10	1.9E-01	5.6E-10	1.4E-03
VOC	Chlorobenzene	108-90-7	D	4.89E-07	2.0E-02	2.4E-05			2.0E-02		1.88E-04	4.30E-05	5.0E-02	8.6E-04	4.60E-10	1.05E-10	5.0E-02	2.1E-09	8.8E-04
VOC	Chloroethane	75-00-3	LC	4.89E-07	1.0E-01	4.9E-06			1.0E-01		1.34E-03	3.05E-04	1.0E+01	3.0E-05	4.60E-10	1.05E-10	1.0E+01	1.1E-11	3.5E-05
VOC	Chloroform	67-66-3	B2	4.89E-07	1.0E-02	4.9E-05			1.0E-02		4.34E-04	9.91E-05	5.0E-02	2.0E-03	4.60E-10	1.05E-10	5.0E-02	2.1E-09	2.0E-03
VOC	Chloromethane	74-87-3	D	4.89E-07							8.06E-04	1.84E-04	9.0E-02	2.0E-03	4.60E-10	1.05E-10	9.0E-02	1.2E-09	2.0E-03
VOC	2-Chlorotoluene	95-49-8		4.89E-07	2.0E-02	2.4E-05			2.0E-02		1.17E-04	2.66E-05			4.60E-10	1.05E-10			2.4E-05
VOC	Cumene	98-82-8	D	4.89E-07	1.0E-01	4.9E-06			1.0E-01		1.76E-04	4.03E-05	4.0E-01	1.0E-04	4.60E-10	1.05E-10	4.0E-01	2.6E-10	1.1E-04
VOC	Cyclohexane	110-82-7	ID	4.89E-07							8.13E-04	1.86E-04	6.0E+00	3.1E-05	4.60E-10	1.05E-10	6.0E+00	1.8E-11	3.1E-05
VOC	Dibromochloromethane	124-48-1	C	4.89E-07	2.0E-02	2.4E-05			2.0E-02		8.12E-05	1.85E-05			4.60E-10	1.05E-10			2.4E-05
VOC	1,1-Dichloroethane	75-34-3	SC	4.89E-07	2.0E-01	2.4E-06			2.0E-01		4.71E-04	1.08E-04	5.0E-01	2.2E-04	4.60E-10	1.05E-10	5.0E-01	2.1E-10	2.2E-04
VOC	1,1-Dichloroethene	75-35-4	C	4.89E-07	5.0E-02	9.8E-06			5.0E-02		8.59E-04	1.96E-04	2.0E-01	9.8E-04	4.60E-10	1.05E-10	2.0E-01	5.3E-10	9.9E-04
VOC	1,2-Dichloroethene (total)	540-59-0		4.89E-07	1.0E-02	4.9E-05			1.0E-02		4.30E-04	9.81E-05			4.60E-10	1.05E-10			4.9E-05
VOC	cis-1,2-Dichloroethene	156-59-2	ID	4.89E-07	1.0E-02	4.9E-05			1.0E-02		3.91E-04	8.94E-05			4.60E-10	1.05E-10			4.9E-05
VOC	trans-1,2-Dichloroethene	156-60-5		4.89E-07	2.0E-02	2.4E-05			2.0E-02		5.16E-04	1.18E-04	6.0E-02	2.0E-03	4.60E-10	1.05E-10	6.0E-02	1.8E-09	2.0E-03
VOC	Ethyl Benzene	100-41-4	D	4.89E-07	1.0E-01	4.9E-06			1.0E-01		2.19E-04	4.99E-05	1.0E+00	5.0E-05	4.60E-10	1.05E-10	1.0E+00	1.1E-10	5.5E-05
VOC	Methyl Acetate	79-20-9		4.89E-07	1.0E+00	4.9E-07			1.0E+00		9.52E-05	2.17E-05			4.60E-10	1.05E-10			4.9E-07
VOC	4-Methyl-2-pentanone	108-10-1	ID	4.89E-07							9.93E-05	2.27E-05	3.0E+00	7.6E-06	4.60E-10	1.05E-10	3.0E+00	3.5E-11	7.6E-06
VOC	Methylcyclohexane	108-87-2		4.89E-07							1.12E-03	2.55E-04	3.0E+00	8.5E-05	4.60E-10	1.05E-10	3.0E+00	3.5E-11	8.5E-05
VOC	Methylene Chloride	75-09-2	B2	4.89E-07	6.0E-02	8.2E-06			6.0E-02		4.25E-04	9.71E-05	1.0E+00	9.3E-05	4.60E-10	1.05E-10	1.0E+00	1.0E-10	1.0E-04
VOC	Styrene	100-42-5		4.89E-07	2.0E-01	2.4E-06			2.0E-01		8.86E-05	2.02E-05	1.0E+00	2.0E-05	4.60E-10	1.05E-10	1.0E+00	1.1E-10	2.3E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5		4.89E-07	4.0E-03	1.2E-04			4.0E-03		7.82E-05	1.78E-05			4.60E-10	1.05E-10			1.2E-04
VOC	Tetrachloroethene	127-18-4	C-B2	4.89E-07	1.0E-02	4.9E-05			1.0E-02		4.61E-04	1.05E-04	4.0E-01	2.6E-04	4.60E-10	1.05E-10	4.0E-01	2.6E-10	3.1E-04
VOC	Toluene	108-88-3	ID	4.89E-07	8.0E-02	6.1E-06			8.0E-02		3.03E-04	6.92E-05	5.0E+00	1.4E-05	4.60E-10	1.05E-10	5.0E+00	2.1E-11	2.0E-05
VOC	1,1,1-Trichloroethane	71-55-6	ID	4.89E-07	2.0E+00	2.4E-07			2.0E+00		5.53E-04	1.26E-04	5.0E+00	2.5E-05	4.60E-10	1.05E-10	5.0E+00	2.1E-11	2.5E-05
VOC	1,1,2-Trichloroethane	79-00-5	C	4.89E-07	4.0E-03	1.2E-04			4.0E-03		1.68E-04	3.84E-05			4.60E-10	1.05E-10			1.2E-04
VOC	Trichloroethene	79-01-6	C-B2	4.89E-07	6.0E-03	8.2E-05			6.0E-03		3.74E-04	8.53E-05	5.4E-01	1.6E-04	4.60E-10	1.05E-10	5.4E-01	2.0E-10	2.4E-04
VOC	Trichlorofluoromethane	75-69-4		4.89E-07	3.0E-01	1.6E-06			3.0E-01		1.11E-03	2.53E-04	7.0E-01	3.6E-04	4.60E-10	1.05E-10	7.0E-01	1.5E-10	3.6E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		4.89E-07	3.0E+01	1.6E-08			3.0E+01		1.17E-03	2.66E-04	3.0E+01	8.9E-06	4.60E-10	1.05E-10	3.0E+01	3.5E-12	8.9E-06
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.89E-07							9.53E-05	2.18E-05	7.0E-03	3.1E-03	4.60E-10	1.05E-10	7.0E-03	1.5E-08	3.1E-03
VOC	Vinyl Chloride	75-01-4	A	4.89E-07	3.0E-03	1.6E-04			3.0E-03		1.14E-03	2.61E-04	1.0E-01	2.6E-03	4.60E-10	1.05E-10	1.0E-01	1.1E-09	2.8E-03
VOC	Xylenes (total)	1330-20-7	ID	4.89E-07	2.0E-01	2.4E-06			2.0E-01		2.01E-04	4.59E-05	1.0E-01	4.6E-04	4.60E-10	1.05E-10	1.0E-01	1.1E-09	4.6E-04
SVOC	Acenaphthene	83-32-9		4.89E-07	6.0E-02	8.2E-06	1.30E-01	8.40E-07	6.0E-02	1.4E-05	4.45E-06	1.02E-06			4.60E-10	1.05E-10			2.2E-05
SVOC	Benzo(a)anthracene	56-55-3	B2	4.89E-07			1.30E-01	8.40E-07			1.02E-07	2.33E-08			4.60E-10	1.05E-10			
SVOC	Benzo(a)pyrene	50-32-8	B2	4.89E-07			1.30E-01	8.40E-07			4.85E-08	1.11E-08			4.60E-10	1.05E-10			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	4.89E-07			1.30E-01	8.40E-07			1.50E-07	3.43E-08			4.60E-10	1.05E-10			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	4.89E-07	3.0E-02	1.6E-05	1.30E-01	8.40E-07	3.0E-02	2.8E-05	9.72E-09	2.22E-09			4.60E-10	1.05E-10			4.4E-05
SVOC	Benzo(k)fluoranthene	207-08-9	B2	4.89E-07			1.30E-01	8.40E-07			3.35E-08	7.64E-09			4.60E-10	1.05E-10			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.89E-07	2.0E-02	2.4E-05	1.00E-01	6.46E-07	2.0E-02	3.2E-05	7.47E-09	1.70E-09			4.60E-10	1.05E-10			5.7E-05
SVOC	Butylbenzylphthalate	85-68-7	C	4.89E-07	2.0E-01	2.4E-06	1.00E-01	6.46E-07	2.0E-01	3.2E-06	1.54E-07	3.51E-08			4.60E-10	1.05E-10			5.7E-06
SVOC	Chrysene	218-01-9	B2	4.89E-07			1.30E-01	8.40E-07			2.67E-07	6.11E-08			4.60E-10	1.05E-10			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	4.89E-07			1.30E-01	8.40E-07			1.73E-08	3.96E-09			4.60E-10	1.05E-10			

Attachment D3: Noncancer HQ Calculations for Exposure of Routine Workers to Soil
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Cancer Class	Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
				ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Dibenzofuran	132-64-9	D	4.89E-07	4.0E-03	1.2E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	2.88E-07	6.57E-08			4.60E-10	1.05E-10			2.8E-04
SVOC	Di-n-butylphthalate	84-74-2	D	4.89E-07	1.0E-01	4.9E-06	1.00E-01	6.46E-07	1.0E-01	6.5E-06	2.25E-07	5.13E-08			4.60E-10	1.05E-10			1.1E-05
SVOC	Di-n-octylphthalate	117-84-0		4.89E-07	4.0E-02	1.2E-05	1.00E-01	6.46E-07	4.0E-02	1.6E-05	1.25E-08	2.85E-09			4.60E-10	1.05E-10			2.8E-05
SVOC	Fluoranthene	206-44-0	D	4.89E-07	4.0E-02	1.2E-05	1.30E-01	8.40E-07	4.0E-02	2.1E-05	2.92E-07	6.66E-08			4.60E-10	1.05E-10			3.3E-05
SVOC	Fluorene	86-73-7	D	4.89E-07	4.0E-02	1.2E-05	1.30E-01	8.40E-07	4.0E-02	2.1E-05	1.92E-06	4.39E-07			4.60E-10	1.05E-10			3.3E-05
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	4.89E-07			1.30E-01	8.40E-07			2.07E-08	4.73E-09			4.60E-10	1.05E-10			
SVOC	2-Methylnaphthalene	91-57-6	ID	4.89E-07	4.0E-03	1.2E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	1.20E-05	2.74E-06			4.60E-10	1.05E-10			2.8E-04
SVOC	Naphthalene	91-20-3	C	4.89E-07	2.0E-02	2.4E-05	1.30E-01	8.40E-07	2.0E-02	4.2E-05	1.95E-05	4.45E-06	3.0E-03	1.5E-03	4.60E-10	1.05E-10	3.0E-03	3.5E-08	1.6E-03
SVOC	Phenanthrene	85-01-8	D	4.89E-07	3.0E-02	1.6E-05	1.30E-01	8.40E-07	3.0E-02	2.8E-05	7.37E-07	1.68E-07			4.60E-10	1.05E-10			4.4E-05
SVOC	Phenol	108-95-2	ID	4.89E-07	3.0E-01	1.6E-06	1.00E-01	6.46E-07	3.0E-01	2.2E-06	6.63E-06	1.51E-06			4.60E-10	1.05E-10			3.8E-06
SVOC	Pyrene	129-00-0	NC	4.89E-07	3.0E-02	1.6E-05	1.30E-01	8.40E-07	3.0E-02	2.8E-05	2.42E-07	5.52E-08			4.60E-10	1.05E-10			4.4E-05
PCB	PCBs (total)	1336-36-3	B2	4.89E-07	2.0E-05	2.4E-02	1.40E-01	9.04E-07	2.0E-05	4.5E-02	4.67E-07	1.07E-07			4.60E-10	1.05E-10			7.0E-02
INORG	Arsenic	7440-38-2	A	4.89E-07	3.0E-04	1.6E-03	3.00E-02	1.94E-07	3.0E-04	6.5E-04			1.5E-05		4.60E-10	1.05E-10	1.5E-05	7.0E-06	2.3E-03
INORG	Barium	7440-39-3	NC	4.89E-07	2.0E-01	2.4E-06			1.4E-02						4.60E-10	1.05E-10			2.4E-06
INORG	Beryllium	7440-41-7	B1	4.89E-07	2.0E-03	2.4E-04			1.4E-05				2.0E-05		4.60E-10	1.05E-10	2.0E-05	5.3E-06	2.5E-04
INORG	Cadmium	7440-43-9	B1	4.89E-07	1.0E-03	4.9E-04	1.00E-03	6.46E-09	2.5E-05	2.6E-04			1.0E-05		4.60E-10	1.05E-10	1.0E-05	1.1E-05	7.6E-04
INORG	Chromium (total)	7440-47-3		4.89E-07	3.0E-03	1.6E-04			7.5E-05				1.0E-04		4.60E-10	1.05E-10	1.0E-04	1.1E-06	1.6E-04
INORG	Cobalt	7440-48-4	LC	4.89E-07	3.0E-04	1.6E-03			3.0E-04				6.0E-06		4.60E-10	1.05E-10	6.0E-06	1.8E-05	1.6E-03
INORG	Copper	7440-50-8	D	4.89E-07	4.0E-02	1.2E-05			4.0E-02						4.60E-10	1.05E-10			1.2E-05
INORG	Cyanide (total)	57-12-5	D	4.89E-07	2.0E-02	2.4E-05			2.0E-02				9.0E-03		4.60E-10	1.05E-10	9.0E-03	1.2E-08	2.4E-05
INORG	Manganese	7439-96-5	D	4.89E-07	1.4E-01	3.5E-06			8.4E-03				5.0E-05		4.60E-10	1.05E-10	5.0E-05	2.1E-06	5.6E-06
INORG	Mercury	7439-97-6	D	4.89E-07	3.0E-04	1.6E-03			2.1E-05		5.07E-06	1.16E-06	3.0E-04	3.9E-03	4.60E-10	1.05E-10	3.0E-04	3.5E-07	5.5E-03
INORG	Nickel	7440-02-0	A	4.89E-07	2.0E-02	2.4E-05			8.0E-04				9.0E-05		4.60E-10	1.05E-10	9.0E-05	1.2E-06	2.6E-05
INORG	Selenium	7782-49-2	D	4.89E-07	5.0E-03	9.8E-05			5.0E-03				2.0E-02		4.60E-10	1.05E-10	2.0E-02	5.3E-09	9.8E-05
INORG	Thallium	7440-28-0		4.89E-07	7.0E-05	7.0E-03			7.0E-05						4.60E-10	1.05E-10			7.0E-03
INORG	Vanadium	7440-62-2		4.89E-07	7.0E-03	7.0E-05			1.8E-04						4.60E-10	1.05E-10			7.0E-05
INORG	Zinc	7440-66-6	ID	4.89E-07	3.0E-01	1.6E-06			3.0E-01						4.60E-10	1.05E-10			1.6E-06
Notes:																			
Unit HQs are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire site) and region-specific meteorological parameters.																			

**Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Subsurface Soil
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} (m ² /day)	α _{so}	K _{oc} (L/kg)	K _d (L/kg)	C _{source} (mg/m ³)	α _{ML}	α	C _{building} (mg/m ³)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	9.52E-04	1.74E-01	1.74E-01	8.21E-05	5.81E-01		7.72E+00	9.69E-04	8.21E-05	6.34E-04
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.31E-01	1.24E-01	1.24E-01	8.18E-05	5.82E+01		8.58E+02	8.72E-06	8.72E-06	7.48E-03
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.62E-02	4.19E-02	4.19E-02	8.00E-05	5.51E+01		2.76E+02	2.71E-05	2.71E-05	7.48E-03
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.61E-03	1.14E-01	1.14E-01	8.17E-05	2.00E+00		1.30E+01	5.75E-04	8.17E-05	1.06E-03
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	7.91E-01	1.46E-01	1.46E-01	8.20E-05	4.59E+01		2.62E+03	2.85E-06	2.85E-06	7.48E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	7.32E-01	1.10E-01	1.10E-01	8.17E-05	1.74E+02		2.54E+03	2.95E-06	2.95E-06	7.48E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.71E-02	1.03E-01	1.03E-01	8.16E-05	2.20E+02		5.49E+02	1.36E-05	1.36E-05	7.48E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	2.84E-01	3.81E-01	3.81E-01	8.25E-05	1.62E+01		1.52E+03	4.93E-06	4.93E-06	7.48E-03
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	8.98E-02	1.46E-01	1.46E-01	8.20E-05	3.97E+01		6.27E+02	1.19E-05	1.19E-05	7.48E-03
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	2.99E-01	1.77E-01	1.77E-01	8.21E-05	3.97E+01		1.57E+03	4.77E-06	4.77E-06	7.48E-03
VOC	2-Chlorotoluene	95-49-8	5.43E-01	7.52E-05	8.58E-02	8.83E-02	8.83E-02	8.14E-05	6.12E+02		6.03E+02	1.24E-05	1.24E-05	7.48E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.19E-01	9.14E-02	9.14E-02	8.15E-05	7.05E+02		1.27E+03	5.90E-06	5.90E-06	7.48E-03
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	4.69E+00	1.18E-01	1.18E-01	8.18E-05	6.35E+02		3.97E+03	1.88E-06	1.88E-06	7.48E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	2.03E-02	2.76E-02	2.76E-02	7.86E-05	6.26E+01		1.59E+02	4.70E-05	4.70E-05	7.48E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.39E-01	1.04E-01	1.04E-01	8.16E-05	3.13E+01		8.99E+02	8.32E-06	8.32E-06	7.48E-03
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	6.97E-01	1.27E-01	1.27E-01	8.18E-05	5.82E+01		2.49E+03	3.01E-06	3.01E-06	7.48E-03
VOC	1,2-Dichloroethene (total)	540-59-0	6.36E-01	9.76E-05	1.21E-01	1.03E-01	1.03E-01	8.16E-05	3.56E+01		8.06E+02	9.29E-06	9.29E-06	7.48E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	9.86E-02	1.03E-01	1.03E-01	8.16E-05	3.56E+01		6.79E+02	1.10E-05	1.10E-05	7.48E-03
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	2.38E-01	9.94E-02	9.94E-02	8.16E-05	5.22E+01		1.35E+03	5.56E-06	5.56E-06	7.48E-03
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.60E-01	1.05E-01	1.05E-01	8.16E-05	3.67E+02		1.00E+03	7.46E-06	7.46E-06	7.48E-03
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	2.16E-03	1.35E-01	1.35E-01	8.19E-05	1.66E+00		1.75E+01	4.27E-04	8.19E-05	1.43E-03
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	3.72E-03	1.05E-01	1.05E-01	8.16E-05	1.05E+01		3.00E+01	2.49E-04	8.16E-05	2.45E-03
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	9.74E+00	1.03E-01	1.03E-01	8.16E-05	2.66E+02		4.20E+03	1.78E-06	1.78E-06	7.48E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	5.59E-02	1.42E-01	1.42E-01	8.19E-05	1.17E+01		4.12E+02	1.82E-05	1.82E-05	7.48E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.46E-02	9.98E-02	9.98E-02	8.16E-05	7.77E+02		4.04E+02	1.85E-05	1.85E-05	7.48E-03
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.13E-01	6.83E-05	6.77E-03	9.98E-02	9.98E-02	8.16E-05	9.35E+01		5.44E+01	1.38E-04	8.16E-05	4.43E-03
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.89E-01	1.01E-01	1.01E-01	8.16E-05	1.56E+02		1.85E+03	4.05E-06	4.05E-06	7.48E-03
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.45E-01	1.22E-01	1.22E-01	8.18E-05	1.80E+02		9.30E+02	8.05E-06	8.05E-06	7.48E-03
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	4.12E-01	1.10E-01	1.10E-01	8.17E-05	1.10E+02		1.91E+03	3.92E-06	3.92E-06	7.48E-03
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.93E-02	1.10E-01	1.10E-01	8.17E-05	5.03E+01		1.51E+02	4.94E-05	4.94E-05	7.48E-03
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.35E-01	1.11E-01	1.11E-01	8.17E-05	1.68E+02		1.33E+03	5.61E-06	5.61E-06	7.48E-03
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	3.09E+00	1.22E-01	1.22E-01	8.18E-05	1.21E+02		3.77E+03	1.99E-06	1.99E-06	7.48E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	1.48E+01	1.10E-01	1.10E-01	8.17E-05	3.81E+02		4.28E+03	1.75E-06	1.75E-06	7.48E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.11E-01	8.52E-02	8.52E-02	8.14E-05	1.18E+03		7.50E+02	9.98E-06	9.98E-06	7.48E-03
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	8.02E-01	1.49E-01	1.49E-01	8.20E-05	1.85E+01		2.64E+03	2.84E-06	2.84E-06	7.48E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.35E-01	1.10E-01	1.10E-01	8.17E-05	3.86E+02		8.79E+02	8.51E-06	8.51E-06	7.48E-03
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	2.02E-03	5.92E-02	5.92E-02	8.08E-05	7.14E+03		1.64E+01	4.57E-04	8.08E-05	1.32E-03
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	2.63E-05	7.29E-02	7.29E-02	8.12E-05	4.01E+05		2.14E-01	3.50E-02	8.12E-05	1.74E-05
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	5.87E-06	6.57E-02	6.57E-02	8.10E-05	1.01E+06		4.77E-02	1.57E-01	8.10E-05	3.86E-06
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	7.20E-04	3.18E-02	3.18E-02	7.92E-05	1.24E+06		5.85E+00	1.28E-03	7.92E-05	4.63E-04
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	1.63E-06	4.16E-02	4.16E-02	8.00E-05	1.28E+07		1.33E-02	5.63E-01	8.00E-05	1.06E-06
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	4.74E-06	3.58E-02	3.58E-02	7.95E-05	1.24E+06		3.85E-02	1.94E-01	7.95E-05	3.06E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	6.06E-07	7.01E-02	7.01E-02	8.11E-05	1.50E+07		4.93E-03	1.52E+00	8.11E-05	4.00E-07
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	1.04E-05	2.61E-02	2.61E-02	7.84E-05	5.73E+04		8.48E-02	8.82E-02	7.84E-05	6.65E-06
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	6.67E-04	3.49E-02	3.49E-02	7.95E-05	4.01E+05		5.42E+00	1.38E-03	7.95E-05	4.31E-04
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	2.09E-08	8.79E-01	8.79E-01	8.26E-05	3.77E+06		1.70E-04	4.40E+01	8.26E-05	1.41E-08
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	1.02E-05	3.55E-02	3.55E-02	7.95E-05	2.07E+04		8.33E-02	8.98E-02	7.95E-05	6.63E-06
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	7.69E-09	3.57E+00	3.57E+00	8.44E-05	3.40E+04		6.25E-05	1.20E+02	8.44E-05	5.28E-09
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	4.93E-04	2.13E-02	2.13E-02	7.75E-05	8.38E+07		4.01E+00	1.87E-03	7.75E-05	3.10E-04
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	1.56E-04	4.26E-02	4.26E-02	8.00E-05	1.08E+05		1.27E+00	5.89E-03	8.00E-05	1.02E-04
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	8.23E-04	5.11E-02	5.11E-02	8.05E-05	1.38E+04		6.68E+00	1.12E-03	8.05E-05	5.38E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	7.70E-06	2.92E-02	2.92E-02	7.88E-05	3.45E+06		6.26E-02	1.20E-01	7.88E-05	4.94E-06
SVOC	2-Methylnaphthalene	91-57-6	4.51E-01	6.70E-05	1.05E-02	7.34E-02	7.34E-02	8.12E-05	6.23E+03		8.35E+01	8.97E-05	8.12E-05	6.78E-03
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	7.98E-03	8.30E-02	8.30E-02	8.13E-05	2.01E+03		6.39E+01	1.17E-04	8.13E-05	5.20E-03
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	1.87E-04	5.29E-02	5.29E-02	8.06E-05	2.42E+04		1.52E+00	4.93E-03	8.06E-05	1.22E-04
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	6.37E-06	1.20E-01	1.20E-01	8.18E-05	2.88E+01		5.18E-02	1.45E-01	8.18E-05	4.23E-06
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	1.02E-04	3.85E-02	3.85E-02	7.98E-05	1.06E+05		8.32E-01	9.00E-03	7.98E-05	6.63E-05
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	1.60E-02	2.84E-02	2.84E-02	7.87E-05	2.45E+06		1.27E+02	5.92E-05	5.92E-05	7.48E-03
INORG	Arsenic	7440-38-2								2.90E+01				
INORG	Barium	7440-39-3								4.10E+01				
INORG	Beryllium	7440-41-7								7.90E+02				
INORG	Cadmium	7440-43-9								7.50E+01				
INORG	Chromium (total)	7440-47-3								1.90E+01				
INORG	Cobalt	7440-48-4								4.50E+01				

**Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Subsurface Soil
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} (m ² /day)	α _{so}	K _{oc} (L/kg)	K _d (L/kg)	C _{source} (mg/m ³)	α _{ML}	α	C _{building} (mg/m ³)
INORG	Copper	7440-50-8								3.50E+01				
INORG	Cyanide (total)	57-12-5								9.90E+00				
INORG	Manganese	7439-96-5								6.50E+01				
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.49E-01	4.32E-02	4.32E-02	8.01E-05		1.00E+03	1.49E-01	5.01E-02	8.01E-05	1.20E-05
INORG	Nickel	7440-02-0								6.50E+01				
INORG	Selenium	7782-49-2								5.00E+00				
INORG	Thallium	7440-28-0								7.10E+01				
INORG	Vanadium	7440-62-2								1.00E+03				
INORG	Zinc	7440-66-6								6.20E+01				
Notes: The indoor air concentration is calculated at a unit soil concentration of 1 mg/kg.														
Soil and Building Characteristics			Crack Soil		Deep Vadose Soil									
SCS Soil texture class			Sand		Silty Clay									
Bulk density	kg/L	p _b	1.66		1.38									
Total porosity	L/L-soil	θ _T	0.375		0.481									
Water-filled porosity	L/L-soil	θ _w	0.053		0.170									
Air-filled porosity	L/L-soil	θ _a	0.322		0.311									
Organic carbon fraction	unitless	f _{oc}												
Residual saturation	L/L-soil	θ _r	0.053											
Hydraulic conductivity	cm/s	K	7.4E-03											
Dynamic viscosity of water	g/cm-s	μ _w	0.01307											
Density of water	g/cm ³	ρ _w	1.0											
Gravitational acceleration	cm/s ²	g	980.7											
Intrinsic permeability	cm ²	k	9.9E-08											
Relative saturation	unitless	S _r												
van Genuchten N	unitless	N	1.32											
van Genuchten M	unitless	M	0.243											
Relative air permeability	unitless	k _{rg}	1.000											
Permeability to vapor	cm ²	k _v	9.9E-08											
Distance from building foundation to source	m	L _T	0.15											
Bldg foundation thickness	m	L _{crack}	0.15											
Bldg foundation length	m		19.29											
Bldg foundation width	m		19.29											
Bldg occupied height	m		2.44											
Bldg occupied volume	m ³		907.93											
Occupied depth below ground	m													
Bldg area for vapor intrusion	m ²	A _B	372.1											
Ratio of A _{crack} to A _B		η	1E-04											
Area of cracks	m ²	A _{crack}	3.86E-02											
Air exchange rate	hour ⁻¹	ach	2.0											
Building ventilation rate	m ³ /day	Q _{bldg}	4.36E+04											
Pressure difference between outdoors-indoors	kg/m-s ²	ΔP	1.0											
Viscosity of air	kg/m-s	μ _a	1.8E-05											
Crack length (bldg perimeter)	m	X _{crack}	77.16											
Crack depth below ground	m	Z _{crack}	0.15											
Crack radius	m	r _{crack}	5E-04											
Soil gas flow rate into bldg	m ³ /day	Q _{soil}	3.61E+00											
Averaging period	day	T	9.13E+03											
Contaminant thickness	m	ΔH	5.796											

**Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} ^T (m ² /day)	α _∞	C _{building} (mg/m ³)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	9.52E-04	1.74E-01	9.58E-02	5.17E-05	4.92E-05
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.31E-01	1.24E-01	6.72E-02	4.45E-05	5.83E-03
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.62E-02	4.19E-02	2.28E-02	2.34E-05	8.48E-04
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.61E-03	1.14E-01	6.23E-02	4.30E-05	6.91E-05
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	7.91E-01	1.46E-01	7.94E-02	4.79E-05	3.79E-02
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	7.32E-01	1.10E-01	5.95E-02	4.21E-05	3.08E-02
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.71E-02	1.03E-01	5.57E-02	4.07E-05	3.13E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	2.84E-01	3.81E-01	2.07E-01	6.47E-05	1.84E-02
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	8.98E-02	1.46E-01	7.94E-02	4.80E-05	4.31E-03
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	2.99E-01	1.77E-01	9.62E-02	5.18E-05	1.55E-02
VOC	2-Chlorotoluene	95-49-8	5.43E-01	7.52E-05	8.58E-02	8.83E-02	4.79E-02	3.76E-05	3.22E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.19E-01	9.14E-02	4.96E-02	3.83E-05	8.38E-03
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	4.69E+00	1.18E-01	6.40E-02	4.36E-05	2.04E-01
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	2.03E-02	2.76E-02	1.50E-02	1.71E-05	3.48E-04
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.39E-01	1.04E-01	5.66E-02	4.10E-05	5.69E-03
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	6.97E-01	1.27E-01	6.87E-02	4.50E-05	3.14E-02
VOC	1,2-Dichloroethene (total)	540-59-0	6.36E-01	9.76E-05	1.21E-01	1.03E-01	5.62E-02	4.09E-05	4.95E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	9.86E-02	1.03E-01	5.62E-02	4.09E-05	4.03E-03
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	2.38E-01	9.94E-02	5.40E-02	4.00E-05	9.51E-03
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.60E-01	1.05E-01	5.72E-02	4.12E-05	6.58E-03
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	2.16E-03	1.35E-01	7.36E-02	4.64E-05	1.00E-04
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	3.72E-03	1.05E-01	5.75E-02	4.13E-05	1.54E-04
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	9.74E+00	1.03E-01	5.61E-02	4.08E-05	3.98E-01
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	5.59E-02	1.42E-01	7.71E-02	4.74E-05	2.65E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.46E-02	9.98E-02	5.42E-02	4.01E-05	2.19E-03
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.13E-01	6.83E-05	6.77E-03	9.98E-02	5.43E-02	4.02E-05	2.72E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.89E-01	1.01E-01	5.50E-02	4.04E-05	1.57E-02
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.45E-01	1.22E-01	6.64E-02	4.43E-05	6.41E-03
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	4.12E-01	1.10E-01	5.95E-02	4.21E-05	1.73E-02
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.93E-02	1.10E-01	5.96E-02	4.21E-05	8.11E-04
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.35E-01	1.11E-01	6.03E-02	4.23E-05	9.93E-03
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	3.09E+00	1.22E-01	6.64E-02	4.43E-05	1.37E-01
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	1.48E+01	1.10E-01	5.95E-02	4.21E-05	6.20E-01
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.11E-01	8.52E-02	4.63E-02	3.69E-05	4.09E-03
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	8.02E-01	1.49E-01	8.09E-02	4.83E-05	3.88E-02
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.35E-01	1.10E-01	5.95E-02	4.20E-05	5.67E-03
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	2.02E-03	5.92E-02	3.25E-02	2.99E-05	6.04E-05
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	2.63E-05	7.29E-02	7.35E-02	4.64E-05	1.22E-06
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	5.87E-06	6.57E-02	1.88E-01	6.33E-05	3.72E-07
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	7.20E-04	3.18E-02	1.80E-02	1.97E-05	1.42E-05
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	1.63E-06	4.16E-02	3.42E-01	7.08E-05	1.16E-07
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	4.74E-06	3.58E-02	1.36E-01	5.81E-05	2.75E-07
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	6.06E-07	7.01E-02	6.38E-01	7.59E-05	4.60E-08
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	1.04E-05	2.61E-02	6.01E-02	4.22E-05	4.41E-07
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	6.67E-04	3.49E-02	1.99E-02	2.12E-05	1.42E-05
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	2.09E-08	8.79E-01	2.51E+01	8.26E-05	1.73E-09
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	1.02E-05	3.55E-02	7.74E-02	4.74E-05	4.86E-07
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	7.69E-09	3.57E+00	1.03E+02	8.44E-05	6.49E-10
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	4.93E-04	2.13E-02	1.23E-02	1.45E-05	7.16E-06
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	1.56E-04	4.26E-02	2.72E-02	2.65E-05	4.15E-06
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	8.23E-04	5.11E-02	2.87E-02	2.75E-05	2.26E-05
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	7.70E-06	2.92E-02	8.88E-02	5.02E-05	3.87E-07
SVOC	2-Methylnaphthalene	91-57-6	4.51E-01	6.70E-05	1.05E-02	7.34E-02	3.99E-02	3.39E-05	3.54E-04
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	7.98E-03	8.30E-02	4.51E-02	3.63E-05	2.90E-04
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	1.87E-04	5.29E-02	3.27E-02	2.99E-05	5.59E-06
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	6.37E-06	1.20E-01	2.07E-01	6.47E-05	4.12E-07
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	1.02E-04	3.85E-02	2.79E-02	2.70E-05	2.76E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	1.60E-02	2.84E-02	1.54E-02	1.75E-05	2.80E-04
INORG	Arsenic	7440-38-2							
INORG	Barium	7440-39-3							
INORG	Beryllium	7440-41-7							
INORG	Cadmium	7440-43-9							

**Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} ^T (m ² /day)	α _∞	C _{building} (mg/m ³)
INORG	Chromium (total)	7440-47-3							
INORG	Cobalt	7440-48-4							
INORG	Copper	7440-50-8							
INORG	Cyanide (total)	57-12-5							
INORG	Manganese	7439-96-5							
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.49E-01	4.32E-02	2.34E-02	2.39E-05	3.57E-03
INORG	Nickel	7440-02-0							
INORG	Selenium	7782-49-2							
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6							
Notes:	The indoor air concentration is calculated at a unit groundwater concentration of 1 mg/L.								
Crack Soil and Building Characteristics			Crack Soil						
	SCS Soil texture class			Sand					
	Bulk density	kg/L	ρ _b	1.66					
	Total porosity	L/L-soil	θ _T	0.375					
	Water-filled porosity	L/L-soil	θ _w	0.053					
	Air-filled porosity	L/L-soil	θ _a	0.322					
	Residual saturation	L/L-soil	θ _r	0.053					
	Hydraulic conductivity	cm/s	K	7.4E-03					
	Dynamic viscosity of water	g/cm-s	μ _w	0.01307					
	Density of water	g/cm ³	ρ _w	1.0					
	Gravitational acceleration	cm/s ²	g	980.7					
	Intrinsic permeability	cm ²	k	9.92E-08					
	Relative saturation	unitless	S _e						
	van Genuchten N	unitless	N	1.321					
	van Genuchten M	unitless	M	0.243					
	Relative air permeability	unitless	k _{rg}	1.000					
	Permeability to vapor	cm ²	k _v	9.92E-08					
	Distance from building foundation to source	m	L _T	5.95					
	Bldg foundation thickness	m	L _{crack}	0.15					
	Bldg foundation length	m		19.29					
	Bldg foundation width	m		19.29					
	Bldg occupied height	m		2.44					
	Bldg occupied volume	m ³		907.93					
	Occupied depth below ground	m							
	Bldg area for vapor intrusion	m ²	A _B	372.1					
	Ratio of A _{crack} to A _B		η	1E-04					
	Area of cracks	m ²	A _{crack}	3.86E-02					
	Air exchange rate	hour ⁻¹	ach	2.0					
	Building ventilation rate	m ³ /day	Q _{bldg}	4.358E+04					
	Pressure difference between outdoors-indoors	kg/m-s ²	ΔP	1.0					
	Viscosity of air	kg/m-s	μ _a	1.8E-05					
	Crack length (bldg perimeter)	m	X _{crack}	77.16					
	Crack depth below ground	m	Z _{crack}	0.15					
	Crack radius	m	r _{crack}	5E-04					
	Soil gas flow rate into bldg	m ³ /day	Q _{soil}	3.607E+00					

Attachment D3: Routine Worker Cancer Risk Calculations for Vapor Intrusion in a Commercial / Industrial Slab-on-Grade Building Former Delco Plant 5, Kokomo, Indiana									
				Groundwater Indoor Air Vapor Inhalation			Soil Indoor Air Vapor Inhalation		
Chem Group	Chemical	CASRN	Carc Class	C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
VOC	Acetone	67-64-1	ID	4.92E-05			6.24E-04		
VOC	Benzene	71-43-2	A	5.83E-03	7.8E-03	3.7E-06	7.48E-03	7.8E-03	4.8E-06
VOC	Bromodichloromethane	75-27-4	B2	8.48E-04			7.48E-03		
VOC	2-Butanone	78-93-3	ID	6.91E-05			1.01E-03		
VOC	Carbon Disulfide	75-15-0		3.79E-02			7.48E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	3.08E-02	1.5E-02	3.8E-05	7.48E-03	1.5E-02	9.2E-06
VOC	Chlorobenzene	108-90-7	D	3.13E-03			7.07E-03		
VOC	Chloroethane	75-00-3	LC	1.84E-02			7.48E-03		
VOC	Chloroform	67-66-3	B2	4.31E-03	2.3E-02	8.1E-06	7.48E-03	2.3E-02	1.4E-05
VOC	Chloromethane	74-87-3	D	1.55E-02			7.48E-03		
VOC	2-Chlorotoluene	95-49-8		3.22E-03			3.14E-03		
VOC	Cumene	98-82-8	D	8.38E-03			6.94E-03		
VOC	Cyclohexane	110-82-7	ID	2.04E-01			7.48E-03		
VOC	Dibromochloromethane	124-48-1	C	3.48E-04			4.69E-03		
VOC	1,1-Dichloroethane	75-34-3	SC	5.69E-03	1.6E-03	7.4E-07	7.48E-03	1.6E-03	9.8E-07
VOC	1,1-Dichloroethene	75-35-4	C	3.14E-02			7.48E-03		
VOC	1,2-Dichloroethene (total)	540-59-0		4.95E-03			7.48E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	4.03E-03			7.48E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		9.51E-03			7.48E-03		
VOC	Ethyl Benzene	100-41-4	D	6.58E-03			7.48E-03		
VOC	Methyl Acetate	79-20-9		1.00E-04			1.37E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.54E-04			1.90E-03		
VOC	Methylcyclohexane	108-87-2		3.98E-01			7.48E-03		
VOC	Methylene Chloride	75-09-2	B2	2.65E-03	4.7E-04	1.0E-07	7.48E-03	4.7E-04	2.9E-07
VOC	Styrene	100-42-5		2.19E-03			1.61E-03		
VOC	1,1,2,2-Tetrachloroethane	79-34-5		2.72E-04			1.25E-03		
VOC	Tetrachloroethene	127-18-4	C-B2	1.57E-02	3.1E-03	3.9E-06	7.48E-03	3.1E-03	1.9E-06
VOC	Toluene	108-88-3	ID	6.41E-03			7.48E-03		
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.73E-02			7.48E-03		
VOC	1,1,2-Trichloroethane	79-00-5	C	8.11E-04	1.6E-02	1.1E-06	5.28E-03	1.6E-02	6.9E-06
VOC	Trichloroethene	79-01-6	C-B2	9.93E-03	1.7E-03	1.4E-06	7.48E-03	1.7E-03	1.0E-06
VOC	Trichlorofluoromethane	75-69-4		1.37E-01			7.48E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.20E-01			7.48E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.09E-03			2.17E-03		
VOC	Vinyl Chloride	75-01-4	A	3.88E-02	8.8E-03	2.8E-05	7.48E-03	8.8E-03	5.4E-06
VOC	Xylenes (total)	1330-20-7	ID	5.67E-03			7.48E-03		
SVOC	Acenaphthene	83-32-9		6.04E-05			6.70E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.22E-06	8.8E-02	8.8E-09	1.57E-09	8.8E-02	1.1E-11
SVOC	Benzo(a)pyrene	50-32-8	B2	3.72E-07	8.8E-01	2.7E-08	1.38E-10	8.8E-01	9.9E-12
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.42E-05	8.8E-02	1.0E-07	1.35E-08	8.8E-02	9.7E-11
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.16E-07			3.00E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.75E-07	8.8E-03	2.0E-10	8.91E-11	8.8E-03	6.4E-14
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.60E-08	2.4E-03	9.0E-12	9.63E-13	2.4E-03	1.9E-16
SVOC	Butylbenzylphthalate	85-68-7	C	4.41E-07			4.20E-09		
SVOC	Chrysene	218-01-9	B2	1.42E-05	8.8E-04	1.0E-09	3.89E-08	8.8E-04	2.8E-12
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.73E-09	8.8E-01	1.2E-10	1.35E-13	8.8E-01	9.7E-15
SVOC	Dibenzofuran	132-64-9	D	4.86E-07			1.16E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	6.49E-10			5.60E-12		
SVOC	Di-n-octylphthalate	117-84-0		7.16E-06			1.34E-10		
SVOC	Fluoranthene	206-44-0	D	4.15E-06			3.41E-08		
SVOC	Fluorene	86-73-7	D	2.26E-05			1.41E-06		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.87E-07	8.8E-02	2.8E-09	5.18E-11	8.8E-02	3.7E-13
SVOC	2-Methylnaphthalene	91-57-6	ID	3.54E-04			3.98E-05		
SVOC	Naphthalene	91-20-3	C	2.90E-04	3.4E-02	8.0E-07	9.33E-05	3.4E-02	2.6E-07
SVOC	Phenanthrene	85-01-8	D	5.59E-06			1.82E-07		
SVOC	Phenol	108-95-2	ID	4.12E-07			2.36E-06		
SVOC	Pyrene	129-00-0	NC	2.76E-06			2.27E-08		

Attachment D3: Routine Worker Cancer Risk Calculations for Vapor Intrusion in a Commercial / Industrial Slab-on-Grade Building Former Delco Plant 5, Kokomo, Indiana									
				Groundwater Indoor Air Vapor Inhalation			Soil Indoor Air Vapor Inhalation		
Chem Group	Chemical	CASRN	Carc Class	C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
PCB	PCBs (total)	1336-36-3	B2	2.80E-04	5.7E-01	1.3E-05	1.51E-07	5.7E-01	7.0E-09
INORG	Arsenic	7440-38-2	A		4.3E+00			4.3E+00	
INORG	Barium	7440-39-3	NC						
INORG	Beryllium	7440-41-7	B1		2.4E+00			2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00			1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01			1.2E+01	
INORG	Cobalt	7440-48-4	LC		9.0E+00			9.0E+00	
INORG	Copper	7440-50-8	D						
INORG	Cyanide (total)	57-12-5	D						
INORG	Manganese	7439-96-5	D						
INORG	Mercury	7439-97-6	D	3.57E-03			1.20E-05		
INORG	Nickel	7440-02-0	A		2.4E-01			2.4E-01	
INORG	Selenium	7782-49-2	D						
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6	ID						
Notes:									
Unit risks for groundwater indoor air vapor inhalation are calculated at a concentration of 1 mg/L.									
Unit risks for soil indoor air vapor inhalation are calculated at a concentration of 1 mg/kg.									

Attachment D3: Routine Worker Noncancer HQ Calculations for Vapor Intrusion in a Commercial / Industrial Slab-on-Grade Building Former Delco Plant 5, Kokomo, Indiana									
				Groundwater Indoor Air Vapor Inhalation			Soil Indoor Air Vapor Inhalation		
Chem Group	Chemical	CASRN	Carc Class	C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
VOC	Acetone	67-64-1	ID	4.92E-05	3.1E+01	3.6E-07	6.24E-04	3.1E+01	4.6E-06
VOC	Benzene	71-43-2	A	5.83E-03	3.0E-02	4.4E-02	7.48E-03	3.0E-02	5.7E-02
VOC	Bromodichloromethane	75-27-4	B2	8.48E-04			7.48E-03		
VOC	2-Butanone	78-93-3	ID	6.91E-05	5.0E+00	3.2E-06	1.01E-03	5.0E+00	4.6E-05
VOC	Carbon Disulfide	75-15-0		3.79E-02	7.0E-01	1.2E-02	7.48E-03	7.0E-01	2.4E-03
VOC	Carbon Tetrachloride	56-23-5	B2	3.08E-02	1.9E-01	3.7E-02	7.48E-03	1.9E-01	9.1E-03
VOC	Chlorobenzene	108-90-7	D	3.13E-03	5.0E-02	1.4E-02	7.07E-03	5.0E-02	3.2E-02
VOC	Chloroethane	75-00-3	LC	1.84E-02	1.0E+01	4.2E-04	7.48E-03	1.0E+01	1.7E-04
VOC	Chloroform	67-66-3	B2	4.31E-03	5.0E-02	2.0E-02	7.48E-03	5.0E-02	3.4E-02
VOC	Chloromethane	74-87-3	D	1.55E-02	9.0E-02	3.9E-02	7.48E-03	9.0E-02	1.9E-02
VOC	2-Chlorotoluene	95-49-8		3.22E-03			3.14E-03		
VOC	Cumene	98-82-8	D	8.38E-03	4.0E-01	4.8E-03	6.94E-03	4.0E-01	4.0E-03
VOC	Cyclohexane	110-82-7	ID	2.04E-01	6.0E+00	7.8E-03	7.48E-03	6.0E+00	2.8E-04
VOC	Dibromochloromethane	124-48-1	C	3.48E-04			4.69E-03		
VOC	1,1-Dichloroethane	75-34-3	SC	5.69E-03	5.0E-01	2.6E-03	7.48E-03	5.0E-01	3.4E-03
VOC	1,1-Dichloroethene	75-35-4	C	3.14E-02	2.0E-01	3.6E-02	7.48E-03	2.0E-01	8.5E-03
VOC	1,2-Dichloroethene (total)	540-59-0		4.95E-03			7.48E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	4.03E-03			7.48E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		9.51E-03	6.0E-02	3.6E-02	7.48E-03	6.0E-02	2.8E-02
VOC	Ethyl Benzene	100-41-4	D	6.58E-03	1.0E+00	1.5E-03	7.48E-03	1.0E+00	1.7E-03
VOC	Methyl Acetate	79-20-9		1.00E-04			1.37E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.54E-04	3.0E+00	1.2E-05	1.90E-03	3.0E+00	1.4E-04
VOC	Methylcyclohexane	108-87-2		3.98E-01	3.0E+00	3.0E-02	7.48E-03	3.0E+00	5.7E-04
VOC	Methylene Chloride	75-09-2	B2	2.65E-03	1.0E+00	5.8E-04	7.48E-03	1.0E+00	1.6E-03
VOC	Styrene	100-42-5		2.19E-03	1.0E+00	5.0E-04	1.61E-03	1.0E+00	3.7E-04
VOC	1,1,2,2-Tetrachloroethane	79-34-5		2.72E-04			1.25E-03		
VOC	Tetrachloroethene	127-18-4	C-B2	1.57E-02	4.0E-01	9.0E-03	7.48E-03	4.0E-01	4.3E-03
VOC	Toluene	108-88-3	ID	6.41E-03	5.0E+00	2.9E-04	7.48E-03	5.0E+00	3.4E-04
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.73E-02	5.0E+00	7.9E-04	7.48E-03	5.0E+00	3.4E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	8.11E-04			5.28E-03		
VOC	Trichloroethene	79-01-6	C-B2	9.93E-03	5.4E-01	4.2E-03	7.48E-03	5.4E-01	3.2E-03
VOC	Trichlorofluoromethane	75-69-4		1.37E-01	7.0E-01	4.5E-02	7.48E-03	7.0E-01	2.4E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		6.20E-01	3.0E+01	4.7E-03	7.48E-03	3.0E+01	5.7E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.09E-03	7.0E-03	1.3E-01	2.17E-03	7.0E-03	7.1E-02
VOC	Vinyl Chloride	75-01-4	A	3.88E-02	1.0E-01	8.9E-02	7.48E-03	1.0E-01	1.7E-02
VOC	Xylenes (total)	1330-20-7	ID	5.67E-03	1.0E-01	1.3E-02	7.48E-03	1.0E-01	1.7E-02
SVOC	Acenaphthene	83-32-9		6.04E-05			6.70E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.22E-06			1.57E-09		
SVOC	Benzo(a)pyrene	50-32-8	B2	3.72E-07			1.38E-10		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.42E-05			1.35E-08		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.16E-07			3.00E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.75E-07			8.91E-11		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.60E-08			9.63E-13		
SVOC	Butylbenzylphthalate	85-68-7	C	4.41E-07			4.20E-09		
SVOC	Chrysene	218-01-9	B2	1.42E-05			3.89E-08		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.73E-09			1.35E-13		
SVOC	Dibenzofuran	132-64-9	D	4.86E-07			1.16E-08		
SVOC	Di-n-butylphthalate	84-74-2	D	6.49E-10			5.60E-12		
SVOC	Di-n-octylphthalate	117-84-0		7.16E-06			1.34E-10		
SVOC	Fluoranthene	206-44-0	D	4.15E-06			3.41E-08		
SVOC	Fluorene	86-73-7	D	2.26E-05			1.41E-06		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.87E-07			5.18E-11		
SVOC	2-Methylnaphthalene	91-57-6	ID	3.54E-04			3.98E-05		
SVOC	Naphthalene	91-20-3	C	2.90E-04	3.0E-03	2.2E-02	9.33E-05	3.0E-03	7.1E-03
SVOC	Phenanthrene	85-01-8	D	5.59E-06			1.82E-07		

Attachment D3: Routine Worker Noncancer HQ Calculations for Vapor Intrusion in a Commercial / Industrial Slab-on-Grade Building Former Delco Plant 5, Kokomo, Indiana									
				Groundwater Indoor Air Vapor Inhalation			Soil Indoor Air Vapor Inhalation		
Chem Group	Chemical	CASRN	Carc Class	C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
SVOC	Phenol	108-95-2	ID	4.12E-07			2.36E-06		
SVOC	Pyrene	129-00-0	NC	2.76E-06			2.27E-08		
PCB	PCBs (total)	1336-36-3	B2	2.80E-04			1.51E-07		
INORG	Arsenic	7440-38-2	A		1.5E-05			1.5E-05	
INORG	Barium	7440-39-3	NC						
INORG	Beryllium	7440-41-7	B1		2.0E-05			2.0E-05	
INORG	Cadmium	7440-43-9	B1		1.0E-05			1.0E-05	
INORG	Chromium (total)	7440-47-3			1.0E-04			1.0E-04	
INORG	Cobalt	7440-48-4	LC		6.0E-06			6.0E-06	
INORG	Copper	7440-50-8	D						
INORG	Cyanide (total)	57-12-5	D		9.0E-03			9.0E-03	
INORG	Manganese	7439-96-5	D		5.0E-05			5.0E-05	
INORG	Mercury	7439-97-6	D	3.57E-03	3.0E-04	2.7E+00	1.20E-05	3.0E-04	9.1E-03
INORG	Nickel	7440-02-0	A		9.0E-05			9.0E-05	
INORG	Selenium	7782-49-2	D		2.0E-02			2.0E-02	
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6	ID						
Notes:									
Unit HQs for groundwater indoor air vapor inhalation are calculated at a concentration of 1 mg/L.									
Unit HQs for soil indoor air vapor inhalation are calculated at a concentration of 1 mg/kg.									

Attachment D3: Outdoor Air Concentration due to Volatilization from Groundwater
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	H (unitless)	D _{air} (m ² /day)	D _{water} (m ² /day)	D _G (m ² /day)	D _L (m ² /day)	D _e (m ² /day)	J (mg/m ² -s)	C _{air} (mg/m ³)
VOC	Acetone	67-64-1	9.52E-04	1.07E+00	9.85E-05	9.46E-02	1.15E-06	9.58E-02	1.73E-07	2.93E-06
VOC	Benzene	71-43-2	1.31E-01	7.60E-01	8.47E-05	6.72E-02	9.91E-07	6.72E-02	1.67E-05	2.82E-04
VOC	Bromodichloromethane	75-27-4	3.62E-02	2.57E-01	9.16E-05	2.27E-02	1.07E-06	2.28E-02	1.56E-06	2.64E-05
VOC	2-Butanone	78-93-3	1.61E-03	6.98E-01	8.47E-05	6.17E-02	9.91E-07	6.23E-02	1.90E-07	3.21E-06
VOC	Carbon Disulfide	75-15-0	7.91E-01	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	1.19E-04	2.01E-03
VOC	Carbon Tetrachloride	56-23-5	7.32E-01	6.74E-01	7.60E-05	5.95E-02	8.90E-07	5.95E-02	8.27E-05	1.40E-03
VOC	Chlorobenzene	108-90-7	7.71E-02	6.31E-01	7.52E-05	5.57E-02	8.80E-07	5.57E-02	8.15E-06	1.38E-04
VOC	Chloroethane	75-00-3	2.84E-01	2.34E+00	9.94E-05	2.07E-01	1.16E-06	2.07E-01	1.11E-04	1.88E-03
VOC	Chloroform	67-66-3	8.98E-02	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	1.35E-05	2.29E-04
VOC	Chloromethane	74-87-3	2.99E-01	1.09E+00	5.62E-05	9.62E-02	6.57E-07	9.62E-02	5.46E-05	9.22E-04
VOC	2-Chlorotoluene	95-49-8	8.58E-02	5.43E-01	7.52E-05	4.79E-02	8.80E-07	4.79E-02	7.81E-06	1.32E-04
VOC	Cumene	98-82-8	2.19E-01	5.62E-01	6.13E-05	4.96E-02	7.18E-07	4.96E-02	2.06E-05	3.48E-04
VOC	Cyclohexane	110-82-7	4.69E+00	7.25E-01	7.86E-05	6.40E-02	9.20E-07	6.40E-02	5.70E-04	9.62E-03
VOC	Dibromochloromethane	124-48-1	2.03E-02	1.69E-01	9.07E-05	1.50E-02	1.06E-06	1.50E-02	5.79E-07	9.79E-06
VOC	1,1-Dichloroethane	75-34-3	1.39E-01	6.41E-01	9.07E-05	5.66E-02	1.06E-06	5.66E-02	1.49E-05	2.52E-04
VOC	1,1-Dichloroethene	75-35-4	6.97E-01	7.78E-01	8.99E-05	6.87E-02	1.05E-06	6.87E-02	9.09E-05	1.54E-03
VOC	1,2-Dichloroethene (total)	540-59-0	1.21E-01	6.36E-01	9.76E-05	5.62E-02	1.14E-06	5.62E-02	1.29E-05	2.18E-04
VOC	cis-1,2-Dichloroethene	156-59-2	9.86E-02	6.36E-01	9.76E-05	5.62E-02	1.14E-06	5.62E-02	1.05E-05	1.78E-04
VOC	trans-1,2-Dichloroethene	156-60-5	2.38E-01	6.11E-01	1.03E-04	5.40E-02	1.20E-06	5.40E-02	2.44E-05	4.11E-04
VOC	Ethyl Benzene	100-41-4	1.60E-01	6.48E-01	6.74E-05	5.72E-02	7.89E-07	5.72E-02	1.73E-05	2.93E-04
VOC	Methyl Acetate	79-20-9	2.16E-03	8.27E-01	9.50E-05	7.30E-02	1.11E-06	7.36E-02	3.02E-07	5.10E-06
VOC	4-Methyl-2-pentanone	108-10-1	3.72E-03	6.48E-01	6.74E-05	5.72E-02	7.89E-07	5.75E-02	4.05E-07	6.85E-06
VOC	Methylcyclohexane	108-87-2	9.74E+00	6.35E-01	7.36E-05	5.61E-02	8.62E-07	5.61E-02	1.04E-03	1.75E-02
VOC	Methylene Chloride	75-09-2	5.59E-02	8.73E-01	1.01E-04	7.71E-02	1.18E-06	7.71E-02	8.18E-06	1.38E-04
VOC	Styrene	100-42-5	5.46E-02	6.13E-01	6.91E-05	5.42E-02	8.09E-07	5.42E-02	5.62E-06	9.49E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.77E-03	6.13E-01	6.83E-05	5.42E-02	7.99E-07	5.43E-02	6.98E-07	1.18E-05
VOC	Tetrachloroethene	127-18-4	3.89E-01	6.22E-01	7.08E-05	5.49E-02	8.29E-07	5.50E-02	4.06E-05	6.86E-04
VOC	Toluene	108-88-3	1.45E-01	7.52E-01	7.43E-05	6.64E-02	8.70E-07	6.64E-02	1.82E-05	3.08E-04
VOC	1,1,1-Trichloroethane	71-55-6	4.12E-01	6.74E-01	7.60E-05	5.95E-02	8.90E-07	5.95E-02	4.66E-05	7.86E-04
VOC	1,1,2-Trichloroethane	79-00-5	1.93E-02	6.74E-01	7.60E-05	5.95E-02	8.90E-07	5.96E-02	2.18E-06	3.69E-05
VOC	Trichloroethene	79-01-6	2.35E-01	6.83E-01	7.86E-05	6.03E-02	9.20E-07	6.03E-02	2.69E-05	4.54E-04
VOC	Trichlorofluoromethane	75-69-4	3.09E+00	7.52E-01	8.38E-05	6.64E-02	9.81E-07	6.64E-02	3.89E-04	6.57E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.48E+01	6.74E-01	7.08E-05	5.95E-02	8.29E-07	5.95E-02	1.67E-03	2.82E-02
VOC	1,2,4-Trimethylbenzene	95-63-6	1.11E-01	5.24E-01	6.84E-05	4.62E-02	8.01E-07	4.63E-02	9.75E-06	1.65E-04
VOC	Vinyl Chloride	75-01-4	8.02E-01	9.16E-01	1.06E-04	8.09E-02	1.24E-06	8.09E-02	1.23E-04	2.08E-03
VOC	Xylenes (total)	1330-20-7	1.35E-01	6.74E-01	7.56E-05	5.95E-02	8.84E-07	5.95E-02	1.52E-05	2.57E-04
SVOC	Acenaphthene	83-32-9	2.02E-03	3.64E-01	6.64E-05	3.21E-02	7.78E-07	3.25E-02	1.25E-07	2.11E-06
SVOC	Benzo(a)anthracene	56-55-3	2.63E-05	4.41E-01	7.78E-05	3.89E-02	9.10E-07	7.35E-02	3.67E-09	6.20E-08
SVOC	Benzo(a)pyrene	50-32-8	5.87E-06	3.72E-01	7.78E-05	3.28E-02	9.10E-07	1.88E-01	2.09E-09	3.54E-08
SVOC	Benzo(b)fluoranthene	205-99-2	7.20E-04	1.95E-01	4.80E-05	1.72E-02	5.62E-07	1.80E-02	2.47E-08	4.16E-07
SVOC	Benzo(g,h,i)perylene	191-24-2	1.63E-06	1.88E-01	4.54E-05	1.66E-02	5.32E-07	3.42E-01	1.06E-09	1.79E-08
SVOC	Benzo(k)fluoranthene	207-08-9	4.74E-06	1.95E-01	4.80E-05	1.72E-02	5.62E-07	1.36E-01	1.22E-09	2.07E-08
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.06E-07	3.03E-01	3.16E-05	2.68E-02	3.70E-07	6.38E-01	7.34E-10	1.24E-08
SVOC	Butylbenzylphthalate	85-68-7	1.04E-05	1.50E-01	4.17E-05	1.33E-02	4.88E-07	6.01E-02	1.19E-09	2.01E-08
SVOC	Chrysene	218-01-9	6.67E-04	2.14E-01	5.37E-05	1.89E-02	6.28E-07	1.99E-02	2.52E-08	4.25E-07
SVOC	Dibenz(a,h)anthracene	53-70-3	2.09E-08	1.75E-01	4.48E-05	1.54E-02	5.24E-07	2.51E+01	9.95E-10	1.68E-08
SVOC	Dibenzofuran	132-64-9	1.02E-05	2.06E-01	5.18E-05	1.82E-02	6.07E-07	7.74E-02	1.51E-09	2.54E-08
SVOC	Di-n-butylphthalate	84-74-2	7.69E-09	3.78E-01	6.79E-05	3.34E-02	7.95E-07	1.03E+02	1.51E-09	2.55E-08
SVOC	Di-n-octylphthalate	117-84-0	4.93E-04	1.30E-01	3.09E-05	1.15E-02	3.62E-07	1.23E-02	1.15E-08	1.94E-07
SVOC	Fluoranthene	206-44-0	1.56E-04	2.61E-01	5.49E-05	2.30E-02	6.42E-07	2.72E-02	8.06E-09	1.36E-07
SVOC	Fluorene	86-73-7	8.23E-04	3.14E-01	6.81E-05	2.77E-02	7.97E-07	2.87E-02	4.48E-08	7.57E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	7.70E-06	1.64E-01	4.89E-05	1.45E-02	5.72E-07	8.88E-02	1.30E-09	2.19E-08
SVOC	2-Methylnaphthalene	91-57-6	1.05E-02	4.51E-01	6.70E-05	3.98E-02	7.84E-07	3.99E-02	7.93E-07	1.34E-05
SVOC	Naphthalene	91-20-3	7.98E-03	5.10E-01	6.48E-05	4.50E-02	7.58E-07	4.51E-02	6.84E-07	1.15E-05
SVOC	Phenanthrene	85-01-8	1.87E-04	3.24E-01	6.45E-05	2.86E-02	7.55E-07	3.27E-02	1.16E-08	1.96E-07
SVOC	Phenol	108-95-2	6.37E-06	1.87E-01	7.86E-05	6.26E-02	9.20E-07	2.07E-01	2.50E-09	4.23E-08
SVOC	Pyrene	129-00-0	1.02E-04	2.35E-01	6.26E-05	2.08E-02	7.32E-07	2.79E-02	5.42E-09	9.16E-08
PCB	PCBs (total)	1336-36-3	1.60E-02	1.75E-01	4.32E-05	1.54E-02	5.06E-07	1.54E-02	4.70E-07	7.94E-06
INORG	Arsenic	7440-38-2								
INORG	Barium	7440-39-3								
INORG	Beryllium	7440-41-7								
INORG	Cadmium	7440-43-9								
INORG	Chromium (total)	7440-47-3								
INORG	Cobalt	7440-48-4								
INORG	Copper	7440-50-8								
INORG	Cyanide (total)	57-12-5								
INORG	Manganese	7439-96-5								
INORG	Mercury	7439-97-6	1.49E-01	2.65E-01	5.44E-05	2.34E-02	6.37E-07	2.34E-02	6.65E-06	1.12E-04

Attachment D3: Outdoor Air Concentration due to Volatilization from Groundwater Former Delco Plant 5, Kokomo, Indiana										
Chem Group	Chemical	CASRN	H (unitless)	D _{air} (m ² /day)	D _{water} (m ² /day)	D _G (m ² /day)	D _L (m ² /day)	D _e (m ² /day)	J (mg/m ² -s)	C _{air} (mg/m ³)
INORG	Nickel	7440-02-0								
INORG	Selenium	7782-49-2								
INORG	Thallium	7440-28-0								
INORG	Vanadium	7440-62-2								
INORG	Zinc	7440-66-6								
Notes: The outdoor air concentration is calculated at a unit groundwater concentration of 1 mg/L.										
	Soil type			Silty Clay						
	Bulk density	kg/L	ρ _b	1.38						
	Total porosity	L/L-soil	θ _T	0.481						
	Water-filled porosity	L/L-soil	θ _w	0.170						
	Air-filled porosity	L/L-soil	θ _a	0.311						
	Depth to groundwater	m	DTW	6.10						
	Dispersion coefficient	(kg/m ³) / (kg/m ² /s)	CI/Q	16.9	from correlation equation in USEPA SSSG (2002)					

**Attachment D3: Routine Worker Cancer Risk Calculations for Groundwater
Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	C_{air} (mg/m³)	URF (m³/mg)	Unit Risk
VOC	Acetone	67-64-1	2.93E-06		
VOC	Benzene	71-43-2	2.82E-04	7.8E-03	1.8E-07
VOC	Bromodichloromethane	75-27-4	2.64E-05		
VOC	2-Butanone	78-93-3	3.21E-06		
VOC	Carbon Disulfide	75-15-0	2.01E-03		
VOC	Carbon Tetrachloride	56-23-5	1.40E-03	1.5E-02	1.7E-06
VOC	Chlorobenzene	108-90-7	1.38E-04		
VOC	Chloroethane	75-00-3	1.88E-03		
VOC	Chloroform	67-66-3	2.29E-04	2.3E-02	4.3E-07
VOC	Chloromethane	74-87-3	9.22E-04		
VOC	2-Chlorotoluene	95-49-8	1.32E-04		
VOC	Cumene	98-82-8	3.48E-04		
VOC	Cyclohexane	110-82-7	9.62E-03		
VOC	Dibromochloromethane	124-48-1	9.79E-06		
VOC	1,1-Dichloroethane	75-34-3	2.52E-04	1.6E-03	3.3E-08
VOC	1,1-Dichloroethene	75-35-4	1.54E-03		
VOC	1,2-Dichloroethene (total)	540-59-0	2.18E-04		
VOC	cis-1,2-Dichloroethene	156-59-2	1.78E-04		
VOC	trans-1,2-Dichloroethene	156-60-5	4.11E-04		
VOC	Ethyl Benzene	100-41-4	2.93E-04		
VOC	Methyl Acetate	79-20-9	5.10E-06		
VOC	4-Methyl-2-pentanone	108-10-1	6.85E-06		
VOC	Methylcyclohexane	108-87-2	1.75E-02		
VOC	Methylene Chloride	75-09-2	1.38E-04	4.7E-04	5.3E-09
VOC	Styrene	100-42-5	9.49E-05		
VOC	1,1,2,2-Tetrachloroethane	79-34-5	1.18E-05		
VOC	Tetrachloroethene	127-18-4	6.86E-04	3.1E-03	1.7E-07
VOC	Toluene	108-88-3	3.08E-04		
VOC	1,1,1-Trichloroethane	71-55-6	7.86E-04		
VOC	1,1,2-Trichloroethane	79-00-5	3.69E-05	1.6E-02	4.8E-08
VOC	Trichloroethene	79-01-6	4.54E-04	1.7E-03	6.3E-08
VOC	Trichlorofluoromethane	75-69-4	6.57E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.82E-02		
VOC	1,2,4-Trimethylbenzene	95-63-6	1.65E-04		
VOC	Vinyl Chloride	75-01-4	2.08E-03	8.8E-03	1.5E-06
VOC	Xylenes (total)	1330-20-7	2.57E-04		
SVOC	Acenaphthene	83-32-9	2.11E-06		
SVOC	Benzo(a)anthracene	56-55-3	6.20E-08	8.8E-02	4E-10
SVOC	Benzo(a)pyrene	50-32-8	3.54E-08	8.8E-01	3E-09
SVOC	Benzo(b)fluoranthene	205-99-2	4.16E-07	8.8E-02	3E-09
SVOC	Benzo(g,h,i)perylene	191-24-2	1.79E-08		
SVOC	Benzo(k)fluoranthene	207-08-9	2.07E-08	8.8E-03	1E-11
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.24E-08	2.4E-03	2E-12
SVOC	Butylbenzylphthalate	85-68-7	2.01E-08		
SVOC	Chrysene	218-01-9	4.25E-07	8.8E-04	3E-11
SVOC	Dibenz(a,h)anthracene	53-70-3	1.68E-08	8.8E-01	1E-09
SVOC	Dibenzofuran	132-64-9	2.54E-08		

**Attachment D3: Routine Worker Cancer Risk Calculations for Groundwater
Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	C_{air} (mg/m³)	URF (m³/mg)	Unit Risk
SVOC	Di-n-butylphthalate	84-74-2	2.55E-08		
SVOC	Di-n-octylphthalate	117-84-0	1.94E-07		
SVOC	Fluoranthene	206-44-0	1.36E-07		
SVOC	Fluorene	86-73-7	7.57E-07		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.19E-08	8.8E-02	2E-10
SVOC	2-Methylnaphthalene	91-57-6	1.34E-05		
SVOC	Naphthalene	91-20-3	1.15E-05	3.4E-02	3E-08
SVOC	Phenanthrene	85-01-8	1.96E-07		
SVOC	Phenol	108-95-2	4.23E-08		
SVOC	Pyrene	129-00-0	9.16E-08		
PCB	PCBs (total)	1336-36-3	7.94E-06	5.7E-01	4E-07
INORG	Arsenic	7440-38-2		4.3E+00	
INORG	Barium	7440-39-3			
INORG	Beryllium	7440-41-7		2.4E+00	
INORG	Cadmium	7440-43-9		1.8E+00	
INORG	Chromium (total)	7440-47-3		1.2E+01	
INORG	Cobalt	7440-48-4		9.0E+00	
INORG	Copper	7440-50-8			
INORG	Cyanide (total)	57-12-5			
INORG	Manganese	7439-96-5			
INORG	Mercury	7439-97-6	1.12E-04		
INORG	Nickel	7440-02-0		2.4E-01	
INORG	Selenium	7782-49-2			
INORG	Thallium	7440-28-0			
INORG	Vanadium	7440-62-2			
INORG	Zinc	7440-66-6			
Notes:					
Unit risks for groundwater indoor air vapor inhalation are calculated at a concentration of 1 mg/L.					

**Attachment D3: Routine Worker Noncancer HQ Calculations for Groundwater
Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	C_{air} (mg/m³)	RfC (mg/m³)	Unit HQ
VOC	Acetone	67-64-1	2.93E-06	3.1E+01	2.2E-08
VOC	Benzene	71-43-2	2.82E-04	3.0E-02	2.1E-03
VOC	Bromodichloromethane	75-27-4	2.64E-05		
VOC	2-Butanone	78-93-3	3.21E-06	5.0E+00	1.5E-07
VOC	Carbon Disulfide	75-15-0	2.01E-03	7.0E-01	6.6E-04
VOC	Carbon Tetrachloride	56-23-5	1.40E-03	1.9E-01	1.7E-03
VOC	Chlorobenzene	108-90-7	1.38E-04	5.0E-02	6.3E-04
VOC	Chloroethane	75-00-3	1.88E-03	1.0E+01	4.3E-05
VOC	Chloroform	67-66-3	2.29E-04	5.0E-02	1.0E-03
VOC	Chloromethane	74-87-3	9.22E-04	9.0E-02	2.3E-03
VOC	2-Chlorotoluene	95-49-8	1.32E-04		
VOC	Cumene	98-82-8	3.48E-04	4.0E-01	2.0E-04
VOC	Cyclohexane	110-82-7	9.62E-03	6.0E+00	3.7E-04
VOC	Dibromochloromethane	124-48-1	9.79E-06		
VOC	1,1-Dichloroethane	75-34-3	2.52E-04	5.0E-01	1.2E-04
VOC	1,1-Dichloroethene	75-35-4	1.54E-03	2.0E-01	1.8E-03
VOC	1,2-Dichloroethene (total)	540-59-0	2.18E-04		
VOC	cis-1,2-Dichloroethene	156-59-2	1.78E-04		
VOC	trans-1,2-Dichloroethene	156-60-5	4.11E-04	6.0E-02	1.6E-03
VOC	Ethyl Benzene	100-41-4	2.93E-04	1.0E+00	6.7E-05
VOC	Methyl Acetate	79-20-9	5.10E-06		
VOC	4-Methyl-2-pentanone	108-10-1	6.85E-06	3.0E+00	5.2E-07
VOC	Methylcyclohexane	108-87-2	1.75E-02	3.0E+00	1.3E-03
VOC	Methylene Chloride	75-09-2	1.38E-04	1.0E+00	3.0E-05
VOC	Styrene	100-42-5	9.49E-05	1.0E+00	2.2E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	1.18E-05		
VOC	Tetrachloroethene	127-18-4	6.86E-04	4.0E-01	3.9E-04
VOC	Toluene	108-88-3	3.08E-04	5.0E+00	1.4E-05
VOC	1,1,1-Trichloroethane	71-55-6	7.86E-04	5.0E+00	3.6E-05
VOC	1,1,2-Trichloroethane	79-00-5	3.69E-05		
VOC	Trichloroethene	79-01-6	4.54E-04	5.4E-01	1.9E-04
VOC	Trichlorofluoromethane	75-69-4	6.57E-03	7.0E-01	2.1E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.82E-02	3.0E+01	2.1E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	1.65E-04	7.0E-03	5.4E-03
VOC	Vinyl Chloride	75-01-4	2.08E-03	1.0E-01	4.8E-03
VOC	Xylenes (total)	1330-20-7	2.57E-04	1.0E-01	5.9E-04
SVOC	Acenaphthene	83-32-9	2.11E-06		
SVOC	Benzo(a)anthracene	56-55-3	6.20E-08		
SVOC	Benzo(a)pyrene	50-32-8	3.54E-08		
SVOC	Benzo(b)fluoranthene	205-99-2	4.16E-07		
SVOC	Benzo(g,h,i)perylene	191-24-2	1.79E-08		
SVOC	Benzo(k)fluoranthene	207-08-9	2.07E-08		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.24E-08		
SVOC	Butylbenzylphthalate	85-68-7	2.01E-08		
SVOC	Chrysene	218-01-9	4.25E-07		
SVOC	Dibenz(a,h)anthracene	53-70-3	1.68E-08		
SVOC	Dibenzofuran	132-64-9	2.54E-08		

**Attachment D3: Routine Worker Noncancer HQ Calculations for Groundwater
Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	C_{air} (mg/m³)	RfC (mg/m³)	Unit HQ
SVOC	Di-n-butylphthalate	84-74-2	2.55E-08		
SVOC	Di-n-octylphthalate	117-84-0	1.94E-07		
SVOC	Fluoranthene	206-44-0	1.36E-07		
SVOC	Fluorene	86-73-7	7.57E-07		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.19E-08		
SVOC	2-Methylnaphthalene	91-57-6	1.34E-05		
SVOC	Naphthalene	91-20-3	1.15E-05	3.0E-03	8.8E-04
SVOC	Phenanthrene	85-01-8	1.96E-07		
SVOC	Phenol	108-95-2	4.23E-08		
SVOC	Pyrene	129-00-0	9.16E-08		
PCB	PCBs (total)	1336-36-3	7.94E-06		
INORG	Arsenic	7440-38-2		1.5E-05	
INORG	Barium	7440-39-3			
INORG	Beryllium	7440-41-7		2.0E-05	
INORG	Cadmium	7440-43-9		1.0E-05	
INORG	Chromium (total)	7440-47-3		1.0E-04	
INORG	Cobalt	7440-48-4		6.0E-06	
INORG	Copper	7440-50-8			
INORG	Cyanide (total)	57-12-5		9.0E-03	
INORG	Manganese	7439-96-5		5.0E-05	
INORG	Mercury	7439-97-6	1.12E-04	3.0E-04	8.5E-02
INORG	Nickel	7440-02-0		9.0E-05	
INORG	Selenium	7782-49-2		2.0E-02	
INORG	Thallium	7440-28-0			
INORG	Vanadium	7440-62-2			
INORG	Zinc	7440-66-6			
Note:					
Unit HQs for groundwater volatilization to outdoor air are calculated at a concentration of 1 mg/L.					

Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} (m ² /day)	α _{so}	K _{oc} (L/kg)	K _d (L/kg)	C _{source} (mg/m ³)	α _{ML}	α	C _{building} (mg/m ³)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	9.52E-04	1.74E-01	1.74E-01	7.13E-05	5.81E-01	1.98E-03	7.60E+00	5.18E-04	7.13E-05	5.42E-04
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.31E-01	1.24E-01	1.24E-01	6.75E-05	5.82E+01	1.98E-01	3.73E+02	1.05E-05	1.05E-05	3.94E-03
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.62E-02	4.19E-02	4.19E-02	4.19E-02	4.95E-05	5.51E+01	1.87E-01	1.14E+02	3.47E-05	3.47E-05
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.61E-03	1.14E-01	1.14E-01	6.64E-05	2.00E+00	6.79E-03	1.23E+01	3.19E-04	6.64E-05	8.19E-04
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	7.91E-01	1.46E-01	1.46E-01	6.94E-05	4.59E+01	1.56E-01	1.73E+03	2.28E-06	2.28E-06	3.94E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	7.32E-01	1.10E-01	1.10E-01	6.59E-05	1.74E+02	5.91E-01	8.32E+02	4.73E-06	4.73E-06	3.94E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.71E-02	1.03E-01	1.03E-01	6.50E-05	2.20E+02	7.49E-01	8.66E+01	4.54E-05	4.54E-05	3.94E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	2.84E-01	3.81E-01	3.81E-01	7.71E-05	1.62E+01	5.52E-02	1.17E+03	3.36E-06	3.36E-06	3.94E-03
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	8.98E-02	1.46E-01	1.46E-01	6.94E-05	3.97E+01	1.35E-01	3.23E+02	1.22E-05	1.22E-05	3.94E-03
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	2.99E-01	1.77E-01	1.77E-01	7.14E-05	3.97E+01	1.35E-01	9.19E+02	4.28E-06	4.28E-06	3.94E-03
VOC	2-Chlorotoluene	95-49-8	5.43E-01	7.52E-05	8.58E-02	8.83E-02	8.83E-02	6.28E-05	6.12E+02	2.08E+00	3.86E+01	1.02E-04	6.28E-05	2.42E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.19E-01	9.14E-02	9.14E-02	6.33E-05	7.05E+02	2.40E+00	8.51E+01	4.62E-05	4.62E-05	3.94E-03
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	4.69E+00	1.18E-01	1.18E-01	6.68E-05	6.35E+02	2.16E+00	1.40E+03	2.80E-06	2.80E-06	3.94E-03
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	2.03E-02	2.76E-02	2.76E-02	4.10E-05	6.26E+01	2.13E-01	5.97E+01	6.59E-05	4.10E-05	2.45E-03
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.39E-01	1.04E-01	1.04E-01	6.52E-05	3.13E+01	1.07E-01	5.32E+02	7.40E-06	7.40E-06	3.94E-03
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	6.97E-01	1.27E-01	1.27E-01	6.77E-05	5.82E+01	1.98E-01	1.46E+03	2.70E-06	2.70E-06	3.94E-03
VOC	1,2-Dichloroethene (total)	540-59-0	6.36E-01	9.76E-05	1.21E-01	1.03E-01	1.03E-01	6.51E-05	3.56E+01	1.21E-01	4.46E+02	8.82E-06	8.82E-06	3.94E-03
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	9.86E-02	1.03E-01	1.03E-01	6.51E-05	3.56E+01	1.21E-01	3.70E+02	1.06E-05	1.06E-05	3.94E-03
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	2.38E-01	9.94E-02	9.94E-02	6.45E-05	5.22E+01	1.77E-01	6.71E+02	5.86E-06	5.86E-06	3.94E-03
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.60E-01	1.05E-01	1.05E-01	6.54E-05	3.67E+02	1.25E+00	1.13E+02	3.47E-05	3.47E-05	3.94E-03
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	2.16E-03	1.35E-01	1.35E-01	6.85E-05	1.66E+00	5.65E-03	1.67E+01	2.35E-04	6.85E-05	1.15E-03
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	3.72E-03	1.05E-01	1.05E-01	6.54E-05	1.05E+01	3.57E-02	2.33E+01	1.69E-04	6.54E-05	1.52E-03
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	9.74E+00	1.03E-01	1.03E-01	6.51E-05	2.66E+02	9.06E-01	3.02E+03	1.30E-06	1.30E-06	3.94E-03
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	5.59E-02	1.42E-01	1.42E-01	6.91E-05	1.17E+01	3.98E-02	3.18E+02	1.24E-05	1.24E-05	3.94E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.46E-02	9.98E-02	9.98E-02	6.46E-05	7.77E+02	2.64E+00	1.97E+01	2.00E-04	6.46E-05	1.27E-03
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.13E-01	6.83E-05	6.77E-03	9.98E-02	9.98E-02	6.46E-05	9.35E+01	3.18E-01	1.53E+01	2.57E-04	6.46E-05	9.88E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.89E-01	1.01E-01	1.01E-01	6.48E-05	1.56E+02	5.30E-01	5.26E+02	7.49E-06	7.49E-06	3.94E-03
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.45E-01	1.22E-01	1.22E-01	6.73E-05	1.80E+02	6.13E-01	1.88E+02	2.09E-05	2.09E-05	3.94E-03
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	4.12E-01	1.10E-01	1.10E-01	6.59E-05	1.10E+02	3.75E-01	6.97E+02	5.64E-06	5.64E-06	3.94E-03
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.93E-02	1.10E-01	1.10E-01	6.59E-05	5.03E+01	1.71E-01	6.46E+01	6.09E-05	6.09E-05	3.94E-03
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.35E-01	1.11E-01	1.11E-01	6.61E-05	1.68E+02	5.70E-01	3.15E+02	1.25E-05	1.25E-05	3.94E-03
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	3.09E+00	1.22E-01	1.22E-01	6.73E-05	1.21E+02	4.11E-01	2.51E+03	1.57E-06	1.57E-06	3.94E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	1.48E+01	1.10E-01	1.10E-01	6.59E-05	3.81E+02	1.30E+00	3.11E+03	1.27E-06	1.27E-06	3.94E-03
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.11E-01	8.52E-02	8.52E-02	6.22E-05	1.18E+03	4.01E+00	2.67E+01	1.47E-04	6.22E-05	1.66E-03
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	8.02E-01	1.49E-01	1.49E-01	6.96E-05	1.85E+01	6.28E-02	2.19E+03	1.80E-06	1.80E-06	3.94E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.35E-01	1.10E-01	1.10E-01	6.59E-05	3.86E+02	1.31E+00	9.21E+01	4.27E-05	4.27E-05	3.94E-03
SVOC	Acenaphthene	83-32-1	3.64E-01	6.64E-05	2.02E-03	5.92E-02	5.92E-02	5.61E-05	7.14E+03	2.43E+01	8.29E-02	4.75E-02	5.61E-05	4.65E-06
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	2.63E-05	7.29E-02	7.29E-02	5.97E-05	4.01E+05	1.36E+03	1.93E-05	2.04E+02	5.97E-05	1.15E-09
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	5.87E-06	6.57E-02	6.57E-02	5.80E-05	1.01E+06	3.45E+03	1.70E-06	2.31E+03	5.80E-05	9.86E-11
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	7.20E-04	3.18E-02	3.18E-02	4.39E-05	1.24E+06	4.23E+03	1.70E-04	2.31E+01	4.39E-05	7.48E-09
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	1.63E-06	4.16E-02	4.16E-02	4.94E-05	1.28E+07	4.35E+04	3.75E-08	1.05E+05	4.94E-05	1.85E-12
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	4.74E-06	3.58E-02	3.58E-02	4.64E-05	1.24E+06	4.23E+03	1.12E-06	3.52E+03	4.64E-05	5.19E-11
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	6.06E-07	7.01E-02	7.01E-02	5.91E-05	1.50E+07	5.10E+04	1.19E-08	3.31E+05	5.91E-05	7.02E-13
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	1.04E-05	2.61E-02	2.61E-02	3.98E-05	5.73E+04	1.95E+02	5.36E-05	7.35E+01	3.98E-05	2.13E-09
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	6.67E-04	3.49E-02	3.49E-02	4.59E-05	4.01E+05	1.36E+03	4.89E-04	8.05E+00	4.59E-05	2.24E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	2.09E-08	8.79E-01	8.79E-01	8.02E-05	3.77E+06	1.28E+04	1.63E-09	2.41E+06	8.02E-05	1.31E-13
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	1.02E-05	3.55E-02	3.55E-02	4.62E-05	2.07E+04	7.03E+01	1.45E-04	2.71E+01	4.62E-05	6.72E-09
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	7.69E-09	3.57E+00	3.57E+00	8.38E-05	3.40E+04	1.16E+02	6.64E-08	5.93E+04	8.38E-05	5.56E-12
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	4.93E-04	2.13E-02	2.13E-02	3.57E-05	8.38E+07	2.85E+05	1.73E-06	2.27E+03	3.57E-05	6.17E-11
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	1.56E-04	4.26E-02	4.26E-02	4.99E-05	1.08E+05	3.67E+02	4.26E-04	9.24E+00	4.99E-05	2.13E-08
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	8.23E-04	5.11E-02	5.11E-02	5.34E-05	1.38E+04	4.68E+01	1.75E-02	2.24E-01	5.34E-05	9.36E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	7.70E-06	2.92E-02	2.92E-02	4.22E-05	3.45E+06	1.17E+04	6.57E-07	5.99E+03	4.22E-05	2.77E-11
SVOC	2-Methylnaphthalene	91-57-6	4.51E-01	6.70E-05	1.05E-02	7.34E-02	7.34E-02	5.99E-05	6.23E+03	2.12E+01	4.91E-01	8.02E-03	5.99E-05	2.94E-05
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	7.98E-03	8.30E-02	8.30E-02	6.18E-05	2.01E+03	6.83E+00	1.15E+00	3.43E-03	6.18E-05	7.09E-05
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	1.87E-04	5.29E-02	5.29E-02	5.40E-05	2.42E+04	8.24E+01	2.26E-03	1.74E+00	5.40E-05	1.22E-07
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	6.37E-06	1.20E-01	1.20E-01	6.71E-05	2.88E+01	9.79E-02	2.88E-02	1.37E-01	6.71E-05	1.93E-06
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	1.02E-04	3.85E-02	3.85E-02	4.78E-05	1.06E+05	3.59E+02	2.85E-04	1.38E+01	4.78E-05	1.36E-08
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	1.60E-02	2.84E-02	2.84E-02	4.16E-05	2.45E+06	8.34E+03	1.92E-03	2.05E+00	4.16E-05	7.99E-08
INORG	Arsenic	7440-38-2									2.90E+01			
INORG	Barium	7440-39-3									4.10E+01			
INORG	Beryllium	7440-41-7									7.90E+02			
INORG	Cadmium	7440-43-9									7.50E+01			
INORG	Chromium (total)	7440-47-3									1.90E+01			
INORG	Cobalt	7440-48-4									4.50E+01			

**Attachment D3: Indoor Air Concentration in a Commercial / Industrial Slab-on-Grade Building
due to Vapor Intrusion from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} (m ² /day)	α _{so}	K _{oc} (L/kg)	K _d (L/kg)	C _{source} (mg/m ³)	α _{ML}	α	C _{building} (mg/m ³)
INORG	Copper	7440-50-8								3.50E+01				
INORG	Cyanide (total)	57-12-5								9.90E+00				
INORG	Manganese	7439-96-5								6.50E+01				
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.49E-01	4.32E-02	4.32E-02	5.01E-05		1.00E+03	1.49E-01	2.64E-02	5.01E-05	7.49E-06
INORG	Nickel	7440-02-0								6.50E+01				
INORG	Selenium	7782-49-2								5.00E+00				
INORG	Thallium	7440-28-0								7.10E+01				
INORG	Vanadium	7440-62-2								1.00E+03				
INORG	Zinc	7440-66-6								6.20E+01				
Notes: The indoor air concentration is calculated at a unit soil concentration of 1 mg/kg.														
Soil and Building Characteristics			Crack Soil		Deep Vadose Soil									
SCS Soil texture class			Sand		Silty Clay									
Bulk density	kg/L	p _b	1.66		1.38									
Total porosity	L/L-soil	θ _T	0.375		0.481									
Water-filled porosity	L/L-soil	θ _w	0.053		0.170									
Air-filled porosity	L/L-soil	θ _a	0.322		0.311									
Organic carbon fraction	unitless	f _{oc}	0.003		0.003									
Residual saturation	L/L-soil	θ _r	0.053											
Hydraulic conductivity	cm/s	K	7.4E-03											
Dynamic viscosity of water	g/cm-s	μ _w	0.01307											
Density of water	g/cm ³	ρ _w	1.0											
Gravitational acceleration	cm/s ²	g	980.7											
Intrinsic permeability	cm ²	k	9.9E-08											
Relative saturation	unitless	S _r												
van Genuchten N	unitless	N	1.32											
van Genuchten M	unitless	M	0.243											
Relative air permeability	unitless	k _{rg}	1.000											
Permeability to vapor	cm ²	k _v	9.9E-08											
Distance from building foundation to source	m	L _T	2.90											
Bldg foundation thickness	m	L _{crack}	0.15											
Bldg foundation length	m		19.29											
Bldg foundation width	m		19.29											
Bldg occupied height	m		2.44											
Bldg occupied volume	m ³		907.93											
Occupied depth below ground	m													
Bldg area for vapor intrusion	m ²	A _B	372.1											
Ratio of A _{crack} to A _B		η	1E-04											
Area of cracks	m ²	A _{crack}	3.86E-02											
Air exchange rate	hour ⁻¹	ach	2.0											
Building ventilation rate	m ³ /day	Q _{bldg}	4.36E+04											
Pressure difference between outdoors-indoors	kg/m-s ²	ΔP	1.0											
Viscosity of air	kg/m-s	μ _a	1.8E-05											
Crack length (bldg perimeter)	m	X _{crack}	77.16											
Crack depth below ground	m	Z _{crack}	0.15											
Crack radius	m	r _{crack}	5E-04											
Soil gas flow rate into bldg	m ³ /day	Q _{soil}	3.61E+00											
Averaging period	day	T	9.13E+03											
Contaminant thickness	m	ΔH	3.048											

**Attachment D3: Routine Worker Cancer Risk Calculations for Vapor Intrusion in a
Commercial / Industrial Slab-on-Grade Building from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Soil Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
VOC	Acetone	67-64-1	ID	5.42E-04		
VOC	Benzene	71-43-2	A	3.94E-03	7.8E-03	2.5E-06
VOC	Bromodichloromethane	75-27-4	B2	3.94E-03		
VOC	2-Butanone	78-93-3	ID	8.19E-04		
VOC	Carbon Disulfide	75-15-0		3.94E-03		
VOC	Carbon Tetrachloride	56-23-5	B2	3.94E-03	1.5E-02	4.8E-06
VOC	Chlorobenzene	108-90-7	D	3.94E-03		
VOC	Chloroethane	75-00-3	LC	3.94E-03		
VOC	Chloroform	67-66-3	B2	3.94E-03	2.3E-02	7.4E-06
VOC	Chloromethane	74-87-3	D	3.94E-03		
VOC	2-Chlorotoluene	95-49-8		2.42E-03		
VOC	Cumene	98-82-8	D	3.94E-03		
VOC	Cyclohexane	110-82-7	ID	3.94E-03		
VOC	Dibromochloromethane	124-48-1	C	2.45E-03		
VOC	1,1-Dichloroethane	75-34-3	SC	3.94E-03	1.6E-03	5.1E-07
VOC	1,1-Dichloroethene	75-35-4	C	3.94E-03		
VOC	1,2-Dichloroethene (total)	540-59-0		3.94E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.94E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		3.94E-03		
VOC	Ethyl Benzene	100-41-4	D	3.94E-03		
VOC	Methyl Acetate	79-20-9		1.15E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.52E-03		
VOC	Methylcyclohexane	108-87-2		3.94E-03		
VOC	Methylene Chloride	75-09-2	B2	3.94E-03	4.7E-04	1.5E-07
VOC	Styrene	100-42-5		1.27E-03		
VOC	1,1,2,2-Tetrachloroethane	79-34-5		9.88E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	3.94E-03	3.1E-03	9.8E-07
VOC	Toluene	108-88-3	ID	3.94E-03		
VOC	1,1,1-Trichloroethane	71-55-6	ID	3.94E-03		
VOC	1,1,2-Trichloroethane	79-00-5	C	3.94E-03	1.6E-02	5.1E-06
VOC	Trichloroethene	79-01-6	C-B2	3.94E-03	1.7E-03	5.5E-07
VOC	Trichlorofluoromethane	75-69-4		3.94E-03		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.94E-03		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.66E-03		
VOC	Vinyl Chloride	75-01-4	A	3.94E-03	8.8E-03	2.8E-06
VOC	Xylenes (total)	1330-20-7	ID	3.94E-03		
SVOC	Acenaphthene	83-32-9		4.65E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.15E-09	8.8E-02	8.3E-12
SVOC	Benzo(a)pyrene	50-32-8	B2	9.86E-11	8.8E-01	7.1E-12
SVOC	Benzo(b)fluoranthene	205-99-2	B2	7.48E-09	8.8E-02	5.4E-11
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.85E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	5.19E-11	8.8E-03	3.7E-14
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.02E-13	2.4E-03	1.4E-16
SVOC	Butylbenzylphthalate	85-68-7	C	2.13E-09		

**Attachment D3: Routine Worker Cancer Risk Calculations for Vapor Intrusion in a
Commercial / Industrial Slab-on-Grade Building from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Soil Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
SVOC	Chrysene	218-01-9	B2	2.24E-08	8.8E-04	1.6E-12
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.31E-13	8.8E-01	9.4E-15
SVOC	Dibenzofuran	132-64-9	D	6.72E-09		
SVOC	Di-n-butylphthalate	84-74-2	D	5.56E-12		
SVOC	Di-n-octylphthalate	117-84-0		6.17E-11		
SVOC	Fluoranthene	206-44-0	D	2.13E-08		
SVOC	Fluorene	86-73-7	D	9.36E-07		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.77E-11	8.8E-02	2.0E-13
SVOC	2-Methylnaphthalene	91-57-6	ID	2.94E-05		
SVOC	Naphthalene	91-20-3	C	7.09E-05	3.4E-02	2.0E-07
SVOC	Phenanthrene	85-01-8	D	1.22E-07		
SVOC	Phenol	108-95-2	ID	1.93E-06		
SVOC	Pyrene	129-00-0	NC	1.36E-08		
PCB	PCBs (total)	1336-36-3	B2	7.99E-08	5.7E-01	3.7E-09
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	NC			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Cobalt	7440-48-4	LC		9.0E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	7.49E-06		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	ID			
Note:						
Unit risks for soil indoor air vapor inhalation are calculated at a concentration of 1 mg/kg.						

**Attachment D3: Routine Worker Noncancer HQ Calculations for Vapor Intrusion in
a Commercial / Industrial Slab-on-Grade Building from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Soil Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
VOC	Acetone	67-64-1	ID	5.42E-04	3.1E+01	4.0E-06
VOC	Benzene	71-43-2	A	3.94E-03	3.0E-02	3.0E-02
VOC	Bromodichloromethane	75-27-4	B2	3.94E-03		
VOC	2-Butanone	78-93-3	ID	8.19E-04	5.0E+00	3.7E-05
VOC	Carbon Disulfide	75-15-0		3.94E-03	7.0E-01	1.3E-03
VOC	Carbon Tetrachloride	56-23-5	B2	3.94E-03	1.9E-01	4.8E-03
VOC	Chlorobenzene	108-90-7	D	3.94E-03	5.0E-02	1.8E-02
VOC	Chloroethane	75-00-3	LC	3.94E-03	1.0E+01	9.0E-05
VOC	Chloroform	67-66-3	B2	3.94E-03	5.0E-02	1.8E-02
VOC	Chloromethane	74-87-3	D	3.94E-03	9.0E-02	1.0E-02
VOC	2-Chlorotoluene	95-49-8		2.42E-03		
VOC	Cumene	98-82-8	D	3.94E-03	4.0E-01	2.2E-03
VOC	Cyclohexane	110-82-7	ID	3.94E-03	6.0E+00	1.5E-04
VOC	Dibromochloromethane	124-48-1	C	2.45E-03		
VOC	1,1-Dichloroethane	75-34-3	SC	3.94E-03	5.0E-01	1.8E-03
VOC	1,1-Dichloroethene	75-35-4	C	3.94E-03	2.0E-01	4.5E-03
VOC	1,2-Dichloroethene (total)	540-59-0		3.94E-03		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.94E-03		
VOC	trans-1,2-Dichloroethene	156-60-5		3.94E-03	6.0E-02	1.5E-02
VOC	Ethyl Benzene	100-41-4	D	3.94E-03	1.0E+00	9.0E-04
VOC	Methyl Acetate	79-20-9		1.15E-03		
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.52E-03	3.0E+00	1.2E-04
VOC	Methylcyclohexane	108-87-2		3.94E-03	3.0E+00	3.0E-04
VOC	Methylene Chloride	75-09-2	B2	3.94E-03	1.0E+00	8.6E-04
VOC	Styrene	100-42-5		1.27E-03	1.0E+00	2.9E-04
VOC	1,1,2,2-Tetrachloroethane	79-34-5		9.88E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	3.94E-03	4.0E-01	2.2E-03
VOC	Toluene	108-88-3	ID	3.94E-03	5.0E+00	1.8E-04
VOC	1,1,1-Trichloroethane	71-55-6	ID	3.94E-03	5.0E+00	1.8E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	3.94E-03		
VOC	Trichloroethene	79-01-6	C-B2	3.94E-03	5.4E-01	1.7E-03
VOC	Trichlorofluoromethane	75-69-4		3.94E-03	7.0E-01	1.3E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.94E-03	3.0E+01	3.0E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.66E-03	7.0E-03	5.4E-02
VOC	Vinyl Chloride	75-01-4	A	3.94E-03	1.0E-01	9.0E-03
VOC	Xylenes (total)	1330-20-7	ID	3.94E-03	1.0E-01	9.0E-03
SVOC	Acenaphthene	83-32-9		4.65E-06		
SVOC	Benzo(a)anthracene	56-55-3	B2	1.15E-09		
SVOC	Benzo(a)pyrene	50-32-8	B2	9.86E-11		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	7.48E-09		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.85E-12		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	5.19E-11		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.02E-13		

**Attachment D3: Routine Worker Noncancer HQ Calculations for Vapor Intrusion in
a Commercial / Industrial Slab-on-Grade Building from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Soil Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
SVOC	Butylbenzylphthalate	85-68-7	C	2.13E-09		
SVOC	Chrysene	218-01-9	B2	2.24E-08		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.31E-13		
SVOC	Dibenzofuran	132-64-9	D	6.72E-09		
SVOC	Di-n-butylphthalate	84-74-2	D	5.56E-12		
SVOC	Di-n-octylphthalate	117-84-0		6.17E-11		
SVOC	Fluoranthene	206-44-0	D	2.13E-08		
SVOC	Fluorene	86-73-7	D	9.36E-07		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.77E-11		
SVOC	2-Methylnaphthalene	91-57-6	ID	2.94E-05		
SVOC	Naphthalene	91-20-3	C	7.09E-05	3.0E-03	5.4E-03
SVOC	Phenanthrene	85-01-8	D	1.22E-07		
SVOC	Phenol	108-95-2	ID	1.93E-06		
SVOC	Pyrene	129-00-0	NC	1.36E-08		
PCB	PCBs (total)	1336-36-3	B2	7.99E-08		
INORG	Arsenic	7440-38-2	A		1.5E-05	
INORG	Barium	7440-39-3	NC			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		1.0E-05	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Cobalt	7440-48-4	LC		6.0E-06	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D		9.0E-03	
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	7.49E-06	3.0E-04	5.7E-03
INORG	Nickel	7440-02-0	A		9.0E-05	
INORG	Selenium	7782-49-2	D		2.0E-02	
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	ID			
Note:						
Unit HQs for soil indoor air vapor inhalation are calculated at a concentration of 1 mg/kg.						

Attachment D3: Vapor Flux of TCE to Outdoor Air from Soil Source at 10 ft bgs
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² s)
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.03E+00	6.03E-02	9.20E-07	1.37E-02	3.56E-01
Notes:	The flux is calculated at a unit soil concentration of 1 mg/kg.											
	Soil bulk density	kg/L	ρ _b	1.38	<i>Silty-Clay</i>							
	Soil porosity	L/L-soil	θ	0.48	<i>Silty Clay</i>							
	Soil water content	L/L-soil	θ _w	0.17	<i>Measured</i>							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	<i>porosity-water content</i>							
	Soil organic carbon fraction	unitless	f _{oc}	0.0034	<i>Measured</i>							
	Averaging period	year	ED	25								
		K	T	285.5								
	Depth to top of source	m	Z ₁	3.048								
	Depth to bottom of source	m	Z ₂	6.096								

Attachment D3: Estimates of Cancer Risk and HQ for Routine Worker Exposure to Soil at Example Location SB-0634 Former GM Delco Plant 5, Kokomo, Indiana																				
Location	Chem Group	Chemical	CASRN	Max Detect (mg/kg)	Max Limit (mg/kg)	Background Conc (mg/kg)	Site-Related Exposure Concentration (mg/kg)	Basis of Site-Related Exposure Concentration	Routine Worker											
									Volatilization to Indoor Air (surface source)				Volatilization to Indoor Air (source 10 ft bgs)				Outdoor Activities			
									Unit Risk	Unit HQ	Risk	HQ	Unit Risk	Unit HQ	Risk	HQ	Unit Risk	Unit HQ	Risk	HQ
SB-0634	VOC	Acetone	67-64-1	1.20E-01	8.25E-02		1.20E-01	Half-Limit		4.6E-06		6E-07		4.0E-06		5E-07		1.1E-06		1E-07
SB-0634	VOC	Benzene	71-43-2	6.00E-03	4.10E-03		6.00E-03	Half-Limit	4.8E-06	5.7E-02	3E-08	3E-04	2.5E-06	3.0E-02	2E-08	2E-04	2.8E-07	3.4E-03	2E-09	2E-05
SB-0634	VOC	Bromodichloromethane	75-27-4		6.10E-03		3.05E-03	Half-Limit									1.1E-08	2.4E-05	3E-11	7E-08
SB-0634	VOC	2-Butanone	78-93-3		6.10E-02		3.05E-02	Half-Limit		4.6E-05		1E-06		3.7E-05		1E-06		4.3E-06		1E-07
SB-0634	VOC	Carbon Disulfide	75-15-0	5.70E-02	8.25E-03		5.70E-02	Max Detect		2.4E-03		1E-04		1.3E-03		7E-05		3.3E-04		2E-05
SB-0634	VOC	Carbon Tetrachloride	56-23-5		6.10E-03		3.05E-03	Half-Limit	9.2E-06	9.1E-03	3E-08	3E-05	4.8E-06	4.8E-03	1E-08	1E-05	7.6E-07	1.4E-03	2E-09	4E-06
SB-0634	VOC	Chlorobenzene	108-90-7		6.10E-03		3.05E-03	Half-Limit		3.2E-02		1E-04		1.8E-02		5E-05		8.8E-04		3E-06
SB-0634	VOC	Chloroethane	75-00-3		6.10E-03		3.05E-03	Half-Limit		1.7E-04		5E-07		9.0E-05		3E-07		3.5E-05		1E-07
SB-0634	VOC	Chloroform	67-66-3		6.10E-03		3.05E-03	Half-Limit	1.4E-05	3.4E-02	4E-08	1E-04	7.4E-06	1.8E-02	2E-08	5E-05	8.1E-07	2.0E-03	2E-09	6E-06
SB-0634	VOC	Chloromethane	74-87-3		6.10E-03		3.05E-03	Half-Limit		1.9E-02		6E-05		1.0E-02		3E-05		2.0E-03		6E-06
SB-0634	VOC	Cumene	98-82-8	2.90E-03	4.10E-03		2.90E-03	Half-Limit		4.0E-03		1E-05		2.2E-03		7E-06		1.1E-04		3E-07
SB-0634	VOC	Cyclohexane	110-82-7	1.00E-03	6.10E-03		1.00E-03	Half-Limit		2.8E-04		3E-07		1.5E-04		1E-07		3.1E-05		3E-08
SB-0634	VOC	Dibromochloromethane	124-48-1		6.10E-03		3.05E-03	Half-Limit									1.5E-08	2.4E-05	4E-11	7E-08
SB-0634	VOC	1,1-Dichloroethane	75-34-3		6.10E-03		3.05E-03	Half-Limit	9.8E-07	3.4E-03	3E-09	1E-05	5.1E-07	1.8E-03	2E-09	5E-06	6.1E-08	2.2E-04	2E-10	7E-07
SB-0634	VOC	1,1-Dichloroethene	75-35-4	3.90E-01	6.10E-03		3.90E-01	Half-Limit		8.5E-03		3E-03		4.5E-03		2E-03		9.9E-04		4E-04
SB-0634	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			1.40E+02	Max Detect										4.9E-05		7E-03
SB-0634	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01	6.10E-03		8.70E-01	Max Detect		2.8E-02		2E-02		1.5E-02		1E-02		2.0E-03		2E-03
SB-0634	VOC	Ethyl Benzene	100-41-4	2.10E-02	4.10E-03		2.10E-02	Max Detect		1.7E-03		4E-05		9.0E-04		2E-05		5.5E-05		1E-06
SB-0634	VOC	Methyl Acetate	79-20-9		1.20E-02		6.00E-03	Half-Limit										4.9E-07		3E-09
SB-0634	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01	8.25E-03		2.00E-01	Max Detect		1.4E-04		3E-05		1.2E-04		2E-05		7.6E-06		2E-06
SB-0634	VOC	Methylcyclohexane	108-87-2	5.70E-03	8.25E-03		5.70E-03	Half-Limit		5.7E-04		3E-06		3.0E-04		2E-06		8.5E-05		5E-07
SB-0634	VOC	Methylene Chloride	75-09-2	7.80E-03			7.80E-03	Max Detect	2.9E-07	1.6E-03	2E-09	1E-05	1.5E-07	8.6E-04	1E-09	7E-06	1.8E-08	1.0E-04	1E-10	8E-07
SB-0634	VOC	Styrene	100-42-5	1.00E-01	4.10E-03		1.00E-01	Max Detect		3.7E-04		4E-05		2.9E-04		3E-05		2.3E-05		2E-06
SB-0634	VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.10E-03		3.05E-03	Half-Limit										1.2E-04		4E-07
SB-0634	VOC	Tetrachloroethene	127-18-4	3.40E-03	6.10E-03		3.40E-03	Max Detect	1.9E-06	4.3E-03	6E-09	1E-05	9.8E-07	2.2E-03	3E-09	8E-06	1.2E-07	3.1E-04	4E-10	1E-06
SB-0634	VOC	Toluene	108-88-3	8.00E-03	4.10E-03		8.00E-03	Half-Limit		3.4E-04		3E-06		1.8E-04		1E-06		2.0E-05		2E-07
SB-0634	VOC	1,1,1-Trichloroethane	71-55-6		6.10E-03		3.05E-03	Half-Limit		3.4E-04		1E-06		1.8E-04		5E-07		2.5E-05		8E-08
SB-0634	VOC	1,1,2-Trichloroethane	79-00-5		6.10E-03		3.05E-03	Half-Limit	6.9E-06		2E-08		5.1E-06		2E-08		2.3E-07	1.2E-04	7E-10	4E-07
SB-0634	VOC	Trichloroethene	79-01-6	1.30E+02			1.30E+02	Max Detect	1.0E-06	3.2E-03	1E-04	4E-01	5.5E-07	1.7E-03	7E-05	2E-01	5.4E-08	2.4E-04	7E-06	3E-02
SB-0634	VOC	Trichlorofluoromethane	75-69-4		6.10E-03		3.05E-03	Half-Limit		2.4E-03		7E-06		1.3E-03		4E-06		3.6E-04		1E-06
SB-0634	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.20E-02		6.00E-03	Half-Limit		5.7E-05		3E-07		3.0E-05		2E-07		8.9E-06		5E-08
SB-0634	VOC	Vinyl Chloride	75-01-4	7.90E+00	2.40E-03		7.90E+00	Half-Limit	5.4E-06	1.7E-02	4E-05	1E-01	2.8E-06	9.0E-03	2E-05	7E-02	1.1E-06	2.8E-03	8E-06	2E-02
SB-0634	VOC	Xylenes (total)	1330-20-7	2.61E-02	4.10E-03		2.61E-02	Max Detect		1.7E-02		4E-04		9.0E-03		2E-04		4.6E-04		1E-05
SB-0634	PCB	PCBs (total)	1336-36-3		3.30E-01		1.65E-01	Interpolated Half-Limit	7.0E-09		1E-09		3.7E-09		6E-10		1.0E-06	7.0E-02	2E-07	1E-02
SB-0634	INORG	Lead	7439-92-1	1.90E+01			1.90E+01	Interpolated Max												
SB-0634	INORG	Manganese	7439-96-5	5.50E+02		8.17E+02		Interpolated Max is Less than Background										5.6E-06		
SB-0634	INORG	Thallium	7440-28-0	3.50E+00	5.00E-01		3.50E+00	Interpolated Half-Limit										7.0E-03		2E-02
								Sum:			2E-04	6E-01			9E-05	3E-01			2E-05	1E-01
Note:																				
Values above USEPA's cumulative cancer risk limit of 1E-4 or HI limit of 1 are highlighted.																				

**Attachment D3: Single-Chemical Risk Estimates for Routine Worker Exposure to Shallow Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Max Detect (mg/L)	Routine Worker							
						Vapor Intrusion				Outdoor Air Inhalation			
						Unit Risk	Unit HQ	Risk	HQ	Unit Risk	Unit HQ	Risk	HQ
AOI 2	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.64E-01								
AOI 2	VOC	trans-1,2-Dichloroethene	156-60-5		3.48E-02		4E-02		1E-03		2E-03		5E-05
AOI 2	VOC	Vinyl Chloride	75-01-4	A	3.90E-03	3E-05	9E-02	1E-07	3E-04	1E-06	5E-03	6E-09	2E-05
AOI 2	SVOC	2-Methylnaphthalene	91-57-6	ID	6.50E-04								
AOI 2	INORG	Arsenic	7440-38-2	A	7.74E-03								
AOI 2	INORG	Barium	7440-39-3	NC	1.96E-01								
AOI 2	INORG	Chromium (total)	7440-47-3		6.40E-03								
AOI 2	INORG	Cobalt	7440-48-4	LC	3.20E-03								
AOI 2	INORG	Copper	7440-50-8	D	6.96E-03								
AOI 2	INORG	Manganese	7439-96-5	D	3.12E-01								
AOI 2	INORG	Nickel	7440-02-0	A	8.44E-03								
AOI 2	INORG	Vanadium	7440-62-2		8.52E-03								
AOI 2	INORG	Zinc	7440-66-6	ID	3.69E-02								
AOI 3	VOC	1,1-Dichloroethane	75-34-3	SC	3.20E-03	7E-07	3E-03	2E-09	8E-06	3E-08	1E-04	1E-10	4E-07
AOI 3	VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.46E-01								
AOI 3	VOC	trans-1,2-Dichloroethene	156-60-5		3.28E-02		4E-02		1E-03		2E-03		5E-05
AOI 3	VOC	Trichloroethene	79-01-6	C-B2	5.94E+00	1E-06	4E-03	8E-06	3E-02	6E-08	2E-04	4E-07	1E-03
AOI 3	VOC	Vinyl Chloride	75-01-4	A	4.95E-03	3E-05	9E-02	1E-07	4E-04	1E-06	5E-03	7E-09	2E-05
AOI 3	INORG	Arsenic	7440-38-2	A	6.70E-03								
AOI 3	INORG	Manganese	7439-96-5	D	4.90E-01								
AOI 5	VOC	Benzene	71-43-2	A	2.30E-03	4E-06	4E-02	9E-09	1E-04	2E-07	2E-03	4E-10	5E-06
AOI 5	VOC	1,1-Dichloroethane	75-34-3	SC	1.20E-02	7E-07	3E-03	9E-09	3E-05	3E-08	1E-04	4E-10	1E-06
AOI 5	VOC	1,1-Dichloroethene	75-35-4	C	9.35E-03		4E-02		3E-04		2E-03		2E-05
AOI 5	VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.10E+00								
AOI 5	VOC	trans-1,2-Dichloroethene	156-60-5		9.10E-02		4E-02		3E-03		2E-03		1E-04
AOI 5	VOC	Trichloroethene	79-01-6	C-B2	7.60E+00	1E-06	4E-03	1E-05	3E-02	6E-08	2E-04	5E-07	1E-03
AOI 5	VOC	Vinyl Chloride	75-01-4	A	1.00E-01	3E-05	9E-02	3E-06	9E-03	1E-06	5E-03	1E-07	5E-04
AOI 5	INORG	Arsenic	7440-38-2	A	8.37E-03								
AOI 5	INORG	Barium	7440-39-3	NC	2.15E-01								
AOI 5	INORG	Chromium (total)	7440-47-3		2.67E-02								
AOI 5	INORG	Copper	7440-50-8	D	2.70E-02								
AOI 5	INORG	Lead	7439-92-1	B2	1.42E-02								
AOI 5	INORG	Manganese	7439-96-5	D	8.01E-01								
AOI 5	INORG	Zinc	7440-66-6	ID	7.35E-02								
AOI 6	VOC	1,1-Dichloroethane	75-34-3	SC	1.90E-01	7E-07	3E-03	1E-07	5E-04	3E-08	1E-04	6E-09	2E-05
AOI 6	VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.10E-01								
AOI 6	VOC	trans-1,2-Dichloroethene	156-60-5		6.00E-03		4E-02		2E-04		2E-03		9E-06
AOI 6	VOC	1,1,1-Trichloroethane	71-55-6	ID	2.10E-02		8E-04		2E-05		4E-05		8E-07

**Attachment D3: Single-Chemical Risk Estimates for Routine Worker Exposure to Shallow Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Max Detect (mg/L)	Routine Worker							
						Vapor Intrusion				Outdoor Air Inhalation			
						Unit Risk	Unit HQ	Risk	HQ	Unit Risk	Unit HQ	Risk	HQ
AOI 6	VOC	Trichloroethene	79-01-6	C-B2	5.20E-02	1E-06	4E-03	7E-08	2E-04	6E-08	2E-04	3E-09	1E-05
AOI 6	INORG	Arsenic	7440-38-2	A	5.70E-03								
AOI 6	INORG	Manganese	7439-96-5	D	4.09E-01								
AOI 7	VOC	1,1-Dichloroethene	75-35-4	C	4.50E-03		4E-02		2E-04		2E-03		8E-06
AOI 7	VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.00E+00								
AOI 7	VOC	trans-1,2-Dichloroethene	156-60-5		8.80E-02		4E-02		3E-03		2E-03		1E-04
AOI 7	VOC	Trichloroethene	79-01-6	C-B2	4.80E+00	1E-06	4E-03	7E-06	2E-02	6E-08	2E-04	3E-07	9E-04
AOI 7	VOC	Vinyl Chloride	75-01-4	A	2.10E-02	3E-05	9E-02	6E-07	2E-03	1E-06	5E-03	3E-08	1E-04
AOI 7	SVOC	2-Methylnaphthalene	91-57-6	ID	6.40E-04								
AOI 7	INORG	Arsenic	7440-38-2	A	9.20E-03								
AOI 7	INORG	Barium	7440-39-3	NC	2.74E-01								
AOI 7	INORG	Manganese	7439-96-5	D	2.70E-01								
Upgradient	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.00E-02								
Upgradient	VOC	Trichloroethene	79-01-6	C-B2	1.30E-03	1E-06	4E-03	2E-09	5E-06	6E-08	2E-04	8E-11	3E-07
Upgradient	VOC	Vinyl Chloride	75-01-4	A	6.80E-03	3E-05	9E-02	2E-07	6E-04	1E-06	5E-03	1E-08	3E-05
Off-Site East	VOC	cis-1,2-Dichloroethene	156-59-2	ID	5.71E-01								
Off-Site East	VOC	trans-1,2-Dichloroethene	156-60-5		1.03E-01		4E-02		4E-03		2E-03		2E-04
Off-Site East	VOC	Trichloroethene	79-01-6	C-B2	4.37E+00	1E-06	4E-03	6E-06	2E-02	6E-08	2E-04	3E-07	8E-04
Off-Site East	VOC	Vinyl Chloride	75-01-4	A	5.60E-03	3E-05	9E-02	2E-07	5E-04	1E-06	5E-03	8E-09	3E-05
Off-Site East	INORG	Arsenic	7440-38-2	A	1.12E-02								
Off-Site East	INORG	Manganese	7439-96-5	D	4.40E-01								
Off-Site West	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.26E-01								
Off-Site West	VOC	trans-1,2-Dichloroethene	156-60-5		1.86E-02		4E-02		7E-04		2E-03		3E-05
Off-Site West	VOC	Vinyl Chloride	75-01-4	A	1.03E-02	3E-05	9E-02	3E-07	9E-04	1E-06	5E-03	2E-08	5E-05
Off-Site West	INORG	Manganese	7439-96-5	D	2.36E-01								
Note:													
Only constituents detected in each area are shown.													

Attachment D4
Risk Calculations for Maintenance Workers

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Attachment D4: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (kg/m ² -s)
VOC	Acetone	67-64-1	5.81E-01		9.52E-04	1.07E+00	9.85E-05	1.73E-01	9.46E-02	1.15E-06	5.28E-04	6.85E-06
VOC	Benzene	71-43-2	5.82E+01		1.31E-01	7.60E-01	8.47E-05	4.84E-01	6.72E-02	9.91E-07	1.82E-02	4.02E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.62E-02	2.57E-01	9.16E-05	4.40E-01	2.27E-02	1.07E-06	1.87E-03	1.29E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.61E-03	6.98E-01	8.47E-05	1.80E-01	6.17E-02	9.91E-07	5.57E-04	7.04E-06
VOC	Carbon Disulfide	75-15-0	4.59E+01		7.91E-01	8.99E-01	8.64E-05	6.32E-01	7.94E-02	1.01E-06	9.94E-02	9.41E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		7.32E-01	6.74E-01	7.60E-05	1.21E+00	5.95E-02	8.90E-07	3.59E-02	5.65E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.71E-02	6.31E-01	7.52E-05	1.23E+00	5.57E-02	8.80E-07	3.50E-03	1.76E-05
VOC	Chloroethane	75-00-3	1.62E+01		2.84E-01	2.34E+00	9.94E-05	3.34E-01	2.07E-01	1.16E-06	1.76E-01	1.25E-04
VOC	Chloroform	67-66-3	3.97E+01		8.98E-02	8.99E-01	8.64E-05	3.84E-01	7.94E-02	1.01E-06	1.86E-02	4.06E-05
VOC	Chloromethane	74-87-3	3.97E+01		2.99E-01	1.09E+00	5.62E-05	4.49E-01	9.62E-02	6.57E-07	6.40E-02	7.55E-05
VOC	2-Chlorotoluene	95-49-8	6.12E+02		8.58E-02	5.43E-01	7.52E-05	3.07E+00	4.79E-02	8.80E-07	1.34E-03	1.09E-05
VOC	Cumene	98-82-8	7.05E+02		2.19E-01	5.62E-01	6.13E-05	3.55E+00	4.96E-02	7.18E-07	3.06E-03	1.65E-05
VOC	Cyclohexane	110-82-7	6.35E+02		4.69E+00	7.25E-01	7.86E-05	4.61E+00	6.40E-02	9.20E-07	6.51E-02	7.61E-05
VOC	Dibromochloromethane	124-48-1	6.26E+01		2.03E-02	1.69E-01	9.07E-05	4.70E-01	1.50E-02	1.06E-06	6.49E-04	7.60E-06
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.39E-01	6.41E-01	9.07E-05	3.60E-01	5.66E-02	1.06E-06	2.18E-02	4.41E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		6.97E-01	7.78E-01	8.99E-05	6.60E-01	6.87E-02	1.05E-06	7.26E-02	8.04E-05
VOC	1,2-Dichloroethene (total)	540-59-0	3.56E+01		1.21E-01	6.36E-01	9.76E-05	3.74E-01	5.62E-02	1.14E-06	1.82E-02	4.02E-05
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		9.86E-02	6.36E-01	9.76E-05	3.67E-01	5.62E-02	1.14E-06	1.51E-02	3.66E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		2.38E-01	6.11E-01	1.03E-04	4.89E-01	5.40E-02	1.20E-06	2.62E-02	4.83E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.60E-01	6.48E-01	6.74E-05	1.94E+00	5.72E-02	7.89E-07	4.70E-03	2.05E-05
VOC	Methyl Acetate	79-20-9	1.66E+00		2.16E-03	8.27E-01	9.50E-05	1.78E-01	7.30E-02	1.11E-06	8.93E-04	8.91E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		3.72E-03	6.48E-01	6.74E-05	2.20E-01	5.72E-02	7.89E-07	9.70E-04	9.29E-06
VOC	Methylcyclohexane	108-87-2	2.66E+02		9.74E+00	6.35E-01	7.36E-05	4.45E+00	5.61E-02	8.62E-07	1.23E-01	1.05E-04
VOC	Methylene Chloride	75-09-2	1.17E+01		5.59E-02	8.73E-01	1.01E-04	2.42E-01	7.71E-02	1.18E-06	1.78E-02	3.98E-05
VOC	Styrene	100-42-5	7.77E+02		5.46E-02	6.13E-01	6.91E-05	3.83E+00	5.42E-02	8.09E-07	7.73E-04	8.29E-06
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.35E+01		6.77E-03	6.13E-01	6.83E-05	6.11E-01	5.42E-02	7.99E-07	6.02E-04	7.32E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.89E-01	6.22E-01	7.08E-05	1.02E+00	5.49E-02	8.29E-07	2.09E-02	4.32E-05
VOC	Toluene	108-88-3	1.80E+02		1.45E-01	7.52E-01	7.43E-05	1.06E+00	6.64E-02	8.70E-07	9.05E-03	2.84E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		4.12E-01	6.74E-01	7.60E-05	8.15E-01	5.95E-02	8.90E-07	3.01E-02	5.17E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.93E-02	6.74E-01	7.60E-05	4.12E-01	5.95E-02	8.90E-07	2.79E-03	1.58E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.03E+00	6.03E-02	9.20E-07	1.37E-02	3.50E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		3.09E+00	7.52E-01	8.38E-05	1.70E+00	6.64E-02	9.81E-07	1.21E-01	1.04E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		1.48E+01	6.74E-01	7.08E-05	6.55E+00	5.95E-02	8.29E-07	1.34E-01	1.09E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	1.18E+03		1.11E-01	5.24E-01	6.84E-05	5.74E+00	4.62E-02	8.01E-07	8.95E-04	8.92E-06

Attachment D4: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (kg/m ² -s)
VOC	Vinyl Chloride	75-01-4	1.85E+01		8.02E-01	9.16E-01	1.06E-04	5.06E-01	8.09E-02	1.24E-06	1.28E-01	1.07E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.35E-01	6.74E-01	7.56E-05	2.02E+00	5.95E-02	8.84E-07	3.97E-03	1.88E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		2.02E-03	3.64E-01	6.64E-05	3.37E+01	3.21E-02	7.78E-07	1.95E-06	4.17E-07
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		2.63E-05	4.41E-01	7.78E-05	1.88E+03	3.89E-02	9.10E-07	1.03E-09	9.56E-09
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		5.87E-06	3.72E-01	7.78E-05	4.76E+03	3.28E-02	9.10E-07	2.32E-10	4.54E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		7.20E-04	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	2.22E-09	1.41E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		1.63E-06	1.88E-01	4.54E-05	6.01E+04	1.66E-02	5.32E-07	9.30E-12	9.10E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		4.74E-06	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	1.10E-10	3.13E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		6.06E-07	3.03E-01	3.16E-05	7.04E+04	2.68E-02	3.70E-07	5.49E-12	6.99E-10
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		1.04E-05	1.50E-01	4.17E-05	2.69E+02	1.33E-02	4.88E-07	2.33E-09	1.44E-08
SVOC	Chrysene	218-01-9	4.01E+05		6.67E-04	2.14E-01	5.37E-05	1.88E+03	1.89E-02	6.28E-07	7.04E-09	2.50E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		2.09E-08	1.75E-01	4.48E-05	1.77E+04	1.54E-02	5.24E-07	2.96E-11	1.62E-09
SVOC	Dibenzofuran	132-64-9	2.07E+04		1.02E-05	2.06E-01	5.18E-05	9.72E+01	1.82E-02	6.07E-07	8.16E-09	2.69E-08
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		7.69E-09	3.78E-01	6.79E-05	1.60E+02	3.34E-02	7.95E-07	4.97E-09	2.10E-08
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		4.93E-04	1.30E-01	3.09E-05	3.93E+05	1.15E-02	3.62E-07	1.54E-11	1.17E-09
SVOC	Fluoranthene	206-44-0	1.08E+05		1.56E-04	2.61E-01	5.49E-05	5.07E+02	2.30E-02	6.42E-07	8.38E-09	2.73E-08
SVOC	Fluorene	86-73-7	1.38E+04		8.23E-04	3.14E-01	6.81E-05	6.47E+01	2.77E-02	7.97E-07	3.64E-07	1.80E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		7.70E-06	1.64E-01	4.89E-05	1.62E+04	1.45E-02	5.72E-07	4.23E-11	1.94E-09
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.05E-02	4.51E-01	6.70E-05	2.94E+01	3.98E-02	7.84E-07	1.42E-05	1.12E-06
SVOC	Naphthalene	91-20-3	2.01E+03		7.98E-03	5.10E-01	6.48E-05	9.60E+00	4.50E-02	7.58E-07	3.75E-05	1.83E-06
SVOC	Phenanthrene	85-01-8	2.42E+04		1.87E-04	3.24E-01	6.45E-05	1.14E+02	2.86E-02	7.55E-07	5.35E-08	6.90E-08
SVOC	Phenol	108-95-2	2.88E+01		6.37E-06	7.08E-01	7.86E-05	3.05E-01	6.26E-02	9.20E-07	4.33E-06	6.20E-07
SVOC	Pyrene	129-00-0	1.06E+05		1.02E-04	2.35E-01	6.26E-05	4.95E+02	2.08E-02	7.32E-07	5.76E-09	2.26E-08
PCB	PCBs (total)	1336-36-3	2.45E+06		1.60E-02	1.75E-01	4.32E-05	1.15E+04	1.54E-02	5.06E-07	2.15E-08	4.37E-08
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.49E-01	2.65E-01	5.44E-05	1.38E+03	2.34E-02	6.37E-07	2.54E-06	4.75E-07
INORG	Nickel	7440-02-0		6.50E+01								

Attachment D4: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (kg/m ² -s)
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes:	Soil bulk density	kg/L	ρ _b	1.38	<i>Silty-Clay</i>							
	Soil porosity	L/L-soil	θ	0.48	<i>Silty Clay</i>							
	Soil water content	L/L-soil	θ _w	0.17	<i>Measured</i>							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	<i>porosity-water content</i>							
	Soil organic carbon fraction	unitless	f _{oc}	0.0034	<i>Measured</i>							
	Averaging period	year	ED	10								
		s	ED	3.2E+08								

Attachment D4: Cancer Risk Calculations for Exposure of Maintenance Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	1.68E-08							5.79E-04	2.27E-06			5.00E-08	1.96E-10			
VOC	Benzene	71-43-2	A	1.68E-08	5.5E-02	9.2E-10			5.5E-02		3.40E-03	1.33E-05	7.8E-03	1.0E-07	5.00E-08	1.96E-10	7.8E-03	1.5E-12	1.0E-07
VOC	Bromodichloromethane	75-27-4	B2	1.68E-08	6.2E-02	1.0E-09			6.2E-02		1.09E-03	4.27E-06			5.00E-08	1.96E-10			1.0E-09
VOC	2-Butanone	78-93-3	ID	1.68E-08							5.95E-04	2.33E-06			5.00E-08	1.96E-10			
VOC	Carbon Disulfide	75-15-0		1.68E-08							7.94E-03	3.11E-05			5.00E-08	1.96E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	1.68E-08	1.3E-01	2.2E-09			1.3E-01		4.77E-03	1.87E-05	1.5E-02	2.8E-07	5.00E-08	1.96E-10	1.5E-02	2.9E-12	2.8E-07
VOC	Chlorobenzene	108-90-7	D	1.68E-08							1.49E-03	5.83E-06			5.00E-08	1.96E-10			
VOC	Chloroethane	75-00-3	LC	1.68E-08							1.06E-02	4.13E-05			5.00E-08	1.96E-10			
VOC	Chloroform	67-66-3	B2	1.68E-08							3.43E-03	1.34E-05	2.3E-02	3.1E-07	5.00E-08	1.96E-10	2.3E-02	4.5E-12	3.1E-07
VOC	Chloromethane	74-87-3	D	1.68E-08							6.38E-03	2.50E-05			5.00E-08	1.96E-10			
VOC	2-Chlorotoluene	95-49-8		1.68E-08							9.23E-04	3.61E-06			5.00E-08	1.96E-10			
VOC	Cumene	98-82-8	D	1.68E-08							1.39E-03	5.46E-06			5.00E-08	1.96E-10			
VOC	Cyclohexane	110-82-7	ID	1.68E-08							6.43E-03	2.52E-05			5.00E-08	1.96E-10			
VOC	Dibromochloromethane	124-48-1	C	1.68E-08	8.4E-02	1.4E-09			8.4E-02		6.42E-04	2.51E-06			5.00E-08	1.96E-10			1.4E-09
VOC	1,1-Dichloroethane	75-34-3	SC	1.68E-08							3.72E-03	1.46E-05	1.6E-03	2.3E-08	5.00E-08	1.96E-10	1.6E-03	3.1E-13	2.3E-08
VOC	1,1-Dichloroethene	75-35-4	C	1.68E-08							6.79E-03	2.66E-05			5.00E-08	1.96E-10			
VOC	1,2-Dichloroethene (total)	540-59-0		1.68E-08							3.40E-03	1.33E-05			5.00E-08	1.96E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.68E-08							3.09E-03	1.21E-05			5.00E-08	1.96E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		1.68E-08							4.08E-03	1.60E-05			5.00E-08	1.96E-10			
VOC	Ethyl Benzene	100-41-4	D	1.68E-08							1.73E-03	6.76E-06			5.00E-08	1.96E-10			
VOC	Methyl Acetate	79-20-9		1.68E-08							7.53E-04	2.95E-06			5.00E-08	1.96E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.68E-08							7.85E-04	3.07E-06			5.00E-08	1.96E-10			
VOC	Methylcyclohexane	108-87-2		1.68E-08							8.83E-03	3.45E-05			5.00E-08	1.96E-10			
VOC	Methylene Chloride	75-09-2	B2	1.68E-08	7.5E-03	1.3E-10			7.5E-03		3.36E-03	1.32E-05	4.7E-04	6.2E-09	5.00E-08	1.96E-10	4.7E-04	9.2E-14	6.3E-09
VOC	Styrene	100-42-5		1.68E-08							7.00E-04	2.74E-06			5.00E-08	1.96E-10			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		1.68E-08							6.18E-04	2.42E-06			5.00E-08	1.96E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	1.68E-08	5.2E-02	8.7E-10			5.2E-02		3.64E-03	1.43E-05	3.1E-03	4.4E-08	5.00E-08	1.96E-10	3.1E-03	6.0E-13	4.5E-08
VOC	Toluene	108-88-3	ID	1.68E-08							2.40E-03	9.38E-06			5.00E-08	1.96E-10			
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.68E-08							4.37E-03	1.71E-05			5.00E-08	1.96E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.68E-08	5.7E-02	9.6E-10			5.7E-02		1.33E-03	5.21E-06	1.6E-02	8.3E-08	5.00E-08	1.96E-10	1.6E-02	3.1E-12	8.4E-08
VOC	Trichloroethene	79-01-6	C-B2	1.68E-08	1.1E-02	1.8E-10			1.1E-02		2.95E-03	1.16E-05	1.7E-03	2.0E-08	5.00E-08	1.96E-10	1.7E-03	3.3E-13	2.0E-08
VOC	Trichlorofluoromethane	75-69-4		1.68E-08							8.76E-03	3.43E-05			5.00E-08	1.96E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.68E-08							9.23E-03	3.61E-05			5.00E-08	1.96E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.68E-08							7.54E-04	2.95E-06			5.00E-08	1.96E-10			
VOC	Vinyl Chloride	75-01-4	A	1.68E-08	1.4E+00	2.3E-08			1.4E+00		9.02E-03	3.53E-05	8.8E-03	3.1E-07	5.00E-08	1.96E-10	8.8E-03	1.7E-12	3.3E-07
VOC	Xylenes (total)	1330-20-7	ID	1.68E-08							1.59E-03	6.21E-06			5.00E-08	1.96E-10			
SVOC	Acenaphthene	83-32-9		1.68E-08			1.30E-01	1.44E-08			3.52E-05	1.38E-07			5.00E-08	1.96E-10			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.68E-08	7.3E-01	1.2E-08	1.30E-01	1.44E-08	7.3E-01	1.1E-08	8.08E-07	3.16E-09	8.8E-02	2.8E-10	5.00E-08	1.96E-10	8.8E-02	1.7E-11	2.3E-08
SVOC	Benzo(a)pyrene	50-32-8	B2	1.68E-08	7.3E+00	1.2E-07	1.30E-01	1.44E-08	7.3E+00	1.1E-07	3.83E-07	1.50E-09	8.8E-01	1.3E-09	5.00E-08	1.96E-10	8.8E-01	1.7E-10	2.3E-07
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.68E-08	7.3E-01	1.2E-08	1.30E-01	1.44E-08	7.3E-01	1.1E-08	1.19E-06	4.65E-09	8.8E-02	4.1E-10	5.00E-08	1.96E-10	8.8E-02	1.7E-11	2.3E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.68E-08			1.30E-01	1.44E-08			7.68E-08	3.01E-10			5.00E-08	1.96E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.68E-08	7.3E-02	1.2E-09	1.30E-01	1.44E-08	7.3E-02	1.1E-09	2.65E-07	1.04E-09	8.8E-03	9.1E-12	5.00E-08	1.96E-10	8.8E-03	1.7E-12	2.3E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.68E-08	1.4E-02	2.3E-10	1.00E-01	1.11E-08	1.4E-02	1.5E-10	5.90E-08	2.31E-10	2.4E-03	5.5E-13	5.00E-08	1.96E-10	2.4E-03	4.7E-13	3.9E-10
SVOC	Butylbenzylphthalate	85-68-7	C	1.68E-08	1.9E-03	3.2E-11	1.00E-01	1.11E-08	1.9E-03	2.1E-11	1.22E-06	4.76E-09			5.00E-08	1.96E-10			5.3E-11
SVOC	Chrysene	218-01-9	B2	1.68E-08	7.3E-03	1.2E-10	1.30E-01	1.44E-08	7.3E-03	1.1E-10	2.11E-06	8.27E-09	8.8E-04	7.3E-12	5.00E-08	1.96E-10	8.8E-04	1.7E-13	2.3E-10
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.68E-08	7.3E+00	1.2E-07	1.30E-01	1.44E-08	7.3E+00	1.1E-07	1.37E-07	5.37E-10	8.8E-01	4.7E-10	5.00E-08	1.96E-10	8.8E-01	1.7E-10	2.3E-07

Attachment D4: Cancer Risk Calculations for Exposure of Maintenance Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Dibenzofuran	132-64-9	D	1.68E-08			1.00E-01	1.11E-08			2.28E-06	8.91E-09			5.00E-08	1.96E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	1.68E-08			1.00E-01	1.11E-08			1.78E-06	6.95E-09			5.00E-08	1.96E-10			
SVOC	Di-n-octylphthalate	117-84-0		1.68E-08			1.00E-01	1.11E-08			9.88E-08	3.87E-10			5.00E-08	1.96E-10			
SVOC	Fluoranthene	206-44-0	D	1.68E-08			1.30E-01	1.44E-08			2.31E-06	9.03E-09			5.00E-08	1.96E-10			
SVOC	Fluorene	86-73-7	D	1.68E-08			1.30E-01	1.44E-08			1.52E-05	5.95E-08			5.00E-08	1.96E-10			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.68E-08	7.3E-01	1.2E-08	1.30E-01	1.44E-08	7.3E-01	1.1E-08	1.64E-07	6.41E-10	8.8E-02	5.6E-11	5.00E-08	1.96E-10	8.8E-02	1.7E-11	2.3E-08
SVOC	2-Methylnaphthalene	91-57-6	ID	1.68E-08			1.00E-01	1.11E-08			9.49E-05	3.72E-07			5.00E-08	1.96E-10			
SVOC	Naphthalene	91-20-3	C	1.68E-08			1.30E-01	1.44E-08			1.54E-04	6.04E-07	3.4E-02	2.1E-08	5.00E-08	1.96E-10	3.4E-02	6.7E-12	2.1E-08
SVOC	Phenanthrene	85-01-8	D	1.68E-08			1.30E-01	1.44E-08			5.83E-06	2.28E-08			5.00E-08	1.96E-10			
SVOC	Phenol	108-95-2	ID	1.68E-08			1.00E-01	1.11E-08			5.24E-05	2.05E-07			5.00E-08	1.96E-10			
SVOC	Pyrene	129-00-0	NC	1.68E-08			1.30E-01	1.44E-08			1.91E-06	7.49E-09			5.00E-08	1.96E-10			
PCB	PCBs (total)	1336-36-3	B2	1.68E-08	2.0E+00	3.4E-08	1.40E-01	1.55E-08	2.0E+00	3.1E-08	3.69E-06	1.45E-08	5.7E-01	8.3E-09	5.00E-08	1.96E-10	5.7E-01	1.1E-10	7.3E-08
INORG	Arsenic	7440-38-2	A	1.68E-08	1.5E+00	2.5E-08	3.00E-02	3.32E-09	1.5E+00	5.0E-09			4.3E+00		5.00E-08	1.96E-10	4.3E+00	8.4E-10	3.1E-08
INORG	Barium	7440-39-3	NC	1.68E-08											5.00E-08	1.96E-10			
INORG	Beryllium	7440-41-7	B1	1.68E-08									2.4E+00		5.00E-08	1.96E-10	2.4E+00	4.7E-10	4.7E-10
INORG	Cadmium	7440-43-9	B1	1.68E-08			1.00E-03	1.11E-10					1.8E+00		5.00E-08	1.96E-10	1.8E+00	3.5E-10	3.5E-10
INORG	Chromium (total)	7440-47-3		1.68E-08									1.2E+01		5.00E-08	1.96E-10	1.2E+01	2.3E-09	2.3E-09
INORG	Cobalt	7440-48-4	LC	1.68E-08									9.0E+00		5.00E-08	1.96E-10	9.0E+00	1.8E-09	1.8E-09
INORG	Copper	7440-50-8	D	1.68E-08											5.00E-08	1.96E-10			
INORG	Cyanide (total)	57-12-5	D	1.68E-08											5.00E-08	1.96E-10			
INORG	Manganese	7439-96-5	D	1.68E-08											5.00E-08	1.96E-10			
INORG	Mercury	7439-97-6	D	1.68E-08							4.01E-05	1.57E-07			5.00E-08	1.96E-10			
INORG	Nickel	7440-02-0	A	1.68E-08									2.4E-01		5.00E-08	1.96E-10	2.4E-01	4.7E-11	4.7E-11
INORG	Selenium	7782-49-2	D	1.68E-08											5.00E-08	1.96E-10			
INORG	Thallium	7440-28-0		1.68E-08											5.00E-08	1.96E-10			
INORG	Vanadium	7440-62-2		1.68E-08											5.00E-08	1.96E-10			
INORG	Zinc	7440-66-6	ID	1.68E-08											5.00E-08	1.96E-10			
Notes:																			
Unit risks are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 84.5 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire Facility) and region-specific meteorological parameters.																			
The C/Q term has been converted from an annual-average concentration to a 24-hour concentration (USEPA 2002).																			
The concentration of particulates in the air is assumed to be no more 50 ug/m3.																			

Attachment D4: Noncancer HQ Calculations for Exposure of Maintenance Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	1.17E-07	9.0E-01	1.3E-07			9.0E-01		5.79E-04	1.59E-05	3.1E+01	5.1E-07	5.00E-08	1.37E-09	3.1E+01	4.4E-11	6.4E-07
VOC	Benzene	71-43-2	A	1.17E-07	4.0E-03	2.9E-05			4.0E-03		3.40E-03	9.31E-05	3.0E-02	3.1E-03	5.00E-08	1.37E-09	3.0E-02	4.6E-08	3.1E-03
VOC	Bromodichloromethane	75-27-4	B2	1.17E-07	2.0E-02	5.9E-06			2.0E-02		1.09E-03	2.99E-05			5.00E-08	1.37E-09			5.9E-06
VOC	2-Butanone	78-93-3	ID	1.17E-07	6.0E-01	2.0E-07			6.0E-01		5.95E-04	1.63E-05	5.0E+00	3.3E-06	5.00E-08	1.37E-09	5.0E+00	2.7E-10	3.5E-06
VOC	Carbon Disulfide	75-15-0		1.17E-07	1.0E-01	1.2E-06			1.0E-01		7.94E-03	2.18E-04	7.0E-01	3.1E-04	5.00E-08	1.37E-09	7.0E-01	2.0E-09	3.1E-04
VOC	Carbon Tetrachloride	56-23-5	B2	1.17E-07	7.0E-04	1.7E-04			7.0E-04		4.77E-03	1.31E-04	1.9E-01	6.9E-04	5.00E-08	1.37E-09	1.9E-01	7.3E-09	8.6E-04
VOC	Chlorobenzene	108-90-7	D	1.17E-07	2.0E-02	5.9E-06			2.0E-02		1.49E-03	4.08E-05	5.0E-02	8.2E-04	5.00E-08	1.37E-09	5.0E-02	2.7E-08	8.2E-04
VOC	Chloroethane	75-00-3	LC	1.17E-07	1.0E-01	1.2E-06			1.0E-01		1.06E-02	2.89E-04	1.0E+01	2.9E-05	5.00E-08	1.37E-09	1.0E+01	1.4E-10	3.0E-05
VOC	Chloroform	67-66-3	B2	1.17E-07	1.0E-02	1.2E-05			1.0E-02		3.43E-03	9.40E-05	5.0E-02	1.9E-03	5.00E-08	1.37E-09	5.0E-02	2.7E-08	1.9E-03
VOC	Chloromethane	74-87-3	D	1.17E-07							6.38E-03	1.75E-04	9.0E-02	1.9E-03	5.00E-08	1.37E-09	9.0E-02	1.5E-08	1.9E-03
VOC	2-Chlorotoluene	95-49-8		1.17E-07	2.0E-02	5.9E-06			2.0E-02		9.23E-04	2.53E-05			5.00E-08	1.37E-09			5.9E-06
VOC	Cumene	98-82-8	D	1.17E-07	1.0E-01	1.2E-06			1.0E-01		1.39E-03	3.82E-05	4.0E-01	9.5E-05	5.00E-08	1.37E-09	4.0E-01	3.4E-09	9.7E-05
VOC	Cyclohexane	110-82-7	ID	1.17E-07							6.43E-03	1.76E-04	6.0E+00	2.9E-05	5.00E-08	1.37E-09	6.0E+00	2.3E-10	2.9E-05
VOC	Dibromochloromethane	124-48-1	C	1.17E-07	2.0E-02	5.9E-06			2.0E-02		6.42E-04	1.76E-05			5.00E-08	1.37E-09			5.9E-06
VOC	1,1-Dichloroethane	75-34-3	SC	1.17E-07	2.0E-01	5.9E-07			2.0E-01		3.72E-03	1.02E-04	5.0E-01	2.0E-04	5.00E-08	1.37E-09	5.0E-01	2.7E-09	2.0E-04
VOC	1,1-Dichloroethene	75-35-4	C	1.17E-07	5.0E-02	2.3E-06			5.0E-02		6.79E-03	1.86E-04	2.0E-01	9.3E-04	5.00E-08	1.37E-09	2.0E-01	6.8E-09	9.3E-04
VOC	1,2-Dichloroethene (total)	540-59-0		1.17E-07	1.0E-02	1.2E-05			1.0E-02		3.40E-03	9.30E-05			5.00E-08	1.37E-09			1.2E-05
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.17E-07	1.0E-02	1.2E-05			1.0E-02		3.09E-03	8.48E-05			5.00E-08	1.37E-09			1.2E-05
VOC	trans-1,2-Dichloroethene	156-60-5		1.17E-07	2.0E-02	5.9E-06			2.0E-02		4.08E-03	1.12E-04	6.0E-02	1.9E-03	5.00E-08	1.37E-09	6.0E-02	2.3E-08	1.9E-03
VOC	Ethyl Benzene	100-41-4	D	1.17E-07	1.0E-01	1.2E-06			1.0E-01		1.73E-03	4.73E-05	1.0E+00	4.7E-05	5.00E-08	1.37E-09	1.0E+00	1.4E-09	4.9E-05
VOC	Methyl Acetate	79-20-9		1.17E-07	1.0E+00	1.2E-07			1.0E+00		7.53E-04	2.06E-05			5.00E-08	1.37E-09			1.2E-07
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.17E-07							7.85E-04	2.15E-05	3.0E+00	7.2E-06	5.00E-08	1.37E-09	3.0E+00	4.6E-10	7.2E-06
VOC	Methylcyclohexane	108-87-2		1.17E-07							8.83E-03	2.42E-04	3.0E+00	8.1E-05	5.00E-08	1.37E-09	3.0E+00	4.6E-10	8.1E-05
VOC	Methylene Chloride	75-09-2	B2	1.17E-07	6.0E-02	2.0E-06			6.0E-02		3.36E-03	9.21E-05	1.0E+00	8.8E-05	5.00E-08	1.37E-09	1.0E+00	1.3E-09	9.0E-05
VOC	Styrene	100-42-5		1.17E-07	2.0E-01	5.9E-07			2.0E-01		7.00E-04	1.92E-05	1.0E+00	1.9E-05	5.00E-08	1.37E-09	1.0E+00	1.4E-09	2.0E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5		1.17E-07	4.0E-03	2.9E-05			4.0E-03		6.18E-04	1.69E-05			5.00E-08	1.37E-09			2.9E-05
VOC	Tetrachloroethene	127-18-4	C-B2	1.17E-07	1.0E-02	1.2E-05			1.0E-02		3.64E-03	9.99E-05	4.0E-01	2.5E-04	5.00E-08	1.37E-09	4.0E-01	3.4E-09	2.6E-04
VOC	Toluene	108-88-3	ID	1.17E-07	8.0E-02	1.5E-06			8.0E-02		2.40E-03	6.57E-05	5.0E+00	1.3E-05	5.00E-08	1.37E-09	5.0E+00	2.7E-10	1.5E-05
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.17E-07	2.0E+00	5.9E-08			2.0E+00		4.37E-03	1.20E-04	5.0E+00	2.4E-05	5.00E-08	1.37E-09	5.0E+00	2.7E-10	2.4E-05
VOC	1,1,2-Trichloroethane	79-00-5	C	1.17E-07	4.0E-03	2.9E-05			4.0E-03		1.33E-03	3.65E-05			5.00E-08	1.37E-09			2.9E-05
VOC	Trichloroethene	79-01-6	C-B2	1.17E-07	6.0E-03	2.0E-05			6.0E-03		2.95E-03	8.09E-05	5.4E-01	1.5E-04	5.00E-08	1.37E-09	5.4E-01	2.5E-09	1.7E-04
VOC	Trichlorofluoromethane	75-69-4		1.17E-07	3.0E-01	3.9E-07			3.0E-01		8.76E-03	2.40E-04	7.0E-01	3.4E-04	5.00E-08	1.37E-09	7.0E-01	2.0E-09	3.4E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.17E-07	3.0E+01	3.9E-09			3.0E+01		9.23E-03	2.53E-04	3.0E+01	8.4E-06	5.00E-08	1.37E-09	3.0E+01	4.6E-11	8.4E-06
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.17E-07							7.54E-04	2.07E-05	7.0E-03	3.0E-03	5.00E-08	1.37E-09	7.0E-03	2.0E-07	3.0E-03
VOC	Vinyl Chloride	75-01-4	A	1.17E-07	3.0E-03	3.9E-05			3.0E-03		9.02E-03	2.47E-04	1.0E-01	2.5E-03	5.00E-08	1.37E-09	1.0E-01	1.4E-08	2.5E-03
VOC	Xylenes (total)	1330-20-7	ID	1.17E-07	2.0E-01	5.9E-07			2.0E-01		1.59E-03	4.35E-05	1.0E-01	4.4E-04	5.00E-08	1.37E-09	1.0E-01	1.4E-08	4.4E-04
SVOC	Acenaphthene	83-32-9		1.17E-07	6.0E-02	2.0E-06	1.30E-01	1.01E-07	6.0E-02	1.7E-06	3.52E-05	9.65E-07			5.00E-08	1.37E-09			3.6E-06
SVOC	Benzo(a)anthracene	56-55-3	B2	1.17E-07			1.30E-01	1.01E-07			8.08E-07	2.21E-08			5.00E-08	1.37E-09			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.17E-07			1.30E-01	1.01E-07			3.83E-07	1.05E-08			5.00E-08	1.37E-09			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.17E-07			1.30E-01	1.01E-07			1.19E-06	3.26E-08			5.00E-08	1.37E-09			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.17E-07	3.0E-02	3.9E-06	1.30E-01	1.01E-07	3.0E-02	3.4E-06	7.68E-08	2.11E-09			5.00E-08	1.37E-09			7.3E-06
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.17E-07			1.30E-01	1.01E-07			2.65E-07	7.25E-09			5.00E-08	1.37E-09			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.17E-07	2.0E-02	5.9E-06	1.00E-01	7.75E-08	2.0E-02	3.9E-06	5.90E-08	1.62E-09			5.00E-08	1.37E-09			9.7E-06
SVOC	Butylbenzylphthalate	85-68-7	C	1.17E-07	2.0E-01	5.9E-07	1.00E-01	7.75E-08	2.0E-01	3.9E-07	1.22E-06	3.33E-08			5.00E-08	1.37E-09			9.7E-07
SVOC	Chrysene	218-01-9	B2	1.17E-07			1.30E-01	1.01E-07			2.11E-06	5.79E-08			5.00E-08	1.37E-09			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.17E-07			1.30E-01	1.01E-07			1.37E-07	3.76E-09			5.00E-08	1.37E-09			

Attachment D4: Noncancer HQ Calculations for Exposure of Maintenance Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Dibenzofuran	132-64-9	D	1.17E-07	4.0E-03	2.9E-05	1.00E-01	7.75E-08	4.0E-03	1.9E-05	2.28E-06	6.23E-08			5.00E-08	1.37E-09			4.9E-05
SVOC	Di-n-butylphthalate	84-74-2	D	1.17E-07	1.0E-01	1.2E-06	1.00E-01	7.75E-08	1.0E-01	7.7E-07	1.78E-06	4.87E-08			5.00E-08	1.37E-09			1.9E-06
SVOC	Di-n-octylphthalate	117-84-0		1.17E-07	4.0E-02	2.9E-06	1.00E-01	7.75E-08	4.0E-02	1.9E-06	9.88E-08	2.71E-09			5.00E-08	1.37E-09			4.9E-06
SVOC	Fluoranthene	206-44-0	D	1.17E-07	4.0E-02	2.9E-06	1.30E-01	1.01E-07	4.0E-02	2.5E-06	2.31E-06	6.32E-08			5.00E-08	1.37E-09			5.5E-06
SVOC	Fluorene	86-73-7	D	1.17E-07	4.0E-02	2.9E-06	1.30E-01	1.01E-07	4.0E-02	2.5E-06	1.52E-05	4.17E-07			5.00E-08	1.37E-09			5.5E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.17E-07			1.30E-01	1.01E-07			1.64E-07	4.49E-09			5.00E-08	1.37E-09			
SVOC	2-Methylnaphthalene	91-57-6	ID	1.17E-07	4.0E-03	2.9E-05	1.00E-01	7.75E-08	4.0E-03	1.9E-05	9.49E-05	2.60E-06			5.00E-08	1.37E-09			4.9E-05
SVOC	Naphthalene	91-20-3	C	1.17E-07	2.0E-02	5.9E-06	1.30E-01	1.01E-07	2.0E-02	5.0E-06	1.54E-04	4.23E-06	3.0E-03	1.4E-03	5.00E-08	1.37E-09	3.0E-03	4.6E-07	1.4E-03
SVOC	Phenanthrene	85-01-8	D	1.17E-07	3.0E-02	3.9E-06	1.30E-01	1.01E-07	3.0E-02	3.4E-06	5.83E-06	1.60E-07			5.00E-08	1.37E-09			7.3E-06
SVOC	Phenol	108-95-2	ID	1.17E-07	3.0E-01	3.9E-07	1.00E-01	7.75E-08	3.0E-01	2.6E-07	5.24E-05	1.44E-06			5.00E-08	1.37E-09			6.5E-07
SVOC	Pyrene	129-00-0	NC	1.17E-07	3.0E-02	3.9E-06	1.30E-01	1.01E-07	3.0E-02	3.4E-06	1.91E-06	5.24E-08			5.00E-08	1.37E-09			7.3E-06
PCB	PCBs (total)	1336-36-3	B2	1.17E-07	2.0E-05	5.9E-03	1.40E-01	1.08E-07	2.0E-05	5.4E-03	3.69E-06	1.01E-07			5.00E-08	1.37E-09			1.1E-02
INORG	Arsenic	7440-38-2	A	1.17E-07	3.0E-04	3.9E-04	3.00E-02	2.32E-08	3.0E-04	7.7E-05			1.5E-05		5.00E-08	1.37E-09	1.5E-05	9.1E-05	5.6E-04
INORG	Barium	7440-39-3	NC	1.17E-07	2.0E-01	5.9E-07			1.4E-02						5.00E-08	1.37E-09			5.9E-07
INORG	Beryllium	7440-41-7	B1	1.17E-07	2.0E-03	5.9E-05			1.4E-05				2.0E-05		5.00E-08	1.37E-09	2.0E-05	6.8E-05	1.3E-04
INORG	Cadmium	7440-43-9	B1	1.17E-07	1.0E-03	1.2E-04	1.00E-03	7.75E-10	2.5E-05	3.1E-05			1.0E-05		5.00E-08	1.37E-09	1.0E-05	1.4E-04	2.9E-04
INORG	Chromium (total)	7440-47-3		1.17E-07	3.0E-03	3.9E-05			7.5E-05				1.0E-04		5.00E-08	1.37E-09	1.0E-04	1.4E-05	5.3E-05
INORG	Cobalt	7440-48-4	LC	1.17E-07	3.0E-04	3.9E-04			3.0E-04				6.0E-06		5.00E-08	1.37E-09	6.0E-06	2.3E-04	6.2E-04
INORG	Copper	7440-50-8	D	1.17E-07	4.0E-02	2.9E-06			4.0E-02						5.00E-08	1.37E-09			2.9E-06
INORG	Cyanide (total)	57-12-5	D	1.17E-07	2.0E-02	5.9E-06			2.0E-02				9.0E-03		5.00E-08	1.37E-09	9.0E-03	1.5E-07	6.0E-06
INORG	Manganese	7439-96-5	D	1.17E-07	1.4E-01	8.4E-07			8.4E-03				5.0E-05		5.00E-08	1.37E-09	5.0E-05	2.7E-05	2.8E-05
INORG	Mercury	7439-97-6	D	1.17E-07	3.0E-04	3.9E-04			2.1E-05		4.01E-05	1.10E-06	3.0E-04	3.7E-03	5.00E-08	1.37E-09	3.0E-04	4.6E-06	4.1E-03
INORG	Nickel	7440-02-0	A	1.17E-07	2.0E-02	5.9E-06			8.0E-04				9.0E-05		5.00E-08	1.37E-09	9.0E-05	1.5E-05	2.1E-05
INORG	Selenium	7782-49-2	D	1.17E-07	5.0E-03	2.3E-05			5.0E-03				2.0E-02		5.00E-08	1.37E-09	2.0E-02	6.8E-08	2.4E-05
INORG	Thallium	7440-28-0		1.17E-07	7.0E-05	1.7E-03			7.0E-05						5.00E-08	1.37E-09			1.7E-03
INORG	Vanadium	7440-62-2		1.17E-07	7.0E-03	1.7E-05			1.8E-04						5.00E-08	1.37E-09			1.7E-05
INORG	Zinc	7440-66-6	ID	1.17E-07	3.0E-01	3.9E-07			3.0E-01						5.00E-08	1.37E-09			3.9E-07
Notes:																			
Unit HQs are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 84.5 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire site) and region-specific meteorological parameters.																			
The C/Q term has been converted from an annual-average concentration to a 24-hour concentration (USEPA 2002).																			
The concentration of particulates in the air is assumed to be no more 50 ug/m3.																			

Attachment D4: Estimates of Cancer Risk and HQ for Maintenance Worker Exposure to Soil at Example Location SB-0634 Former GM Delco Plant 5, Kokomo, Indiana												
Location	Chem Group	Chemical	CASRN	Max Detect (mg/kg)	Max Limit (mg/kg)	Background Conc (mg/kg)	Site-Related Exposure Concentration (mg/kg)	Basis of Site-Related Exposure Concentration	Maintenance Worker			
									Unit Risk	Unit HQ	Risk	HQ
SB-0634	VOC	Acetone	67-64-1	1.20E-01	8.25E-02		1.20E-01	Half-Limit		6.4E-07		8E-08
SB-0634	VOC	Benzene	71-43-2	6.00E-03	4.10E-03		6.00E-03	Half-Limit	1.0E-07	3.1E-03	6E-10	2E-05
SB-0634	VOC	Bromodichloromethane	75-27-4		6.10E-03		3.05E-03	Half-Limit	1.0E-09	5.9E-06	3E-12	2E-08
SB-0634	VOC	2-Butanone	78-93-3		6.10E-02		3.05E-02	Half-Limit		3.5E-06		1E-07
SB-0634	VOC	Carbon Disulfide	75-15-0	5.70E-02	8.25E-03		5.70E-02	Max Detect		3.1E-04		2E-05
SB-0634	VOC	Carbon Tetrachloride	56-23-5		6.10E-03		3.05E-03	Half-Limit	2.8E-07	8.6E-04	9E-10	3E-06
SB-0634	VOC	Chlorobenzene	108-90-7		6.10E-03		3.05E-03	Half-Limit		8.2E-04		3E-06
SB-0634	VOC	Chloroethane	75-00-3		6.10E-03		3.05E-03	Half-Limit		3.0E-05		9E-08
SB-0634	VOC	Chloroform	67-66-3		6.10E-03		3.05E-03	Half-Limit	3.1E-07	1.9E-03	9E-10	6E-06
SB-0634	VOC	Chloromethane	74-87-3		6.10E-03		3.05E-03	Half-Limit		1.9E-03		6E-06
SB-0634	VOC	Cumene	98-82-8	2.90E-03	4.10E-03		2.90E-03	Half-Limit		9.7E-05		3E-07
SB-0634	VOC	Cyclohexane	110-82-7	1.00E-03	6.10E-03		1.00E-03	Half-Limit		2.9E-05		3E-08
SB-0634	VOC	Dibromochloromethane	124-48-1		6.10E-03		3.05E-03	Half-Limit	1.4E-09	5.9E-06	4E-12	2E-08
SB-0634	VOC	1,1-Dichloroethane	75-34-3		6.10E-03		3.05E-03	Half-Limit	2.3E-08	2.0E-04	7E-11	6E-07
SB-0634	VOC	1,1-Dichloroethene	75-35-4	3.90E-01	6.10E-03		3.90E-01	Half-Limit		9.3E-04		4E-04
SB-0634	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			1.40E+02	Max Detect		1.2E-05		2E-03
SB-0634	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01	6.10E-03		8.70E-01	Max Detect		1.9E-03		2E-03
SB-0634	VOC	Ethyl Benzene	100-41-4	2.10E-02	4.10E-03		2.10E-02	Max Detect		4.9E-05		1E-06
SB-0634	VOC	Methyl Acetate	79-20-9		1.20E-02		6.00E-03	Half-Limit		1.2E-07		7E-10
SB-0634	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01	8.25E-03		2.00E-01	Max Detect		7.2E-06		1E-06
SB-0634	VOC	Methylcyclohexane	108-87-2	5.70E-03	8.25E-03		5.70E-03	Half-Limit		8.1E-05		5E-07
SB-0634	VOC	Methylene Chloride	75-09-2	7.80E-03			7.80E-03	Max Detect	6.3E-09	9.0E-05	5E-11	7E-07
SB-0634	VOC	Styrene	100-42-5	1.00E-01	4.10E-03		1.00E-01	Max Detect		2.0E-05		2E-06
SB-0634	VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.10E-03		3.05E-03	Half-Limit		2.9E-05		9E-08
SB-0634	VOC	Tetrachloroethene	127-18-4	3.40E-03	6.10E-03		3.40E-03	Max Detect	4.5E-08	2.6E-04	2E-10	9E-07
SB-0634	VOC	Toluene	108-88-3	8.00E-03	4.10E-03		8.00E-03	Half-Limit		1.5E-05		1E-07
SB-0634	VOC	1,1,1-Trichloroethane	71-55-6		6.10E-03		3.05E-03	Half-Limit		2.4E-05		7E-08
SB-0634	VOC	1,1,2-Trichloroethane	79-00-5		6.10E-03		3.05E-03	Half-Limit	8.4E-08	2.9E-05	3E-10	9E-08
SB-0634	VOC	Trichloroethene	79-01-6	1.30E+02			1.30E+02	Max Detect	2.0E-08	1.7E-04	3E-06	2E-02
SB-0634	VOC	Trichlorofluoromethane	75-69-4		6.10E-03		3.05E-03	Half-Limit		3.4E-04		1E-06
SB-0634	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.20E-02		6.00E-03	Half-Limit		8.4E-06		5E-08
SB-0634	VOC	Vinyl Chloride	75-01-4	7.90E+00	2.40E-03		7.90E+00	Half-Limit	3.3E-07	2.5E-03	3E-06	2E-02
SB-0634	VOC	Xylenes (total)	1330-20-7	2.61E-02	4.10E-03		2.61E-02	Max Detect		4.4E-04		1E-05
SB-0634	PCB	PCBs (total)	1336-36-3		3.30E-01		1.65E-01	Interpolated Half-Limit	7.3E-08	1.1E-02	1E-08	2E-03
SB-0634	INORG	Lead	7439-92-1	1.90E+01			1.90E+01	Interpolated Max				
SB-0634	INORG	Manganese	7439-96-5	5.50E+02		8.17E+02		Interpolated Max is Less than Background		2.8E-05		
SB-0634	INORG	Thallium	7440-28-0	3.50E+00	5.00E-01		3.50E+00	Interpolated Half-Limit		1.7E-03		6E-03
								Sum:			5E-06	5E-02
Note:												
Values above USEPA's cumulative cancer risk limit of 1E-4 or HI limit of 1 are highlighted.												

Attachment D4: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA _{event} (mg/cm ²)
VOC	Acetone	67-64-1	5.8E+01	1.0E+00	5.2E-04	1.5E-03	2.2E-01	3.3E-01	3.0E-01	5.3E-01	1.27E-06
VOC	Benzene	71-43-2	7.8E+01	1.0E+00	1.5E-02	5.0E-02	2.9E-01	3.7E-01	3.3E-01	6.9E-01	3.70E-05
VOC	Bromodichloromethane	75-27-4	1.6E+02	1.0E+00	4.7E-03	2.3E-02	8.7E-01	3.5E-01	3.2E-01	2.1E+00	1.70E-05
VOC	2-Butanone	78-93-3	7.2E+01	1.0E+00	9.6E-04	3.1E-03	2.7E-01	3.4E-01	3.1E-01	6.4E-01	2.42E-06
VOC	Carbon Disulfide	75-15-0	7.6E+01	1.0E+00	1.2E-02	4.2E-02	2.8E-01	3.6E-01	3.3E-01	6.7E-01	3.11E-05
VOC	Carbon Tetrachloride	56-23-5	1.5E+02	1.0E+00	1.4E-02	6.6E-02	7.6E-01	3.8E-01	3.4E-01	1.8E+00	4.84E-05
VOC	Chlorobenzene	108-90-7	1.1E+02	1.0E+00	2.9E-02	1.2E-01	4.5E-01	4.2E-01	3.8E-01	1.1E+00	8.00E-05
VOC	Chloroethane	75-00-3	6.5E+01	1.0E+00	6.1E-03	1.9E-02	2.4E-01	3.5E-01	3.1E-01	5.8E-01	1.49E-05
VOC	Chloroform	67-66-3	1.2E+02	1.0E+00	6.3E-03	2.6E-02	4.9E-01	3.5E-01	3.2E-01	1.2E+00	1.86E-05
VOC	Chloromethane	74-87-3	5.0E+01	1.0E+00	1.5E-02	4.2E-02	2.0E-01	3.6E-01	3.3E-01	4.8E-01	3.58E-05
VOC	2-Chlorotoluene	95-49-8	1.3E+02	1.0E+00	5.6E-02	2.4E-01	5.4E-01	5.1E-01	4.7E-01	1.3E+00	1.64E-04
VOC	Cumene	98-82-8	1.2E+02	1.0E+00	6.8E-02	2.9E-01	5.0E-01	5.5E-01	5.1E-01	1.2E+00	1.93E-04
VOC	Cyclohexane	110-82-7	8.4E+01	1.0E+00	1.0E-01	3.5E-01	3.1E-01	6.0E-01	5.7E-01	7.5E-01	2.30E-04
VOC	Dibromochloromethane	124-48-1	2.1E+02	1.0E+00	2.9E-03	1.6E-02	1.5E+00	3.4E-01	3.1E-01	3.7E+00	1.42E-05
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	1.0E+00	6.7E-03	2.6E-02	3.8E-01	3.5E-01	3.2E-01	9.0E-01	1.83E-05
VOC	1,1-Dichloroethene	75-35-4	9.7E+01	1.0E+00	1.2E-02	4.4E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	3.10E-05
VOC	1,2-Dichloroethene (total)	540-59-0	9.7E+01	1.0E+00	7.7E-03	2.9E-02	3.7E-01	3.5E-01	3.2E-01	8.8E-01	2.07E-05
VOC	cis-1,2-Dichloroethene	156-59-2	9.7E+01	1.0E+00	7.7E-03	2.9E-02	3.7E-01	3.5E-01	3.2E-01	8.8E-01	2.07E-05
VOC	trans-1,2-Dichloroethene	156-60-5	9.7E+01	1.0E+00	1.1E-02	4.0E-02	3.7E-01	3.6E-01	3.3E-01	8.8E-01	2.83E-05
VOC	Ethyl Benzene	100-41-4	1.1E+02	1.0E+00	4.8E-02	1.9E-01	4.1E-01	4.7E-01	4.3E-01	9.9E-01	1.27E-04
VOC	Methyl Acetate	79-20-9	7.4E+01	1.0E+00	8.0E-04	2.7E-03	2.7E-01	3.4E-01	3.0E-01	6.6E-01	2.04E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	1.0E+00	2.7E-03	1.0E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	7.32E-06
VOC	Methylcyclohexane	108-87-2	9.8E+01	1.0E+00	4.0E-02	1.5E-01	3.7E-01	4.4E-01	4.0E-01	9.0E-01	1.05E-04
VOC	Methylene Chloride	75-09-2	8.5E+01	1.0E+00	3.5E-03	1.3E-02	3.1E-01	3.4E-01	3.1E-01	7.5E-01	9.25E-06
VOC	Styrene	100-42-5	1.0E+02	1.0E+00	3.6E-02	1.4E-01	4.0E-01	4.3E-01	4.0E-01	9.7E-01	9.63E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	1.7E+02	1.0E+00	6.9E-03	3.4E-02	9.2E-01	3.6E-01	3.2E-01	2.2E+00	2.57E-05
VOC	Tetrachloroethene	127-18-4	1.7E+02	1.0E+00	1.1E-02	5.4E-02	8.9E-01	3.7E-01	3.4E-01	2.1E+00	3.99E-05
VOC	Toluene	108-88-3	9.2E+01	1.0E+00	3.2E-02	1.2E-01	3.5E-01	4.2E-01	3.8E-01	8.3E-01	8.08E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	1.0E+00	1.2E-02	5.5E-02	5.9E-01	3.7E-01	3.4E-01	1.4E+00	3.85E-05
VOC	1,1,2-Trichloroethane	79-00-5	1.3E+02	1.0E+00	6.4E-03	2.8E-02	5.9E-01	3.5E-01	3.2E-01	1.4E+00	2.02E-05
VOC	Trichloroethene	79-01-6	1.3E+02	1.0E+00	1.8E-02	7.9E-02	5.7E-01	3.9E-01	3.5E-01	1.4E+00	5.53E-05
VOC	Trichlorofluoromethane	75-69-4	1.4E+02	1.0E+00	1.3E-02	5.7E-02	6.2E-01	3.7E-01	3.4E-01	1.5E+00	4.03E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	1.0E+00	1.7E-02	9.1E-02	1.2E+00	4.0E-01	3.6E-01	2.8E+00	7.31E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	1.2E+02	1.0E+00	1.1E-01	4.4E-01	5.0E-01	6.7E-01	6.5E-01	1.2E+00	2.92E-04
VOC	Vinyl Chloride	75-01-4	6.3E+01	1.0E+00	6.9E-03	2.1E-02	2.4E-01	3.5E-01	3.2E-01	5.7E-01	1.69E-05
VOC	Xylenes (total)	1330-20-7	1.1E+02	1.0E+00	5.0E-02	2.0E-01	4.1E-01	4.8E-01	4.4E-01	9.9E-01	1.32E-04
SVOC	Acenaphthene	83-32-9	1.5E+02	1.0E+00	8.4E-02	4.0E-01	7.7E-01	6.4E-01	6.1E-01	1.8E+00	2.96E-04
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	9.0E-01	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	2.40E-03

Attachment D4: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA _{event} (mg/cm ²)
SVOC	Benzo(a)pyrene	50-32-8	2.5E+02	8.0E-01	6.6E-01	4.0E+00	2.7E+00	4.1E+00	1.2E+01	1.2E+01	3.41E-03
SVOC	Benzo(b)fluoranthene	205-99-2	2.5E+02	8.0E-01	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	3.90E-03
SVOC	Benzo(g,h,i)perylene	191-24-2	2.8E+02	7.0E-01	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	5.27E-03
SVOC	Benzo(k)fluoranthene	207-08-9	2.5E+02	8.0E-01	7.6E-01	4.6E+00	2.7E+00	4.7E+00	1.5E+01	1.2E+01	3.90E-03
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	4.0E-01	6.8E-01	5.1E+00	1.6E+01	5.2E+00	1.9E+01	7.1E+01	4.26E-03
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	9.0E-01	4.4E-02	3.0E-01	5.9E+00	5.6E-01	5.2E-01	1.4E+01	3.78E-04
SVOC	Chrysene	218-01-9	2.3E+02	9.0E-01	4.8E-01	2.8E+00	2.0E+00	2.9E+00	6.3E+00	8.4E+00	2.40E-03
SVOC	Dibenz(a,h)anthracene	53-70-3	2.8E+02	7.0E-01	1.0E+00	6.4E+00	3.8E+00	6.5E+00	2.9E+01	1.7E+01	5.34E-03
SVOC	Dibenzofuran	132-64-9	1.7E+02	1.0E+00	1.4E-01	7.1E-01	9.2E-01	9.1E-01	9.6E-01	3.6E+00	5.36E-04
SVOC	Di-n-butylphthalate	84-74-2	2.8E+02	9.0E-01	4.8E-02	3.1E-01	3.8E+00	5.6E-01	5.3E-01	9.1E+00	3.31E-04
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	3.0E-01	1.0E+00	7.6E+00	1.6E+01	7.6E+00	3.9E+01	7.2E+01	4.72E-03
SVOC	Fluoranthene	206-44-0	2.0E+02	1.0E+00	2.8E-01	1.5E+00	1.4E+00	1.7E+00	2.4E+00	5.7E+00	1.31E-03
SVOC	Fluorene	86-73-7	1.7E+02	1.0E+00	1.1E-01	5.5E-01	9.0E-01	7.7E-01	7.7E-01	2.2E+00	4.13E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.8E+02	7.0E-01	1.0E+00	6.4E+00	3.7E+00	6.4E+00	2.8E+01	1.6E+01	5.27E-03
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	1.0E+00	8.9E-02	4.1E-01	6.6E-01	6.5E-01	6.2E-01	1.6E+00	2.89E-04
SVOC	Naphthalene	91-20-3	1.3E+02	1.0E+00	5.0E-02	2.2E-01	5.5E-01	4.9E-01	4.5E-01	1.3E+00	1.49E-04
SVOC	Phenanthrene	85-01-8	1.8E+02	1.0E+00	1.4E-01	7.2E-01	1.0E+00	9.1E-01	9.7E-01	4.1E+00	5.59E-04
SVOC	Phenol	108-95-2	9.4E+01	1.0E+00	4.5E-03	1.7E-02	3.5E-01	3.4E-01	3.1E-01	8.5E-01	1.20E-05
SVOC	Pyrene	129-00-0	2.0E+02	1.0E+00	2.8E-01	1.5E+00	1.4E+00	1.6E+00	2.4E+00	5.7E+00	1.29E-03
PCB	PCBs (total)	1336-36-3	3.3E+02	7.0E-01	4.5E-01	3.1E+00	7.2E+00	3.2E+00	7.7E+00	3.1E+01	3.31E-03
INORG	Arsenic	7440-38-2	7.5E+01		1.0E-03						2.00E-06
INORG	Barium	7440-39-3	1.4E+02		1.0E-03						2.00E-06
INORG	Beryllium	7440-41-7	9.0E+00		1.0E-03						2.00E-06
INORG	Cadmium	7440-43-9	1.1E+02		1.0E-03						2.00E-06
INORG	Chromium (total)	7440-47-3	5.2E+01		2.0E-03						4.00E-06
INORG	Cobalt	7440-48-4	5.9E+01		4.0E-04						8.00E-07
INORG	Copper	7440-50-8	6.4E+01		1.0E-03						2.00E-06
INORG	Cyanide (total)	57-12-5	2.6E+01		1.0E-03						2.00E-06
INORG	Manganese	7439-96-5	5.5E+01		1.0E-03						2.00E-06
INORG	Mercury	7439-97-6	2.0E+02		1.0E-03						2.00E-06
INORG	Nickel	7440-02-0	5.9E+01		2.0E-04						4.00E-07
INORG	Selenium	7782-49-2	7.9E+01		1.0E-03						2.00E-06
INORG	Thallium	7440-28-0	2.0E+02		1.0E-03						2.00E-06
INORG	Vanadium	7440-62-2	5.1E+01		1.0E-03						2.00E-06
INORG	Zinc	7440-66-6	6.5E+01		6.0E-04						1.20E-06
Notes:											
The flux is calculated at a unit groundwater concentration of 1 mg/L.											
K _p is capped at 1 cm/hr (USEPA 1992).											

Attachment D4: Cancer Risk Calculations for Exposure of Maintenance Workers to Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Carc Class	Incidental Ingestion			Dermal Contact				Vapor Inhalation			All Routes
				LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	DA _{event} (mg/cm ²)	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	2.80E-07			1.27E-06	1.17E-07			4.13E-02			
VOC	Benzene	71-43-2	A	2.80E-07	5.5E-02	1.5E-08	3.70E-05	3.41E-06	5.5E-02	1.9E-07	1.32E-01	7.8E-03	7E-07	8.7E-07
VOC	Bromodichloromethane	75-27-4	B2	2.80E-07	6.2E-02	1.7E-08	1.70E-05	1.57E-06	6.2E-02	9.7E-08	8.74E-02			1.1E-07
VOC	2-Butanone	78-93-3	ID	2.80E-07			2.42E-06	2.23E-07			5.41E-02			
VOC	Carbon Disulfide	75-15-0		2.80E-07			3.11E-05	2.87E-06			1.36E-01			
VOC	Carbon Tetrachloride	56-23-5	B2	2.80E-07	1.3E-01	3.6E-08	4.84E-05	4.47E-06	1.3E-01	5.8E-07	9.55E-02	1.5E-02	9E-07	1.6E-06
VOC	Chlorobenzene	108-90-7	D	2.80E-07			8.00E-05	7.38E-06			1.09E-01			
VOC	Chloroethane	75-00-3	LC	2.80E-07			1.49E-05	1.37E-06			1.47E-01			
VOC	Chloroform	67-66-3	B2	2.80E-07			1.86E-05	1.71E-06			1.06E-01	2.3E-02	2E-06	1.6E-06
VOC	Chloromethane	74-87-3	D	2.80E-07			3.58E-05	3.30E-06			1.66E-01			
VOC	2-Chlorotoluene	95-49-8		2.80E-07			1.64E-04	1.52E-05			1.03E-01			
VOC	Cumene	98-82-8	D	2.80E-07			1.93E-04	1.78E-05			1.07E-01			
VOC	Cyclohexane	110-82-7	ID	2.80E-07			2.30E-04	2.12E-05			1.29E-01			
VOC	Dibromochloromethane	124-48-1	C	2.80E-07	8.4E-02	2.3E-08	1.42E-05	1.31E-06	8.4E-02	1.1E-07	7.45E-02			1.3E-07
VOC	1,1-Dichloroethane	75-34-3	SC	2.80E-07			1.83E-05	1.69E-06			1.17E-01	1.6E-03	1E-07	1.2E-07
VOC	1,1-Dichloroethene	75-35-4	C	2.80E-07			3.10E-05	2.86E-06			1.20E-01			
VOC	1,2-Dichloroethene (total)	540-59-0		2.80E-07			2.07E-05	1.91E-06			1.18E-01			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.80E-07			2.07E-05	1.91E-06			1.18E-01			
VOC	trans-1,2-Dichloroethene	156-60-5		2.80E-07			2.83E-05	2.62E-06			1.19E-01			
VOC	Ethyl Benzene	100-41-4	D	2.80E-07			1.27E-04	1.17E-05			1.14E-01			
VOC	Methyl Acetate	79-20-9		2.80E-07			2.04E-06	1.88E-07			6.35E-02			
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.80E-07			7.32E-06	6.75E-07			7.20E-02			
VOC	Methylcyclohexane	108-87-2		2.80E-07			1.05E-04	9.66E-06			1.20E-01			
VOC	Methylene Chloride	75-09-2	B2	2.80E-07	7.5E-03	2.1E-09	9.25E-06	8.54E-07	7.5E-03	6.4E-09	1.23E-01	4.7E-04	4E-08	4.6E-08
VOC	Styrene	100-42-5		2.80E-07			9.63E-05	8.88E-06			1.12E-01			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		2.80E-07			2.57E-05	2.37E-06			6.91E-02			
VOC	Tetrachloroethene	127-18-4	C-B2	2.80E-07	5.2E-02	1.5E-08	3.99E-05	3.68E-06	5.2E-02	1.9E-07	9.17E-02	3.1E-03	2E-07	3.9E-07
VOC	Toluene	108-88-3	ID	2.80E-07			8.08E-05	7.45E-06			1.22E-01			
VOC	1,1,1-Trichloroethane	71-55-6	ID	2.80E-07			3.85E-05	3.56E-06			1.02E-01			
VOC	1,1,2-Trichloroethane	79-00-5	C	2.80E-07	5.7E-02	1.6E-08	2.02E-05	1.86E-06	5.7E-02	1.1E-07	9.19E-02	1.6E-02	1E-06	1.1E-06
VOC	Trichloroethene	79-01-6	C-B2	2.80E-07	1.1E-02	3.1E-09	5.53E-05	5.10E-06	1.1E-02	5.6E-08	1.03E-01	1.7E-03	1E-07	1.7E-07
VOC	Trichlorofluoromethane	75-69-4		2.80E-07			4.03E-05	3.72E-06			1.01E-01			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.80E-07			7.31E-05	6.74E-06			8.68E-02			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	2.80E-07			2.92E-04	2.69E-05			1.06E-01			
VOC	Vinyl Chloride	75-01-4	A	2.80E-07	1.4E+00	3.9E-07	1.69E-05	1.56E-06	1.4E+00	2.2E-06	1.50E-01	8.8E-03	9E-07	3.4E-06
VOC	Xylenes (total)	1330-20-7	ID	2.80E-07			1.32E-04	1.22E-05			1.13E-01			
SVOC	Acenaphthene	83-32-9		2.80E-07			2.96E-04	2.73E-05			4.53E-02			
SVOC	Benzo(a)anthracene	56-55-3	B2	2.80E-07	7.3E-01	2.0E-07	2.40E-03	2.21E-04	7.3E-01	1.6E-04	9.71E-04	8.8E-02	6E-08	1.6E-04
SVOC	Benzo(a)pyrene	50-32-8	B2	2.80E-07	7.3E+00	2.0E-06	3.41E-03	3.14E-04	7.3E+00	2.3E-03	2.11E-04	8.8E-01	1E-07	2.3E-03
SVOC	Benzo(b)fluoranthene	205-99-2	B2	2.80E-07	7.3E-01	2.0E-07	3.90E-03	3.60E-04	7.3E-01	2.6E-04	1.93E-02	8.8E-02	1E-06	2.6E-04
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.80E-07			5.27E-03	4.86E-04			5.72E-05			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.80E-07	7.3E-02	2.0E-08	3.90E-03	3.60E-04	7.3E-02	2.6E-05	1.71E-04	8.8E-03	1E-09	2.6E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.80E-07	1.4E-02	3.9E-09	4.26E-03	3.93E-04	1.4E-02	5.5E-06	1.89E-05	2.4E-03	3E-11	5.5E-06

Attachment D4: Cancer Risk Calculations for Exposure of Maintenance Workers to Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Carc Class	Incidental Ingestion			Dermal Contact				Vapor Inhalation			All Routes
				LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	DA _{event} (mg/cm ²)	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Butylbenzylphthalate	85-68-7	C	2.80E-07	1.9E-03	5.3E-10	3.78E-04	3.48E-05	1.9E-03	6.6E-08	3.49E-04			6.7E-08
SVOC	Chrysene	218-01-9	B2	2.80E-07	7.3E-03	2.0E-09	2.40E-03	2.21E-04	7.3E-03	1.6E-06	1.89E-02	8.8E-04	1E-08	1.6E-06
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	2.80E-07	7.3E+00	2.0E-06	5.34E-03	4.93E-04	7.3E+00	3.6E-03	7.31E-07	8.8E-01	4E-10	3.6E-03
SVOC	Dibenzofuran	132-64-9	D	2.80E-07			5.36E-04	4.95E-05			4.22E-04			
SVOC	Di-n-butylphthalate	84-74-2	D	2.80E-07			3.31E-04	3.06E-05			2.69E-07			
SVOC	Di-n-octylphthalate	117-84-0		2.80E-07			4.72E-03	4.35E-04			1.23E-02			
SVOC	Fluoranthene	206-44-0	D	2.80E-07			1.31E-03	1.20E-04			5.67E-03			
SVOC	Fluorene	86-73-7	D	2.80E-07			4.13E-04	3.81E-05			2.49E-02			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.80E-07	7.3E-01	2.0E-07	5.27E-03	4.86E-04	7.3E-01	3.5E-04	2.69E-04	8.8E-02	2E-08	3.6E-04
SVOC	2-Methylnaphthalene	91-57-6	ID	2.80E-07			2.89E-04	2.66E-05			8.18E-02			
SVOC	Naphthalene	91-20-3	C	2.80E-07			1.49E-04	1.37E-05			8.13E-02	3.4E-02	2E-06	1.8E-06
SVOC	Phenanthrene	85-01-8	D	2.80E-07			5.59E-04	5.16E-05			6.98E-03			
SVOC	Phenol	108-95-2	ID	2.80E-07			1.20E-05	1.11E-06			3.19E-04			
SVOC	Pyrene	129-00-0	NC	2.80E-07			1.29E-03	1.19E-04			3.80E-03			
PCB	PCBs (total)	1336-36-3	B2	2.80E-07	2.0E+00	5.6E-07	3.31E-03	3.05E-04	2.0E+00	6.1E-04	5.84E-02	5.7E-01	2E-05	6.3E-04
INORG	Arsenic	7440-38-2	A	2.80E-07	1.5E+00	4.2E-07	2.00E-06	1.85E-07	1.5E+00	2.8E-07		4.3E+00		7.0E-07
INORG	Barium	7440-39-3	NC	2.80E-07			2.00E-06	1.85E-07						
INORG	Beryllium	7440-41-7	B1	2.80E-07			2.00E-06	1.85E-07				2.4E+00		
INORG	Cadmium	7440-43-9	B1	2.80E-07			2.00E-06	1.85E-07				1.8E+00		
INORG	Chromium (total)	7440-47-3		2.80E-07			4.00E-06	3.69E-07				1.2E+01		
INORG	Cobalt	7440-48-4	LC	2.80E-07			8.00E-07	7.38E-08				9.0E+00		
INORG	Copper	7440-50-8	D	2.80E-07			2.00E-06	1.85E-07						
INORG	Cyanide (total)	57-12-5	D	2.80E-07			2.00E-06	1.85E-07						
INORG	Manganese	7439-96-5	D	2.80E-07			2.00E-06	1.85E-07						
INORG	Mercury	7439-97-6	D	2.80E-07			2.00E-06	1.85E-07			8.26E-02			
INORG	Nickel	7440-02-0	A	2.80E-07			4.00E-07	3.69E-08				2.4E-01		
INORG	Selenium	7782-49-2	D	2.80E-07			2.00E-06	1.85E-07						
INORG	Thallium	7440-28-0		2.80E-07			2.00E-06	1.85E-07						
INORG	Vanadium	7440-62-2		2.80E-07			2.00E-06	1.85E-07						
INORG	Zinc	7440-66-6	ID	2.80E-07			1.20E-06	1.11E-07						
Notes:														
Unit risks are calculated at a groundwater concentration of 1 mg/L.														
The dispersion coefficient to outdoor air (C/Q) is 11.0 (kg/m3) / (kg/m2/s).														
This C/Q term is estimated using USEPA's SCREEN3 air dispersion model (USEPA 1995) to estimate maximum 1-hour concentrations at ground level. The source area for maintenance workers is based on a 15 by 15 foot excavation.														

Attachment D4: Noncancer HQ Calculations for Exposure of Maintenance Workers to Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Carc Class	Incidental Ingestion			Dermal Contact				Vapor Inhalation				All Routes
				ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	DA _{event} (mg/cm ²)	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	ADD (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	1.96E-06	9.0E-01	2.2E-06	1.27E-06	8.21E-07	9.0E-01	9.1E-07	4.13E-02	1.89E-04	3.1E+01	6.1E-06	9.2E-06
VOC	Benzene	71-43-2	A	1.96E-06	4.0E-03	4.9E-04	3.70E-05	2.39E-05	4.0E-03	6.0E-03	1.32E-01	6.02E-04	3.0E-02	2.0E-02	2.7E-02
VOC	Bromodichloromethane	75-27-4	B2	1.96E-06	2.0E-02	9.8E-05	1.70E-05	1.10E-05	2.0E-02	5.5E-04	8.74E-02	3.99E-04			6.5E-04
VOC	2-Butanone	78-93-3	ID	1.96E-06	6.0E-01	3.3E-06	2.42E-06	1.56E-06	6.0E-01	2.6E-06	5.41E-02	2.47E-04	5.0E+00	4.9E-05	5.5E-05
VOC	Carbon Disulfide	75-15-0		1.96E-06	1.0E-01	2.0E-05	3.11E-05	2.01E-05	1.0E-01	2.0E-04	1.36E-01	6.20E-04	7.0E-01	8.9E-04	1.1E-03
VOC	Carbon Tetrachloride	56-23-5	B2	1.96E-06	7.0E-04	2.8E-03	4.84E-05	3.13E-05	7.0E-04	4.5E-02	9.55E-02	4.36E-04	1.9E-01	2.3E-03	5.0E-02
VOC	Chlorobenzene	108-90-7	D	1.96E-06	2.0E-02	9.8E-05	8.00E-05	5.17E-05	2.0E-02	2.6E-03	1.09E-01	4.96E-04	5.0E-02	9.9E-03	1.3E-02
VOC	Chloroethane	75-00-3	LC	1.96E-06	1.0E-01	2.0E-05	1.49E-05	9.61E-06	1.0E-01	9.6E-05	1.47E-01	6.69E-04	1.0E+01	6.7E-05	1.8E-04
VOC	Chloroform	67-66-3	B2	1.96E-06	1.0E-02	2.0E-04	1.86E-05	1.20E-05	1.0E-02	1.2E-03	1.06E-01	4.84E-04	5.0E-02	9.7E-03	1.1E-02
VOC	Chloromethane	74-87-3	D	1.96E-06			3.58E-05	2.31E-05			1.66E-01	7.57E-04	9.0E-02	8.4E-03	8.4E-03
VOC	2-Chlorotoluene	95-49-8		1.96E-06	2.0E-02	9.8E-05	1.64E-04	1.06E-04	2.0E-02	5.3E-03	1.03E-01	4.69E-04			5.4E-03
VOC	Cumene	98-82-8	D	1.96E-06	1.0E-01	2.0E-05	1.93E-04	1.24E-04	1.0E-01	1.2E-03	1.07E-01	4.90E-04	4.0E-01	1.2E-03	2.5E-03
VOC	Cyclohexane	110-82-7	ID	1.96E-06			2.30E-04	1.49E-04			1.29E-01	5.91E-04	6.0E+00	9.8E-05	9.8E-05
VOC	Dibromochloromethane	124-48-1	C	1.96E-06	2.0E-02	9.8E-05	1.42E-05	9.16E-06	2.0E-02	4.6E-04	7.45E-02	3.40E-04			5.6E-04
VOC	1,1-Dichloroethane	75-34-3	SC	1.96E-06	2.0E-01	9.8E-06	1.83E-05	1.18E-05	2.0E-01	5.9E-05	1.17E-01	5.36E-04	5.0E-01	1.1E-03	1.1E-03
VOC	1,1-Dichloroethene	75-35-4	C	1.96E-06	5.0E-02	3.9E-05	3.10E-05	2.00E-05	5.0E-02	4.0E-04	1.20E-01	5.49E-04	2.0E-01	2.7E-03	3.2E-03
VOC	1,2-Dichloroethene (total)	540-59-0		1.96E-06	1.0E-02	2.0E-04	2.07E-05	1.34E-05	1.0E-02	1.3E-03	1.18E-01	5.40E-04			1.5E-03
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.96E-06	1.0E-02	2.0E-04	2.07E-05	1.34E-05	1.0E-02	1.3E-03	1.18E-01	5.38E-04			1.5E-03
VOC	trans-1,2-Dichloroethene	156-60-5		1.96E-06	2.0E-02	9.8E-05	2.83E-05	1.83E-05	2.0E-02	9.2E-04	1.19E-01	5.45E-04	6.0E-02	9.1E-03	1.0E-02
VOC	Ethyl Benzene	100-41-4	D	1.96E-06	1.0E-01	2.0E-05	1.27E-04	8.19E-05	1.0E-01	8.2E-04	1.14E-01	5.19E-04	1.0E+00	5.2E-04	1.4E-03
VOC	Methyl Acetate	79-20-9		1.96E-06	1.0E+00	2.0E-06	2.04E-06	1.32E-06	1.0E+00	1.3E-06	6.35E-02	2.90E-04			3.3E-06
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.96E-06			7.32E-06	4.72E-06			7.20E-02	3.29E-04	3.0E+00	1.1E-04	1.1E-04
VOC	Methylcyclohexane	108-87-2		1.96E-06			1.05E-04	6.76E-05			1.20E-01	5.47E-04	3.0E+00	1.8E-04	1.8E-04
VOC	Methylene Chloride	75-09-2	B2	1.96E-06	6.0E-02	3.3E-05	9.25E-06	5.98E-06	6.0E-02	1.0E-04	1.23E-01	5.64E-04	1.0E+00	5.4E-04	6.7E-04
VOC	Styrene	100-42-5		1.96E-06	2.0E-01	9.8E-06	9.63E-05	6.22E-05	2.0E-01	3.1E-04	1.12E-01	5.09E-04	1.0E+00	5.1E-04	8.3E-04
VOC	1,1,2,2-Tetrachloroethane	79-34-5		1.96E-06	4.0E-03	4.9E-04	2.57E-05	1.66E-05	4.0E-03	4.2E-03	6.91E-02	3.15E-04			4.6E-03
VOC	Tetrachloroethene	127-18-4	C-B2	1.96E-06	1.0E-02	2.0E-04	3.99E-05	2.58E-05	1.0E-02	2.6E-03	9.17E-02	4.19E-04	4.0E-01	1.0E-03	3.8E-03
VOC	Toluene	108-88-3	ID	1.96E-06	8.0E-02	2.4E-05	8.08E-05	5.22E-05	8.0E-02	6.5E-04	1.22E-01	5.56E-04	5.0E+00	1.1E-04	7.9E-04
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.96E-06	2.0E+00	9.8E-07	3.85E-05	2.49E-05	2.0E+00	1.2E-05	1.02E-01	4.67E-04	5.0E+00	9.3E-05	1.1E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	1.96E-06	4.0E-03	4.9E-04	2.02E-05	1.30E-05	4.0E-03	3.3E-03	9.19E-02	4.20E-04			3.7E-03
VOC	Trichloroethene	79-01-6	C-B2	1.96E-06	6.0E-03	3.3E-04	5.53E-05	3.57E-05	6.0E-03	5.9E-03	1.03E-01	4.69E-04	5.4E-01	8.7E-04	7.1E-03
VOC	Trichlorofluoromethane	75-69-4		1.96E-06	3.0E-01	6.5E-06	4.03E-05	2.60E-05	3.0E-01	8.7E-05	1.01E-01	4.62E-04	7.0E-01	6.6E-04	7.5E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.96E-06	3.0E+01	6.5E-08	7.31E-05	4.72E-05	3.0E+01	1.6E-06	8.68E-02	3.96E-04	3.0E+01	1.3E-05	1.5E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.96E-06			2.92E-04	1.88E-04			1.06E-01	4.85E-04	7.0E-03	6.9E-02	6.9E-02
VOC	Vinyl Chloride	75-01-4	A	1.96E-06	3.0E-03	6.5E-04	1.69E-05	1.09E-05	3.0E-03	3.6E-03	1.50E-01	6.84E-04	1.0E-01	6.8E-03	1.1E-02
VOC	Xylenes (total)	1330-20-7	ID	1.96E-06	2.0E-01	9.8E-06	1.32E-04	8.51E-05	2.0E-01	4.3E-04	1.13E-01	5.17E-04	1.0E-01	5.2E-03	5.6E-03
SVOC	Acenaphthene	83-32-9		1.96E-06	6.0E-02	3.3E-05	2.96E-04	1.91E-04	6.0E-02	3.2E-03	4.53E-02	2.07E-04			3.2E-03
SVOC	Benzo(a)anthracene	56-55-3	B2	1.96E-06			2.40E-03	1.55E-03			9.71E-04	4.43E-06			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.96E-06			3.41E-03	2.20E-03			2.11E-04	9.65E-07			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.96E-06			3.90E-03	2.52E-03			1.93E-02	8.81E-05			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.96E-06	3.0E-02	6.5E-05	5.27E-03	3.40E-03	3.0E-02	1.1E-01	5.72E-05	2.61E-07			1.1E-01
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.96E-06			3.90E-03	2.52E-03			1.71E-04	7.79E-07			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.96E-06	2.0E-02	9.8E-05	4.26E-03	2.75E-03	2.0E-02	1.4E-01	1.89E-05	8.63E-08			1.4E-01
SVOC	Butylbenzylphthalate	85-68-7	C	1.96E-06	2.0E-01	9.8E-06	3.78E-04	2.44E-04	2.0E-01	1.2E-03	3.49E-04	1.59E-06			1.2E-03
SVOC	Chrysene	218-01-9	B2	1.96E-06			2.40E-03	1.55E-03			1.89E-02	8.64E-05			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.96E-06			5.34E-03	3.45E-03			7.31E-07	3.34E-09			
SVOC	Dibenzofuran	132-64-9	D	1.96E-06	4.0E-03	4.9E-04	5.36E-04	3.46E-04	4.0E-03	8.7E-02	4.22E-04	1.93E-06			8.7E-02
SVOC	Di-n-butylphthalate	84-74-2	D	1.96E-06	1.0E-01	2.0E-05	3.31E-04	2.14E-04	1.0E-01	1.2E-03	2.69E-07	1.23E-09			2.2E-03
SVOC	Di-n-octylphthalate	117-84-0		1.96E-06	4.0E-02	4.9E-05	4.72E-03	3.05E-03	4.0E-02	7.6E-02	1.23E-02	5.59E-05			7.6E-02

**Attachment D4: Noncancer HQ Calculations for Exposure of Maintenance Workers to Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana**

				Incidental Ingestion			Dermal Contact				Vapor Inhalation				All Routes
Chem Group	Chemical	CASRN	Carc Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	DA _{event} (mg/cm ²)	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	ADD (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Fluoranthene	206-44-0	D	1.96E-06	4.0E-02	4.9E-05	1.31E-03	8.43E-04	4.0E-02	2.1E-02	5.67E-03	2.59E-05			2.1E-02
SVOC	Fluorene	86-73-7	D	1.96E-06	4.0E-02	4.9E-05	4.13E-04	2.67E-04	4.0E-02	6.7E-03	2.49E-02	1.14E-04			6.7E-03
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.96E-06			5.27E-03	3.40E-03			2.69E-04	1.23E-06			
SVOC	2-Methylnaphthalene	91-57-6	ID	1.96E-06	4.0E-03	4.9E-04	2.89E-04	1.86E-04	4.0E-03	4.7E-02	8.18E-02	3.74E-04			4.7E-02
SVOC	Naphthalene	91-20-3	C	1.96E-06	2.0E-02	9.8E-05	1.49E-04	9.62E-05	2.0E-02	4.8E-03	8.13E-02	3.71E-04	3.0E-03	1.2E-01	1.3E-01
SVOC	Phenanthrene	85-01-8	D	1.96E-06	3.0E-02	6.5E-05	5.59E-04	3.61E-04	3.0E-02	1.2E-02	6.98E-03	3.19E-05			1.2E-02
SVOC	Phenol	108-95-2	ID	1.96E-06	3.0E-01	6.5E-06	1.20E-05	7.75E-06	3.0E-01	2.6E-05	3.19E-04	1.46E-06			3.2E-05
SVOC	Pyrene	129-00-0	NC	1.96E-06	3.0E-02	6.5E-05	1.29E-03	8.30E-04	3.0E-02	2.8E-02	3.80E-03	1.73E-05			2.8E-02
PCB	PCBs (total)	1336-36-3	B2	1.96E-06	2.0E-05	9.8E-02	3.31E-03	2.14E-03	2.0E-05	1.1E+02	5.84E-02	2.67E-04			1.1E+02
INORG	Arsenic	7440-38-2	A	1.96E-06	3.0E-04	6.5E-03	2.00E-06	1.29E-06	3.0E-04	4.3E-03			1.5E-05		1.1E-02
INORG	Barium	7440-39-3	NC	1.96E-06	2.0E-01	9.8E-06	2.00E-06	1.29E-06	1.4E-02	9.2E-05					1.0E-04
INORG	Beryllium	7440-41-7	B1	1.96E-06	2.0E-03	9.8E-04	2.00E-06	1.29E-06	1.4E-05	9.2E-02			2.0E-05		9.3E-02
INORG	Cadmium	7440-43-9	B1	1.96E-06	5.0E-04	3.9E-03	2.00E-06	1.29E-06	2.5E-05	5.2E-02			1.0E-05		5.6E-02
INORG	Chromium (total)	7440-47-3		1.96E-06	3.0E-03	6.5E-04	4.00E-06	2.58E-06	7.5E-05	3.4E-02			1.0E-04		3.5E-02
INORG	Cobalt	7440-48-4	LC	1.96E-06	3.0E-04	6.5E-03	8.00E-07	5.17E-07	3.0E-04	1.7E-03			6.0E-06		8.2E-03
INORG	Copper	7440-50-8	D	1.96E-06	4.0E-02	4.9E-05	2.00E-06	1.29E-06	4.0E-02	3.2E-05					8.1E-05
INORG	Cyanide (total)	57-12-5	D	1.96E-06	2.0E-02	9.8E-05	2.00E-06	1.29E-06	2.0E-02	6.5E-05			9.0E-03		1.6E-04
INORG	Manganese	7439-96-5	D	1.96E-06	1.4E-01	1.4E-05	2.00E-06	1.29E-06	8.4E-03	1.5E-04			5.0E-05		1.7E-04
INORG	Mercury	7439-97-6	D	1.96E-06	3.0E-04	6.5E-03	2.00E-06	1.29E-06	2.1E-05	6.2E-02	8.26E-02	3.77E-04	3.0E-04	1.3E+00	1.3E+00
INORG	Nickel	7440-02-0	A	1.96E-06	2.0E-02	9.8E-05	4.00E-07	2.58E-07	8.0E-04	3.2E-04			9.0E-05		4.2E-04
INORG	Selenium	7782-49-2	D	1.96E-06	5.0E-03	3.9E-04	2.00E-06	1.29E-06	5.0E-03	2.6E-04			2.0E-02		6.5E-04
INORG	Thallium	7440-28-0		1.96E-06	7.0E-05	2.8E-02	2.00E-06	1.29E-06	7.0E-05	1.8E-02					4.6E-02
INORG	Vanadium	7440-62-2		1.96E-06	7.0E-03	2.8E-04	2.00E-06	1.29E-06	1.8E-04	7.1E-03					7.4E-03
INORG	Zinc	7440-66-6	ID	1.96E-06	3.0E-01	6.5E-06	1.20E-06	7.75E-07	3.0E-01	2.6E-06					9.1E-06
Notes:															
Unit HQs are calculated at a groundwater concentration of 1 mg/L.															
The dispersion coefficient to outdoor air (C/Q) is 84.5 (kg/m3) / (kg/m2/s).															
This C/Q term is estimated using USEPA's SCREEN3 air dispersion model (USEPA 1995) to estimate maximum 1-hour concentrations at ground level. The source area for maintenance workers is based on a 15 by 15 foot excavation.															

Attachment D4: Single-Chemical Risk Estimates for Maintenance Worker Exposure to Shallow Groundwater
Former Delco Plant 5, Kokomo, Indiana

Area	Chem Group	Chemical	CASRN	Carc Class	Max Detect (mg/L)	Maintenance Worker			
						Unit Risk	Unit HQ	Risk	HQ
AOI 2	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.64E-01		2E-03		4E-04
AOI 2	VOC	trans-1,2-Dichloroethene	156-60-5		3.48E-02		1E-02		4E-04
AOI 2	VOC	Vinyl Chloride	75-01-4	A	3.90E-03	3E-06	1E-02	1E-08	4E-05
AOI 2	SVOC	2-Methylnaphthalene	91-57-6	ID	6.50E-04		5E-02		3E-05
AOI 2	INORG	Arsenic	7440-38-2	A	7.74E-03	7E-07	1E-02	5E-09	8E-05
AOI 2	INORG	Barium	7440-39-3	NC	1.96E-01		1E-04		2E-05
AOI 2	INORG	Chromium (total)	7440-47-3		6.40E-03		4E-02		2E-04
AOI 2	INORG	Cobalt	7440-48-4	LC	3.20E-03		8E-03		3E-05
AOI 2	INORG	Copper	7440-50-8	D	6.96E-03		8E-05		6E-07
AOI 2	INORG	Manganese	7439-96-5	D	3.12E-01		2E-04		5E-05
AOI 2	INORG	Nickel	7440-02-0	A	8.44E-03		4E-04		4E-06
AOI 2	INORG	Vanadium	7440-62-2		8.52E-03		7E-03		6E-05
AOI 2	INORG	Zinc	7440-66-6	ID	3.69E-02		9E-06		3E-07
AOI 3	VOC	1,1-Dichloroethane	75-34-3	SC	3.20E-03	1E-07	1E-03	4E-10	4E-06
AOI 3	VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.46E-01		2E-03		5E-04
AOI 3	VOC	trans-1,2-Dichloroethene	156-60-5		3.28E-02		1E-02		3E-04
AOI 3	VOC	Trichloroethene	79-01-6	C-B2	5.94E+00	2E-07	7E-03	1E-06	4E-02
AOI 3	VOC	Vinyl Chloride	75-01-4	A	4.95E-03	3E-06	1E-02	2E-08	6E-05
AOI 3	INORG	Arsenic	7440-38-2	A	6.70E-03	7E-07	1E-02	5E-09	7E-05
AOI 3	INORG	Manganese	7439-96-5	D	4.90E-01		2E-04		8E-05
AOI 5	VOC	Benzene	71-43-2	A	2.30E-03	9E-07	3E-02	2E-09	6E-05
AOI 5	VOC	1,1-Dichloroethane	75-34-3	SC	1.20E-02	1E-07	1E-03	1E-09	1E-05
AOI 5	VOC	1,1-Dichloroethene	75-35-4	C	9.35E-03		3E-03		3E-05
AOI 5	VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.10E+00		2E-03		2E-03
AOI 5	VOC	trans-1,2-Dichloroethene	156-60-5		9.10E-02		1E-02		9E-04
AOI 5	VOC	Trichloroethene	79-01-6	C-B2	7.60E+00	2E-07	7E-03	1E-06	5E-02
AOI 5	VOC	Vinyl Chloride	75-01-4	A	1.00E-01	3E-06	1E-02	3E-07	1E-03
AOI 5	INORG	Arsenic	7440-38-2	A	8.37E-03	7E-07	1E-02	6E-09	9E-05
AOI 5	INORG	Barium	7440-39-3	NC	2.15E-01		1E-04		2E-05
AOI 5	INORG	Chromium (total)	7440-47-3		2.67E-02		4E-02		9E-04
AOI 5	INORG	Copper	7440-50-8	D	2.70E-02		8E-05		2E-06
AOI 5	INORG	Lead	7439-92-1	B2	1.42E-02				
AOI 5	INORG	Manganese	7439-96-5	D	8.01E-01		2E-04		1E-04
AOI 5	INORG	Zinc	7440-66-6	ID	7.35E-02		9E-06		7E-07
AOI 6	VOC	1,1-Dichloroethane	75-34-3	SC	1.90E-01	1E-07	1E-03	2E-08	2E-04
AOI 6	VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.10E-01		2E-03		5E-04
AOI 6	VOC	trans-1,2-Dichloroethene	156-60-5		6.00E-03		1E-02		6E-05
AOI 6	VOC	1,1,1-Trichloroethane	71-55-6	ID	2.10E-02		1E-04		2E-06
AOI 6	VOC	Trichloroethene	79-01-6	C-B2	5.20E-02	2E-07	7E-03	9E-09	4E-04
AOI 6	INORG	Arsenic	7440-38-2	A	5.70E-03	7E-07	1E-02	4E-09	6E-05
AOI 6	INORG	Manganese	7439-96-5	D	4.09E-01		2E-04		7E-05
AOI 7	VOC	1,1-Dichloroethene	75-35-4	C	4.50E-03		3E-03		1E-05
AOI 7	VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.00E+00		2E-03		2E-03
AOI 7	VOC	trans-1,2-Dichloroethene	156-60-5		8.80E-02		1E-02		9E-04
AOI 7	VOC	Trichloroethene	79-01-6	C-B2	4.80E+00	2E-07	7E-03	8E-07	3E-02
AOI 7	VOC	Vinyl Chloride	75-01-4	A	2.10E-02	3E-06	1E-02	7E-08	2E-04
AOI 7	SVOC	2-Methylnaphthalene	91-57-6	ID	6.40E-04		5E-02		3E-05
AOI 7	INORG	Arsenic	7440-38-2	A	9.20E-03	7E-07	1E-02	6E-09	1E-04
AOI 7	INORG	Barium	7440-39-3	NC	2.74E-01		1E-04		3E-05
AOI 7	INORG	Manganese	7439-96-5	D	2.70E-01		2E-04		5E-05
Upgradient	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.00E-02		2E-03		3E-05
Upgradient	VOC	Trichloroethene	79-01-6	C-B2	1.30E-03	2E-07	7E-03	2E-10	9E-06
Upgradient	VOC	Vinyl Chloride	75-01-4	A	6.80E-03	3E-06	1E-02	2E-08	8E-05
Off-Site East	VOC	cis-1,2-Dichloroethene	156-59-2	ID	5.71E-01		2E-03		9E-04
Off-Site East	VOC	trans-1,2-Dichloroethene	156-60-5		1.03E-01		1E-02		1E-03
Off-Site East	VOC	Trichloroethene	79-01-6	C-B2	4.37E+00	2E-07	7E-03	8E-07	3E-02
Off-Site East	VOC	Vinyl Chloride	75-01-4	A	5.60E-03	3E-06	1E-02	2E-08	6E-05
Off-Site East	INORG	Arsenic	7440-38-2	A	1.12E-02	7E-07	1E-02	8E-09	1E-04
Off-Site East	INORG	Manganese	7439-96-5	D	4.40E-01		2E-04		7E-05

**Attachment D4: Single-Chemical Risk Estimates for Maintenance Worker Exposure to Shallow
Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Max Detect (mg/L)	Maintenance Worker			
						Unit Risk	Unit HQ	Risk	HQ
Off-Site West	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.26E-01		2E-03		3E-04
Off-Site West	VOC	trans-1,2-Dichloroethene	156-60-5		1.86E-02		1E-02		2E-04
Off-Site West	VOC	Vinyl Chloride	75-01-4	A	1.03E-02	3E-06	1E-02	4E-08	1E-04
Off-Site West	INORG	Manganese	7439-96-5	D	2.36E-01		2E-04		4E-05
Note:									
Only constituents detected in each area are shown.									

Attachment D5
Risk Calculations for Construction Workers

Attachment D5 Table of Contents

Vapor Flux from Soil to Outdoor Air

Cancer Risk Calculations for Exposure of Construction Workers to Soil

Noncancer HQ Calculations for Exposure of Construction Workers to Soil

Cancer Risk Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis
on Soil Ingestion Rate

Noncancer HQ Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis
on Soil Ingestion Rate

Estimates of Cancer Risk and HQ for Construction Worker Exposure to Soil at Example
Location SB-0634

Upper-Bound Estimates of Cumulative Cancer Risk and HI for Construction Worker Sensitivity
Analysis

Area-Weighted Estimates of Construction Worker Soil Contact HI for Exposure Areas around
SB-0775

Area-Weighted Estimates of Construction Worker Soil Contact HI for Exposure Areas around
SB-0757

Area-averaged HI for Exposure Areas Centered on SB-0775 and SB-0757

Attachment D5: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
VOC	Acetone	67-64-1	5.81E-01		9.52E-04	1.07E+00	9.85E-05	1.73E-01	9.46E-02	1.15E-06	5.28E-04	2.17E-05
VOC	Benzene	71-43-2	5.82E+01		1.31E-01	7.60E-01	8.47E-05	4.84E-01	6.72E-02	9.91E-07	1.82E-02	1.27E-04
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.62E-02	2.57E-01	9.16E-05	4.40E-01	2.27E-02	1.07E-06	1.87E-03	4.08E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.61E-03	6.98E-01	8.47E-05	1.80E-01	6.17E-02	9.91E-07	5.57E-04	2.23E-05
VOC	Carbon Disulfide	75-15-0	4.59E+01		7.91E-01	8.99E-01	8.64E-05	6.32E-01	7.94E-02	1.01E-06	9.94E-02	2.97E-04
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		7.32E-01	6.74E-01	7.60E-05	1.21E+00	5.95E-02	8.90E-07	3.59E-02	1.79E-04
VOC	Chlorobenzene	108-90-7	2.20E+02		7.71E-02	6.31E-01	7.52E-05	1.23E+00	5.57E-02	8.80E-07	3.50E-03	5.58E-05
VOC	Chloroethane	75-00-3	1.62E+01		2.84E-01	2.34E+00	9.94E-05	3.34E-01	2.07E-01	1.16E-06	1.76E-01	3.95E-04
VOC	Chloroform	67-66-3	3.97E+01		8.98E-02	8.99E-01	8.64E-05	3.84E-01	7.94E-02	1.01E-06	1.86E-02	1.29E-04
VOC	Chloromethane	74-87-3	3.97E+01		2.99E-01	1.09E+00	5.62E-05	4.49E-01	9.62E-02	6.57E-07	6.40E-02	2.39E-04
VOC	2-Chlorotoluene	95-49-8	6.12E+02		8.58E-02	5.43E-01	7.52E-05	3.07E+00	4.79E-02	8.80E-07	1.34E-03	3.45E-05
VOC	Cumene	98-82-8	7.05E+02		2.19E-01	5.62E-01	6.13E-05	3.55E+00	4.96E-02	7.18E-07	3.06E-03	5.22E-05
VOC	Cyclohexane	110-82-7	6.35E+02		4.69E+00	7.25E-01	7.86E-05	4.61E+00	6.40E-02	9.20E-07	6.51E-02	2.41E-04
VOC	Dibromochloromethane	124-48-1	6.26E+01		2.03E-02	1.69E-01	9.07E-05	4.70E-01	1.50E-02	1.06E-06	6.49E-04	2.40E-05
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.39E-01	6.41E-01	9.07E-05	3.60E-01	5.66E-02	1.06E-06	2.18E-02	1.39E-04
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		6.97E-01	7.78E-01	8.99E-05	6.60E-01	6.87E-02	1.05E-06	7.26E-02	2.54E-04
VOC	1,2-Dichloroethene (total)	540-59-0	3.56E+01		1.21E-01	6.36E-01	9.76E-05	3.74E-01	5.62E-02	1.14E-06	1.82E-02	1.27E-04
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		9.86E-02	6.36E-01	9.76E-05	3.67E-01	5.62E-02	1.14E-06	1.51E-02	1.16E-04
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		2.38E-01	6.11E-01	1.03E-04	4.89E-01	5.40E-02	1.20E-06	2.62E-02	1.53E-04
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.60E-01	6.48E-01	6.74E-05	1.94E+00	5.72E-02	7.89E-07	4.70E-03	6.47E-05
VOC	Methyl Acetate	79-20-9	1.66E+00		2.16E-03	8.27E-01	9.50E-05	1.78E-01	7.30E-02	1.11E-06	8.93E-04	2.82E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		3.72E-03	6.48E-01	6.74E-05	2.20E-01	5.72E-02	7.89E-07	9.70E-04	2.94E-05
VOC	Methylcyclohexane	108-87-2	2.66E+02		9.74E+00	6.35E-01	7.36E-05	4.45E+00	5.61E-02	8.62E-07	1.23E-01	3.31E-04
VOC	Methylene Chloride	75-09-2	1.17E+01		5.59E-02	8.73E-01	1.01E-04	2.42E-01	7.71E-02	1.18E-06	1.78E-02	1.26E-04
VOC	Styrene	100-42-5	7.77E+02		5.46E-02	6.13E-01	6.91E-05	3.83E+00	5.42E-02	8.09E-07	7.73E-04	2.62E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.35E+01		6.77E-03	6.13E-01	6.83E-05	6.11E-01	5.42E-02	7.99E-07	6.02E-04	2.31E-05
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.89E-01	6.22E-01	7.08E-05	1.02E+00	5.49E-02	8.29E-07	2.09E-02	1.36E-04
VOC	Toluene	108-88-3	1.80E+02		1.45E-01	7.52E-01	7.43E-05	1.06E+00	6.64E-02	8.70E-07	9.05E-03	8.98E-05
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		4.12E-01	6.74E-01	7.60E-05	8.15E-01	5.95E-02	8.90E-07	3.01E-02	1.64E-04
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.93E-02	6.74E-01	7.60E-05	4.12E-01	5.95E-02	8.90E-07	2.79E-03	4.98E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.03E+00	6.03E-02	9.20E-07	1.37E-02	1.11E-04
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		3.09E+00	7.52E-01	8.38E-05	1.70E+00	6.64E-02	9.81E-07	1.21E-01	3.28E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		1.48E+01	6.74E-01	7.08E-05	6.55E+00	5.95E-02	8.29E-07	1.34E-01	3.45E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	1.18E+03		1.11E-01	5.24E-01	6.84E-05	5.74E+00	4.62E-02	8.01E-07	8.95E-04	2.82E-05

Attachment D5: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
VOC	Vinyl Chloride	75-01-4	1.85E+01		8.02E-01	9.16E-01	1.06E-04	5.06E-01	8.09E-02	1.24E-06	1.28E-01	3.38E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.35E-01	6.74E-01	7.56E-05	2.02E+00	5.95E-02	8.84E-07	3.97E-03	5.95E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		2.02E-03	3.64E-01	6.64E-05	3.37E+01	3.21E-02	7.78E-07	1.95E-06	1.32E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		2.63E-05	4.41E-01	7.78E-05	1.88E+03	3.89E-02	9.10E-07	1.03E-09	3.02E-08
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		5.87E-06	3.72E-01	7.78E-05	4.76E+03	3.28E-02	9.10E-07	2.32E-10	1.44E-08
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		7.20E-04	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	2.22E-09	4.45E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		1.63E-06	1.88E-01	4.54E-05	6.01E+04	1.66E-02	5.32E-07	9.30E-12	2.88E-09
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		4.74E-06	1.95E-01	4.80E-05	5.84E+03	1.72E-02	5.62E-07	1.10E-10	9.91E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		6.06E-07	3.03E-01	3.16E-05	7.04E+04	2.68E-02	3.70E-07	5.49E-12	2.21E-09
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		1.04E-05	1.50E-01	4.17E-05	2.69E+02	1.33E-02	4.88E-07	2.33E-09	4.56E-08
SVOC	Chrysene	218-01-9	4.01E+05		6.67E-04	2.14E-01	5.37E-05	1.88E+03	1.89E-02	6.28E-07	7.04E-09	7.92E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		2.09E-08	1.75E-01	4.48E-05	1.77E+04	1.54E-02	5.24E-07	2.96E-11	5.13E-09
SVOC	Dibenzofuran	132-64-9	2.07E+04		1.02E-05	2.06E-01	5.18E-05	9.72E+01	1.82E-02	6.07E-07	8.16E-09	8.52E-08
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		7.69E-09	3.78E-01	6.79E-05	1.60E+02	3.34E-02	7.95E-07	4.97E-09	6.65E-08
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		4.93E-04	1.30E-01	3.09E-05	3.93E+05	1.15E-02	3.62E-07	1.54E-11	3.70E-09
SVOC	Fluoranthene	206-44-0	1.08E+05		1.56E-04	2.61E-01	5.49E-05	5.07E+02	2.30E-02	6.42E-07	8.38E-09	8.64E-08
SVOC	Fluorene	86-73-7	1.38E+04		8.23E-04	3.14E-01	6.81E-05	6.47E+01	2.77E-02	7.97E-07	3.64E-07	5.69E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		7.70E-06	1.64E-01	4.89E-05	1.62E+04	1.45E-02	5.72E-07	4.23E-11	6.14E-09
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.05E-02	4.51E-01	6.70E-05	2.94E+01	3.98E-02	7.84E-07	1.42E-05	3.55E-06
SVOC	Naphthalene	91-20-3	2.01E+03		7.98E-03	5.10E-01	6.48E-05	9.60E+00	4.50E-02	7.58E-07	3.75E-05	5.78E-06
SVOC	Phenanthrene	85-01-8	2.42E+04		1.87E-04	3.24E-01	6.45E-05	1.14E+02	2.86E-02	7.55E-07	5.35E-08	2.18E-07
SVOC	Phenol	108-95-2	2.88E+01		6.37E-06	7.08E-01	7.86E-05	3.05E-01	6.26E-02	9.20E-07	4.33E-06	1.96E-06
SVOC	Pyrene	129-00-0	1.06E+05		1.02E-04	2.35E-01	6.26E-05	4.95E+02	2.08E-02	7.32E-07	5.76E-09	7.16E-08
PCB	PCBs (total)	1336-36-3	2.45E+06		1.60E-02	1.75E-01	4.32E-05	1.15E+04	1.54E-02	5.06E-07	2.15E-08	1.38E-07
INORG	Arsenic	7440-38-2		2.90E+01								
INORG	Barium	7440-39-3		4.10E+01								
INORG	Beryllium	7440-41-7		7.90E+02								
INORG	Cadmium	7440-43-9		7.50E+01								
INORG	Chromium (total)	7440-47-3		1.90E+01								
INORG	Cobalt	7440-48-4		4.50E+01								
INORG	Copper	7440-50-8		3.50E+01								
INORG	Cyanide (total)	57-12-5		9.90E+00								
INORG	Manganese	7439-96-5		6.50E+01								
INORG	Mercury	7439-97-6		1.00E+03	1.49E-01	2.65E-01	5.44E-05	1.38E+03	2.34E-02	6.37E-07	2.54E-06	1.50E-06
INORG	Nickel	7440-02-0		6.50E+01								

Attachment D5: Vapor Flux from Soil to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	K _{oc} (L/kg)	K _d (L/kg)	H (unitless)	D _{air} (m ² /d)	D _{water} (m ² /d)	R _L (unitless)	D _G (m ² /d)	D _L (m ² /d)	D _E (m ² /d)	J _v (mg/m ² -s)
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Thallium	7440-28-0		7.10E+01								
INORG	Vanadium	7440-62-2		1.00E+03								
INORG	Zinc	7440-66-6		6.20E+01								
Notes: The flux is calculated at a unit soil concentration of 1 mg/kg.												
	Soil bulk density	kg/L	ρ _b	1.38	<i>Silty-Clay</i>							
	Soil porosity	L/L-soil	θ	0.48	<i>Silty Clay</i>							
	Soil water content	L/L-soil	θ _w	0.17	<i>Measured</i>							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	<i>porosity-water content</i>							
	Soil organic carbon fraction	unitless	f _{oc}	0.0034	<i>Measured</i>							
	Averaging period	year	ED	1								
		s	ED	3.2E+07								

Attachment D5: Cancer Risk Calculations for Exposure of Construction Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	2.80E-08							3.66E-04	1.19E-06			5.00E-08	1.63E-10			
VOC	Benzene	71-43-2	A	2.80E-08	5.5E-02	1.5E-09			5.5E-02		2.15E-03	7.01E-06	7.8E-03	5.5E-08	5.00E-08	1.63E-10	7.8E-03	1.3E-12	5.6E-08
VOC	Bromodichloromethane	75-27-4	B2	2.80E-08	6.2E-02	1.7E-09			6.2E-02		6.90E-04	2.25E-06			5.00E-08	1.63E-10			1.7E-09
VOC	2-Butanone	78-93-3	ID	2.80E-08							3.76E-04	1.23E-06			5.00E-08	1.63E-10			
VOC	Carbon Disulfide	75-15-0		2.80E-08							5.02E-03	1.64E-05			5.00E-08	1.63E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	2.80E-08	1.3E-01	3.6E-09			1.3E-01		3.02E-03	9.85E-06	1.5E-02	1.5E-07	5.00E-08	1.63E-10	1.5E-02	2.4E-12	1.5E-07
VOC	Chlorobenzene	108-90-7	D	2.80E-08							9.42E-04	3.07E-06			5.00E-08	1.63E-10			
VOC	Chloroethane	75-00-3	LC	2.80E-08							6.68E-03	2.18E-05			5.00E-08	1.63E-10			
VOC	Chloroform	67-66-3	B2	2.80E-08							2.17E-03	7.08E-06	2.3E-02	1.6E-07	5.00E-08	1.63E-10	2.3E-02	3.8E-12	1.6E-07
VOC	Chloromethane	74-87-3	D	2.80E-08							4.03E-03	1.32E-05			5.00E-08	1.63E-10			
VOC	2-Chlorotoluene	95-49-8		2.80E-08							5.83E-04	1.90E-06			5.00E-08	1.63E-10			
VOC	Cumene	98-82-8	D	2.80E-08							8.82E-04	2.88E-06			5.00E-08	1.63E-10			
VOC	Cyclohexane	110-82-7	ID	2.80E-08							4.07E-03	1.33E-05			5.00E-08	1.63E-10			
VOC	Dibromochloromethane	124-48-1	C	2.80E-08	8.4E-02	2.3E-09			8.4E-02		4.06E-04	1.32E-06			5.00E-08	1.63E-10			2.3E-09
VOC	1,1-Dichloroethane	75-34-3	SC	2.80E-08							2.35E-03	7.68E-06	1.6E-03	1.2E-08	5.00E-08	1.63E-10	1.6E-03	2.6E-13	1.2E-08
VOC	1,1-Dichloroethene	75-35-4	C	2.80E-08							4.29E-03	1.40E-05			5.00E-08	1.63E-10			
VOC	1,2-Dichloroethene (total)	540-59-0		2.80E-08							2.15E-03	7.00E-06			5.00E-08	1.63E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.80E-08							1.96E-03	6.38E-06			5.00E-08	1.63E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		2.80E-08							2.58E-03	8.42E-06			5.00E-08	1.63E-10			
VOC	Ethyl Benzene	100-41-4	D	2.80E-08							1.09E-03	3.56E-06			5.00E-08	1.63E-10			
VOC	Methyl Acetate	79-20-9		2.80E-08							4.76E-04	1.55E-06			5.00E-08	1.63E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	2.80E-08							4.96E-04	1.62E-06			5.00E-08	1.63E-10			
VOC	Methylcyclohexane	108-87-2		2.80E-08							5.58E-03	1.82E-05			5.00E-08	1.63E-10			
VOC	Methylene Chloride	75-09-2	B2	2.80E-08	7.5E-03	2.1E-10			7.5E-03		2.13E-03	6.93E-06	4.7E-04	3.3E-09	5.00E-08	1.63E-10	4.7E-04	7.7E-14	3.5E-09
VOC	Styrene	100-42-5		2.80E-08							4.43E-04	1.44E-06			5.00E-08	1.63E-10			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		2.80E-08							3.91E-04	1.27E-06			5.00E-08	1.63E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	2.80E-08	5.2E-02	1.5E-09			5.2E-02		2.31E-03	7.52E-06	3.1E-03	2.3E-08	5.00E-08	1.63E-10	3.1E-03	5.0E-13	2.4E-08
VOC	Toluene	108-88-3	ID	2.80E-08							1.52E-03	4.95E-06			5.00E-08	1.63E-10			
VOC	1,1,1-Trichloroethane	71-55-6	ID	2.80E-08							2.76E-03	9.01E-06			5.00E-08	1.63E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	2.80E-08	5.7E-02	1.6E-09			5.7E-02		8.42E-04	2.75E-06	1.6E-02	4.4E-08	5.00E-08	1.63E-10	1.6E-02	2.6E-12	4.6E-08
VOC	Trichloroethene	79-01-6	C-B2	2.80E-08	1.1E-02	3.1E-10			1.1E-02		1.87E-03	6.09E-06	1.7E-03	1.0E-08	5.00E-08	1.63E-10	1.7E-03	2.8E-13	1.1E-08
VOC	Trichlorofluoromethane	75-69-4		2.80E-08							5.54E-03	1.81E-05			5.00E-08	1.63E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		2.80E-08							5.84E-03	1.90E-05			5.00E-08	1.63E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	2.80E-08							4.77E-04	1.55E-06			5.00E-08	1.63E-10			
VOC	Vinyl Chloride	75-01-4	A	2.80E-08	1.4E+00	3.9E-08			1.4E+00		5.71E-03	1.86E-05	8.8E-03	1.6E-07	5.00E-08	1.63E-10	8.8E-03	1.4E-12	2.0E-07
VOC	Xylenes (total)	1330-20-7	ID	2.80E-08							1.00E-03	3.28E-06			5.00E-08	1.63E-10			
SVOC	Acenaphthene	83-32-9		2.80E-08			1.30E-01	1.20E-08			2.23E-05	7.26E-08			5.00E-08	1.63E-10			
SVOC	Benzo(a)anthracene	56-55-3	B2	2.80E-08	7.3E-01	2.0E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	5.11E-07	1.67E-09	8.8E-02	1.5E-10	5.00E-08	1.63E-10	8.8E-02	1.4E-11	2.9E-08
SVOC	Benzo(a)pyrene	50-32-8	B2	2.80E-08	7.3E+00	2.0E-07	1.30E-01	1.20E-08	7.3E+00	8.8E-08	2.42E-07	7.91E-10	8.8E-01	7.0E-10	5.00E-08	1.63E-10	8.8E-01	1.4E-10	2.9E-07
SVOC	Benzo(b)fluoranthene	205-99-2	B2	2.80E-08	7.3E-01	2.0E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	7.51E-07	2.45E-09	8.8E-02	2.2E-10	5.00E-08	1.63E-10	8.8E-02	1.4E-11	2.9E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	D	2.80E-08			1.30E-01	1.20E-08			4.86E-08	1.59E-10			5.00E-08	1.63E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	2.80E-08	7.3E-02	2.0E-09	1.30E-01	1.20E-08	7.3E-02	8.8E-10	1.67E-07	5.46E-10	8.8E-03	4.8E-12	5.00E-08	1.63E-10	8.8E-03	1.4E-12	2.9E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	2.80E-08	1.4E-02	3.9E-10	1.00E-01	9.23E-09	1.4E-02	1.3E-10	3.73E-08	1.22E-10	2.4E-03	2.9E-13	5.00E-08	1.63E-10	2.4E-03	3.9E-13	5.2E-10
SVOC	Butylbenzylphthalate	85-68-7	C	2.80E-08	1.9E-03	5.3E-11	1.00E-01	9.23E-09	1.9E-03	1.8E-11	7.69E-07	2.51E-09			5.00E-08	1.63E-10			7.1E-11
SVOC	Chrysene	218-01-9	B2	2.80E-08	7.3E-03	2.0E-10	1.30E-01	1.20E-08	7.3E-03	8.8E-11	1.34E-06	4.36E-09	8.8E-04	3.8E-12	5.00E-08	1.63E-10	8.8E-04	1.4E-13	3.0E-10
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	2.80E-08	7.3E+00	2.0E-07	1.30E-01	1.20E-08	7.3E+00	8.8E-08	8.67E-08	2.83E-10	8.8E-01	2.5E-10	5.00E-08	1.63E-10	8.8E-01	1.4E-10	2.9E-07

Attachment D5: Cancer Risk Calculations for Exposure of Construction Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Dibenzofuran	132-64-9	D	2.80E-08			1.00E-01	9.23E-09			1.44E-06	4.69E-09			5.00E-08	1.63E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	2.80E-08			1.00E-01	9.23E-09			1.12E-06	3.67E-09			5.00E-08	1.63E-10			
SVOC	Di-n-octylphthalate	117-84-0		2.80E-08			1.00E-01	9.23E-09			6.25E-08	2.04E-10			5.00E-08	1.63E-10			
SVOC	Fluoranthene	206-44-0	D	2.80E-08			1.30E-01	1.20E-08			1.46E-06	4.76E-09			5.00E-08	1.63E-10			
SVOC	Fluorene	86-73-7	D	2.80E-08			1.30E-01	1.20E-08			9.62E-06	3.14E-08			5.00E-08	1.63E-10			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.80E-08	7.3E-01	2.0E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	1.04E-07	3.38E-10	8.8E-02	3.0E-11	5.00E-08	1.63E-10	8.8E-02	1.4E-11	2.9E-08
SVOC	2-Methylnaphthalene	91-57-6	ID	2.80E-08			1.00E-01	9.23E-09			6.00E-05	1.96E-07			5.00E-08	1.63E-10			
SVOC	Naphthalene	91-20-3	C	2.80E-08			1.30E-01	1.20E-08			9.76E-05	3.18E-07	3.4E-02	1.1E-08	5.00E-08	1.63E-10	3.4E-02	5.5E-12	1.1E-08
SVOC	Phenanthrene	85-01-8	D	2.80E-08			1.30E-01	1.20E-08			3.69E-06	1.20E-08			5.00E-08	1.63E-10			
SVOC	Phenol	108-95-2	ID	2.80E-08			1.00E-01	9.23E-09			3.31E-05	1.08E-07			5.00E-08	1.63E-10			
SVOC	Pyrene	129-00-0	NC	2.80E-08			1.30E-01	1.20E-08			1.21E-06	3.95E-09			5.00E-08	1.63E-10			
PCB	PCBs (total)	1336-36-3	B2	2.80E-08	2.0E+00	5.6E-08	1.40E-01	1.29E-08	2.0E+00	2.6E-08	2.34E-06	7.62E-09	5.7E-01	4.4E-09	5.00E-08	1.63E-10	5.7E-01	9.3E-11	8.6E-08
INORG	Arsenic	7440-38-2	A	2.80E-08	1.5E+00	4.2E-08	3.00E-02	2.77E-09	1.5E+00	4.2E-09			4.3E+00		5.00E-08	1.63E-10	4.3E+00	7.0E-10	4.7E-08
INORG	Barium	7440-39-3	NC	2.80E-08											5.00E-08	1.63E-10			
INORG	Beryllium	7440-41-7	B1	2.80E-08									2.4E+00		5.00E-08	1.63E-10	2.4E+00	3.9E-10	3.9E-10
INORG	Cadmium	7440-43-9	B1	2.80E-08			1.00E-03	9.23E-11					1.8E+00		5.00E-08	1.63E-10	1.8E+00	2.9E-10	2.9E-10
INORG	Chromium (total)	7440-47-3		2.80E-08									1.2E+01		5.00E-08	1.63E-10	1.2E+01	2.0E-09	2.0E-09
INORG	Cobalt	7440-48-4	LC	2.80E-08									9.0E+00		5.00E-08	1.63E-10	9.0E+00	1.5E-09	1.5E-09
INORG	Copper	7440-50-8	D	2.80E-08											5.00E-08	1.63E-10			
INORG	Cyanide (total)	57-12-5	D	2.80E-08											5.00E-08	1.63E-10			
INORG	Manganese	7439-96-5	D	2.80E-08											5.00E-08	1.63E-10			
INORG	Mercury	7439-97-6	D	2.80E-08							2.54E-05	8.28E-08			5.00E-08	1.63E-10			
INORG	Nickel	7440-02-0	A	2.80E-08									2.4E-01		5.00E-08	1.63E-10	2.4E-01	3.9E-11	3.9E-11
INORG	Selenium	7782-49-2	D	2.80E-08											5.00E-08	1.63E-10			
INORG	Thallium	7440-28-0		2.80E-08											5.00E-08	1.63E-10			
INORG	Vanadium	7440-62-2		2.80E-08											5.00E-08	1.63E-10			
INORG	Zinc	7440-66-6	ID	2.80E-08											5.00E-08	1.63E-10			
Notes:																			
Unit risks are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire Facility) and region-specific meteorological parameters.																			
The concentration of particulates in the air is assumed to be no more 50 ug/m3.																			

Attachment D5: Noncancer HQ Calculations for Exposure of Construction Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	1.96E-06	2.0E+00	9.8E-07			2.0E+00		3.66E-04	8.36E-05	3.1E+01	2.7E-06	5.00E-08	1.14E-08	3.1E+01	3.7E-10	3.7E-06
VOC	Benzene	71-43-2	A	1.96E-06	4.0E-03	4.9E-04			4.0E-03		2.15E-03	4.90E-04	9.0E-02	5.4E-03	5.00E-08	1.14E-08	9.0E-02	1.3E-07	5.9E-03
VOC	Bromodichloromethane	75-27-4	B2	1.96E-06	2.0E-02	9.8E-05			2.0E-02		6.90E-04	1.57E-04			5.00E-08	1.14E-08			9.8E-05
VOC	2-Butanone	78-93-3	ID	1.96E-06	2.0E+00	9.8E-07			2.0E+00		3.76E-04	8.59E-05	5.0E+00	1.7E-05	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.8E-05
VOC	Carbon Disulfide	75-15-0		1.96E-06	1.0E-01	2.0E-05			1.0E-01		5.02E-03	1.15E-03	7.0E-01	1.6E-03	5.00E-08	1.14E-08	7.0E-01	1.6E-08	1.7E-03
VOC	Carbon Tetrachloride	56-23-5	B2	1.96E-06	7.0E-03	2.8E-04			7.0E-03		3.02E-03	6.89E-04	1.9E-01	3.7E-03	5.00E-08	1.14E-08	1.9E-01	6.0E-08	3.9E-03
VOC	Chlorobenzene	108-90-7	D	1.96E-06	7.0E-02	2.8E-05			7.0E-02		9.42E-04	2.15E-04	5.0E-01	4.3E-04	5.00E-08	1.14E-08	5.0E-01	2.3E-08	4.6E-04
VOC	Chloroethane	75-00-3	LC	1.96E-06	1.0E-01	2.0E-05			1.0E-01		6.68E-03	1.52E-03	1.0E+01	1.5E-04	5.00E-08	1.14E-08	1.0E+01	1.1E-09	1.7E-04
VOC	Chloroform	67-66-3	B2	1.96E-06	1.0E-01	2.0E-05			1.0E-01		2.17E-03	4.96E-04	5.0E-02	9.9E-03	5.00E-08	1.14E-08	5.0E-02	2.3E-07	9.9E-03
VOC	Chloromethane	74-87-3	D	1.96E-06							4.03E-03	9.21E-04	4.1E-01	2.2E-03	5.00E-08	1.14E-08	4.1E-01	2.8E-08	2.2E-03
VOC	2-Chlorotoluene	95-49-8		1.96E-06	2.0E-01	9.8E-06			2.0E-01		5.83E-04	1.33E-04			5.00E-08	1.14E-08			9.8E-06
VOC	Cumene	98-82-8	D	1.96E-06	4.0E-01	4.9E-06			4.0E-01		8.82E-04	2.01E-04	4.0E-01	5.0E-04	5.00E-08	1.14E-08	4.0E-01	2.9E-08	5.1E-04
VOC	Cyclohexane	110-82-7	ID	1.96E-06							4.07E-03	9.28E-04	6.0E+00	1.5E-04	5.00E-08	1.14E-08	6.0E+00	1.9E-09	1.5E-04
VOC	Dibromochloromethane	124-48-1	C	1.96E-06	2.0E-01	9.8E-06			2.0E-01		4.06E-04	9.27E-05			5.00E-08	1.14E-08			9.8E-06
VOC	1,1-Dichloroethane	75-34-3	SC	1.96E-06	2.0E+00	9.8E-07			2.0E+00		2.35E-03	5.38E-04	5.0E+00	1.1E-04	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.1E-04
VOC	1,1-Dichloroethene	75-35-4	C	1.96E-06	5.0E-02	3.9E-05			5.0E-02		4.29E-03	9.80E-04	2.0E-01	4.9E-03	5.00E-08	1.14E-08	2.0E-01	5.7E-08	4.9E-03
VOC	1,2-Dichloroethene (total)	540-59-0		1.96E-06	1.0E-01	2.0E-05			1.0E-01		2.15E-03	4.90E-04			5.00E-08	1.14E-08			2.0E-05
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.96E-06	1.0E-01	2.0E-05			1.0E-01		1.96E-03	4.47E-04			5.00E-08	1.14E-08			2.0E-05
VOC	trans-1,2-Dichloroethene	156-60-5		1.96E-06	2.0E-01	9.8E-06			2.0E-01		2.58E-03	5.89E-04	7.9E-01	7.4E-04	5.00E-08	1.14E-08	7.9E-01	1.4E-08	7.5E-04
VOC	Ethyl Benzene	100-41-4	D	1.96E-06	1.0E-01	2.0E-05			1.0E-01		1.09E-03	2.49E-04	1.0E+00	2.5E-04	5.00E-08	1.14E-08	1.0E+00	1.1E-08	2.7E-04
VOC	Methyl Acetate	79-20-9		1.96E-06	1.0E+01	2.0E-07			1.0E+01		4.76E-04	1.09E-04			5.00E-08	1.14E-08			2.0E-07
VOC	4-Methyl-2-pentanone	108-10-1	ID	1.96E-06							4.96E-04	1.13E-04	3.0E+00	3.8E-05	5.00E-08	1.14E-08	3.0E+00	3.8E-09	3.8E-05
VOC	Methylcyclohexane	108-87-2		1.96E-06							5.58E-03	1.27E-03	3.0E+00	4.2E-04	5.00E-08	1.14E-08	3.0E+00	3.8E-09	4.2E-04
VOC	Methylene Chloride	75-09-2	B2	1.96E-06	6.0E-02	3.3E-05			6.0E-02		2.13E-03	4.85E-04	1.0E+00	4.7E-04	5.00E-08	1.14E-08	1.0E+00	1.1E-08	5.0E-04
VOC	Styrene	100-42-5		1.96E-06	2.0E-01	9.8E-06			2.0E-01		4.43E-04	1.01E-04	3.0E+00	3.4E-05	5.00E-08	1.14E-08	3.0E+00	3.8E-09	4.3E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5		1.96E-06	1.0E-02	2.0E-04			1.0E-02		3.91E-04	8.92E-05			5.00E-08	1.14E-08			2.0E-04
VOC	Tetrachloroethene	127-18-4	C-B2	1.96E-06	1.0E-01	2.0E-05			1.0E-01		2.31E-03	5.26E-04	4.0E-01	1.3E-03	5.00E-08	1.14E-08	4.0E-01	2.9E-08	1.3E-03
VOC	Toluene	108-88-3	ID	1.96E-06	8.0E-01	2.4E-06			8.0E-01		1.52E-03	3.46E-04	5.0E+00	6.9E-05	5.00E-08	1.14E-08	5.0E+00	2.3E-09	7.2E-05
VOC	1,1,1-Trichloroethane	71-55-6	ID	1.96E-06	7.0E+00	2.8E-07			7.0E+00		2.76E-03	6.31E-04	5.0E+00	1.3E-04	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.3E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	1.96E-06	4.0E-03	4.9E-04			4.0E-03		8.42E-04	1.92E-04			5.00E-08	1.14E-08			4.9E-04
VOC	Trichloroethene	79-01-6	C-B2	1.96E-06	6.0E-03	3.3E-04			6.0E-03		1.87E-03	4.26E-04	5.4E-01	7.9E-04	5.00E-08	1.14E-08	5.4E-01	2.1E-08	1.1E-03
VOC	Trichlorofluoromethane	75-69-4		1.96E-06	7.0E-01	2.8E-06			7.0E-01		5.54E-03	1.26E-03	7.0E+00	1.8E-04	5.00E-08	1.14E-08	7.0E+00	1.6E-09	1.8E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.96E-06	3.0E+01	6.5E-08			3.0E+01		5.84E-03	1.33E-03	3.0E+01	4.4E-05	5.00E-08	1.14E-08	3.0E+01	3.8E-10	4.4E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.96E-06							4.77E-04	1.09E-04	7.0E-02	1.6E-03	5.00E-08	1.14E-08	7.0E-02	1.6E-07	1.6E-03
VOC	Vinyl Chloride	75-01-4	A	1.96E-06	3.0E-03	6.5E-04			3.0E-03		5.71E-03	1.30E-03	1.0E-01	1.3E-02	5.00E-08	1.14E-08	1.0E-01	1.1E-07	1.4E-02
VOC	Xylenes (total)	1330-20-7	ID	1.96E-06	2.0E-01	9.8E-06			2.0E-01		1.00E-03	2.29E-04	3.0E-01	7.6E-04	5.00E-08	1.14E-08	3.0E-01	3.8E-08	7.7E-04
SVOC	Acenaphthene	83-32-9		1.96E-06	6.0E-01	3.3E-06	1.30E-01	8.40E-07	6.0E-01	1.4E-06	2.23E-05	5.08E-06			5.00E-08	1.14E-08			4.7E-06
SVOC	Benzo(a)anthracene	56-55-3	B2	1.96E-06			1.30E-01	8.40E-07			5.11E-07	1.17E-07			5.00E-08	1.14E-08			
SVOC	Benzo(a)pyrene	50-32-8	B2	1.96E-06			1.30E-01	8.40E-07			2.42E-07	5.54E-08			5.00E-08	1.14E-08			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.96E-06			1.30E-01	8.40E-07			7.51E-07	1.72E-07			5.00E-08	1.14E-08			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1.96E-06	3.0E-01	6.5E-06	1.30E-01	8.40E-07	3.0E-01	2.8E-06	4.86E-08	1.11E-08			5.00E-08	1.14E-08			9.3E-06
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1.96E-06			1.30E-01	8.40E-07			1.67E-07	3.82E-08			5.00E-08	1.14E-08			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.96E-06	1.0E-01	2.0E-05	1.00E-01	6.46E-07	1.0E-01	6.5E-06	3.73E-08	8.52E-09			5.00E-08	1.14E-08			2.6E-05
SVOC	Butylbenzylphthalate	85-68-7	C	1.96E-06	2.0E+00	9.8E-07	1.00E-01	6.46E-07	2.0E+00	3.2E-07	7.69E-07	1.76E-07			5.00E-08	1.14E-08			1.3E-06
SVOC	Chrysene	218-01-9	B2	1.96E-06			1.30E-01	8.40E-07			1.34E-06	3.05E-07			5.00E-08	1.14E-08			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.96E-06			1.30E-01	8.40E-07			8.67E-08	1.98E-08			5.00E-08	1.14E-08			

Attachment D5: Noncancer HQ Calculations for Exposure of Construction Workers to Soil Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Dibenzofuran	132-64-9	D	1.96E-06	4.0E-03	4.9E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	1.44E-06	3.29E-07			5.00E-08	1.14E-08			6.5E-04
SVOC	Di-n-butylphthalate	84-74-2	D	1.96E-06	1.0E+00	2.0E-06	1.00E-01	6.46E-07	1.0E+00	6.5E-07	1.12E-06	2.57E-07			5.00E-08	1.14E-08			2.6E-06
SVOC	Di-n-octylphthalate	117-84-0		1.96E-06	4.0E-01	4.9E-06	1.00E-01	6.46E-07	4.0E-01	1.6E-06	6.25E-08	1.43E-08			5.00E-08	1.14E-08			6.5E-06
SVOC	Fluoranthene	206-44-0	D	1.96E-06	4.0E-01	4.9E-06	1.30E-01	8.40E-07	4.0E-01	2.1E-06	1.46E-06	3.33E-07			5.00E-08	1.14E-08			7.0E-06
SVOC	Fluorene	86-73-7	D	1.96E-06	4.0E-01	4.9E-06	1.30E-01	8.40E-07	4.0E-01	2.1E-06	9.62E-06	2.20E-06			5.00E-08	1.14E-08			7.0E-06
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.96E-06			1.30E-01	8.40E-07			1.04E-07	2.37E-08			5.00E-08	1.14E-08			
SVOC	2-Methylnaphthalene	91-57-6	ID	1.96E-06	4.0E-03	4.9E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	6.00E-05	1.37E-05			5.00E-08	1.14E-08			6.5E-04
SVOC	Naphthalene	91-20-3	C	1.96E-06	2.0E-01	9.8E-06	1.30E-01	8.40E-07	2.0E-01	4.2E-06	9.76E-05	2.23E-05	3.0E-03	7.4E-03	5.00E-08	1.14E-08	3.0E-03	3.8E-06	7.4E-03
SVOC	Phenanthrene	85-01-8	D	1.96E-06	3.0E-01	6.5E-06	1.30E-01	8.40E-07	3.0E-01	2.8E-06	3.69E-06	8.42E-07			5.00E-08	1.14E-08			9.3E-06
SVOC	Phenol	108-95-2	ID	1.96E-06	3.0E-01	6.5E-06	1.00E-01	6.46E-07	3.0E-01	2.2E-06	3.31E-05	7.57E-06			5.00E-08	1.14E-08			8.7E-06
SVOC	Pyrene	129-00-0	NC	1.96E-06	3.0E-01	6.5E-06	1.30E-01	8.40E-07	3.0E-01	2.8E-06	1.21E-06	2.76E-07			5.00E-08	1.14E-08			9.3E-06
PCB	PCBs (total)	1336-36-3	B2	1.96E-06	3.0E-05	6.5E-02	1.40E-01	9.04E-07	3.0E-05	3.0E-02	2.34E-06	5.33E-07			5.00E-08	1.14E-08			9.5E-02
INORG	Arsenic	7440-38-2	A	1.96E-06	5.0E-03	3.9E-04	3.00E-02	1.94E-07	5.0E-03	3.9E-05			1.5E-05		5.00E-08	1.14E-08	1.5E-05	7.6E-04	1.2E-03
INORG	Barium	7440-39-3	NC	1.96E-06	2.0E-01	9.8E-06			1.4E-02						5.00E-08	1.14E-08			9.8E-06
INORG	Beryllium	7440-41-7	B1	1.96E-06	2.0E-03	9.8E-04			1.4E-05				2.0E-05		5.00E-08	1.14E-08	2.0E-05	5.7E-04	1.5E-03
INORG	Cadmium	7440-43-9	B1	1.96E-06	1.0E-03	2.0E-03	1.00E-03	6.46E-09	2.5E-05	2.6E-04			9.0E-04		5.00E-08	1.14E-08	9.0E-04	1.3E-05	2.2E-03
INORG	Chromium (total)	7440-47-3		1.96E-06	5.0E-03	3.9E-04			1.3E-04				3.0E-04		5.00E-08	1.14E-08	3.0E-04	3.8E-05	4.3E-04
INORG	Cobalt	7440-48-4	LC	1.96E-06	3.0E-03	6.5E-04			3.0E-03				2.0E-05		5.00E-08	1.14E-08	2.0E-05	5.7E-04	1.2E-03
INORG	Copper	7440-50-8	D	1.96E-06	4.0E-02	4.9E-05			4.0E-02						5.00E-08	1.14E-08			4.9E-05
INORG	Cyanide (total)	57-12-5	D	1.96E-06	2.0E-02	9.8E-05			2.0E-02				9.0E-03		5.00E-08	1.14E-08	9.0E-03	1.3E-06	9.9E-05
INORG	Manganese	7439-96-5	D	1.96E-06	1.4E-01	1.4E-05			8.4E-03				5.0E-05		5.00E-08	1.14E-08	5.0E-05	2.3E-04	2.4E-04
INORG	Mercury	7439-97-6	D	1.96E-06	3.0E-03	6.5E-04			2.1E-04		2.54E-05	5.79E-06	3.0E-04	1.9E-02	5.00E-08	1.14E-08	3.0E-04	3.8E-05	2.0E-02
INORG	Nickel	7440-02-0	A	1.96E-06	2.0E-02	9.8E-05			8.0E-04				2.0E-04		5.00E-08	1.14E-08	2.0E-04	5.7E-05	1.5E-04
INORG	Selenium	7782-49-2	D	1.96E-06	5.0E-03	3.9E-04			5.0E-03				2.0E-02		5.00E-08	1.14E-08	2.0E-02	5.7E-07	3.9E-04
INORG	Thallium	7440-28-0		1.96E-06	7.0E-05	2.8E-02			7.0E-05						5.00E-08	1.14E-08			2.8E-02
INORG	Vanadium	7440-62-2		1.96E-06	7.0E-03	2.8E-04			1.8E-04						5.00E-08	1.14E-08			2.8E-04
INORG	Zinc	7440-66-6	ID	1.96E-06	3.0E-01	6.5E-06			3.0E-01						5.00E-08	1.14E-08			6.5E-06
Notes:																			
Unit HQs are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire site) and region-specific meteorological parameters.																			
The concentration of particulates in the air is assumed to be no more than 50 ug/m3.																			

Attachment D5: Cancer Risk Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis on Soil Ingestion Rate
Former Delco Plant 5, Kokomo, Indiana

				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	4.61E-08							3.66E-04	1.19E-06			5.00E-08	1.63E-10			
VOC	Benzene	71-43-2	A	4.61E-08	5.5E-02	2.5E-09			5.5E-02		2.15E-03	7.01E-06	7.8E-03	5.5E-08	5.00E-08	1.63E-10	7.8E-03	1.3E-12	5.7E-08
VOC	Bromodichloromethane	75-27-4	B2	4.61E-08	6.2E-02	2.9E-09			6.2E-02		6.90E-04	2.25E-06			5.00E-08	1.63E-10			2.9E-09
VOC	2-Butanone	78-93-3	ID	4.61E-08							3.76E-04	1.23E-06			5.00E-08	1.63E-10			
VOC	Carbon Disulfide	75-15-0		4.61E-08							5.02E-03	1.64E-05			5.00E-08	1.63E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	4.61E-08	1.3E-01	6.0E-09			1.3E-01		3.02E-03	9.85E-06	1.5E-02	1.5E-07	5.00E-08	1.63E-10	1.5E-02	2.4E-12	1.5E-07
VOC	Chlorobenzene	108-90-7	D	4.61E-08							9.42E-04	3.07E-06			5.00E-08	1.63E-10			
VOC	Chloroethane	75-00-3	LC	4.61E-08							6.68E-03	2.18E-05			5.00E-08	1.63E-10			
VOC	Chloroform	67-66-3	B2	4.61E-08							2.17E-03	7.08E-06	2.3E-02	1.6E-07	5.00E-08	1.63E-10	2.3E-02	3.8E-12	1.6E-07
VOC	Chloromethane	74-87-3	D	4.61E-08							4.03E-03	1.32E-05			5.00E-08	1.63E-10			
VOC	2-Chlorotoluene	95-49-8		4.61E-08							5.83E-04	1.90E-06			5.00E-08	1.63E-10			
VOC	Cumene	98-82-8	D	4.61E-08							8.82E-04	2.88E-06			5.00E-08	1.63E-10			
VOC	Cyclohexane	110-82-7	ID	4.61E-08							4.07E-03	1.33E-05			5.00E-08	1.63E-10			
VOC	Dibromochloromethane	124-48-1	C	4.61E-08	8.4E-02	3.9E-09			8.4E-02		4.06E-04	1.32E-06			5.00E-08	1.63E-10			3.9E-09
VOC	1,1-Dichloroethane	75-34-3	SC	4.61E-08							2.35E-03	7.68E-06	1.6E-03	1.2E-08	5.00E-08	1.63E-10	1.6E-03	2.6E-13	1.2E-08
VOC	1,1-Dichloroethene	75-35-4	C	4.61E-08							4.29E-03	1.40E-05			5.00E-08	1.63E-10			
VOC	1,2-Dichloroethene (total)	540-59-0		4.61E-08							2.15E-03	7.00E-06			5.00E-08	1.63E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	4.61E-08							1.96E-03	6.38E-06			5.00E-08	1.63E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		4.61E-08							2.58E-03	8.42E-06			5.00E-08	1.63E-10			
VOC	Ethyl Benzene	100-41-4	D	4.61E-08							1.09E-03	3.56E-06			5.00E-08	1.63E-10			
VOC	Methyl Acetate	79-20-9		4.61E-08							4.76E-04	1.55E-06			5.00E-08	1.63E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	4.61E-08							4.96E-04	1.62E-06			5.00E-08	1.63E-10			
VOC	Methylcyclohexane	108-87-2		4.61E-08							5.58E-03	1.82E-05			5.00E-08	1.63E-10			
VOC	Methylene Chloride	75-09-2	B2	4.61E-08	7.5E-03	3.5E-10			7.5E-03		2.13E-03	6.93E-06	4.7E-04	3.3E-09	5.00E-08	1.63E-10	4.7E-04	7.7E-14	3.6E-09
VOC	Styrene	100-42-5		4.61E-08							4.43E-04	1.44E-06			5.00E-08	1.63E-10			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		4.61E-08							3.91E-04	1.27E-06			5.00E-08	1.63E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	4.61E-08	5.2E-02	2.4E-09			5.2E-02		2.31E-03	7.52E-06	3.1E-03	2.3E-08	5.00E-08	1.63E-10	3.1E-03	5.0E-13	2.5E-08
VOC	Toluene	108-88-3	ID	4.61E-08							1.52E-03	4.95E-06			5.00E-08	1.63E-10			
VOC	1,1,1-Trichloroethane	71-55-6	ID	4.61E-08							2.76E-03	9.01E-06			5.00E-08	1.63E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	4.61E-08	5.7E-02	2.6E-09			5.7E-02		8.42E-04	2.75E-06	1.6E-02	4.4E-08	5.00E-08	1.63E-10	1.6E-02	2.6E-12	4.7E-08
VOC	Trichloroethene	79-01-6	C-B2	4.61E-08	1.1E-02	5.1E-10			1.1E-02		1.87E-03	6.09E-06	1.7E-03	1.0E-08	5.00E-08	1.63E-10	1.7E-03	2.8E-13	1.1E-08
VOC	Trichlorofluoromethane	75-69-4		4.61E-08							5.54E-03	1.81E-05			5.00E-08	1.63E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		4.61E-08							5.84E-03	1.90E-05			5.00E-08	1.63E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	4.61E-08							4.77E-04	1.55E-06			5.00E-08	1.63E-10			
VOC	Vinyl Chloride	75-01-4	A	4.61E-08	1.4E+00	6.5E-08			1.4E+00		5.71E-03	1.86E-05	8.8E-03	1.6E-07	5.00E-08	1.63E-10	8.8E-03	1.4E-12	2.3E-07
VOC	Xylenes (total)	1330-20-7	ID	4.61E-08							1.00E-03	3.28E-06			5.00E-08	1.63E-10			
SVOC	Acenaphthene	83-32-9		4.61E-08			1.30E-01	1.20E-08			2.23E-05	7.26E-08			5.00E-08	1.63E-10			
SVOC	Benzo(a)anthracene	56-55-3	B2	4.61E-08	7.3E-01	3.4E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	5.11E-07	1.67E-09	8.8E-02	1.5E-10	5.00E-08	1.63E-10	8.8E-02	1.4E-11	4.3E-08
SVOC	Benzo(a)pyrene	50-32-8	B2	4.61E-08	7.3E+00	3.4E-07	1.30E-01	1.20E-08	7.3E+00	8.8E-08	2.42E-07	7.91E-10	8.8E-01	7.0E-10	5.00E-08	1.63E-10	8.8E-01	1.4E-10	4.3E-07
SVOC	Benzo(b)fluoranthene	205-99-2	B2	4.61E-08	7.3E-01	3.4E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	7.51E-07	2.45E-09	8.8E-02	2.2E-10	5.00E-08	1.63E-10	8.8E-02	1.4E-11	4.3E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	D	4.61E-08			1.30E-01	1.20E-08			4.86E-08	1.59E-10			5.00E-08	1.63E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	4.61E-08	7.3E-02	3.4E-09	1.30E-01	1.20E-08	7.3E-02	8.8E-10	1.67E-07	5.46E-10	8.8E-03	4.8E-12	5.00E-08	1.63E-10	8.8E-03	1.4E-12	4.2E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4.61E-08	1.4E-02	6.5E-10	1.00E-01	9.23E-09	1.4E-02	1.3E-10	3.73E-08	1.22E-10	2.4E-03	2.9E-13	5.00E-08	1.63E-10	2.4E-03	3.9E-13	7.8E-10
SVOC	Butylbenzylphthalate	85-68-7	C	4.61E-08	1.9E-03	8.8E-11	1.00E-01	9.23E-09	1.9E-03	1.8E-11	7.69E-07	2.51E-09			5.00E-08	1.63E-10			1.1E-10
SVOC	Chrysene	218-01-9	B2	4.61E-08	7.3E-03	3.4E-10	1.30E-01	1.20E-08	7.3E-03	8.8E-11	1.34E-06	4.36E-09	8.8E-04	3.8E-12	5.00E-08	1.63E-10	8.8E-04	1.4E-13	4.3E-10
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	4.61E-08	7.3E+00	3.4E-07	1.30E-01	1.20E-08	7.3E+00	8.8E-08	8.67E-08	2.83E-10	8.8E-01	2.5E-10	5.00E-08	1.63E-10	8.8E-01	1.4E-10	4.2E-07

Attachment D5: Cancer Risk Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis on Soil Ingestion Rate
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Cancer Class	Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
				LADD (mg/kg/d)	SF _{oral} (mg/kg/d) ⁻¹	Unit Risk	ABS _{derm}	LADD (mg/kg/d)	SF _{derm} (mg/kg/d) ⁻¹	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Dibenzofuran	132-64-9	D	4.61E-08			1.00E-01	9.23E-09			1.44E-06	4.69E-09			5.00E-08	1.63E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	4.61E-08			1.00E-01	9.23E-09			1.12E-06	3.67E-09			5.00E-08	1.63E-10			
SVOC	Di-n-octylphthalate	117-84-0		4.61E-08			1.00E-01	9.23E-09			6.25E-08	2.04E-10			5.00E-08	1.63E-10			
SVOC	Fluoranthene	206-44-0	D	4.61E-08			1.30E-01	1.20E-08			1.46E-06	4.76E-09			5.00E-08	1.63E-10			
SVOC	Fluorene	86-73-7	D	4.61E-08			1.30E-01	1.20E-08			9.62E-06	3.14E-08			5.00E-08	1.63E-10			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	4.61E-08	7.3E-01	3.4E-08	1.30E-01	1.20E-08	7.3E-01	8.8E-09	1.04E-07	3.38E-10	8.8E-02	3.0E-11	5.00E-08	1.63E-10	8.8E-02	1.4E-11	4.2E-08
SVOC	2-Methylnaphthalene	91-57-6	ID	4.61E-08			1.00E-01	9.23E-09			6.00E-05	1.96E-07			5.00E-08	1.63E-10			
SVOC	Naphthalene	91-20-3	C	4.61E-08			1.30E-01	1.20E-08			9.76E-05	3.18E-07	3.4E-02	1.1E-08	5.00E-08	1.63E-10	3.4E-02	5.5E-12	1.1E-08
SVOC	Phenanthrene	85-01-8	D	4.61E-08			1.30E-01	1.20E-08			3.69E-06	1.20E-08			5.00E-08	1.63E-10			
SVOC	Phenol	108-95-2	ID	4.61E-08			1.00E-01	9.23E-09			3.31E-05	1.08E-07			5.00E-08	1.63E-10			
SVOC	Pyrene	129-00-0	NC	4.61E-08			1.30E-01	1.20E-08			1.21E-06	3.95E-09			5.00E-08	1.63E-10			
PCB	PCBs (total)	1336-36-3	B2	4.61E-08	2.0E+00	9.2E-08	1.40E-01	1.29E-08	2.0E+00	2.6E-08	2.34E-06	7.62E-09	5.7E-01	4.4E-09	5.00E-08	1.63E-10	5.7E-01	9.3E-11	1.2E-07
INORG	Arsenic	7440-38-2	A	4.61E-08	1.5E+00	6.9E-08	3.00E-02	2.77E-09	1.5E+00	4.2E-09			4.3E+00		5.00E-08	1.63E-10	4.3E+00	7.0E-10	7.4E-08
INORG	Barium	7440-39-3	NC	4.61E-08											5.00E-08	1.63E-10			
INORG	Beryllium	7440-41-7	B1	4.61E-08									2.4E+00		5.00E-08	1.63E-10	2.4E+00	3.9E-10	3.9E-10
INORG	Cadmium	7440-43-9	B1	4.61E-08			1.00E-03	9.23E-11					1.8E+00		5.00E-08	1.63E-10	1.8E+00	2.9E-10	2.9E-10
INORG	Chromium (total)	7440-47-3		4.61E-08									1.2E+01		5.00E-08	1.63E-10	1.2E+01	2.0E-09	2.0E-09
INORG	Cobalt	7440-48-4	LC	4.61E-08									9.0E+00		5.00E-08	1.63E-10	9.0E+00	1.5E-09	1.5E-09
INORG	Copper	7440-50-8	D	4.61E-08											5.00E-08	1.63E-10			
INORG	Cyanide (total)	57-12-5	D	4.61E-08											5.00E-08	1.63E-10			
INORG	Manganese	7439-96-5	D	4.61E-08											5.00E-08	1.63E-10			
INORG	Mercury	7439-97-6	D	4.61E-08							2.54E-05	8.28E-08			5.00E-08	1.63E-10			
INORG	Nickel	7440-02-0	A	4.61E-08									2.4E-01		5.00E-08	1.63E-10	2.4E-01	3.9E-11	3.9E-11
INORG	Selenium	7782-49-2	D	4.61E-08											5.00E-08	1.63E-10			
INORG	Thallium	7440-28-0		4.61E-08											5.00E-08	1.63E-10			
INORG	Vanadium	7440-62-2		4.61E-08											5.00E-08	1.63E-10			
INORG	Zinc	7440-66-6	ID	4.61E-08											5.00E-08	1.63E-10			
Notes:																			
Unit risks are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire Facility) and region-specific meteorological parameters.																			
The concentration of particulates in the air is assumed to be no more 50 ug/m3.																			

Attachment D5: Noncancer HQ Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis on Soil Ingestion Rate Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	3.23E-06	2.0E+00	1.6E-06			2.0E+00		3.66E-04	8.36E-05	3.1E+01	2.7E-06	5.00E-08	1.14E-08	3.1E+01	3.7E-10	4.3E-06
VOC	Benzene	71-43-2	A	3.23E-06	4.0E-03	8.1E-04			4.0E-03		2.15E-03	4.90E-04	9.0E-02	5.4E-03	5.00E-08	1.14E-08	9.0E-02	1.3E-07	6.3E-03
VOC	Bromodichloromethane	75-27-4	B2	3.23E-06	2.0E-02	1.6E-04			2.0E-02		6.90E-04	1.57E-04			5.00E-08	1.14E-08			1.6E-04
VOC	2-Butanone	78-93-3	ID	3.23E-06	2.0E+00	1.6E-06			2.0E+00		3.76E-04	8.59E-05	5.0E+00	1.7E-05	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.9E-05
VOC	Carbon Disulfide	75-15-0		3.23E-06	1.0E-01	3.2E-05			1.0E-01		5.02E-03	1.15E-03	7.0E-01	1.6E-03	5.00E-08	1.14E-08	7.0E-01	1.6E-08	1.7E-03
VOC	Carbon Tetrachloride	56-23-5	B2	3.23E-06	7.0E-03	4.6E-04			7.0E-03		3.02E-03	6.89E-04	1.9E-01	3.7E-03	5.00E-08	1.14E-08	1.9E-01	6.0E-08	4.1E-03
VOC	Chlorobenzene	108-90-7	D	3.23E-06	7.0E-02	4.6E-05			7.0E-02		9.42E-04	2.15E-04	5.0E-01	4.3E-04	5.00E-08	1.14E-08	5.0E-01	2.3E-08	4.8E-04
VOC	Chloroethane	75-00-3	LC	3.23E-06	1.0E-01	3.2E-05			1.0E-01		6.68E-03	1.52E-03	1.0E+01	1.5E-04	5.00E-08	1.14E-08	1.0E+01	1.1E-09	1.8E-04
VOC	Chloroform	67-66-3	B2	3.23E-06	1.0E-01	3.2E-05			1.0E-01		2.17E-03	4.96E-04	5.0E-02	9.9E-03	5.00E-08	1.14E-08	5.0E-02	2.3E-07	9.9E-03
VOC	Chloromethane	74-87-3	D	3.23E-06							4.03E-03	9.21E-04	4.1E-01	2.2E-03	5.00E-08	1.14E-08	4.1E-01	2.8E-08	2.2E-03
VOC	2-Chlorotoluene	95-49-8		3.23E-06	2.0E-01	1.6E-05			2.0E-01		5.83E-04	1.33E-04			5.00E-08	1.14E-08			1.6E-05
VOC	Cumene	98-82-8	D	3.23E-06	4.0E-01	8.1E-06			4.0E-01		8.82E-04	2.01E-04	4.0E-01	5.0E-04	5.00E-08	1.14E-08	4.0E-01	2.9E-08	5.1E-04
VOC	Cyclohexane	110-82-7	ID	3.23E-06							4.07E-03	9.28E-04	6.0E+00	1.5E-04	5.00E-08	1.14E-08	6.0E+00	1.9E-09	1.5E-04
VOC	Dibromochloromethane	124-48-1	C	3.23E-06	2.0E-01	1.6E-05			2.0E-01		4.06E-04	9.27E-05			5.00E-08	1.14E-08			1.6E-05
VOC	1,1-Dichloroethane	75-34-3	SC	3.23E-06	2.0E+00	1.6E-06			2.0E+00		2.35E-03	5.38E-04	5.0E+00	1.1E-04	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.1E-04
VOC	1,1-Dichloroethene	75-35-4	C	3.23E-06	5.0E-02	6.5E-05			5.0E-02		4.29E-03	9.80E-04	2.0E-01	4.9E-03	5.00E-08	1.14E-08	2.0E-01	5.7E-08	5.0E-03
VOC	1,2-Dichloroethene (total)	540-59-0		3.23E-06	1.0E-01	3.2E-05			1.0E-01		2.15E-03	4.90E-04			5.00E-08	1.14E-08			3.2E-05
VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.23E-06	1.0E-01	3.2E-05			1.0E-01		1.96E-03	4.47E-04			5.00E-08	1.14E-08			3.2E-05
VOC	trans-1,2-Dichloroethene	156-60-5		3.23E-06	2.0E-01	1.6E-05			2.0E-01		2.58E-03	5.89E-04	7.9E-01	7.4E-04	5.00E-08	1.14E-08	7.9E-01	1.4E-08	7.6E-04
VOC	Ethyl Benzene	100-41-4	D	3.23E-06	1.0E-01	3.2E-05			1.0E-01		1.09E-03	2.49E-04	1.0E+00	2.5E-04	5.00E-08	1.14E-08	1.0E+00	1.1E-08	2.8E-04
VOC	Methyl Acetate	79-20-9		3.23E-06	1.0E+01	3.2E-07			1.0E+01		4.76E-04	1.09E-04			5.00E-08	1.14E-08			3.2E-07
VOC	4-Methyl-2-pentanone	108-10-1	ID	3.23E-06							4.96E-04	1.13E-04	3.0E+00	3.8E-05	5.00E-08	1.14E-08	3.0E+00	3.8E-09	3.8E-05
VOC	Methylcyclohexane	108-87-2		3.23E-06							5.58E-03	1.27E-03	3.0E+00	4.2E-04	5.00E-08	1.14E-08	3.0E+00	3.8E-09	4.2E-04
VOC	Methylene Chloride	75-09-2	B2	3.23E-06	6.0E-02	5.4E-05			6.0E-02		2.13E-03	4.85E-04	1.0E+00	4.7E-04	5.00E-08	1.14E-08	1.0E+00	1.1E-08	5.2E-04
VOC	Styrene	100-42-5		3.23E-06	2.0E-01	1.6E-05			2.0E-01		4.43E-04	1.01E-04	3.0E+00	3.4E-05	5.00E-08	1.14E-08	3.0E+00	3.8E-09	5.0E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5		3.23E-06	1.0E-02	3.2E-04			1.0E-02		3.91E-04	8.92E-05			5.00E-08	1.14E-08			3.2E-04
VOC	Tetrachloroethene	127-18-4	C-B2	3.23E-06	1.0E-01	3.2E-05			1.0E-01		2.31E-03	5.26E-04	4.0E-01	1.3E-03	5.00E-08	1.14E-08	4.0E-01	2.9E-08	1.3E-03
VOC	Toluene	108-88-3	ID	3.23E-06	8.0E-01	4.0E-06			8.0E-01		1.52E-03	3.46E-04	5.0E+00	6.9E-05	5.00E-08	1.14E-08	5.0E+00	2.3E-09	7.3E-05
VOC	1,1,1-Trichloroethane	71-55-6	ID	3.23E-06	7.0E+00	4.6E-07			7.0E+00		2.76E-03	6.31E-04	5.0E+00	1.3E-04	5.00E-08	1.14E-08	5.0E+00	2.3E-09	1.3E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	3.23E-06	4.0E-03	8.1E-04			4.0E-03		8.42E-04	1.92E-04			5.00E-08	1.14E-08			8.1E-04
VOC	Trichloroethene	79-01-6	C-B2	3.23E-06	6.0E-03	5.4E-04			6.0E-03		1.87E-03	4.26E-04	5.4E-01	7.9E-04	5.00E-08	1.14E-08	5.4E-01	2.1E-08	1.3E-03
VOC	Trichlorofluoromethane	75-69-4		3.23E-06	7.0E-01	4.6E-06			7.0E-01		5.54E-03	1.26E-03	7.0E+00	1.8E-04	5.00E-08	1.14E-08	7.0E+00	1.6E-09	1.9E-04
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		3.23E-06	3.0E+01	1.1E-07			3.0E+01		5.84E-03	1.33E-03	3.0E+01	4.4E-05	5.00E-08	1.14E-08	3.0E+01	3.8E-10	4.5E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	3.23E-06							4.77E-04	1.09E-04	7.0E-02	1.6E-03	5.00E-08	1.14E-08	7.0E-02	1.6E-07	1.6E-03
VOC	Vinyl Chloride	75-01-4	A	3.23E-06	3.0E-03	1.1E-03			3.0E-03		5.71E-03	1.30E-03	1.0E-01	1.3E-02	5.00E-08	1.14E-08	1.0E-01	1.1E-07	1.4E-02
VOC	Xylenes (total)	1330-20-7	ID	3.23E-06	2.0E-01	1.6E-05			2.0E-01		1.00E-03	2.29E-04	3.0E-01	7.6E-04	5.00E-08	1.14E-08	3.0E-01	3.8E-08	7.8E-04
SVOC	Acenaphthene	83-32-9		3.23E-06	6.0E-01	5.4E-06	1.30E-01	8.40E-07	6.0E-01	1.4E-06	2.23E-05	5.08E-06			5.00E-08	1.14E-08			6.8E-06
SVOC	Benzo(a)anthracene	56-55-3	B2	3.23E-06			1.30E-01	8.40E-07			5.11E-07	1.17E-07			5.00E-08	1.14E-08			
SVOC	Benzo(a)pyrene	50-32-8	B2	3.23E-06			1.30E-01	8.40E-07			2.42E-07	5.54E-08			5.00E-08	1.14E-08			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	3.23E-06			1.30E-01	8.40E-07			7.51E-07	1.72E-07			5.00E-08	1.14E-08			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.23E-06	3.0E-01	1.1E-05	1.30E-01	8.40E-07	3.0E-01	2.8E-06	4.86E-08	1.11E-08			5.00E-08	1.14E-08			1.4E-05
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.23E-06			1.30E-01	8.40E-07			1.67E-07	3.82E-08			5.00E-08	1.14E-08			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	3.23E-06	1.0E-01	3.2E-05	1.00E-01	6.46E-07	1.0E-01	6.5E-06	3.73E-08	8.52E-09			5.00E-08	1.14E-08			3.9E-05
SVOC	Butylbenzylphthalate	85-68-7	C	3.23E-06	2.0E+00	1.6E-06	1.00E-01	6.46E-07	2.0E+00	3.2E-07	7.69E-07	1.76E-07			5.00E-08	1.14E-08			1.9E-06
SVOC	Chrysene	218-01-9	B2	3.23E-06			1.30E-01	8.40E-07			1.34E-06	3.05E-07			5.00E-08	1.14E-08			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	3.23E-06			1.30E-01	8.40E-07			8.67E-08	1.98E-08			5.00E-08	1.14E-08			

Attachment D5: Noncancer HQ Calculations for Exposure of Construction Workers to Soil - Sensitivity Analysis on Soil Ingestion Rate Former Delco Plant 5, Kokomo, Indiana																			
				Soil Ingestion			Soil Dermal Contact				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	ADD (mg/kg/d)	RfD _{oral} (mg/kg/d)	Unit HQ	ABS _{derm}	ADD (mg/kg/d)	RfD _{derm} (mg/kg/d)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Dibenzofuran	132-64-9	D	3.23E-06	4.0E-03	8.1E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	1.44E-06	3.29E-07			5.00E-08	1.14E-08			9.7E-04
SVOC	Di-n-butylphthalate	84-74-2	D	3.23E-06	1.0E+00	3.2E-06	1.00E-01	6.46E-07	1.0E+00	6.5E-07	1.12E-06	2.57E-07			5.00E-08	1.14E-08			3.9E-06
SVOC	Di-n-octylphthalate	117-84-0		3.23E-06	4.0E-01	8.1E-06	1.00E-01	6.46E-07	4.0E-01	1.6E-06	6.25E-08	1.43E-08			5.00E-08	1.14E-08			9.7E-06
SVOC	Fluoranthene	206-44-0	D	3.23E-06	4.0E-01	8.1E-06	1.30E-01	8.40E-07	4.0E-01	2.1E-06	1.46E-06	3.33E-07			5.00E-08	1.14E-08			1.0E-05
SVOC	Fluorene	86-73-7	D	3.23E-06	4.0E-01	8.1E-06	1.30E-01	8.40E-07	4.0E-01	2.1E-06	9.62E-06	2.20E-06			5.00E-08	1.14E-08			1.0E-05
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	3.23E-06			1.30E-01	8.40E-07			1.04E-07	2.37E-08			5.00E-08	1.14E-08			
SVOC	2-Methylnaphthalene	91-57-6	ID	3.23E-06	4.0E-03	8.1E-04	1.00E-01	6.46E-07	4.0E-03	1.6E-04	6.00E-05	1.37E-05			5.00E-08	1.14E-08			9.7E-04
SVOC	Naphthalene	91-20-3	C	3.23E-06	2.0E-01	1.6E-05	1.30E-01	8.40E-07	2.0E-01	4.2E-06	9.76E-05	2.23E-05	3.0E-03	7.4E-03	5.00E-08	1.14E-08	3.0E-03	3.8E-06	7.4E-03
SVOC	Phenanthrene	85-01-8	D	3.23E-06	3.0E-01	1.1E-05	1.30E-01	8.40E-07	3.0E-01	2.8E-06	3.69E-06	8.42E-07			5.00E-08	1.14E-08			1.4E-05
SVOC	Phenol	108-95-2	ID	3.23E-06	3.0E-01	1.1E-05	1.00E-01	6.46E-07	3.0E-01	2.2E-06	3.31E-05	7.57E-06			5.00E-08	1.14E-08			1.3E-05
SVOC	Pyrene	129-00-0	NC	3.23E-06	3.0E-01	1.1E-05	1.30E-01	8.40E-07	3.0E-01	2.8E-06	1.21E-06	2.76E-07			5.00E-08	1.14E-08			1.4E-05
PCB	PCBs (total)	1336-36-3	B2	3.23E-06	3.0E-05	1.1E-01	1.40E-01	9.04E-07	3.0E-05	3.0E-02	2.34E-06	5.33E-07			5.00E-08	1.14E-08			1.4E-01
INORG	Arsenic	7440-38-2	A	3.23E-06	5.0E-03	6.5E-04	3.00E-02	1.94E-07	5.0E-03	3.9E-05			1.5E-05		5.00E-08	1.14E-08	1.5E-05	7.6E-04	1.4E-03
INORG	Barium	7440-39-3	NC	3.23E-06	2.0E-01	1.6E-05			1.4E-02						5.00E-08	1.14E-08			1.6E-05
INORG	Beryllium	7440-41-7	B1	3.23E-06	2.0E-03	1.6E-03			1.4E-05				2.0E-05		5.00E-08	1.14E-08	2.0E-05	5.7E-04	2.2E-03
INORG	Cadmium	7440-43-9	B1	3.23E-06	1.0E-03	3.2E-03	1.00E-03	6.46E-09	2.5E-05	2.6E-04			9.0E-04		5.00E-08	1.14E-08	9.0E-04	1.3E-05	3.5E-03
INORG	Chromium (total)	7440-47-3		3.23E-06	5.0E-03	6.5E-04			1.3E-04				3.0E-04		5.00E-08	1.14E-08	3.0E-04	3.8E-05	6.8E-04
INORG	Cobalt	7440-48-4	LC	3.23E-06	3.0E-03	1.1E-03			3.0E-03				2.0E-05		5.00E-08	1.14E-08	2.0E-05	5.7E-04	1.6E-03
INORG	Copper	7440-50-8	D	3.23E-06	4.0E-02	8.1E-05			4.0E-02						5.00E-08	1.14E-08			8.1E-05
INORG	Cyanide (total)	57-12-5	D	3.23E-06	2.0E-02	1.6E-04			2.0E-02				9.0E-03		5.00E-08	1.14E-08	9.0E-03	1.3E-06	1.6E-04
INORG	Manganese	7439-96-5	D	3.23E-06	1.4E-01	2.3E-05			8.4E-03				5.0E-05		5.00E-08	1.14E-08	5.0E-05	2.3E-04	2.5E-04
INORG	Mercury	7439-97-6	D	3.23E-06	3.0E-03	1.1E-03			2.1E-04		2.54E-05	5.79E-06	3.0E-04	1.9E-02	5.00E-08	1.14E-08	3.0E-04	3.8E-05	2.0E-02
INORG	Nickel	7440-02-0	A	3.23E-06	2.0E-02	1.6E-04			8.0E-04				2.0E-04		5.00E-08	1.14E-08	2.0E-04	5.7E-05	2.2E-04
INORG	Selenium	7782-49-2	D	3.23E-06	5.0E-03	6.5E-04			5.0E-03				2.0E-02		5.00E-08	1.14E-08	2.0E-02	5.7E-07	6.5E-04
INORG	Thallium	7440-28-0		3.23E-06	7.0E-05	4.6E-02			7.0E-05						5.00E-08	1.14E-08			4.6E-02
INORG	Vanadium	7440-62-2		3.23E-06	7.0E-03	4.6E-04			1.8E-04						5.00E-08	1.14E-08			4.6E-04
INORG	Zinc	7440-66-6	ID	3.23E-06	3.0E-01	1.1E-05			3.0E-01						5.00E-08	1.14E-08			1.1E-05
Notes:																			
Unit HQs are calculated at a soil concentration of 1 mg/kg.																			
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).																			
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the entire site) and region-specific meteorological parameters.																			
The concentration of particulates in the air is assumed to be no more than 50 ug/m3.																			

Attachment D5: Estimates of Cancer Risk and HQ for Construction Worker Exposure to Soil at Example Location SB-0634 Former GM Delco Plant 5, Kokomo, Indiana												
Location	Chem Group	Chemical	CASRN	Max Detect (mg/kg)	Max Limit (mg/kg)	Background Conc (mg/kg)	Site-Related Exposure Concentration (mg/kg)	Basis of Site-Related Exposure Concentration	Construction Worker			
									Unit Risk	Unit HQ	Risk	HQ
SB-0634	VOC	Acetone	67-64-1	1.20E-01	8.25E-02		1.20E-01	Half-Limit		3.7E-06		4E-07
SB-0634	VOC	Benzene	71-43-2	6.00E-03	4.10E-03		6.00E-03	Half-Limit	5.6E-08	5.9E-03	3E-10	4E-05
SB-0634	VOC	Bromodichloromethane	75-27-4		6.10E-03		3.05E-03	Half-Limit	1.7E-09	9.8E-05	5E-12	3E-07
SB-0634	VOC	2-Butanone	78-93-3		6.10E-02		3.05E-02	Half-Limit		1.8E-05		6E-07
SB-0634	VOC	Carbon Disulfide	75-15-0	5.70E-02	8.25E-03		5.70E-02	Max Detect		1.7E-03		9E-05
SB-0634	VOC	Carbon Tetrachloride	56-23-5		6.10E-03		3.05E-03	Half-Limit	1.5E-07	3.9E-03	5E-10	1E-05
SB-0634	VOC	Chlorobenzene	108-90-7		6.10E-03		3.05E-03	Half-Limit		4.6E-04		1E-06
SB-0634	VOC	Chloroethane	75-00-3		6.10E-03		3.05E-03	Half-Limit		1.7E-04		5E-07
SB-0634	VOC	Chloroform	67-66-3		6.10E-03		3.05E-03	Half-Limit	1.6E-07	9.9E-03	5E-10	3E-05
SB-0634	VOC	Chloromethane	74-87-3		6.10E-03		3.05E-03	Half-Limit		2.2E-03		7E-06
SB-0634	VOC	Cumene	98-82-8	2.90E-03	4.10E-03		2.90E-03	Half-Limit		5.1E-04		1E-06
SB-0634	VOC	Cyclohexane	110-82-7	1.00E-03	6.10E-03		1.00E-03	Half-Limit		1.5E-04		2E-07
SB-0634	VOC	Dibromochloromethane	124-48-1		6.10E-03		3.05E-03	Half-Limit	2.3E-09	9.8E-06	7E-12	3E-08
SB-0634	VOC	1,1-Dichloroethane	75-34-3		6.10E-03		3.05E-03	Half-Limit	1.2E-08	1.1E-04	4E-11	3E-07
SB-0634	VOC	1,1-Dichloroethene	75-35-4	3.90E-01	6.10E-03		3.90E-01	Half-Limit		4.9E-03		2E-03
SB-0634	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			1.40E+02	Max Detect		2.0E-05		3E-03
SB-0634	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01	6.10E-03		8.70E-01	Max Detect		7.5E-04		7E-04
SB-0634	VOC	Ethyl Benzene	100-41-4	2.10E-02	4.10E-03		2.10E-02	Max Detect		2.7E-04		6E-06
SB-0634	VOC	Methyl Acetate	79-20-9		1.20E-02		6.00E-03	Half-Limit		2.0E-07		1E-09
SB-0634	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01	8.25E-03		2.00E-01	Max Detect		3.8E-05		8E-06
SB-0634	VOC	Methylcyclohexane	108-87-2	5.70E-03	8.25E-03		5.70E-03	Half-Limit		4.2E-04		2E-06
SB-0634	VOC	Methylene Chloride	75-09-2	7.80E-03			7.80E-03	Max Detect	3.5E-09	5.0E-04	3E-11	4E-06
SB-0634	VOC	Styrene	100-42-5	1.00E-01	4.10E-03		1.00E-01	Max Detect		4.3E-05		4E-06
SB-0634	VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.10E-03		3.05E-03	Half-Limit		2.0E-04		6E-07
SB-0634	VOC	Tetrachloroethene	127-18-4	3.40E-03	6.10E-03		3.40E-03	Max Detect	2.4E-08	1.3E-03	8E-11	5E-06
SB-0634	VOC	Toluene	108-88-3	8.00E-03	4.10E-03		8.00E-03	Half-Limit		7.2E-05		6E-07
SB-0634	VOC	1,1,1-Trichloroethane	71-55-6		6.10E-03		3.05E-03	Half-Limit		1.3E-04		4E-07
SB-0634	VOC	1,1,2-Trichloroethane	79-00-5		6.10E-03		3.05E-03	Half-Limit	4.6E-08	4.9E-04	1E-10	1E-06
SB-0634	VOC	Trichloroethene	79-01-6	1.30E+02			1.30E+02	Max Detect	1.1E-08	1.1E-03	1E-06	1E-01
SB-0634	VOC	Trichlorofluoromethane	75-69-4		6.10E-03		3.05E-03	Half-Limit		1.8E-04		6E-07
SB-0634	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.20E-02		6.00E-03	Half-Limit		4.4E-05		3E-07
SB-0634	VOC	Vinyl Chloride	75-01-4	7.90E+00	2.40E-03		7.90E+00	Half-Limit	2.0E-07	1.4E-02	2E-06	1E-01
SB-0634	VOC	Xylenes (total)	1330-20-7	2.61E-02	4.10E-03		2.61E-02	Max Detect		7.7E-04		2E-05
SB-0634	PCB	PCBs (total)	1336-36-3		3.30E-01		1.65E-01	Interpolated Half-Limit	8.6E-08	9.5E-02	1E-08	2E-02
SB-0634	INORG	Lead	7439-92-1	1.90E+01			1.90E+01	Interpolated Max				
SB-0634	INORG	Manganese	7439-96-5	5.50E+02		8.17E+02		Interpolated Max is Less than Background		2.4E-04		
SB-0634	INORG	Thallium	7440-28-0	3.50E+00	5.00E-01		3.50E+00	Interpolated Half-Limit		2.8E-02		1E-01
								Sum:			3E-06	4E-01
Note:												
Values above USEPA's cumulative cancer risk limit of 1E-4 or HI limit of 1 are highlighted.												

**Attachment D5: Upper-Bound Estimates of Cumulative
Cancer Risk and HI for Construction Worker Sensitivity
Analysis**

Former GM Delco Plant 5, Kokomo, Indiana

Location	Construction Worker		Construction Worker Sensitivity Analysis with 330 mg/d Soil Ingestion	
	Risk	HI	Risk	HI
GP-1	3E-07	2E-01	3E-07	3E-01
GP-10	7E-07	3E-01	8E-07	5E-01
GP-11	3E-07	1E-01	3E-07	1E-01
GP-12	3E-07	1E-01	3E-07	1E-01
GP-13	3E-07	1E-01	3E-07	1E-01
GP-14	3E-07	2E-01	3E-07	2E-01
GP-15	3E-07	1E-01	3E-07	1E-01
GP-16	3E-07	1E-01	3E-07	1E-01
GP-17	3E-07	1E-01	3E-07	1E-01
GP-18	3E-07	1E-01	3E-07	1E-01
GP-19	3E-07	1E-01	3E-07	1E-01
GP-2	1E-05	5E-01	2E-05	7E-01
GP-20	3E-07	2E-01	3E-07	2E-01
GP-21	3E-07	2E-01	3E-07	2E-01
GP-22	3E-07	2E-01	3E-07	3E-01
GP-3	6E-07	2E-01	7E-07	3E-01
GP-4	3E-07	2E-01	3E-07	2E-01
GP-5	6E-07	2E-01	7E-07	3E-01
GP-6	7E-07	3E-01	8E-07	4E-01
GP-7	6E-07	2E-01	7E-07	3E-01
GP-8	7E-07	3E-01	8E-07	5E-01
GP-9	7E-07	3E-01	8E-07	5E-01
MW-0501-P1	7E-08	2E-01	7E-08	3E-01
MW-0506-I2	2E-06	2E-01	2E-06	2E-01
MW-0619-S1	2E-08	3E-02	2E-08	5E-02
MW-0622-S2	3E-08	1E-01	4E-08	2E-01
P1	7E-07	1E-02	7E-07	2E-02
P4	1E-06	1E-01	1E-06	2E-01
P7	5E-07	2E-02	5E-07	2E-02
P8	1E-06	1E-01	1E-06	1E-01
P9	7E-07	1E-02	7E-07	2E-02
SB-0501	6E-08	2E-01	6E-08	2E-01
SB-0502	7E-08	2E-01	8E-08	3E-01
SB-0503	7E-08	2E-01	8E-08	3E-01
SB-0504	6E-08	2E-01	6E-08	2E-01
SB-0505	5E-08	2E-01	6E-08	3E-01
SB-0506	2E-07	3E-01	2E-07	4E-01
SB-0509	1E-07	2E-01	1E-07	3E-01
SB-0510	6E-09	1E-01	8E-09	2E-01
SB-0511	7E-09	1E-01	9E-09	2E-01
SB-0512	1E-06	3E-01	1E-06	4E-01
SB-0513	2E-06	4E-01	2E-06	5E-01
SB-0514	1E-06	4E-01	1E-06	5E-01
SB-0516	1E-06	2E-01	1E-06	3E-01
SB-0517	3E-09	1E-01	4E-09	2E-01

**Attachment D5: Upper-Bound Estimates of Cumulative
Cancer Risk and HI for Construction Worker Sensitivity
Analysis**

Former GM Delco Plant 5, Kokomo, Indiana

Location	Construction Worker		Construction Worker Sensitivity Analysis with 330 mg/d Soil Ingestion	
	Risk	HI	Risk	HI
SB-0518	1E-06	2E-01	1E-06	3E-01
SB-0519	2E-06	3E-01	3E-06	4E-01
SB-0520	2E-06	2E-01	2E-06	3E-01
SB-0521	3E-06	4E-01	3E-06	6E-01
SB-0522	4E-07	2E-01	5E-07	2E-01
SB-0523	2E-08	3E-02	2E-08	5E-02
SB-0524	2E-08	3E-02	2E-08	5E-02
SB-0525	7E-07	1E-01	7E-07	1E-01
SB-0526	9E-07	1E-01	9E-07	2E-01
SB-0527	4E-08	4E-02	5E-08	6E-02
SB-0528	1E-07	4E-02	1E-07	7E-02
SB-0529	2E-08	3E-02	2E-08	5E-02
SB-0530	3E-07	6E-02	3E-07	8E-02
SB-0531	2E-08	3E-02	2E-08	5E-02
SB-0532	2E-08	3E-02	2E-08	5E-02
SB-0533	7E-08	1E-01	7E-08	2E-01
SB-0603	2E-08	9E-03	2E-08	1E-02
SB-0604	5E-08	4E-02	6E-08	6E-02
SB-0605	2E-08	3E-02	2E-08	5E-02
SB-0608	7E-07	8E-02	7E-07	1E-01
SB-0609	2E-08	9E-03	2E-08	1E-02
SB-0610	9E-08	2E-02	9E-08	2E-02
SB-0611	8E-08	2E-02	8E-08	2E-02
SB-0612	1E-06	2E-01	1E-06	2E-01
SB-0613	1E-06	1E-01	1E-06	1E-01
SB-0614	5E-08	4E-02	5E-08	6E-02
SB-0615	2E-08	3E-02	2E-08	5E-02
SB-0617	2E-08	1E-01	2E-08	2E-01
SB-0622	1E-07	2E-01	1E-07	3E-01
SB-0623	1E-07	2E-01	1E-07	3E-01
SB-0624	2E-07	2E-01	2E-07	3E-01
SB-0625	2E-07	2E-01	2E-07	3E-01
SB-0626	1E-07	2E-01	2E-07	3E-01
SB-0627	1E-07	2E-01	2E-07	3E-01
SB-0628	3E-08	3E-02	3E-08	5E-02
SB-0629	1E-06	2E-01	1E-06	2E-01
SB-0630	2E-06	1E-01	2E-06	2E-01
SB-0631	5E-08	1E-02	6E-08	2E-02
SB-0632	2E-08	9E-03	2E-08	1E-02
SB-0633	5E-08	1E-02	5E-08	2E-02
SB-0634	3E-06	4E-01	3E-06	5E-01
SB-0635	1E-06	2E-01	1E-06	3E-01
SB-0636	2E-07	2E-01	2E-07	3E-01
SB-0637	6E-07	2E-01	6E-07	3E-01
SB-0638	1E-06	2E-01	1E-06	3E-01

**Attachment D5: Upper-Bound Estimates of Cumulative
Cancer Risk and HI for Construction Worker Sensitivity
Analysis**

Former GM Delco Plant 5, Kokomo, Indiana

Location	Construction Worker		Construction Worker Sensitivity Analysis with 330 mg/d Soil Ingestion	
	Risk	HI	Risk	HI
SB-0639	9E-07	2E-01	9E-07	3E-01
SB-0640	9E-07	2E-01	9E-07	3E-01
SB-0641	7E-07	1E-01	7E-07	1E-01
SB-0642	2E-07	1E-01	2E-07	2E-01
SB-0705	1E-06	2E-01	1E-06	3E-01
SB-0706	1E-06	3E-01	1E-06	4E-01
SB-0715	3E-08	3E-02	3E-08	5E-02
SB-0721	2E-06	2E-01	2E-06	3E-01
SB-0731	1E-08	3E-02	1E-08	5E-02
SB-0733	2E-07	6E-02	2E-07	8E-02
SB-0742	1E-06	3E-01	1E-06	4E-01
SB-0743	2E-06	4E-01	2E-06	5E-01
SB-0744	3E-07	1E-01	3E-07	2E-01
SB-0745	2E-08	1E-01	3E-08	2E-01
SB-0746	5E-06	7E-01	5E-06	8E-01
SB-0747	2E-07	1E-01	2E-07	2E-01
SB-0748	2E-08	2E-02	2E-08	4E-02
SB-0749	1E-05	1E+00	1E-05	2E+00
SB-0750	3E-06	4E-01	3E-06	4E-01
SB-0751	9E-06	1E+00	9E-06	1E+00
SB-0752	2E-08	2E-02	2E-08	3E-02
SB-0753	3E-07	5E-02	3E-07	7E-02
SB-0754	6E-07	2E-01	6E-07	3E-01
SB-0755	2E-06	3E-01	2E-06	3E-01
SB-0756	9E-06	1E+00	1E-05	1E+00
SB-0757	2E-05	2E+00	2E-05	3E+00
SB-0761	7E-07	2E-01	7E-07	3E-01
SB-0762	5E-08	1E-01	6E-08	2E-01
SB-0763	1E-06	1E-01	1E-06	2E-01
SB-0764	2E-08	4E-02	3E-08	7E-02
SB-0765	4E-08	4E-02	5E-08	7E-02
SB-0766	1E-05	1E+00	1E-05	1E+00
SB-0767	3E-08	2E-02	4E-08	4E-02
SB-0768	7E-07	1E-01	8E-07	2E-01
SB-0769	3E-08	1E-01	4E-08	2E-01
SB-0770	2E-06	2E-01	2E-06	2E-01
SB-0771	1E-06	7E-02	1E-06	9E-02
SB-0772	4E-06	6E-01	5E-06	8E-01
SB-0773	3E-08	1E-01	3E-08	2E-01
SB-0774	3E-07	1E-01	3E-07	2E-01
SB-0775	5E-05	5E+00	5E-05	6E+00
SB-0776	1E-06	1E-01	1E-06	2E-01
SB-0777	7E-07	2E-01	7E-07	3E-01
SB-0778	4E-07	3E-02	4E-07	3E-02
SB-0779	9E-07	5E-02	9E-07	6E-02

**Attachment D5: Upper-Bound Estimates of Cumulative
Cancer Risk and HI for Construction Worker Sensitivity
Analysis
Former GM Delco Plant 5, Kokomo, Indiana**

Location	Construction Worker		Construction Worker Sensitivity Analysis with 330 mg/d Soil Ingestion	
	Risk	HI	Risk	HI
SB-0780	1E-06	8E-02	1E-06	1E-01
SB-0781	1E-06	2E-01	1E-06	2E-01
SB-0782	1E-06	2E-01	1E-06	2E-01
SB-0783	4E-07	4E-02	4E-07	5E-02
SB-0784	3E-08	1E-01	4E-08	2E-01
SB-0785	8E-08	4E-02	8E-08	6E-02
SB-0786	1E-08	3E-02	1E-08	5E-02
SB-0787	1E-06	2E-01	1E-06	2E-01
SB-0788	4E-08	5E-02	5E-08	7E-02
SB-0801	2E-06	3E-01	2E-06	3E-01
SB-0802	3E-08	2E-02	3E-08	3E-02
SB-0803	9E-07	4E-02	9E-07	5E-02
SB-0804	1E-06	4E-02	1E-06	5E-02
SB-0805	9E-07	1E-01	1E-06	2E-01
SB-0806	2E-08	2E-02	3E-08	3E-02
SB-0807	2E-08	1E-01	3E-08	2E-01
SB-0808	2E-08	1E-01	3E-08	2E-01
SB-0809	1E-06	2E-01	1E-06	3E-01
SB-0810	2E-08	2E-02	3E-08	3E-02
SB-0811	2E-08	2E-02	3E-08	3E-02
SB-0812	2E-08	2E-02	3E-08	3E-02
SB-0813	3E-08	2E-02	3E-08	3E-02
SB-0814	2E-08	2E-02	3E-08	3E-02
SB-1	7E-08	6E-02	7E-08	9E-02
SB-10	1E-07	5E-02	1E-07	7E-02
SB-11	5E-07	7E-02	5E-07	9E-02
SB-12	4E-07	6E-02	5E-07	8E-02
SB-14	3E-07	6E-02	4E-07	9E-02
SB-15	4E-07	1E-01	5E-07	2E-01
SB-18	1E-06	2E-01	1E-06	2E-01
SB-19	7E-07	3E-01	9E-07	4E-01
SB-2	9E-08	9E-02	1E-07	1E-01
SB-3	2E-06	3E-01	2E-06	3E-01
SB-4	6E-08	4E-02	6E-08	7E-02
SB-5	3E-07	5E-02	5E-07	7E-02
SB-6	3E-07	6E-02	5E-07	8E-02
SB-7	4E-07	6E-02	5E-07	9E-02
SB-8	2E-06	2E-01	2E-06	2E-01
SB-9	5E-07	3E-01	7E-07	4E-01
Notes:				
Values above the USEPA risk limits of 1E-4 or 1 for cancer risk or HI, respectively, are highlighted.				

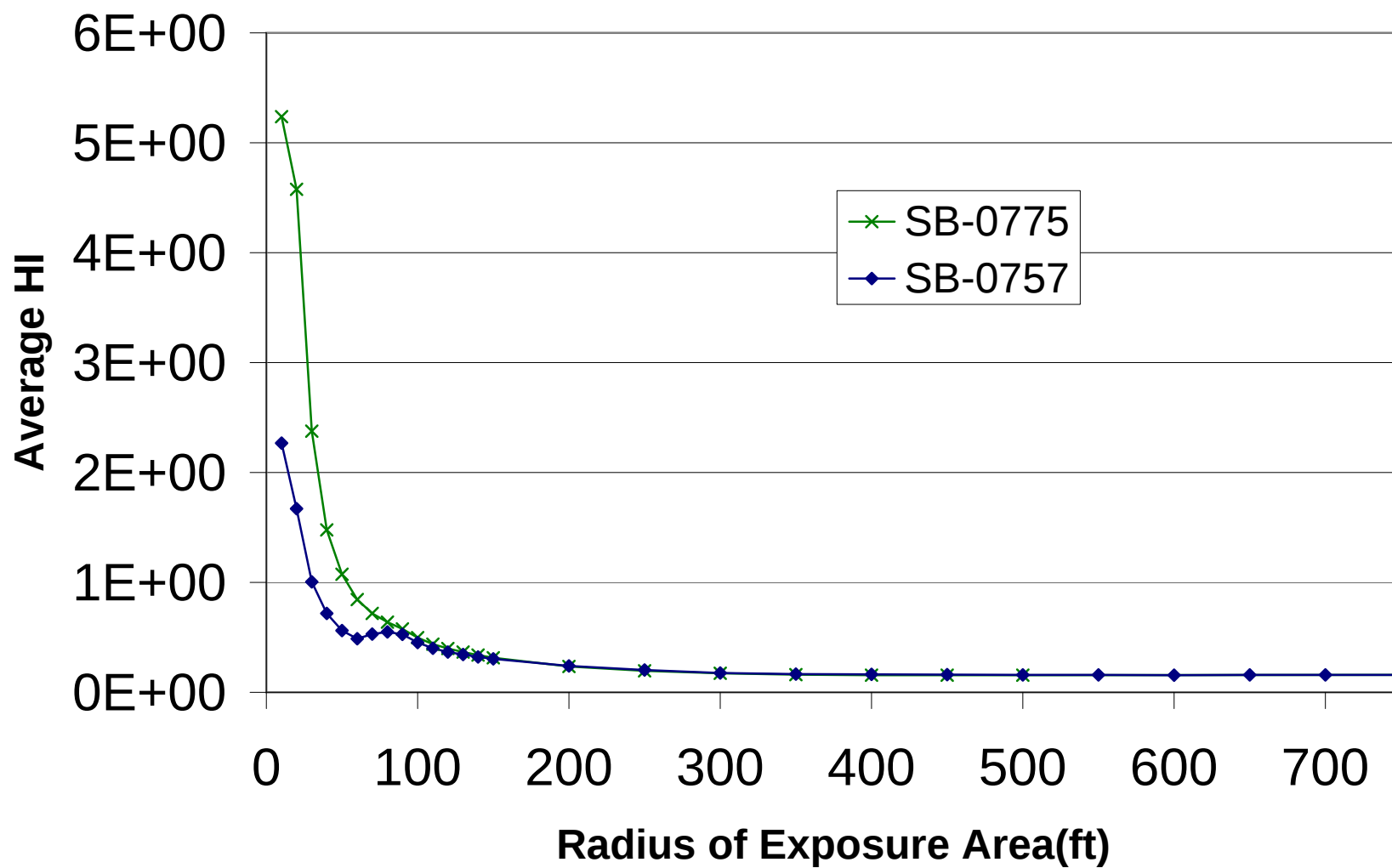
**Attachment D5: Area-Weighted Estimates of Construction Worker
Soil Contact HI for Exposure Areas around SB-0775
Former GM Delco Plant 5, Kokomo, Indiana**

Radius of Exposure Unit (ft)	Area of Exposure Unit (ft²)	Area of Exposure Unit (acre)	Average Construction Worker Soil Contact HI	Average Construction Worker Soil Contact HI - Sensitivity Analysis
10	3.14E+02	7.21E-03	5E+00	6E+00
20	1.25E+03	2.87E-02	5E+00	5E+00
30	2.82E+03	6.46E-02	2E+00	3E+00
40	5.01E+03	1.15E-01	1E+00	2E+00
50	7.83E+03	1.80E-01	1E+00	1E+00
60	1.13E+04	2.59E-01	8E-01	1E+00
70	1.54E+04	3.53E-01	7E-01	9E-01
80	2.01E+04	4.61E-01	6E-01	8E-01
90	2.54E+04	5.83E-01	6E-01	7E-01
100	3.14E+04	7.20E-01	5E-01	6E-01
110	3.73E+04	8.57E-01	4E-01	5E-01
120	4.34E+04	9.96E-01	4E-01	5E-01
130	4.96E+04	1.14E+00	4E-01	4E-01
140	5.61E+04	1.29E+00	3E-01	4E-01
150	6.28E+04	1.44E+00	3E-01	4E-01
200	1.01E+05	2.32E+00	2E-01	3E-01
250	1.47E+05	3.37E+00	2E-01	3E-01
300	2.00E+05	4.59E+00	2E-01	2E-01
350	2.61E+05	6.00E+00	2E-01	2E-01
400	3.21E+05	7.37E+00	2E-01	2E-01
450	3.66E+05	8.39E+00	2E-01	2E-01
500	3.98E+05	9.14E+00	2E-01	2E-01
750	4.68E+05	1.07E+01	2E-01	2E-01
Note:				
Values above USEPA's HI limit of 1 are highlighted.				

**Attachment D5: Area-Weighted Estimates of Construction Worker
Soil Contact HI for Exposure Areas around SB-0757
Former GM Delco Plant 5, Kokomo, Indiana**

Radius of Exposure Unit (ft)	Area of Exposure Unit (ft²)	Area of Exposure Unit (acre)	Average Construction Worker Soil Contact HI	Average Construction Worker Soil Contact HI - Sensitivity Analysis
10	3.13E+02	7.18E-03	2E+00	3E+00
20	1.25E+03	2.87E-02	2E+00	2E+00
30	2.82E+03	6.46E-02	1E+00	1E+00
40	5.01E+03	1.15E-01	7E-01	8E-01
50	7.83E+03	1.80E-01	6E-01	7E-01
60	1.13E+04	2.59E-01	5E-01	6E-01
70	1.54E+04	3.53E-01	5E-01	6E-01
80	2.01E+04	4.61E-01	6E-01	7E-01
90	2.54E+04	5.83E-01	5E-01	6E-01
100	3.13E+04	7.19E-01	5E-01	6E-01
110	3.71E+04	8.52E-01	4E-01	5E-01
120	4.31E+04	9.89E-01	4E-01	4E-01
130	4.92E+04	1.13E+00	3E-01	4E-01
140	5.56E+04	1.28E+00	3E-01	4E-01
150	6.23E+04	1.43E+00	3E-01	4E-01
200	1.00E+05	2.30E+00	2E-01	3E-01
250	1.46E+05	3.34E+00	2E-01	3E-01
300	1.99E+05	4.56E+00	2E-01	2E-01
350	2.60E+05	5.96E+00	2E-01	2E-01
400	3.19E+05	7.32E+00	2E-01	2E-01
450	3.63E+05	8.34E+00	2E-01	2E-01
500	3.96E+05	9.10E+00	2E-01	2E-01
550	4.25E+05	9.75E+00	2E-01	2E-01
600	4.47E+05	1.03E+01	2E-01	2E-01
650	4.61E+05	1.06E+01	2E-01	2E-01
700	4.67E+05	1.07E+01	2E-01	2E-01
750	4.68E+05	1.07E+01	2E-01	2E-01
Note:				
Values above USEPA's HI limit of 1 are highlighted.				

Attachment D5 : Area-averaged HI for Exposure Areas
Centered on SB-0775 and SB-0757



Attachment D6
Risk Calculations for Residents

Attachment D6 Table of Contents

Cancer Risk Calculations for Exposure of Residents to Soil
Noncancer HQ Calculations for Exposure of Residents to Soil
Estimates of Cancer Risk and HQ for Residential Exposure to Soil at Example Location
SB-0634
SCREEN3 Model Run for Offsite Dispersion
Indoor Air Concentration in a Residential Slab-on-Grade Building due to Vapor Intrusion from
Groundwater
Cancer Risk Calculations for Vapor Intrusion in a Residential Slab-on-Grade Building
Noncancer HQ Calculations for Vapor Intrusion in a Residential Slab-on-Grade Building
Single-Chemical Risk Estimates for Residential Exposure to Shallow Groundwater

Attachment D6: Cancer Risk Calculations for Exposure of Residents to Soil Former Delco Plant 5, Kokomo, Indiana												
Chem Group	Chemical	CASRN	Cancer Class	Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
				C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
VOC	Acetone	67-64-1	ID	7.32E-05	3.01E-05			4.60E-10	1.89E-10			
VOC	Benzene	71-43-2	A	4.30E-04	1.77E-04	7.8E-03	1.4E-06	4.60E-10	1.89E-10	7.8E-03	1.5E-12	1.4E-06
VOC	Bromodichloromethane	75-27-4	B2	1.38E-04	5.67E-05			4.60E-10	1.89E-10			
VOC	2-Butanone	78-93-3	ID	7.52E-05	3.09E-05			4.60E-10	1.89E-10			
VOC	Carbon Disulfide	75-15-0		1.00E-03	4.13E-04			4.60E-10	1.89E-10			
VOC	Carbon Tetrachloride	56-23-5	B2	6.04E-04	2.48E-04	1.5E-02	3.7E-06	4.60E-10	1.89E-10	1.5E-02	2.8E-12	3.7E-06
VOC	Chlorobenzene	108-90-7	D	1.88E-04	7.74E-05			4.60E-10	1.89E-10			
VOC	Chloroethane	75-00-3	LC	1.34E-03	5.49E-04			4.60E-10	1.89E-10			
VOC	Chloroform	67-66-3	B2	4.34E-04	1.78E-04	2.3E-02	4.1E-06	4.60E-10	1.89E-10	2.3E-02	4.3E-12	4.1E-06
VOC	Chloromethane	74-87-3	D	8.06E-04	3.31E-04			4.60E-10	1.89E-10			
VOC	2-Chlorotoluene	95-49-8		1.17E-04	4.80E-05			4.60E-10	1.89E-10			
VOC	Cumene	98-82-8	D	1.76E-04	7.25E-05			4.60E-10	1.89E-10			
VOC	Cyclohexane	110-82-7	ID	8.13E-04	3.34E-04			4.60E-10	1.89E-10			
VOC	Dibromochloromethane	124-48-1	C	8.12E-05	3.34E-05			4.60E-10	1.89E-10			
VOC	1,1-Dichloroethane	75-34-3	SC	4.71E-04	1.94E-04	1.6E-03	3.1E-07	4.60E-10	1.89E-10	1.6E-03	3.0E-13	3.1E-07
VOC	1,1-Dichloroethene	75-35-4	C	8.59E-04	3.53E-04			4.60E-10	1.89E-10			
VOC	1,2-Dichloroethene (total)	540-59-0		4.30E-04	1.77E-04			4.60E-10	1.89E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.91E-04	1.61E-04			4.60E-10	1.89E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		5.16E-04	2.12E-04			4.60E-10	1.89E-10			
VOC	Ethyl Benzene	100-41-4	D	2.19E-04	8.98E-05			4.60E-10	1.89E-10			
VOC	Methyl Acetate	79-20-9		9.52E-05	3.91E-05			4.60E-10	1.89E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	9.93E-05	4.08E-05			4.60E-10	1.89E-10			
VOC	Methylcyclohexane	108-87-2		1.12E-03	4.59E-04			4.60E-10	1.89E-10			
VOC	Methylene Chloride	75-09-2	B2	4.25E-04	1.75E-04	4.7E-04	8.2E-08	4.60E-10	1.89E-10	4.7E-04	8.9E-14	8.2E-08
VOC	Styrene	100-42-5		8.86E-05	3.64E-05			4.60E-10	1.89E-10			
VOC	1,1,2,2-Tetrachloroethane	79-34-5		7.82E-05	3.21E-05			4.60E-10	1.89E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	4.61E-04	1.89E-04	3.1E-03	5.8E-07	4.60E-10	1.89E-10	3.1E-03	5.8E-13	5.8E-07
VOC	Toluene	108-88-3	ID	3.03E-04	1.25E-04			4.60E-10	1.89E-10			
VOC	1,1,1-Trichloroethane	71-55-6	ID	5.53E-04	2.27E-04			4.60E-10	1.89E-10			
VOC	1,1,2-Trichloroethane	79-00-5	C	1.68E-04	6.92E-05	1.6E-02	1.1E-06	4.60E-10	1.89E-10	1.6E-02	3.0E-12	1.1E-06
VOC	Trichloroethene	79-01-6	C-B2	3.74E-04	1.54E-04	1.7E-03	2.6E-07	4.60E-10	1.89E-10	1.7E-03	3.2E-13	2.6E-07
VOC	Trichlorofluoromethane	75-69-4		1.11E-03	4.55E-04			4.60E-10	1.89E-10			
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.17E-03	4.80E-04			4.60E-10	1.89E-10			
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	9.53E-05	3.92E-05			4.60E-10	1.89E-10			
VOC	Vinyl Chloride	75-01-4	A	1.14E-03	4.69E-04	8.8E-03	4.1E-06	4.60E-10	1.89E-10	8.8E-03	1.7E-12	4.1E-06
VOC	Xylenes (total)	1330-20-7	ID	2.01E-04	8.25E-05			4.60E-10	1.89E-10			
SVOC	Acenaphthene	83-32-9		4.45E-06	1.83E-06			4.60E-10	1.89E-10			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.02E-07	4.20E-08	8.8E-02	3.7E-09	4.60E-10	1.89E-10	8.8E-02	1.7E-11	3.7E-09
SVOC	Benzo(a)pyrene	50-32-8	B2	4.85E-08	1.99E-08	8.8E-01	1.8E-08	4.60E-10	1.89E-10	8.8E-01	1.7E-10	1.8E-08
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.50E-07	6.18E-08	8.8E-02	5.4E-09	4.60E-10	1.89E-10	8.8E-02	1.7E-11	5.5E-09
SVOC	Benzo(g,h,i)perylene	191-24-2	D	9.72E-09	3.99E-09			4.60E-10	1.89E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.35E-08	1.38E-08	8.8E-03	1.2E-10	4.60E-10	1.89E-10	8.8E-03	1.7E-12	1.2E-10
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.47E-09	3.07E-09	2.4E-03	7.4E-12	4.60E-10	1.89E-10	2.4E-03	4.5E-13	7.8E-12
SVOC	Butylbenzylphthalate	85-68-7	C	1.54E-07	6.32E-08			4.60E-10	1.89E-10			
SVOC	Chrysene	218-01-9	B2	2.67E-07	1.10E-07	8.8E-04	9.7E-11	4.60E-10	1.89E-10	8.8E-04	1.7E-13	9.7E-11
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.73E-08	7.13E-09	8.8E-01	6.3E-09	4.60E-10	1.89E-10	8.8E-01	1.7E-10	6.4E-09

Attachment D6: Cancer Risk Calculations for Exposure of Residents to Soil Former Delco Plant 5, Kokomo, Indiana												
Chem Group	Chemical	CASRN	Cancer Class	Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
				C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	C _{air} (mg/m ³)	Dose (mg/m ³)	URF (m ³ /mg)	Unit Risk	Unit Risk
SVOC	Dibenzofuran	132-64-9	D	2.88E-07	1.18E-07			4.60E-10	1.89E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	2.25E-07	9.24E-08			4.60E-10	1.89E-10			
SVOC	Di-n-octylphthalate	117-84-0		1.25E-08	5.14E-09			4.60E-10	1.89E-10			
SVOC	Fluoranthene	206-44-0	D	2.92E-07	1.20E-07			4.60E-10	1.89E-10			
SVOC	Fluorene	86-73-7	D	1.92E-06	7.91E-07			4.60E-10	1.89E-10			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.07E-08	8.52E-09	8.8E-02	7.5E-10	4.60E-10	1.89E-10	8.8E-02	1.7E-11	7.7E-10
SVOC	2-Methylnaphthalene	91-57-6	ID	1.20E-05	4.94E-06			4.60E-10	1.89E-10			
SVOC	Naphthalene	91-20-3	C	1.95E-05	8.02E-06	3.4E-02	2.7E-07	4.60E-10	1.89E-10	3.4E-02	6.4E-12	2.7E-07
SVOC	Phenanthrene	85-01-8	D	7.37E-07	3.03E-07			4.60E-10	1.89E-10			
SVOC	Phenol	108-95-2	ID	6.63E-06	2.72E-06			4.60E-10	1.89E-10			
SVOC	Pyrene	129-00-0	NC	2.42E-07	9.94E-08			4.60E-10	1.89E-10			
PCB	PCBs (total)	1336-36-3	B2	4.67E-07	1.92E-07	5.7E-01	1.1E-07	4.60E-10	1.89E-10	5.7E-01	1.1E-10	1.1E-07
INORG	Arsenic	7440-38-2	A			4.3E+00		4.60E-10	1.89E-10	4.3E+00	8.1E-10	8.1E-10
INORG	Barium	7440-39-3	NC					4.60E-10	1.89E-10			
INORG	Beryllium	7440-41-7	B1			2.4E+00		4.60E-10	1.89E-10	2.4E+00	4.5E-10	4.5E-10
INORG	Cadmium	7440-43-9	B1			1.8E+00		4.60E-10	1.89E-10	1.8E+00	3.4E-10	3.4E-10
INORG	Chromium (total)	7440-47-3				1.2E+01		4.60E-10	1.89E-10	1.2E+01	2.3E-09	2.3E-09
INORG	Cobalt	7440-48-4	LC			9.0E+00		4.60E-10	1.89E-10	9.0E+00	1.7E-09	1.7E-09
INORG	Copper	7440-50-8	D					4.60E-10	1.89E-10			
INORG	Cyanide (total)	57-12-5	D					4.60E-10	1.89E-10			
INORG	Manganese	7439-96-5	D					4.60E-10	1.89E-10			
INORG	Mercury	7439-97-6	D	5.07E-06	2.09E-06			4.60E-10	1.89E-10			
INORG	Nickel	7440-02-0	A			2.4E-01		4.60E-10	1.89E-10	2.4E-01	4.5E-11	4.5E-11
INORG	Selenium	7782-49-2	D					4.60E-10	1.89E-10			
INORG	Thallium	7440-28-0						4.60E-10	1.89E-10			
INORG	Vanadium	7440-62-2						4.60E-10	1.89E-10			
INORG	Zinc	7440-66-6	ID					4.60E-10	1.89E-10			
Notes:												
Unit risks are calculated at a soil concentration of 1 mg/kg.												
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).												
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size												

Attachment D6: Noncancer HQ Calculations for Exposure of Residents to Soil Former Delco Plant 5, Kokomo, Indiana												
				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
VOC	Acetone	67-64-1	ID	7.32E-05	7.02E-05	3.1E+01	2.3E-06	4.60E-10	4.41E-10	3.1E+01	1.4E-11	2.3E-06
VOC	Benzene	71-43-2	A	4.30E-04	4.12E-04	3.0E-02	1.4E-02	4.60E-10	4.41E-10	3.0E-02	1.5E-08	1.4E-02
VOC	Bromodichloromethane	75-27-4	B2	1.38E-04	1.32E-04			4.60E-10	4.41E-10			
VOC	2-Butanone	78-93-3	ID	7.52E-05	7.21E-05	5.0E+00	1.4E-05	4.60E-10	4.41E-10	5.0E+00	8.8E-11	1.4E-05
VOC	Carbon Disulfide	75-15-0		1.00E-03	9.64E-04	7.0E-01	1.4E-03	4.60E-10	4.41E-10	7.0E-01	6.3E-10	1.4E-03
VOC	Carbon Tetrachloride	56-23-5	B2	6.04E-04	5.79E-04	1.9E-01	3.1E-03	4.60E-10	4.41E-10	1.9E-01	2.3E-09	3.1E-03
VOC	Chlorobenzene	108-90-7	D	1.88E-04	1.81E-04	5.0E-02	3.6E-03	4.60E-10	4.41E-10	5.0E-02	8.8E-09	3.6E-03
VOC	Chloroethane	75-00-3	LC	1.34E-03	1.28E-03	1.0E+01	1.3E-04	4.60E-10	4.41E-10	1.0E+01	4.4E-11	1.3E-04
VOC	Chloroform	67-66-3	B2	4.34E-04	4.16E-04	5.0E-02	8.3E-03	4.60E-10	4.41E-10	5.0E-02	8.8E-09	8.3E-03
VOC	Chloromethane	74-87-3	D	8.06E-04	7.73E-04	9.0E-02	8.6E-03	4.60E-10	4.41E-10	9.0E-02	4.9E-09	8.6E-03
VOC	2-Chlorotoluene	95-49-8		1.17E-04	1.12E-04			4.60E-10	4.41E-10			
VOC	Cumene	98-82-8	D	1.76E-04	1.69E-04	4.0E-01	4.2E-04	4.60E-10	4.41E-10	4.0E-01	1.1E-09	4.2E-04
VOC	Cyclohexane	110-82-7	ID	8.13E-04	7.80E-04	6.0E+00	1.3E-04	4.60E-10	4.41E-10	6.0E+00	7.4E-11	1.3E-04
VOC	Dibromochloromethane	124-48-1	C	8.12E-05	7.79E-05			4.60E-10	4.41E-10			
VOC	1,1-Dichloroethane	75-34-3	SC	4.71E-04	4.52E-04	5.0E-01	9.0E-04	4.60E-10	4.41E-10	5.0E-01	8.8E-10	9.0E-04
VOC	1,1-Dichloroethene	75-35-4	C	8.59E-04	8.23E-04	2.0E-01	4.1E-03	4.60E-10	4.41E-10	2.0E-01	2.2E-09	4.1E-03
VOC	1,2-Dichloroethene (total)	540-59-0		4.30E-04	4.12E-04			4.60E-10	4.41E-10			
VOC	cis-1,2-Dichloroethene	156-59-2	ID	3.91E-04	3.75E-04			4.60E-10	4.41E-10			
VOC	trans-1,2-Dichloroethene	156-60-5		5.16E-04	4.95E-04	6.0E-02	8.3E-03	4.60E-10	4.41E-10	6.0E-02	7.4E-09	8.3E-03
VOC	Ethyl Benzene	100-41-4	D	2.19E-04	2.10E-04	1.0E+00	2.1E-04	4.60E-10	4.41E-10	1.0E+00	4.4E-10	2.1E-04
VOC	Methyl Acetate	79-20-9		9.52E-05	9.13E-05			4.60E-10	4.41E-10			
VOC	4-Methyl-2-pentanone	108-10-1	ID	9.93E-05	9.52E-05	3.0E+00	3.2E-05	4.60E-10	4.41E-10	3.0E+00	1.5E-10	3.2E-05
VOC	Methylcyclohexane	108-87-2		1.12E-03	1.07E-03	3.0E+00	3.6E-04	4.60E-10	4.41E-10	3.0E+00	1.5E-10	3.6E-04
VOC	Methylene Chloride	75-09-2	B2	4.25E-04	4.08E-04	1.0E+00	3.9E-04	4.60E-10	4.41E-10	1.0E+00	4.2E-10	3.9E-04
VOC	Styrene	100-42-5		8.86E-05	8.49E-05	1.0E+00	8.5E-05	4.60E-10	4.41E-10	1.0E+00	4.4E-10	8.5E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5		7.82E-05	7.50E-05			4.60E-10	4.41E-10			
VOC	Tetrachloroethene	127-18-4	C-B2	4.61E-04	4.42E-04	4.0E-01	1.1E-03	4.60E-10	4.41E-10	4.0E-01	1.1E-09	1.1E-03
VOC	Toluene	108-88-3	ID	3.03E-04	2.91E-04	5.0E+00	5.8E-05	4.60E-10	4.41E-10	5.0E+00	8.8E-11	5.8E-05
VOC	1,1,1-Trichloroethane	71-55-6	ID	5.53E-04	5.30E-04	5.0E+00	1.1E-04	4.60E-10	4.41E-10	5.0E+00	8.8E-11	1.1E-04
VOC	1,1,2-Trichloroethane	79-00-5	C	1.68E-04	1.61E-04			4.60E-10	4.41E-10			
VOC	Trichloroethene	79-01-6	C-B2	3.74E-04	3.58E-04	5.4E-01	6.7E-04	4.60E-10	4.41E-10	5.4E-01	8.2E-10	6.7E-04
VOC	Trichlorofluoromethane	75-69-4		1.11E-03	1.06E-03	7.0E-01	1.5E-03	4.60E-10	4.41E-10	7.0E-01	6.3E-10	1.5E-03
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.17E-03	1.12E-03	3.0E+01	3.7E-05	4.60E-10	4.41E-10	3.0E+01	1.5E-11	3.7E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	9.53E-05	9.14E-05	7.0E-03	1.3E-02	4.60E-10	4.41E-10	7.0E-03	6.3E-08	1.3E-02
VOC	Vinyl Chloride	75-01-4	A	1.14E-03	1.09E-03	1.0E-01	1.1E-02	4.60E-10	4.41E-10	1.0E-01	4.4E-09	1.1E-02
VOC	Xylenes (total)	1330-20-7	ID	2.01E-04	1.93E-04	1.0E-01	1.9E-03	4.60E-10	4.41E-10	1.0E-01	4.4E-09	1.9E-03
SVOC	Acenaphthene	83-32-9		4.45E-06	4.27E-06			4.60E-10	4.41E-10			
SVOC	Benzo(a)anthracene	56-55-3	B2	1.02E-07	9.80E-08			4.60E-10	4.41E-10			
SVOC	Benzo(a)pyrene	50-32-8	B2	4.85E-08	4.65E-08			4.60E-10	4.41E-10			
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1.50E-07	1.44E-07			4.60E-10	4.41E-10			
SVOC	Benzo(g,h,i)perylene	191-24-2	D	9.72E-09	9.32E-09			4.60E-10	4.41E-10			
SVOC	Benzo(k)fluoranthene	207-08-9	B2	3.35E-08	3.21E-08			4.60E-10	4.41E-10			
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7.47E-09	7.16E-09			4.60E-10	4.41E-10			
SVOC	Butylbenzylphthalate	85-68-7	C	1.54E-07	1.48E-07			4.60E-10	4.41E-10			
SVOC	Chrysene	218-01-9	B2	2.67E-07	2.56E-07			4.60E-10	4.41E-10			
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1.73E-08	1.66E-08			4.60E-10	4.41E-10			

Attachment D6: Noncancer HQ Calculations for Exposure of Residents to Soil Former Delco Plant 5, Kokomo, Indiana												
				Soil Vapor Inhalation				Soil Particulate Inhalation				All Routes
Chem Group	Chemical	CASRN	Cancer Class	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	C _{air} (mg/m ³)	Dose (mg/m ³)	RfC (mg/m ³)	Unit HQ	Unit HQ
SVOC	Dibenzofuran	132-64-9	D	2.88E-07	2.76E-07			4.60E-10	4.41E-10			
SVOC	Di-n-butylphthalate	84-74-2	D	2.25E-07	2.16E-07			4.60E-10	4.41E-10			
SVOC	Di-n-octylphthalate	117-84-0		1.25E-08	1.20E-08			4.60E-10	4.41E-10			
SVOC	Fluoranthene	206-44-0	D	2.92E-07	2.80E-07			4.60E-10	4.41E-10			
SVOC	Fluorene	86-73-7	D	1.92E-06	1.84E-06			4.60E-10	4.41E-10			
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	2.07E-08	1.99E-08			4.60E-10	4.41E-10			
SVOC	2-Methylnaphthalene	91-57-6	ID	1.20E-05	1.15E-05			4.60E-10	4.41E-10			
SVOC	Naphthalene	91-20-3	C	1.95E-05	1.87E-05	3.0E-03	6.2E-03	4.60E-10	4.41E-10	3.0E-03	1.5E-07	6.2E-03
SVOC	Phenanthrene	85-01-8	D	7.37E-07	7.07E-07			4.60E-10	4.41E-10			
SVOC	Phenol	108-95-2	ID	6.63E-06	6.36E-06			4.60E-10	4.41E-10			
SVOC	Pyrene	129-00-0	NC	2.42E-07	2.32E-07			4.60E-10	4.41E-10			
PCB	PCBs (total)	1336-36-3	B2	4.67E-07	4.48E-07			4.60E-10	4.41E-10			
INORG	Arsenic	7440-38-2	A			1.5E-05		4.60E-10	4.41E-10	1.5E-05	2.9E-05	2.9E-05
INORG	Barium	7440-39-3	NC					4.60E-10	4.41E-10			
INORG	Beryllium	7440-41-7	B1			2.0E-05		4.60E-10	4.41E-10	2.0E-05	2.2E-05	2.2E-05
INORG	Cadmium	7440-43-9	B1			1.0E-05		4.60E-10	4.41E-10	1.0E-05	4.4E-05	4.4E-05
INORG	Chromium (total)	7440-47-3				1.0E-04		4.60E-10	4.41E-10	1.0E-04	4.4E-06	4.4E-06
INORG	Cobalt	7440-48-4	LC			6.0E-06		4.60E-10	4.41E-10	6.0E-06	7.4E-05	7.4E-05
INORG	Copper	7440-50-8	D					4.60E-10	4.41E-10			
INORG	Cyanide (total)	57-12-5	D			9.0E-03		4.60E-10	4.41E-10	9.0E-03	4.9E-08	4.9E-08
INORG	Manganese	7439-96-5	D			5.0E-05		4.60E-10	4.41E-10	5.0E-05	8.8E-06	8.8E-06
INORG	Mercury	7439-97-6	D	5.07E-06	4.87E-06	3.0E-04	1.6E-02	4.60E-10	4.41E-10	3.0E-04	1.5E-06	1.6E-02
INORG	Nickel	7440-02-0	A			9.0E-05		4.60E-10	4.41E-10	9.0E-05	4.9E-06	4.9E-06
INORG	Selenium	7782-49-2	D			2.0E-02		4.60E-10	4.41E-10	2.0E-02	2.2E-08	2.2E-08
INORG	Thallium	7440-28-0						4.60E-10	4.41E-10			
INORG	Vanadium	7440-62-2						4.60E-10	4.41E-10			
INORG	Zinc	7440-66-6	ID					4.60E-10	4.41E-10			
Notes:												
Unit HQs are calculated at a soil concentration of 1 mg/kg.												
The dispersion coefficient to outdoor air (C/Q) is 16.9 (kg/m3) / (kg/m2/s).												
This C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002), conservatively assuming a source area of 10.5 acres (the size of the site).												

Attachment D6: Estimates of Cancer Risk and HQ for Residential Exposure to Soil at Example Location SB-0634 Former GM Delco Plant 5, Kokomo, Indiana												
Location	Chem Group	Chemical	CASRN	Max Detect (mg/kg)	Max Limit (mg/kg)	Background Conc (mg/kg)	Site-Related Exposure Concentration (mg/kg)	Basis of Site-Related Exposure Concentration	Resident			
									Off-Site Inhalation			
									Unit Risk	Unit HQ	Risk	HQ
SB-0634	VOC	Acetone	67-64-1	1.20E-01	8.25E-02		1.20E-01	Half-Limit		2.3E-06		3E-07
SB-0634	VOC	Benzene	71-43-2	6.00E-03	4.10E-03		6.00E-03	Half-Limit	1.4E-06	1.4E-02	8E-09	8E-05
SB-0634	VOC	Bromodichloromethane	75-27-4		6.10E-03		3.05E-03	Half-Limit				
SB-0634	VOC	2-Butanone	78-93-3		6.10E-02		3.05E-02	Half-Limit		1.4E-05		4E-07
SB-0634	VOC	Carbon Disulfide	75-15-0	5.70E-02	8.25E-03		5.70E-02	Max Detect		1.4E-03		8E-05
SB-0634	VOC	Carbon Tetrachloride	56-23-5		6.10E-03		3.05E-03	Half-Limit	3.7E-06	3.1E-03	1E-08	9E-06
SB-0634	VOC	Chlorobenzene	108-90-7		6.10E-03		3.05E-03	Half-Limit		3.6E-03		1E-05
SB-0634	VOC	Chloroethane	75-00-3		6.10E-03		3.05E-03	Half-Limit		1.3E-04		4E-07
SB-0634	VOC	Chloroform	67-66-3		6.10E-03		3.05E-03	Half-Limit	4.1E-06	8.3E-03	1E-08	3E-05
SB-0634	VOC	Chloromethane	74-87-3		6.10E-03		3.05E-03	Half-Limit		8.6E-03		3E-05
SB-0634	VOC	Cumene	98-82-8	2.90E-03	4.10E-03		2.90E-03	Half-Limit		4.2E-04		1E-06
SB-0634	VOC	Cyclohexane	110-82-7	1.00E-03	6.10E-03		1.00E-03	Half-Limit		1.3E-04		1E-07
SB-0634	VOC	Dibromochloromethane	124-48-1		6.10E-03		3.05E-03	Half-Limit				
SB-0634	VOC	1,1-Dichloroethane	75-34-3		6.10E-03		3.05E-03	Half-Limit	3.1E-07	9.0E-04	9E-10	3E-06
SB-0634	VOC	1,1-Dichloroethene	75-35-4	3.90E-01	6.10E-03		3.90E-01	Half-Limit		4.1E-03		2E-03
SB-0634	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			1.40E+02	Max Detect				
SB-0634	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01	6.10E-03		8.70E-01	Max Detect		8.3E-03		7E-03
SB-0634	VOC	Ethyl Benzene	100-41-4	2.10E-02	4.10E-03		2.10E-02	Max Detect		2.1E-04		4E-06
SB-0634	VOC	Methyl Acetate	79-20-9		1.20E-02		6.00E-03	Half-Limit				
SB-0634	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01	8.25E-03		2.00E-01	Max Detect		3.2E-05		6E-06
SB-0634	VOC	Methylcyclohexane	108-87-2	5.70E-03	8.25E-03		5.70E-03	Half-Limit		3.6E-04		2E-06
SB-0634	VOC	Methylene Chloride	75-09-2	7.80E-03			7.80E-03	Max Detect	8.2E-08	3.9E-04	6E-10	3E-06
SB-0634	VOC	Styrene	100-42-5	1.00E-01	4.10E-03		1.00E-01	Max Detect		8.5E-05		8E-06
SB-0634	VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.10E-03		3.05E-03	Half-Limit				
SB-0634	VOC	Tetrachloroethene	127-18-4	3.40E-03	6.10E-03		3.40E-03	Max Detect	5.8E-07	1.1E-03	2E-09	4E-06
SB-0634	VOC	Toluene	108-88-3	8.00E-03	4.10E-03		8.00E-03	Half-Limit		5.8E-05		5E-07
SB-0634	VOC	1,1,1-Trichloroethane	71-55-6		6.10E-03		3.05E-03	Half-Limit		1.1E-04		3E-07
SB-0634	VOC	1,1,2-Trichloroethane	79-00-5		6.10E-03		3.05E-03	Half-Limit	1.1E-06		3E-09	
SB-0634	VOC	Trichloroethene	79-01-6	1.30E+02			1.30E+02	Max Detect	2.6E-07	6.7E-04	3E-05	9E-02
SB-0634	VOC	Trichlorofluoromethane	75-69-4		6.10E-03		3.05E-03	Half-Limit		1.5E-03		5E-06
SB-0634	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.20E-02		6.00E-03	Half-Limit		3.7E-05		2E-07
SB-0634	VOC	Vinyl Chloride	75-01-4	7.90E+00	2.40E-03		7.90E+00	Half-Limit	4.1E-06	1.1E-02	3E-05	9E-02
SB-0634	VOC	Xylenes (total)	1330-20-7	2.61E-02	4.10E-03		2.61E-02	Max Detect		1.9E-03		5E-05
SB-0634	PCB	PCBs (total)	1336-36-3		3.30E-01		1.65E-01	Interpolated Half-Limit	1.1E-07		2E-08	
SB-0634	INORG	Lead	7439-92-1	1.90E+01			1.90E+01	Interpolated Max				
SB-0634	INORG	Manganese	7439-96-5	5.50E+02		8.17E+02		Interpolated Max is Less than Background		8.8E-06		
SB-0634	INORG	Thallium	7440-28-0	3.50E+00	5.00E-01		3.50E+00	Interpolated Half-Limit				
								Sum:			7E-05	2E-01
Note: Values above USEPA's cumulative cancer risk limit of 1E-4 or HI limit of 1 are highlighted.												

Attachment D6: SCREEN3 Model Run for Offsite Dispersion

*** SCREEN3 MODEL RUN ***
 *** VERSION DATED 96043 ***

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = AREA
 EMISSION RATE (G/(S-M**2)) = 1.00000
 SOURCE HEIGHT (M) = .0000
 LENGTH OF LARGER SIDE (M) = 206.0000
 LENGTH OF SMALLER SIDE (M) = 206.0000
 RECEPTOR HEIGHT (M) = .0000
 URBAN/RURAL OPTION = RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

ANGLE RELATIVE TO LONG AXIS = .0000

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** STABILITY CLASS 4 ONLY ***
 *** ANEMOMETER HEIGHT WIND SPEED OF 4.29 M/S ONLY ***

 *** SCREEN DISCRETE DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
103.	.1691E+08	4	4.3	4.3	1372.8	.00	0.
108.	.1309E+08	4	4.3	4.3	1372.8	.00	0.
113.	.1123E+08	4	4.3	4.3	1372.8	.00	0.
118.	.1007E+08	4	4.3	4.3	1372.8	.00	0.
123.	.9249E+07	4	4.3	4.3	1372.8	.00	0.
128.	.8610E+07	4	4.3	4.3	1372.8	.00	0.
133.	.8089E+07	4	4.3	4.3	1372.8	.00	0.
143.	.7273E+07	4	4.3	4.3	1372.8	.00	0.
153.	.6651E+07	4	4.3	4.3	1372.8	.00	0.
203.	.4815E+07	4	4.3	4.3	1372.8	.00	0.

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1691E+08	103.	0.

Notes:

¹ This result is 103 m from the center of the source area (at the edge of the 10.5 acre or 206 m square source area), and represents the maximum concentration at any location.

² This result is 123 m from the center of the source area (20 m downwind of the edge of the source area), and is used for the nearest residential properties approximately 20 m from the Facility.

**Attachment D6: Indoor Air Concentration in a Residential Slab-on-Grade Building
due to Vapor Intrusion from Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} ^T (m ² /day)	α _∞	C _{building} (mg/m ³)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	9.52E-04	1.74E-01	9.58E-02	1.44E-04	1.37E-04
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.31E-01	1.24E-01	6.72E-02	1.18E-04	1.54E-02
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.62E-02	4.19E-02	2.28E-02	5.38E-05	1.94E-03
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.61E-03	1.14E-01	6.23E-02	1.12E-04	1.81E-04
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	7.91E-01	1.46E-01	7.94E-02	1.30E-04	1.03E-01
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	7.32E-01	1.10E-01	5.95E-02	1.09E-04	7.99E-02
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.71E-02	1.03E-01	5.57E-02	1.05E-04	8.06E-03
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	2.84E-01	3.81E-01	2.07E-01	2.00E-04	5.69E-02
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	8.98E-02	1.46E-01	7.94E-02	1.30E-04	1.17E-02
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	2.99E-01	1.77E-01	9.62E-02	1.44E-04	4.32E-02
VOC	2-Chlorotoluene	95-49-8	5.43E-01	7.52E-05	8.58E-02	8.83E-02	4.79E-02	9.46E-05	8.12E-03
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.19E-01	9.14E-02	4.96E-02	9.68E-05	2.12E-02
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	4.69E+00	1.18E-01	6.40E-02	1.14E-04	5.36E-01
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	2.03E-02	2.76E-02	1.50E-02	3.77E-05	7.67E-04
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.39E-01	1.04E-01	5.66E-02	1.06E-04	1.47E-02
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	6.97E-01	1.27E-01	6.87E-02	1.19E-04	8.33E-02
VOC	1,2-Dichloroethene (total)	540-59-0	6.36E-01	9.76E-05	1.21E-01	1.03E-01	5.62E-02	1.05E-04	1.27E-02
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	9.86E-02	1.03E-01	5.62E-02	1.05E-04	1.04E-02
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	2.38E-01	9.94E-02	5.40E-02	1.02E-04	2.44E-02
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.60E-01	1.05E-01	5.72E-02	1.07E-04	1.70E-02
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	2.16E-03	1.35E-01	7.36E-02	1.24E-04	2.69E-04
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	3.72E-03	1.05E-01	5.75E-02	1.07E-04	3.97E-04
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	9.74E+00	1.03E-01	5.61E-02	1.05E-04	1.02E+00
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	5.59E-02	1.42E-01	7.71E-02	1.28E-04	7.14E-03
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.46E-02	9.98E-02	5.42E-02	1.03E-04	5.61E-03
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.13E-01	6.83E-05	6.77E-03	9.98E-02	5.43E-02	1.03E-04	6.97E-04
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.89E-01	1.01E-01	5.50E-02	1.04E-04	4.04E-02
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.45E-01	1.22E-01	6.64E-02	1.17E-04	1.69E-02
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	4.12E-01	1.10E-01	5.95E-02	1.09E-04	4.50E-02
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.93E-02	1.10E-01	5.96E-02	1.09E-04	2.11E-03
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.35E-01	1.11E-01	6.03E-02	1.10E-04	2.58E-02
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	3.09E+00	1.22E-01	6.64E-02	1.17E-04	3.61E-01
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	1.48E+01	1.10E-01	5.95E-02	1.09E-04	1.61E+00
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.11E-01	8.52E-02	4.63E-02	9.23E-05	1.03E-02
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	8.02E-01	1.49E-01	8.09E-02	1.31E-04	1.05E-01
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.35E-01	1.10E-01	5.95E-02	1.09E-04	1.47E-02
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	2.02E-03	5.92E-02	3.25E-02	7.13E-05	1.44E-04
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	2.63E-05	7.29E-02	7.35E-02	1.24E-04	3.27E-06
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	5.87E-06	6.57E-02	1.88E-01	1.94E-04	1.14E-06
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	7.20E-04	3.18E-02	1.80E-02	4.42E-05	3.18E-05
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	1.63E-06	4.16E-02	3.42E-01	2.31E-04	3.78E-07
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	4.74E-06	3.58E-02	1.36E-01	1.70E-04	8.07E-07
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	6.06E-07	7.01E-02	6.38E-01	2.60E-04	1.57E-07
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	1.04E-05	2.61E-02	6.01E-02	1.10E-04	1.15E-06
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	6.67E-04	3.49E-02	1.99E-02	4.80E-05	3.20E-05
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	2.09E-08	8.79E-01	2.51E+01	3.01E-04	6.30E-09
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	1.02E-05	3.55E-02	7.74E-02	1.28E-04	1.31E-06
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	7.69E-09	3.57E+00	1.03E+02	3.08E-04	2.37E-09
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	4.93E-04	2.13E-02	1.23E-02	3.15E-05	1.56E-05
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	1.56E-04	4.26E-02	2.72E-02	6.20E-05	9.70E-06
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	8.23E-04	5.11E-02	2.87E-02	6.47E-05	5.33E-05
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	7.70E-06	2.92E-02	8.88E-02	1.38E-04	1.07E-06
SVOC	2-Methylnaphthalene	91-57-6	4.51E-01	6.70E-05	1.05E-02	7.34E-02	3.99E-02	8.31E-05	8.70E-04
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	7.98E-03	8.30E-02	4.51E-02	9.07E-05	7.24E-04
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	1.87E-04	5.29E-02	3.27E-02	7.16E-05	1.34E-05
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	6.37E-06	1.20E-01	2.07E-01	2.00E-04	1.28E-06
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	1.02E-04	3.85E-02	2.79E-02	6.34E-05	6.48E-06
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	1.60E-02	2.84E-02	1.54E-02	3.87E-05	6.20E-04
INORG	Arsenic	7440-38-2							
INORG	Barium	7440-39-3							
INORG	Beryllium	7440-41-7							
INORG	Cadmium	7440-43-9							

**Attachment D6: Indoor Air Concentration in a Residential Slab-on-Grade Building
due to Vapor Intrusion from Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	D _{air} (m ² /day)	D _{water} (m ² /day)	H (unitless)	D _{crack} (m ² /day)	D _{eff} ^T (m ² /day)	α _∞	C _{building} (mg/m ³)
INORG	Chromium (total)	7440-47-3							
INORG	Cobalt	7440-48-4							
INORG	Copper	7440-50-8							
INORG	Cyanide (total)	57-12-5							
INORG	Manganese	7439-96-5							
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.49E-01	4.32E-02	2.34E-02	5.50E-05	8.22E-03
INORG	Nickel	7440-02-0							
INORG	Selenium	7782-49-2							
INORG	Thallium	7440-28-0							
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6							
Notes:	The indoor air concentration is calculated at a unit groundwater concentration of 1 mg/L.								
	Crack Soil and Building Characteristics			Crack Soil					
	SCS Soil texture class			Sand					
	Bulk density	kg/L	ρ _b	1.66					
	Total porosity	L/L-soil	θ _T	0.375					
	Water-filled porosity	L/L-soil	θ _w	0.053					
	Air-filled porosity	L/L-soil	θ _a	0.322					
	Residual saturation	L/L-soil	θ _r	0.053					
	Hydraulic conductivity	cm/s	K	7.4E-03					
	Dynamic viscosity of water	g/cm-s	μ _w	0.01307					
	Density of water	g/cm ³	ρ _w	1.0					
	Gravitational acceleration	cm/s ²	g	980.7					
	Intrinsic permeability	cm ²	k	9.92E-08					
	Relative saturation	unitless	S _e						
	van Genuchten N	unitless	N	1.321					
	van Genuchten M	unitless	M	0.243					
	Relative air permeability	unitless	k _{rg}	1.000					
	Permeability to vapor	cm ²	k _v	9.92E-08					
	Distance from building foundation to source	m	L _T	5.95					
	Bldg foundation thickness	m	L _{crack}	0.15					
	Bldg foundation length	m		10.56					
	Bldg foundation width	m		10.56					
	Bldg occupied height	m		2.44					
	Bldg occupied volume	m ³		272.09					
	Occupied depth below ground	m							
	Bldg area for vapor intrusion	m ²	A _B	111.5					
	Ratio of A _{crack} to A _B		η	2E-04					
	Area of cracks	m ²	A _{crack}	2.11E-02					
	Air exchange rate	hour ⁻¹	ach	1.0					
	Building ventilation rate	m ³ /day	Q _{bldg}	6.530E+03					
	Pressure difference between outdoors-indoors	kg/m-s ²	ΔP	1.0					
	Viscosity of air	kg/m-s	μ _a	1.8E-05					
	Crack length (bldg perimeter)	m	X _{crack}	42.24					
	Crack depth below ground	m	Z _{crack}	0.15					
	Crack radius	m	r _{crack}	5E-04					
	Soil gas flow rate into bldg	m ³ /day	Q _{soil}	1.975E+00					

Attachment D6: Cancer Risk Calculations for Vapor Intrusion in a Residential Slab-on-Grade Building
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Carc Class	Groundwater Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
VOC	Acetone	67-64-1	ID	1.37E-04		
VOC	Benzene	71-43-2	A	1.54E-02	7.8E-03	4.9E-05
VOC	Bromodichloromethane	75-27-4	B2	1.94E-03		
VOC	2-Butanone	78-93-3	ID	1.81E-04		
VOC	Carbon Disulfide	75-15-0		1.03E-01		
VOC	Carbon Tetrachloride	56-23-5	B2	7.99E-02	1.5E-02	4.9E-04
VOC	Chlorobenzene	108-90-7	D	8.06E-03		
VOC	Chloroethane	75-00-3	LC	5.69E-02		
VOC	Chloroform	67-66-3	B2	1.17E-02	2.3E-02	1.1E-04
VOC	Chloromethane	74-87-3	D	4.32E-02		
VOC	2-Chlorotoluene	95-49-8		8.12E-03		
VOC	Cumene	98-82-8	D	2.12E-02		
VOC	Cyclohexane	110-82-7	ID	5.36E-01		
VOC	Dibromochloromethane	124-48-1	C	7.67E-04		
VOC	1,1-Dichloroethane	75-34-3	SC	1.47E-02	1.6E-03	9.6E-06
VOC	1,1-Dichloroethene	75-35-4	C	8.33E-02		
VOC	1,2-Dichloroethene (total)	540-59-0		1.27E-02		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.04E-02		
VOC	trans-1,2-Dichloroethene	156-60-5		2.44E-02		
VOC	Ethyl Benzene	100-41-4	D	1.70E-02		
VOC	Methyl Acetate	79-20-9		2.69E-04		
VOC	4-Methyl-2-pentanone	108-10-1	ID	3.97E-04		
VOC	Methylcyclohexane	108-87-2		1.02E+00		
VOC	Methylene Chloride	75-09-2	B2	7.14E-03	4.7E-04	1.4E-06
VOC	Styrene	100-42-5		5.61E-03		
VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.97E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	4.04E-02	3.1E-03	5.1E-05
VOC	Toluene	108-88-3	ID	1.69E-02		
VOC	1,1,1-Trichloroethane	71-55-6	ID	4.50E-02		
VOC	1,1,2-Trichloroethane	79-00-5	C	2.11E-03	1.6E-02	1.4E-05
VOC	Trichloroethene	79-01-6	C-B2	2.58E-02	1.7E-03	1.8E-05
VOC	Trichlorofluoromethane	75-69-4		3.61E-01		
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.61E+00		
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.03E-02		
VOC	Vinyl Chloride	75-01-4	A	1.05E-01	8.8E-03	3.8E-04
VOC	Xylenes (total)	1330-20-7	ID	1.47E-02		
SVOC	Acenaphthene	83-32-9		1.44E-04		
SVOC	Benzo(a)anthracene	56-55-3	B2	3.27E-06	8.8E-02	1.2E-07
SVOC	Benzo(a)pyrene	50-32-8	B2	1.14E-06	8.8E-01	4.1E-07
SVOC	Benzo(b)fluoranthene	205-99-2	B2	3.18E-05	8.8E-02	1.2E-06
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.78E-07		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	8.07E-07	8.8E-03	2.9E-09
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.57E-07	2.4E-03	1.6E-10
SVOC	Butylbenzylphthalate	85-68-7	C	1.15E-06		

Attachment D6: Cancer Risk Calculations for Vapor Intrusion in a Residential Slab-on-Grade Building
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Carc Class	Groundwater Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	URF (m ³ /mg)	Unit Risk
SVOC	Chrysene	218-01-9	B2	3.20E-05	8.8E-04	1.2E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	6.30E-09	8.8E-01	2.3E-09
SVOC	Dibenzofuran	132-64-9	D	1.31E-06		
SVOC	Di-n-butylphthalate	84-74-2	D	2.37E-09		
SVOC	Di-n-octylphthalate	117-84-0		1.56E-05		
SVOC	Fluoranthene	206-44-0	D	9.70E-06		
SVOC	Fluorene	86-73-7	D	5.33E-05		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.07E-06	8.8E-02	3.9E-08
SVOC	2-Methylnaphthalene	91-57-6	ID	8.70E-04		
SVOC	Naphthalene	91-20-3	C	7.24E-04	3.4E-02	1.0E-05
SVOC	Phenanthrene	85-01-8	D	1.34E-05		
SVOC	Phenol	108-95-2	ID	1.28E-06		
SVOC	Pyrene	129-00-0	NC	6.48E-06		
PCB	PCBs (total)	1336-36-3	B2	6.20E-04	5.7E-01	1.5E-04
INORG	Arsenic	7440-38-2	A		4.3E+00	
INORG	Barium	7440-39-3	NC			
INORG	Beryllium	7440-41-7	B1		2.4E+00	
INORG	Cadmium	7440-43-9	B1		1.8E+00	
INORG	Chromium (total)	7440-47-3			1.2E+01	
INORG	Cobalt	7440-48-4	LC		9.0E+00	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D			
INORG	Manganese	7439-96-5	D			
INORG	Mercury	7439-97-6	D	8.22E-03		
INORG	Nickel	7440-02-0	A		2.4E-01	
INORG	Selenium	7782-49-2	D			
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	ID			
Note:						
Unit risks for groundwater indoor air vapor inhalation are calculated at a concentration of 1 mg/L.						

**Attachment D6: Noncancer HQ Calculations for Vapor Intrusion in a Residential
Slab-on-Grade Building
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Groundwater Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
VOC	Acetone	67-64-1	ID	1.37E-04	3.1E+01	4.3E-06
VOC	Benzene	71-43-2	A	1.54E-02	3.0E-02	4.9E-01
VOC	Bromodichloromethane	75-27-4	B2	1.94E-03		
VOC	2-Butanone	78-93-3	ID	1.81E-04	5.0E+00	3.5E-05
VOC	Carbon Disulfide	75-15-0		1.03E-01	7.0E-01	1.4E-01
VOC	Carbon Tetrachloride	56-23-5	B2	7.99E-02	1.9E-01	4.1E-01
VOC	Chlorobenzene	108-90-7	D	8.06E-03	5.0E-02	1.5E-01
VOC	Chloroethane	75-00-3	LC	5.69E-02	1.0E+01	5.5E-03
VOC	Chloroform	67-66-3	B2	1.17E-02	5.0E-02	2.2E-01
VOC	Chloromethane	74-87-3	D	4.32E-02	9.0E-02	4.6E-01
VOC	2-Chlorotoluene	95-49-8		8.12E-03		
VOC	Cumene	98-82-8	D	2.12E-02	4.0E-01	5.1E-02
VOC	Cyclohexane	110-82-7	ID	5.36E-01	6.0E+00	8.6E-02
VOC	Dibromochloromethane	124-48-1	C	7.67E-04		
VOC	1,1-Dichloroethane	75-34-3	SC	1.47E-02	5.0E-01	2.8E-02
VOC	1,1-Dichloroethene	75-35-4	C	8.33E-02	2.0E-01	4.0E-01
VOC	1,2-Dichloroethene (total)	540-59-0		1.27E-02		
VOC	cis-1,2-Dichloroethene	156-59-2	ID	1.04E-02		
VOC	trans-1,2-Dichloroethene	156-60-5		2.44E-02	6.0E-02	3.9E-01
VOC	Ethyl Benzene	100-41-4	D	1.70E-02	1.0E+00	1.6E-02
VOC	Methyl Acetate	79-20-9		2.69E-04		
VOC	4-Methyl-2-pentanone	108-10-1	ID	3.97E-04	3.0E+00	1.3E-04
VOC	Methylcyclohexane	108-87-2		1.02E+00	3.0E+00	3.3E-01
VOC	Methylene Chloride	75-09-2	B2	7.14E-03	1.0E+00	6.6E-03
VOC	Styrene	100-42-5		5.61E-03	1.0E+00	5.4E-03
VOC	1,1,2,2-Tetrachloroethane	79-34-5		6.97E-04		
VOC	Tetrachloroethene	127-18-4	C-B2	4.04E-02	4.0E-01	9.7E-02
VOC	Toluene	108-88-3	ID	1.69E-02	5.0E+00	3.2E-03
VOC	1,1,1-Trichloroethane	71-55-6	ID	4.50E-02	5.0E+00	8.6E-03
VOC	1,1,2-Trichloroethane	79-00-5	C	2.11E-03		
VOC	Trichloroethene	79-01-6	C-B2	2.58E-02	5.4E-01	4.6E-02
VOC	Trichlorofluoromethane	75-69-4		3.61E-01	7.0E-01	4.9E-01
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		1.61E+00	3.0E+01	5.2E-02
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	1.03E-02	7.0E-03	1.4E+00
VOC	Vinyl Chloride	75-01-4	A	1.05E-01	1.0E-01	1.0E+00
VOC	Xylenes (total)	1330-20-7	ID	1.47E-02	1.0E-01	1.4E-01
SVOC	Acenaphthene	83-32-9		1.44E-04		
SVOC	Benzo(a)anthracene	56-55-3	B2	3.27E-06		
SVOC	Benzo(a)pyrene	50-32-8	B2	1.14E-06		
SVOC	Benzo(b)fluoranthene	205-99-2	B2	3.18E-05		
SVOC	Benzo(g,h,i)perylene	191-24-2	D	3.78E-07		
SVOC	Benzo(k)fluoranthene	207-08-9	B2	8.07E-07		
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1.57E-07		
SVOC	Butylbenzylphthalate	85-68-7	C	1.15E-06		

**Attachment D6: Noncancer HQ Calculations for Vapor Intrusion in a Residential
Slab-on-Grade Building
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Groundwater Indoor Air Vapor Inhalation		
				C _{building} (mg/m ³)	RfC (mg/m ³)	Unit HQ
SVOC	Chrysene	218-01-9	B2	3.20E-05		
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	6.30E-09		
SVOC	Dibenzofuran	132-64-9	D	1.31E-06		
SVOC	Di-n-butylphthalate	84-74-2	D	2.37E-09		
SVOC	Di-n-octylphthalate	117-84-0		1.56E-05		
SVOC	Fluoranthene	206-44-0	D	9.70E-06		
SVOC	Fluorene	86-73-7	D	5.33E-05		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1.07E-06		
SVOC	2-Methylnaphthalene	91-57-6	ID	8.70E-04		
SVOC	Naphthalene	91-20-3	C	7.24E-04	3.0E-03	2.3E-01
SVOC	Phenanthrene	85-01-8	D	1.34E-05		
SVOC	Phenol	108-95-2	ID	1.28E-06		
SVOC	Pyrene	129-00-0	NC	6.48E-06		
PCB	PCBs (total)	1336-36-3	B2	6.20E-04		
INORG	Arsenic	7440-38-2	A		1.5E-05	
INORG	Barium	7440-39-3	NC			
INORG	Beryllium	7440-41-7	B1		2.0E-05	
INORG	Cadmium	7440-43-9	B1		1.0E-05	
INORG	Chromium (total)	7440-47-3			1.0E-04	
INORG	Cobalt	7440-48-4	LC		6.0E-06	
INORG	Copper	7440-50-8	D			
INORG	Cyanide (total)	57-12-5	D		9.0E-03	
INORG	Manganese	7439-96-5	D		5.0E-05	
INORG	Mercury	7439-97-6	D	8.22E-03	3.0E-04	2.6E+01
INORG	Nickel	7440-02-0	A		9.0E-05	
INORG	Selenium	7782-49-2	D		2.0E-02	
INORG	Thallium	7440-28-0				
INORG	Vanadium	7440-62-2				
INORG	Zinc	7440-66-6	ID			
Note:						
Unit HQs for groundwater indoor air vapor inhalation are calculated at a concentration of 1 mg/L.						

**Attachment D6: Single-Chemical Risk Estimates for Residential Exposure to Shallow Groundwater
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Max Detect (mg/L)	Resident							
						Vapor Intrusion				Outdoor Air Inhalation			
						Unit Risk	Unit HQ	Risk	HQ	Unit Risk	Unit HQ	Risk	HQ
Off-Site East	VOC	cis-1,2-Dichloroethene	156-59-2	ID	5.71E-01								
Off-Site East	VOC	trans-1,2-Dichloroethene	156-60-5		1.03E-01		4E-01		4E-02		7E-03		7E-04
Off-Site East	VOC	Trichloroethene	79-01-6	C-B2	4.37E+00	2E-05	5E-02	8E-05	2E-01	3E-07	8E-04	1E-06	4E-03
Off-Site East	VOC	Vinyl Chloride	75-01-4	A	5.60E-03	4E-04	1E+00	2E-06	6E-03	8E-06	2E-02	4E-08	1E-04
Off-Site East	INORG	Arsenic	7440-38-2	A	1.12E-02								
Off-Site East	INORG	Manganese	7439-96-5	D	4.40E-01								
Off-Site West	VOC	cis-1,2-Dichloroethene	156-59-2	ID	2.26E-01								
Off-Site West	VOC	trans-1,2-Dichloroethene	156-60-5		1.86E-02		4E-01		7E-03		7E-03		1E-04
Off-Site West	VOC	Vinyl Chloride	75-01-4	A	1.03E-02	4E-04	1E+00	4E-06	1E-02	8E-06	2E-02	8E-08	2E-04
Off-Site West	INORG	Manganese	7439-96-5	D	2.36E-01								
Note:													
Only constituents detected in each area are shown.													