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November 30, 2007

Ms. Michelle Majack
U.S. Environmental Protection Agency, Region 5
Waste Management Division
77 West Jackson Blvd., DE-9J
Chicago, IL 60604-3590

RE: RCRA Facility Investigation Data Report, Updated May 2007
Performance Based RCRA Corrective Action
Former GM Delco Plant 5, Kokomo, IN
USEPA ID No. IND000806844

Dear Ms. Majack:

Please find enclosed the Resource Conservation and Recovery Act Environmental Indicators CA725 Report, prepared by ENVIRON International Corporation for the Former GM Delco Plant 5 facility in Kokomo, Indiana. Two paper copies and one electronic version (CD) of the report are enclosed for your use. This report is submitted on behalf of General Motors Corporation (GM) and Environmental Corporate Remediation Company, Inc. (ENCORE), in accordance with the performance based RCRA Corrective Action Agreement with USEPA.

Please contact me if you have any questions. Thank you.

Sincerely,

David M. Favero, P.G.
Project Manager

Enclosure

Resource Conservation and Recovery Act Environmental Indicators CA725 Report,
General Motors Corporation, Former GM Delco Plant 5, Kokomo, Indiana, IND
000806844, ENVIRON International, Inc., November 30, 2007.

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**RESOURCE CONSERVATION AND RECOVERY ACT
ENVIRONMENTAL INDICATORS CA725 REPORT**

**General Motors Corporation
Former GM Delco Plant 5
Kokomo, Indiana**

IND 000 806 844

Prepared for

General Motors Corporation
Pontiac, Michigan

Prepared by

ENVIRON International Corporation
Princeton, New Jersey
Project No: 02-14249A

November 30, 2007

C O N T E N T S

1.0 INTRODUCTION.....	1-1
1.1 Background and Purpose	1-1
1.2 Report Organization.....	1-2
2.0 CURRENT HUMAN EXPOSURES UNDER CONTROL.....	2-1
2.1 Information Reviewed	2-1
2.2 Presence of Contamination	2-1
2.2.1 Soil.....	2-3
2.2.2 Groundwater.....	2-4
2.2.3 Borehole Water.....	2-5
2.2.4 Soil Gas	2-6
2.3 Exposure Pathways	2-6
2.3.1 Soil.....	2-7
2.3.2 Groundwater.....	2-7
2.4 Significance of Potential Exposures	2-8
2.4.1 Soil.....	2-8
2.4.2 Groundwater.....	2-10
2.5 Conclusion	2-11
3.0 REFERENCES.....	3-1

Tables

Table 2-1a	Soil Screening Summary - Current Industrial Properties
Table 2-1b	On-site Soil Concentrations that Exceed Screening Criteria
Table 2-2a	Groundwater Screening Summary
Table 2-2b	Groundwater Concentrations that Exceed Screening Criteria
Table 2-3	Soil Gas Screening Summary
Table 2-4a	Upper-Bound Estimates of Cumulative Cancer Risk and Hazard Index for Worker Exposures to Soil
Table 2-4b	Refined Estimates of Cumulative Cancer Risk and Hazard Index for Routine Worker Exposure to Soil at AOI 3
Table 2-4c	Upper-Bound Estimates of Cumulative Cancer Risk and Hazard Index for Inhalation and Contact Exposures to Constituents in Groundwater

Figures

Drawing 1	Boring, Monitoring Well, and Soil Gas Sampling Locations
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Appendices

Appendix A	CA725 Form
Appendix B	Human Health Risk Assessment Supporting Information and Calculations
Appendix C	Background Soil Data and Risk Estimates
Appendix D	Soil Gas Data Evaluation Supporting Information and Calculations

1.0 INTRODUCTION

1.1 Background and Purpose

This Resource Conservation and Recovery Act (RCRA) Environmental Indicators (EI) Report for the CA725 determination was prepared to fulfill provisions in Section V.2 of the January 30, 2006 Performance-Based Corrective Action Agreement between General Motors Corporation (GM) and the U. S. Environmental Protection Agency (USEPA) to complete RCRA corrective action at Former GM Delco Plant 5 which is located at 1723 North Washington Street, Kokomo, Indiana (hereafter referred to as the "Facility") (IND 000 806 844). As part of the Agreement, GM and USEPA set a goal of completing the EI determinations for current human exposures under control (CA725) by November 30, 2007 and migration of contaminated groundwater under control (CA750) by November 30, 2009.

The Facility is located immediately north of an abandoned industrial property (former Midwest Plating Corporation) and includes the area bounded by Webster and Davis Streets to the west, Butler Street to the north, and Washington Street to the east, except for a rectangular parcel at the northeast corner. The majority of the Facility is currently a vacant grass field, except for a 4.3 acre parking lot, a small concrete slab at AOI 5, and a dead end road (Spraker Street) in the northern portion of the Facility. Drawing 1 shows the Facility and its main features.

During the RCRA facility investigation (RFI), GM conducted activities to characterize the nature and extent of releases of hazardous waste and constituents at the Facility. These activities included preparation of a Description of Current Conditions Report (DOCC, ARCADIS 2005a), which identified seven areas of interest (AOIs) at the Facility, and described the physical condition, known historical operations, and any previous investigation or remedial action at each AOI. These AOIs include all the solid waste management units (SWMUs) identified in USEPA's 1992 Preliminary Assessment/Visual Site Inspection report. The AOIs also include other areas at the Facility for which GM has knowledge of past management of hazardous waste or constituents. The DOCC evaluated each AOI and identified those where additional investigation was warranted. Rationale for not further investigating certain other AOIs was also provided in the DOCC.

Based on the information in the DOCC, GM further investigated six of the seven AOIs in three phases of field work as described in the RFI Work Plan and addenda (ARCADIS 2005b, 2006a, 2006c, 2007a, 2007c). The RFI Work Plan and addenda described the objectives, approach, rationale, and procedures for each phase of the investigation. The locations of the AOIs are shown on Drawing 1.

The objective of the RFI field investigations was to collect data for determining whether a significant release of hazardous constituents has occurred at each AOI, and to characterize the extent of a release as necessary to determine whether the release poses a significant risk under current and reasonably expected future land use, or is adversely affecting groundwater quality. The RFI sampling locations are shown on Drawing 1. Drawing 1 also shows the sampling locations where data from previous investigations are being used in combination with the RFI data to support this CA725 determination.

The RFI Work Plan and addenda were submitted to, reviewed with USEPA, and revised based on input from USEPA prior to their implementation. The field investigations were conducted in accordance with these work plans, except where field conditions necessitated changes as presented in the RFI Data Reports (ARCADIS 2006a, 2006b, 2007b, 2007d, 2007e) which were submitted after each stage of the field investigation. The data from each stage of the field investigation were reviewed with USEPA to evaluate the adequacy of data collection and to plan for additional investigation. All the soil and groundwater data used to support this CA725 determination were included in two of the 2007 RFI Data Reports (ARCADIS 2007b and 2007d). The soil gas data which were recently collected are presented in the third RFI Data Report from 2007 (ARCADIS 2007e).

The purpose of this CA725 Report is to evaluate the information and data that have been collected to date as they relate to the CA725 determination of whether current human exposures are under control.

1.2 Report Organization

The remainder of this report is organized as follows:

- Section 2 presents the data evaluation to support the CA725 determination. The discussion is organized to follow USEPA's CA725 form (Interim Final 2/5/99). A completed CA725 form based on this summary is provided in Appendix A of this report.
- Section 3 lists the references cited in this report.

The tables and drawings are found at the end of the text. The completed CA725 form is provided in Appendix A. Risk calculations that support the discussion in this report are provided in Appendices B and D. The background soil data that were collected to support the RFI, and their associated risk estimates, are provided in Appendix C.

2.0 CURRENT HUMAN EXPOSURES UNDER CONTROL

2.1 Information Reviewed

Question 1 of the CA725 form asks whether all relevant information on known and reasonably suspected releases subject to RCRA Corrective Action has been considered in making the EI determination.

All relevant information has been considered in preparing this report. Specifically, information from the following sources was reviewed to support the evaluation of whether current human exposures at the Facility are under control:

- Description of Current Conditions Report (ARCADIS 2005a)
- RFI Work Plan (ARCADIS 2005b)
- RFI Data Report and Phase II Work Plan (ARCADIS 2006a)
- RFI Data Report (ARCADIS 2006b)
- RFI Phase III Work Plan (ARCADIS 2006c, 2007a)
- RFI Data Report (ARCADIS 2007b)
- RFI Work Plan Addendum – Soil Gas Pilot Test (ARCADIS 2007c)
- RFI Phase IV Soil Investigation Data Report (ARCADIS 2007d)
- RFI Soil Gas Data Report (ARCADIS 2007e)

The reports and work plans listed above have been provided to USEPA.

2.2 Presence of Contamination

Question 2 of the CA725 form asks whether groundwater, soil, surface water, sediment, or air is known or reasonably suspected to be "contaminated" above appropriately protective risk-based levels from releases subject to RCRA corrective action. According to the CA725 form:

"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or aqueous, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

In this report, the presence of media that meet the definition of “contamination” is identified using all the data collected during the RFI, which include soil, groundwater, and soil gas data, as well as the data from previous investigations that were discussed in the DOCC. These data were compared with the risk-based screening criteria that are discussed below in Sections 2.2.1, 2.2.2, and 2.2.4. No free-phase nonaqueous-phase liquid (NAPL) has been observed during the RFI field investigation.

The site characterization data were prepared for risk-based evaluation using the following procedures, which are based on USEPA guidance on human health risk assessments (USEPA 1989):

- Constituent concentrations qualified as not detected (i.e., U or UJ-qualified data) during data validation are evaluated as non-detects.
- Constituent concentrations qualified as not usable (i.e., R-qualified data) during data validation are not included.
- Concentrations qualified as estimated (i.e., J-qualified data) are included for quantitative assessment.
- Concentrations in duplicate field samples are averaged to obtain a representative concentration for the sample location. When a constituent was detected in only one sample of a duplicate pair, the average of the detected concentration and one-half the quantitation limit from the non-detect result is used in further calculations.
- The concentrations of endosulfan, methylphenol, 1,3-dichloropropene, xylene, and polychlorinated biphenyl (PCB) are the sums of the concentrations of the isomers or Aroclors that were detected and half the quantitation limits of the isomers or Aroclors that were not detected in the same sample but were detected in the same matrix at the Facility. If no isomer or Aroclor was detected in a sample, the constituent is considered to be not detected in the sample.
- Concentrations of metals in soil that are at or below background levels are considered to represent background conditions. The background levels used for this assessment are the site-specific background soil concentrations discussed in Appendix C. The differences between metal concentrations in on-site samples and background levels are considered to be site-related, and are used in the calculation of site-related risks.

- As a conservative assumption, all concentrations of detected organic constituents are assumed to be site-related.

No constituent that was detected in soil, groundwater, or soil gas is excluded from the risk analysis, except as noted above. A tabulation of all the data used in this CA725 determination is provided in the three RFI Data Reports submitted in 2007.

2.2.1 Soil

Soil characterization data have been collected from on-site areas and off-site areas near the Facility which are currently zoned for industrial/commercial use. The soil data from each of these on-site and off-site areas are summarized on Table 2-1a.

Table 2-1a shows the constituents detected in each area, their detection frequencies, their ranges of detected concentrations, and ratios of the highest site-related concentrations to the screening criteria. The screening criteria are derived from the USEPA Region 9 Preliminary Remediation Goals (PRGs) for industrial soil (USEPA 2004). These PRG-based screening criteria were derived using a target cancer risk of 10^{-5} for carcinogenic constituents and a target hazard quotient (HQ) of 1 for non-carcinogenic constituents.

Table 2-1a shows the ratio of the highest site-related concentration of each constituent in surface and subsurface soil at an area to each screening criterion. The area designations on Table 2-1a are shown on Figures 23 to 32 of the RFI Data Report (ARCADIS 2007b). Ratios higher than 1 identify the presence of soil that meets the definition of “contamination” and are highlighted. As shown on Table 2-1a, the on-site soil at four AOIs has constituents with ratios higher than 1. The constituents with concentrations higher than the screening criteria in these AOIs consist of the following:

<u>AOI 3</u>	trichloroethene (TCE), vinyl chloride, and lead
<u>AOI 5</u>	TCE
<u>AOI 6</u>	tetrachloroethene (PCE) and TCE
<u>AOI 7</u>	TCE

The locations and depths at which concentrations in on-site soil are considered to meet the definition of “contamination” are summarized on Table 2-1b.

The off-site soil samples collected at the former Midwest Plating (FMWP) property show that PCE and TCE are present at concentrations higher than the screening criteria, as shown on Table 2-1a. Information regarding past investigation and remediation at the former Midwest Plating

property indicates that these PCE and TCE concentrations are related to former activities at the property and not former operations at the Facility. As such, these PCE and TCE concentrations are not addressed further in this report.

The off-site soil samples collected immediately west of the Facility do not have any concentration that exceeds the screening criteria, as shown on Table 2-1a. Therefore, the soil in this area does not meet the definition of “contamination”.

No concentration was detected in the off-site soil sample collected immediately east of the Facility (so this area is not included on Table 2-1a). Therefore, the soil in this area does not meet the definition of “contamination”.

The potential for current human exposure to site-related concentrations in on-site soil that are higher than the screening criteria is discussed in Section 2.3, and the significance of any potential exposure is discussed in Section 2.4.

2.2.2 Groundwater

Groundwater characterization data have been collected from on-site and off-site monitoring wells in the saturated sand units identified as P1, S1, I2, S2, and S3, and in the upper portion of the bedrock aquifer (identified as B1). For the purposes of this CA725 determination, only the most recent concentration for each constituent at each well is used. The groundwater data used for this CA725 determination are summarized on Table 2-2a, which groups on-site and off-site data separately. The locations of the monitoring wells are shown on Drawing 1.

Table 2-2a shows the constituents detected in each area, their detection frequencies, their ranges of detected concentrations, and ratios of the highest measured concentrations among the most recent samples from monitoring wells in the area to the screening criteria. For this CA725 determination, the screening criteria for all units are drinking water criteria, regardless of whether groundwater in a unit is currently used for drinking water. The drinking water criteria are based on maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act, and similarly-derived drinking water concentration limits for chemicals that lack MCLs. Drinking water limits for chemicals that lack MCLs are derived from USEPA Region 9 PRGs for ingestion of tap water at a target cancer risk of 10^{-5} and a target HQ of 1. Potable water at and around the Facility is supplied by the American Water Company, which has a well field located 1.1 miles northwest (upgradient) of the Facility and another well field located 1.5 miles southeast (downgradient) of the Facility. Based on water well logs from the American Water Company, the well field to the northwest extracts groundwater from sand and gravel units (which may be

connected to S2 and S3) and the well field to the southeast extracts groundwater predominantly from the bedrock aquifer (which may be connected to B1).

Groundwater that meets the definition of “contamination” is identified on Table 2-2a by comparing the highest concentration of each constituent among the most recent data for each area to the drinking water criteria. The presence of groundwater that meets the definition of “contamination” is identified by ratios of concentrations to the drinking water criteria that exceed 1.

As shown on Table 2-2a, several constituents have concentrations in groundwater that are higher than the drinking water criteria:

<u>On-site</u>	1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), TCE, vinyl chloride
<u>Off-site</u>	cis-1,2-DCE, trans-1,2-dichloroethene, PCE, TCE, vinyl chloride

As shown on Table 2-2a, PCE has concentrations higher than the drinking water screening criteria in S1 and S2 groundwater at the former Midwest Plating property. Information regarding past investigation and remediation at the former Midwest Plating property indicates that the PCE concentration is related to former activities at the property and not former operations at the Facility. As such, the PCE concentration is not addressed further in this report. However, the cis-1,2-DCE and TCE concentrations in S2 and the cis-1,2-DCE concentration in B1 groundwater at or downgradient of the former Midwest Plating property are further addressed in this report, because it is not yet clear based on the groundwater investigation conducted to date whether these concentrations are related to the Facility or former activities at this property.

The locations at which concentrations in groundwater are considered to meet the definition of “contamination” are summarized on Table 2-2b.

The potential for current human exposure to concentrations in groundwater that are higher than the drinking water criteria is discussed in Section 2.3, and the significance of any potential exposure is discussed in Section 2.4.

2.2.3 Borehole Water

Borehole water samples were collected from certain soil boring locations to guide placement of groundwater monitoring wells in the upper saturated units during the initial phase of the RFI field investigation. Although the procedures for collecting these borehole water samples were

intended to minimize the potential for introducing contaminants (including soil particles) into the sample by the sampling procedure itself, such potential could not be entirely eliminated because of the nature of the sample collection method. As such, the borehole water data are not necessarily representative of groundwater quality. Where the borehole water data indicated that groundwater may be contaminated, groundwater monitoring wells were installed to characterize groundwater quality as necessary. As such, the borehole water data are not used as bases for identifying the presence of contamination for this CA725 determination. The borehole water data were presented in the RFI Data Report (ARCADIS 2007b).

2.2.4 Soil Gas

Soil gas samples were collected in the vicinity of monitoring well MW-0612-S1 to verify the appropriateness of the groundwater vapor intrusion criteria used to guide the RFI field investigation. The soil gas data from these samples are summarized on Table 2-3. The soil gas sampling locations are shown on Drawing 1.

Table 2-3 shows the constituents analyzed in soil gas, their detection frequencies, their ranges of detected concentrations, and ratios of the highest measured concentrations to screening criteria. For this CA725 determination, the screening criteria are the generic soil gas screening levels that the Indiana Department of Environmental Management (IDEM) is using to decide whether further vapor intrusion investigation is warranted at a site (IDEM 2006). As shown on Table 2-3, no soil gas concentration exceeds these screening levels. Therefore, the soil gas does not meet the definition of “contamination”.

To further demonstrate that no significant potential exists for vapor intrusion from groundwater in the vicinity of MW-0612-S1, the soil gas TCE data were used to estimate a hypothetical upper-bound indoor air concentration, which was shown to pose no significant inhalation risk. This demonstration is discussed in Appendix D.

2.3 Exposure Pathways

Question 3 of the CA725 form asks whether there are complete exposure pathways between the media that meet the definition of "contamination" identified under Question 2 and human receptors such that exposures can be reasonably expected under current conditions. The potential for exposure to the media that meet the definition of “contamination” identified in Section 2.2 under current conditions at the Facility is discussed in the following subsections. The potential significance of exposures via complete pathways is discussed in Section 2.4.

2.3.1 Soil

The Facility is not currently used or occupied. As discussed in the DOCC, demolition of the buildings, including the removal of floor slabs, was completed in 1993 and the majority of the Facility is currently a vacant grass field except for a 4.3 acre asphalt parking lot, a small concrete slab at AOI 5, and a dead end road (Spraker Street) in the northern portion of the Facility.

The only workers anticipated to be at the Facility are landscapers who periodically mow the grass. However, it is possible that utility maintenance workers also may occasionally be on-site to service or repair underground utilities. Public access to the Facility is not restricted, as the Facility is unfenced. Therefore, access by trespassers is possible. The significance of these receptors' exposures to contaminated soil at the Facility is discussed in Section 2.4.

2.3.2 Groundwater

The 2005 well survey discussed in the DOCC identified no water supply well within the area where groundwater meets the definition of "contamination" based on the RFI groundwater investigation completed to date. Potable water at and around the Facility is supplied by the American Water Company. Therefore, the potential for exposure to contamination via usage of groundwater as a drinking water supply does not currently exist at or around the Facility.

The Facility is not currently used or occupied and all buildings were demolished in 1993, as discussed above. Thus, exposure of workers to groundwater constituents via volatilization and inhalation of vapors in indoor air is not possible. Potential exposure of trespassers to groundwater constituents in the upper-most saturated zones (P1 and S1) that volatilize into outdoor air is possible. Exposure of maintenance workers via contact with groundwater is possible during excavations that extend into P1, which has been found only on-site during the RFI groundwater investigation. The significance of this potential exposure is discussed in Section 2.4.

Potential off-site exposure to constituents in groundwater in the upper-most saturated zone (S1) via volatilization into occupied buildings (residential or commercial/industrial) or into outdoor air is possible. The significance of these potential exposures is discussed in Section 2.4. Maintenance worker exposure to contaminated groundwater in S1 is not reasonably expected, since S1 is deeper than reasonably expected excavation depths.

No potential on-site or off-site exposure to contaminated groundwater in I2, S2, S3, and B1 is possible for the following reasons: no well withdraws groundwater from these units where contaminated groundwater has been found during the investigation completed to date; these units

are deeper than reasonably expected excavation depths; and volatile constituents in these units cannot volatilize into the unsaturated zone and migrate into indoor air.

2.4 Significance of Potential Exposures

Question 4 of the CA725 form asks whether exposure from the complete exposure pathways identified under Question 3 can be reasonably expected to be "significant" or unacceptable. The significance of potential exposures identified in Section 2.3 is discussed below.

2.4.1 Soil

As discussed in Section 2.3.1, the only reasonably expected current human exposures to contaminated soil at the Facility are those associated with trespassers, landscapers who mow the grass, and utility maintenance workers who may service or repair underground utilities. The significance of these potential exposures is discussed below.

Trespassers and Landscapers

The significance of potential exposures of trespassers and landscapers to surface and subsurface soil that meet the definition of "contamination" under current conditions at the Facility is conservatively evaluated in this CA725 determination by estimating upper-bound cumulative cancer and noncancer risks for hypothetical routine worker exposures and comparing them to the USEPA-established levels for determining whether corrective measures are warranted under RCRA corrective action. Under USEPA policy, corrective measures are not warranted when the site-related cumulative cancer risk does not exceed 10^{-4} and the noncancer hazard index (HI) does not exceed 1 (61 FR 19432, May 1, 1996; USEPA 1991).

The upper-bound estimates of cumulative cancer risk and HI are calculated using the highest concentrations detected in surface and subsurface soil at each AOI and assuming that workers contact soil outdoors 8 hours per day, 250 days per year for 25 years. These estimates are presented in Table 2-4a for the AOIs identified in Section 2.2.1 as having contaminated soil. These upper-bound routine worker risk estimates are used as highly conservative surrogate estimates for trespassers and landscapers who are expected to have exposures that are at least an order of magnitude lower.

As shown on Table 2-4a, the upper-bound cumulative cancer risk and HI estimates for exposure of hypothetical routine workers to the highest detected concentrations in surface and subsurface soil are less than USEPA risk limits of 10^{-4} and 1, respectively, for all AOIs except AOI 3 where the cumulative cancer risk is 3×10^{-4} . Because trespassers and landscapers are expected to have exposures that are at least an order of magnitude lower, the risk estimates for these receptors are

also expected to be at least an order of magnitude lower than those shown on Table 2-4a. As such, even the upper-bound cumulative cancer risk estimate for AOI 3 should be interpreted to mean that trespasser and landscaper exposures are insignificant. The following discussion explains one assumption which caused the upper-bound cancer risk estimate for AOI 3 to be unrealistically conservative, and the calculations that were performed to correct this assumption so that the routine worker cancer risk estimate can be used as a surrogate to show that trespasser and landscaper exposures are insignificant.

The cumulative cancer risk estimate for AOI 3 on Table 2-4a is almost entirely attributable to the inhalation risk associated with a TCE concentration of 1,900 mg/kg in soil. This concentration was detected at boring SB-0757 from 14 to 15 feet bgs, and is the highest TCE concentration among the soil characterization data that have been collected at the Facility to date. The inhalation risk was calculated using this concentration and a vapor emission estimate from the model recommended by USEPA for screening-level analysis (USEPA 1996). As discussed in Appendix B, this model is an USEPA-adaptation of a model by Jury et al. (1983, 1990) which assumes a uniform concentration from ground surface to infinite depth. As such, the calculations assumed that 1,900 mg/kg of TCE is present at AOI 3 from ground surface to infinite depth, when the concentration is actually from 14 to 15 ft bgs and the maximum depth of TCE contamination in the vadose zone is approximately 20 ft (i.e., the vadose zone depth).

In fact, the soil characterization data for AOI 3 show that high TCE concentrations are found only at depths greater than 8 ft. As shown on Table 2 of the Phase IV Soil Investigation Data Report (ARCADIS 2007d), PID readings in the top 8 ft of the vadose zone were consistently low, and became elevated only at greater depths. These PID readings are consistent with the AOI 3 soil data that have been collected to date, which show that TCE concentrations in the top 8 ft of soil are low and no TCE concentration exceeds the screening criterion in this interval (see Table 2-1b). As noted above, the depth of TCE contamination in the vadose zone cannot be more than 20 ft, which is the depth of the vadose zone.

Because the TCE contamination is limited to a certain depth interval below ground surface, the model originally developed by Jury et al. (1983, 1990), without USEPA's 1996 adaptation, is more appropriate for estimating TCE vapor emission at AOI 3. The equation that describes this model is discussed in Appendix B. In applying the model, the TCE concentration of 1,900 mg/kg was assumed to exist in the interval from 8 ft to 20 ft bgs. Because 1,900 mg/kg is somewhat higher than the C_{sat} of 1,300 mg/kg for TCE in silty-clay soil, the model is expected to overestimate the initial TCE emission rate, since it assumes the vapor phase concentration is proportional to the adsorbed and dissolved phase soil concentrations even though the vapor

phase concentration actually cannot increase with concentrations above C_{sat} . However, this model was used instead of calculations based on Raoult's law because such calculations require an estimate of the TCE mole fraction in the nonaqueous-phase, and no free-phase NAPL was observed during collection of the soil samples at AOI 3 (or anywhere else at the Facility).

Using the TCE emission estimate from this application of the original model by Jury et al. gives a cancer risk estimate of approximately 6×10^{-5} for routine worker inhalation of TCE. Combining this with the original risk estimates for TCE exposure via ingestion, dermal contact, and particulate inhalation, and the risk estimates for routine worker exposure to all the other chemicals (approximately 3×10^{-5}) gives a cumulative cancer risk estimate of 9×10^{-5} for routine workers. As noted above, trespasser and landscapers are expected to have much lower exposures than routine workers. Therefore, their risk estimates also would be much lower and clearly not significant.

Additional details of these calculations are discussed in Appendix B.

Maintenance Workers

The significance of potential exposure of maintenance workers to soil that meets the definition of "contamination" is evaluated by estimating upper-bound cumulative cancer and noncancer risks for exposure to surface and subsurface soil and comparing them to the USEPA limits for determining whether corrective measures are warranted under RCRA corrective action. The estimates are calculated using the highest concentrations detected in surface and subsurface soil and assuming maintenance workers have contact with soil 8 hours per day, 5 days per year for 10 years. These risk estimates are summarized on Table 2-4a for the AOIs identified in Section 2.2.1 as having contaminated soil. As shown on Table 2-4a, the upper-bound estimates of cumulative cancer risk and HI are lower than USEPA's risk limits of 10^{-4} and 1, respectively. Therefore, potential exposure of maintenance workers to contaminated soil is not significant.

Additional details of these calculations are discussed in Appendix B.

2.4.2 Groundwater

As discussed in Section 2.2.2, shallow groundwater is considered "contaminated" for the purposes of the CA725 determination based on comparison to drinking water criteria, but the only current potential for exposures to such groundwater is via maintenance worker contact with groundwater in unit P1 during occasional excavations that extend into groundwater, and via inhalation of constituents that volatilize from unit S1 and migrate into off-site buildings or outdoor air.

Maintenance Worker Exposures

The potential significance of maintenance worker contact with groundwater during excavations that extend into groundwater (in unit P1) is evaluated using the same exposure factors discussed in Section 2.4.1 for maintenance worker contact with soil during excavations, except workers are assumed to be in groundwater for 2 of the 8 hours of excavation. Risk estimates are calculated using the highest concentrations detected in groundwater in unit P1. These risk estimates, which are summarized on Table 2-4c, show that these potential exposures are not significant. Additional details of these calculations are discussed in Appendix B.

Indoor Air Exposures

The potential significance of inhalation exposures to constituents in groundwater if they migrate into off-site buildings is evaluated based on residential exposures, which is also protective of commercial/industrial exposures. Risk estimates for indoor air exposures are calculated based on application of the model described by Johnson and Ettinger (1991) using site-specific soil properties and a hypothetical residential building with basement. The highest groundwater concentrations in unit S1 for each off-site area are used in the calculations. The risk estimates for these assumed exposures, which are summarized on Table 2-4c, show that the assumed exposures are not significant. Additional details of the calculations are discussed in Appendix B.

Outdoor Air Exposures

The potential significance of inhalation exposures to constituents in groundwater that migrate into outdoors is evaluated based on a model of groundwater vapor diffusion through the vadose zone soil into outdoor air. Risk estimates for on-site exposures are conservatively evaluated using standard default exposure factors for routine workers (i.e., 8 hours/day, 250 days/year for 25 years) and the highest groundwater concentrations in units P1 or S1 at each on-site area. The risk estimates for off-site exposures are evaluated based on residential exposures, which is also protective of commercial/industrial exposures. Risk estimates for the off-site exposures are calculated using the highest groundwater concentrations in unit S1 at each off-site area. The risk estimates for these exposures, which are summarized on Table 2-4c, show that the exposures are not significant. Additional details of the calculations are discussed in Appendix B.

2.5 Conclusions

The presence of media that meet the definition of “contamination” at the Facility is identified based on a comparison of the RFI site characterization data with conservative generic and site-specific screening criteria. Soil at certain areas of the Facility is considered to be contaminated,

and no contaminated soil is present off-site. Groundwater at certain on-site and off-site areas is considered contaminated. Soil gas collected off-site is not considered to be contaminated.

Currently, the only reasonably expected exposures to contaminated soil at the Facility are those associated with trespassers, landscapers who periodically mow the grass, and maintenance workers who may occasionally excavated into the soil to service or repair underground utilities.

Currently, the only reasonably expected exposures to contaminated groundwater at or near the Facility are via maintenance worker contact with groundwater in P1 and via volatilization from groundwater in S1 into off-site buildings or outdoor air.

The significance of these potential exposures to contaminated soil and groundwater is evaluated by estimating the cumulative cancer risk and HI associated with reasonable maximum exposure under current conditions, and comparing them to USEPA-established levels for determining whether they are significant enough to warrant corrective measures under RCRA corrective action (USEPA 1991). The results of these risk calculations show that the data evaluated in this report support a determination that all current human exposures to “contamination” at or from the Facility are under control.

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T A B L E S

Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)		Ratio of Max Detect to Industrial Criteria
AOI 2	VOC	Acetone	67-64-1	ID	6	4	9.00E-03	1.70E-02		5.4E+04	NC	3.1E-07
AOI 2	VOC	Methylene Chloride	75-09-2	B2	6	5	3.00E-03	6.20E-03		2.1E+02	C	3.0E-05
AOI 2	VOC	Trichloroethene	79-01-6	C-B2	6	1	7.70E-03	7.70E-03		6.1E+01	C	1.3E-04
AOI 2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4	3	2.70E-02	6.60E-02		1.2E+03	C	5.4E-05
AOI 2	SVOC	Chrysene	218-01-9	B2	3	1	3.50E-02	3.50E-02		2.1E+03	C	1.7E-05
AOI 2	SVOC	Di-n-octylphthalate	117-84-0		3	2	3.10E-02	5.90E-02		2.5E+04	NC	2.4E-06
AOI 2	INORG	Arsenic	7440-38-2	A	11	11	2.00E+00	7.60E+00	1.25E+01	1.6E+01	C	
AOI 2	INORG	Barium	7440-39-3	NC	11	11	1.20E+01	1.20E+02	1.32E+02	6.7E+04	NC	
AOI 2	INORG	Beryllium	7440-41-7	B1	11	6	2.20E-01	7.50E-01		1.9E+03	NC	3.9E-04
AOI 2	INORG	Cadmium	7440-43-9	B1	11	11	5.80E-02	6.40E-01		4.5E+02	NC	1.4E-03
AOI 2	INORG	Chromium (total)	7440-47-3		11	11	3.80E+00	2.10E+01	1.67E+01	2.5E+03	NC	1.7E-03
AOI 2	INORG	Cobalt	7440-48-4	B1	11	11	1.90E+00	1.90E+01	1.09E+01	1.3E+04	NC	6.1E-04
AOI 2	INORG	Copper	7440-50-8	D	11	11	8.20E+00	4.50E+01	3.66E+01	4.1E+04	NC	2.1E-04
AOI 2	INORG	Cyanide (total)	57-12-5	D	9	1	3.10E-01	3.10E-01		1.2E+04	NC	2.5E-05
AOI 2	INORG	Lead	7439-92-1	B2	11	11	3.40E+00	3.00E+01	4.64E+01	8.0E+02	NC	
AOI 2	INORG	Manganese	7439-96-5	D	11	11	1.60E+02	7.40E+02	5.45E+02	1.9E+04	NC	1.0E-02
AOI 2	INORG	Nickel	7440-02-0	A	11	11	5.00E+00	4.70E+01	1.91E+01	2.0E+04	NC	1.4E-03
AOI 2	INORG	Selenium	7782-49-2	D	11	1	6.90E-01	6.90E-01		5.1E+03	NC	1.4E-04
AOI 2	INORG	Vanadium	7440-62-2		11	11	6.10E+00	6.70E+01	3.13E+01	1.0E+03	NC	3.5E-02
AOI 2	INORG	Zinc	7440-66-6	ID	11	11	1.10E+01	1.50E+02	9.72E+01	3.1E+05	NC	1.7E-04
AOI 3	VOC	Acetone	67-64-1	ID	32	3	4.60E-02	1.20E-01		5.4E+04	NC	2.2E-06
AOI 3	VOC	Benzene	71-43-2	A	41	2	6.00E-03	1.60E+00		1.4E+01	C	1.1E-01
AOI 3	VOC	Carbon Disulfide	75-15-0		41	2	1.20E-02	5.70E-02		1.2E+03	NC	4.7E-05
AOI 3	VOC	Carbon Tetrachloride	56-23-5	B2	41	6	4.50E-03	2.70E+00		5.5E+00	C	4.9E-01
AOI 3	VOC	Chloroform	67-66-3	B2	41	13	5.00E-03	3.40E-01		4.7E+00	C	7.2E-02
AOI 3	VOC	Cumene	98-82-8	D	36	1	2.90E-03	2.90E-03		2.0E+03	NC	1.5E-06
AOI 3	VOC	Cyclohexane	110-82-7	ID	35	1	1.00E-03	1.00E-03		9.4E+03	NC	1.1E-07
AOI 3	VOC	1,1-Dichloroethane	75-34-3	SC	41	4	5.10E-03	1.20E-01		1.7E+03	NC	6.9E-05
AOI 3	VOC	1,1-Dichloroethene	75-35-4	C	41	2	6.40E-03	3.90E-01		4.1E+02	NC	9.4E-04
AOI 3	VOC	1,2-Dichloroethene (total)	540-59-0		4	1	2.50E-01	2.50E-01		1.5E+02	NC	1.7E-03
AOI 3	VOC	cis-1,2-Dichloroethene	156-59-2	ID	37	19	1.10E-03	1.40E+02		1.5E+02	NC	9.6E-01
AOI 3	VOC	trans-1,2-Dichloroethene	156-60-5		37	4	8.40E-03	8.70E-01		2.3E+02	NC	3.7E-03
AOI 3	VOC	Ethyl Benzene	100-41-4	D	40	1	2.10E-02	2.10E-02		7.4E+03	NC	2.8E-06
AOI 3	VOC	4-Methyl-2-pentanone	108-10-1	ID	40	1	2.00E-01	2.00E-01		4.7E+04	NC	4.3E-06
AOI 3	VOC	Methylcyclohexane	108-87-2		35	1	5.70E-03	5.70E-03		8.7E+03	NC	6.5E-07
AOI 3	VOC	Methylene Chloride	75-09-2	B2	41	11	3.00E-03	1.50E+00		2.1E+02	C	7.3E-03
AOI 3	VOC	Styrene	100-42-5		41	1	1.00E-01	1.00E-01		1.8E+04	NC	5.5E-06
AOI 3	VOC	Tetrachloroethene	127-18-4	C-B2	41	4	1.00E-03	3.40E-03		1.3E+01	C	2.6E-04
AOI 3	VOC	Toluene	108-88-3	ID	41	5	1.20E-03	8.00E-03		2.2E+03	NC	3.6E-06
AOI 3	VOC	1,1,1-Trichloroethane	71-55-6	ID	41	9	1.90E-03	2.70E+00		6.9E+03	NC	3.9E-04
AOI 3	VOC	Trichloroethene	79-01-6	C-B2	72	65	2.00E-03	1.90E+03		6.1E+01	C	3.1E+01
AOI 3	VOC	Vinyl Chloride	75-01-4	A	41	3	1.70E-03	7.90E+00		7.5E+00	C	1.1E+00
AOI 3	VOC	Xylenes (total)	1330-20-7	ID	41	5	3.40E-03	2.61E-02		9.0E+02	NC	2.9E-05

Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)		Ratio of Max Detect to Industrial Criteria
AOI 3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	4	3	3.10E-02	5.60E-02		1.2E+03	C	4.5E-05
AOI 3	SVOC	Di-n-octylphthalate	117-84-0		3	1	3.10E-02	3.10E-02		2.5E+04	NC	1.3E-06
AOI 3	SVOC	Fluoranthene	206-44-0	D	4	1	2.60E-02	2.60E-02		2.2E+04	NC	1.2E-06
AOI 3	SVOC	Pyrene	129-00-0	D	4	1	2.40E-02	2.40E-02		2.9E+04	NC	8.2E-07
AOI 3	INORG	Arsenic	7440-38-2	A	6	6	2.50E+00	1.26E+01	1.25E+01	1.6E+01	C	6.3E-03
AOI 3	INORG	Barium	7440-39-3	NC	6	6	1.40E+01	1.49E+02	1.32E+02	6.7E+04	NC	2.6E-04
AOI 3	INORG	Beryllium	7440-41-7	B1	6	2	2.20E-01	1.53E+00		1.9E+03	NC	7.9E-04
AOI 3	INORG	Cadmium	7440-43-9	B1	6	3	9.50E-02	1.80E-01		4.5E+02	NC	4.0E-04
AOI 3	INORG	Chromium (total)	7440-47-3		6	6	4.10E+00	1.59E+01	1.67E+01	2.5E+03	NC	
AOI 3	INORG	Cobalt	7440-48-4	B1	6	6	2.50E+00	5.99E+00	1.09E+01	1.3E+04	NC	
AOI 3	INORG	Copper	7440-50-8	D	6	6	1.00E+01	2.80E+02	3.66E+01	4.1E+04	NC	6.0E-03
AOI 3	INORG	Lead	7439-92-1	B2	9	9	4.30E+00	1.15E+03	4.64E+01	8.0E+02	NC	1.4E+00
AOI 3	INORG	Manganese	7439-96-5	D	6	6	1.61E+02	5.50E+02	5.45E+02	1.9E+04	NC	2.6E-04
AOI 3	INORG	Nickel	7440-02-0	A	6	6	5.80E+00	1.90E+01	1.91E+01	2.0E+04	NC	
AOI 3	INORG	Thallium	7440-28-0		6	3	2.84E+00	3.50E+00	3.58E+00	6.7E+01	NC	
AOI 3	INORG	Vanadium	7440-62-2		6	6	6.80E+00	3.60E+01	3.13E+01	1.0E+03	NC	4.6E-03
AOI 3	INORG	Zinc	7440-66-6	ID	6	6	3.00E+01	2.42E+02	9.72E+01	3.1E+05	NC	4.7E-04
AOI 5	VOC	Acetone	67-64-1	ID	26	3	2.40E-02	2.50E-02		5.4E+04	NC	4.6E-07
AOI 5	VOC	Benzene	71-43-2	A	42	2	2.80E-03	3.50E-03		1.4E+01	C	2.5E-04
AOI 5	VOC	Chlorobenzene	108-90-7	D	42	2	1.26E-03	3.60E-02		5.3E+02	NC	6.8E-05
AOI 5	VOC	1,1-Dichloroethane	75-34-3	SC	42	13	5.00E-03	1.40E-01		1.7E+03	NC	8.1E-05
AOI 5	VOC	1,1-Dichloroethene	75-35-4	C	42	13	6.00E-03	5.40E-02		4.1E+02	NC	1.3E-04
AOI 5	VOC	cis-1,2-Dichloroethene	156-59-2	ID	40	26	1.00E-03	2.40E+01		1.5E+02	NC	1.6E-01
AOI 5	VOC	trans-1,2-Dichloroethene	156-60-5		40	13	6.40E-03	1.70E-01		2.3E+02	NC	7.2E-04
AOI 5	VOC	Methyl Acetate	79-20-9		26	1	2.40E-01	2.40E-01		9.2E+04	NC	2.6E-06
AOI 5	VOC	Methylene Chloride	75-09-2	B2	42	22	3.00E-03	3.60E-01		2.1E+02	C	1.8E-03
AOI 5	VOC	Tetrachloroethene	127-18-4	C-B2	42	1	3.00E-03	3.00E-03		1.3E+01	C	2.3E-04
AOI 5	VOC	Toluene	108-88-3	ID	42	3	7.60E-04	4.60E-02		2.2E+03	NC	2.1E-05
AOI 5	VOC	1,1,1-Trichloroethane	71-55-6	ID	42	14	2.90E-03	1.40E-01		6.9E+03	NC	2.0E-05
AOI 5	VOC	Trichloroethene	79-01-6	C-B2	42	35	9.00E-03	1.50E+02		6.1E+01	C	2.5E+00
AOI 5	VOC	Trichlorofluoromethane	75-69-4		40	1	2.70E-02	2.70E-02		1.3E+03	NC	2.1E-05
AOI 5	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		26	3	2.20E-03	1.60E+00		6.9E+04	NC	2.3E-05
AOI 5	VOC	Vinyl Chloride	75-01-4	A	42	13	1.00E-03	1.70E-01		7.5E+00	C	2.3E-02
AOI 5	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	7	3	2.90E-02	2.30E+00		1.2E+03	C	1.9E-03
AOI 5	SVOC	Di-n-octylphthalate	117-84-0		7	1	2.40E-01	2.40E-01		2.5E+04	NC	9.7E-06
AOI 5	PCB	PCBs (total)	1336-36-3	B2	14	6	3.98E-02	2.27E+00		7.4E+00	C	3.0E-01
AOI 5	INORG	Arsenic	7440-38-2	A	10	7	2.90E-01	9.00E+00	1.25E+01	1.6E+01	C	
AOI 5	INORG	Barium	7440-39-3	NC	10	10	3.30E+01	1.00E+02	1.32E+02	6.7E+04	NC	
AOI 5	INORG	Beryllium	7440-41-7	B1	5	3	3.20E-01	4.80E-01		1.9E+03	NC	2.5E-04
AOI 5	INORG	Cadmium	7440-43-9	B1	10	5	9.20E-02	5.70E-01		4.5E+02	NC	1.3E-03
AOI 5	INORG	Chromium (total)	7440-47-3		10	10	4.37E+00	1.50E+01	1.67E+01	2.5E+03	NC	
AOI 5	INORG	Cobalt	7440-48-4	B1	5	5	3.70E+00	6.30E+00	1.09E+01	1.3E+04	NC	
AOI 5	INORG	Copper	7440-50-8	D	5	5	1.20E+01	2.50E+01	3.66E+01	4.1E+04	NC	

Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)		Ratio of Max Detect to Industrial Criteria
AOI 5	INORG	Cyanide (total)	57-12-5	D	6	1	2.30E-01	2.30E-01		1.2E+04	NC	1.9E-05
AOI 5	INORG	Lead	7439-92-1	B2	10	10	2.70E+00	8.98E+01	4.64E+01	8.0E+02	NC	5.4E-02
AOI 5	INORG	Manganese	7439-96-5	D	5	5	2.10E+02	3.40E+02	5.45E+02	1.9E+04	NC	
AOI 5	INORG	Nickel	7440-02-0	A	5	5	1.20E+01	1.60E+01	1.91E+01	2.0E+04	NC	
AOI 5	INORG	Vanadium	7440-62-2		5	5	1.10E+01	2.20E+01	3.13E+01	1.0E+03	NC	
AOI 5	INORG	Zinc	7440-66-6	ID	5	5	3.60E+01	7.60E+01	9.72E+01	3.1E+05	NC	
AOI 6	VOC	Acetone	67-64-1	ID	17	4	1.50E-02	7.10E-02		5.4E+04	NC	1.3E-06
AOI 6	VOC	Benzene	71-43-2	A	37	2	2.00E-03	2.51E-02		1.4E+01	C	1.8E-03
AOI 6	VOC	2-Butanone	78-93-3	ID	36	2	2.10E-02	2.20E+00		1.1E+05	NC	1.9E-05
AOI 6	VOC	Carbon Disulfide	75-15-0		37	2	4.90E-03	8.30E-03		1.2E+03	NC	6.9E-06
AOI 6	VOC	Chloroethane	75-00-3		37	4	2.00E-03	3.03E-01		6.5E+01	C	4.7E-03
AOI 6	VOC	Chloroform	67-66-3	B2	37	1	2.00E-03	2.00E-03		4.7E+00	C	4.3E-04
AOI 6	VOC	Chloromethane	74-87-3	D	37	1	2.00E-03	2.00E-03		1.6E+02	NC	1.3E-05
AOI 6	VOC	2-Chlorotoluene	95-49-8		5	1	7.70E-03	7.70E-03		5.6E+02	NC	1.4E-05
AOI 6	VOC	Cumene	98-82-8	D	27	1	4.07E-02	4.07E-02		2.0E+03	NC	2.1E-05
AOI 6	VOC	Cyclohexane	110-82-7	ID	22	2	2.70E-02	5.15E-02		9.4E+03	NC	5.5E-06
AOI 6	VOC	1,1-Dichloroethane	75-34-3	SC	37	15	2.00E-03	5.60E+00		1.7E+03	NC	3.2E-03
AOI 6	VOC	1,1-Dichloroethene	75-35-4	C	37	9	1.40E-03	3.60E-01		4.1E+02	NC	8.7E-04
AOI 6	VOC	1,2-Dichloroethene (total)	540-59-0		10	7	1.00E-03	9.50E-01		1.5E+02	NC	6.5E-03
AOI 6	VOC	cis-1,2-Dichloroethene	156-59-2	ID	27	13	5.70E-03	7.90E+00		1.5E+02	NC	5.4E-02
AOI 6	VOC	trans-1,2-Dichloroethene	156-60-5		27	7	2.60E-02	5.30E-01		2.3E+02	NC	2.3E-03
AOI 6	VOC	Ethyl Benzene	100-41-4	D	37	2	2.00E-03	3.36E-02		7.4E+03	NC	4.5E-06
AOI 6	VOC	4-Methyl-2-pentanone	108-10-1	ID	37	1	4.00E-03	4.00E-03		4.7E+04	NC	8.5E-08
AOI 6	VOC	Methylcyclohexane	108-87-2		22	3	2.30E-03	3.40E-02		8.7E+03	NC	3.9E-06
AOI 6	VOC	Methylene Chloride	75-09-2	B2	37	12	2.00E-03	2.80E-01		2.1E+02	C	1.4E-03
AOI 6	VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	36	1	2.00E-03	2.00E-03		9.3E+00	C	2.2E-04
AOI 6	VOC	Tetrachloroethene	127-18-4	C-B2	37	19	9.00E-04	2.70E+01		1.3E+01	C	2.1E+00
AOI 6	VOC	Toluene	108-88-3	ID	37	6	3.00E-03	2.50E+00		2.2E+03	NC	1.1E-03
AOI 6	VOC	1,1,1-Trichloroethane	71-55-6	ID	37	18	1.60E-03	7.20E+01		6.9E+03	NC	1.0E-02
AOI 6	VOC	Trichloroethene	79-01-6	C-B2	37	26	1.70E-03	2.70E+02		6.1E+01	C	4.4E+00
AOI 6	VOC	Vinyl Chloride	75-01-4	A	37	18	1.00E-03	2.00E-01		7.5E+00	C	2.7E-02
AOI 6	VOC	Xylenes (total)	1330-20-7	ID	37	3	4.00E-03	2.47E-01		9.0E+02	NC	2.7E-04
AOI 6	SVOC	Acenaphthene	83-32-9		16	1	3.90E-02	3.90E-02		2.9E+04	NC	1.3E-06
AOI 6	SVOC	Benzo(a)anthracene	56-55-3	B2	16	3	3.00E-02	2.00E-01		2.1E+01	C	9.5E-03
AOI 6	SVOC	Benzo(a)pyrene	50-32-8	B2	16	3	2.70E-02	2.80E-01		2.1E+00	C	1.3E-01
AOI 6	SVOC	Benzo(b)fluoranthene	205-99-2	B2	16	3	2.90E-02	2.80E-01		2.1E+01	C	1.3E-02
AOI 6	SVOC	Benzo(g,h,i)perylene	191-24-2	D	16	3	2.70E-02	2.20E-01		2.9E+04	NC	7.6E-06
AOI 6	SVOC	Benzo(k)fluoranthene	207-08-9	B2	16	2	1.80E-01	3.80E-01		2.1E+02	C	1.8E-03
AOI 6	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	15	8	3.60E-02	5.20E+00		1.2E+03	C	4.2E-03
AOI 6	SVOC	Butylbenzylphthalate	85-68-7	C	16	1	7.50E-02	7.50E-02		1.2E+05	NC	6.1E-07
AOI 6	SVOC	Chrysene	218-01-9	B2	16	7	2.30E-02	3.70E-01		2.1E+03	C	1.8E-04
AOI 6	SVOC	Dibenz(a,h)anthracene	53-70-3	B2	16	1	5.90E-02	5.90E-02		2.1E+00	C	2.8E-02
AOI 6	SVOC	Dibenzofuran	132-64-9	D	16	2	7.30E-02	1.40E-01		1.6E+03	NC	9.0E-05

**Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)	Ratio of Max Detect to Industrial Criteria
AOI 6	SVOC	Di-n-butylphthalate	84-74-2	D	16	2	1.20E-01	1.40E-01		6.2E+04 NC	2.3E-06
AOI 6	SVOC	Di-n-octylphthalate	117-84-0		16	6	5.90E-02	2.70E+00		2.5E+04 NC	1.1E-04
AOI 6	SVOC	Fluoranthene	206-44-0	D	15	2	1.50E-01	2.30E-01		2.2E+04 NC	1.0E-05
AOI 6	SVOC	Fluorene	86-73-7	D	15	1	7.80E-02	7.80E-02		2.6E+04 NC	3.0E-06
AOI 6	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	15	2	8.80E-02	1.60E-01		2.1E+01 C	7.6E-03
AOI 6	SVOC	Phenanthrene	85-01-8	D	15	3	3.40E-02	1.40E-01		2.9E+04 NC	4.8E-06
AOI 6	SVOC	Phenol	108-95-2	ID	12	1	4.20E+00	4.20E+00		1.8E+05 NC	2.3E-05
AOI 6	SVOC	Pyrene	129-00-0	D	15	4	3.20E-02	3.10E-01		2.9E+04 NC	1.1E-05
AOI 6	PDIST	Petroleum Hydrocarbons - ERO	TPHERO		2	2	1.20E+02	3.00E+03			
AOI 6	PDIST	Gasoline Range Organics	GRO		2	2	1.90E+00	2.60E+00			
AOI 6	PCB	PCBs (total)	1336-36-3	B2	30	2	2.10E-01	1.97E+00		7.4E+00 C	2.6E-01
AOI 6	INORG	Arsenic	7440-38-2	A	15	11	1.40E+00	8.90E+00	1.25E+01	1.6E+01 C	
AOI 6	INORG	Barium	7440-39-3	NC	15	15	2.41E+01	1.06E+02	1.32E+02	6.7E+04 NC	
AOI 6	INORG	Beryllium	7440-41-7	B1	10	3	2.00E-01	8.53E-01		1.9E+03 NC	4.4E-04
AOI 6	INORG	Cadmium	7440-43-9	B1	15	7	2.20E-01	1.30E+01		4.5E+02 NC	2.9E-02
AOI 6	INORG	Chromium (total)	7440-47-3		22	22	5.24E+00	4.91E+01	1.67E+01	2.5E+03 NC	1.3E-02
AOI 6	INORG	Cobalt	7440-48-4	B1	10	10	4.20E+00	7.19E+00	1.09E+01	1.3E+04 NC	
AOI 6	INORG	Copper	7440-50-8	D	10	10	1.30E+01	3.50E+01	3.66E+01	4.1E+04 NC	
AOI 6	INORG	Cyanide (total)	57-12-5	D	15	10	2.40E-01	5.50E+01		1.2E+04 NC	4.5E-03
AOI 6	INORG	Lead	7439-92-1	B2	21	21	4.07E+00	4.35E+02	4.64E+01	8.0E+02 NC	4.9E-01
AOI 6	INORG	Manganese	7439-96-5	D	10	10	1.97E+01	5.80E+02	5.45E+02	1.9E+04 NC	1.8E-03
AOI 6	INORG	Mercury	7439-97-6	D	15	1	3.10E-01	3.10E-01		1.4E+01 NC	2.3E-02
AOI 6	INORG	Nickel	7440-02-0	A	10	10	1.20E+01	3.10E+01	1.91E+01	2.0E+04 NC	5.8E-04
AOI 6	INORG	Thallium	7440-28-0		10	2	2.74E+00	2.92E+00	3.58E+00	6.7E+01 NC	
AOI 6	INORG	Vanadium	7440-62-2		10	10	9.80E+00	3.17E+01	3.13E+01	1.0E+03 NC	3.9E-04
AOI 6	INORG	Zinc	7440-66-6	ID	10	10	3.20E+01	9.70E+01	9.72E+01	3.1E+05 NC	
AOI 7	VOC	Acetone	67-64-1	ID	19	1	4.70E-03	4.70E-03		5.4E+04 NC	8.7E-08
AOI 7	VOC	Chloroform	67-66-3	B2	41	7	1.10E-03	5.50E-03		4.7E+00 C	1.2E-03
AOI 7	VOC	Cumene	98-82-8	D	39	3	1.30E-03	2.00E-03		2.0E+03 NC	1.0E-06
AOI 7	VOC	1,1-Dichloroethane	75-34-3	SC	41	1	7.50E-03	7.50E-03		1.7E+03 NC	4.3E-06
AOI 7	VOC	1,1-Dichloroethene	75-35-4	C	41	1	3.60E-02	3.60E-02		4.1E+02 NC	8.7E-05
AOI 7	VOC	cis-1,2-Dichloroethene	156-59-2	ID	41	13	2.90E-03	4.10E+01		1.5E+02 NC	2.8E-01
AOI 7	VOC	trans-1,2-Dichloroethene	156-60-5		41	6	3.20E-03	1.50E-01		2.3E+02 NC	6.4E-04
AOI 7	VOC	Ethyl Benzene	100-41-4	D	41	5	1.80E-03	2.30E-02		7.4E+03 NC	3.1E-06
AOI 7	VOC	Methylcyclohexane	108-87-2		39	2	1.70E-03	2.50E-03		8.7E+03 NC	2.9E-07
AOI 7	VOC	Methylene Chloride	75-09-2	B2	41	1	3.90E-01	3.90E-01		2.1E+02 C	1.9E-03
AOI 7	VOC	Tetrachloroethene	127-18-4	C-B2	40	2	2.80E-03	3.70E-03		1.3E+01 C	2.8E-04
AOI 7	VOC	Toluene	108-88-3	ID	40	5	2.10E-03	4.00E-03		2.2E+03 NC	1.8E-06
AOI 7	VOC	1,1,1-Trichloroethane	71-55-6	ID	41	4	1.20E-03	5.50E-03		6.9E+03 NC	7.9E-07
AOI 7	VOC	Trichloroethene	79-01-6	C-B2	41	18	1.20E-02	8.30E+01		6.1E+01 C	1.4E+00
AOI 7	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		39	3	2.50E-03	2.90E-02		6.9E+04 NC	4.2E-07
AOI 7	VOC	Vinyl Chloride	75-01-4	A	41	5	4.90E-03	6.60E-01		7.5E+00 C	8.8E-02
AOI 7	VOC	Xylenes (total)	1330-20-7	ID	41	6	3.60E-03	6.90E-02		9.0E+02 NC	7.7E-05

**Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)		Ratio of Max Detect to Industrial Criteria
AOI 7	SVOC	2-Methylnaphthalene	91-57-6	ID	4	1	6.60E-01	6.60E-01		1.9E+02	NC	3.5E-03
AOI 7	SVOC	Phenanthrene	85-01-8	D	4	1	4.70E+00	4.70E+00		2.9E+04	NC	1.6E-04
AOI 7	PDIST	Petroleum Hydrocarbons - ERO	TPHERO		1	1	1.40E+04	1.40E+04				
AOI 7	PDIST	Gasoline Range Organics	GRO		1	1	1.80E+00	1.80E+00				
AOI 7	INORG	Arsenic	7440-38-2	A	4	4	4.73E+00	1.50E+01	1.25E+01	1.6E+01	C	1.6E-01
AOI 7	INORG	Barium	7440-39-3	NC	4	4	3.87E+01	7.33E+01	1.32E+02	6.7E+04	NC	
AOI 7	INORG	Beryllium	7440-41-7	B1	4	3	2.99E-01	3.69E-01		1.9E+03	NC	1.9E-04
AOI 7	INORG	Chromium (total)	7440-47-3		4	4	7.69E+00	1.86E+01	1.67E+01	2.5E+03	NC	7.5E-04
AOI 7	INORG	Cobalt	7440-48-4	B1	4	4	3.92E+00	6.62E+00	1.09E+01	1.3E+04	NC	
AOI 7	INORG	Copper	7440-50-8	D	4	4	1.23E+01	1.83E+01	3.66E+01	4.1E+04	NC	
AOI 7	INORG	Lead	7439-92-1	B2	4	4	4.29E+00	1.68E+01	4.64E+01	8.0E+02	NC	
AOI 7	INORG	Manganese	7439-96-5	D	4	4	2.41E+02	3.73E+02	5.45E+02	1.9E+04	NC	
AOI 7	INORG	Nickel	7440-02-0	A	4	4	1.09E+01	1.80E+01	1.91E+01	2.0E+04	NC	
AOI 7	INORG	Vanadium	7440-62-2		4	4	1.25E+01	2.47E+01	3.13E+01	1.0E+03	NC	
AOI 7	INORG	Zinc	7440-66-6	ID	4	4	2.39E+01	4.35E+01	9.72E+01	3.1E+05	NC	
Upgradient	INORG	Arsenic	7440-38-2	A	3	2	2.63E+00	1.10E+01	1.25E+01	1.6E+01	C	
Upgradient	INORG	Barium	7440-39-3	NC	3	3	1.50E+01	1.68E+02	1.32E+02	6.7E+04	NC	5.4E-04
Upgradient	INORG	Chromium (total)	7440-47-3		3	3	5.65E+00	1.55E+01	1.67E+01	2.5E+03	NC	
Upgradient	INORG	Cobalt	7440-48-4	B1	3	3	2.03E+00	1.14E+01	1.09E+01	1.3E+04	NC	3.8E-05
Upgradient	INORG	Copper	7440-50-8	D	3	3	1.52E+01	4.15E+01	3.66E+01	4.1E+04	NC	1.2E-04
Upgradient	INORG	Lead	7439-92-1	B2	3	3	1.43E+01	4.52E+01	4.64E+01	8.0E+02	NC	
Upgradient	INORG	Manganese	7439-96-5	D	3	3	1.93E+02	6.38E+02	5.45E+02	1.9E+04	NC	4.8E-03
Upgradient	INORG	Nickel	7440-02-0	A	3	3	7.70E+00	1.97E+01	1.91E+01	2.0E+04	NC	2.9E-05
Upgradient	INORG	Thallium	7440-28-0		3	2	3.19E+00	3.62E+00	3.58E+00	6.7E+01	NC	5.9E-04
Upgradient	INORG	Vanadium	7440-62-2		3	3	1.57E+01	2.36E+01	3.13E+01	1.0E+03	NC	
Upgradient	INORG	Zinc	7440-66-6	ID	3	3	2.79E+01	1.00E+02	9.72E+01	3.1E+05	NC	9.1E-06
FMWP	VOC	Carbon Disulfide	75-15-0		5	1	1.05E-02	1.05E-02		1.2E+03	NC	8.7E-06
FMWP	VOC	Chlorobenzene	108-90-7	D	5	3	1.24E-01	1.05E+00		5.3E+02	NC	2.0E-03
FMWP	VOC	1,1-Dichloroethene	75-35-4	C	5	2	3.30E-01	3.92E-01		4.1E+02	NC	9.5E-04
FMWP	VOC	cis-1,2-Dichloroethene	156-59-2	ID	5	4	8.70E-03	1.93E+00		1.5E+02	NC	1.3E-02
FMWP	VOC	Ethyl Benzene	100-41-4	D	5	2	5.49E-02	2.05E-01		7.4E+03	NC	2.8E-05
FMWP	VOC	Tetrachloroethene	127-18-4	C-B2	5	5	8.49E+00	9.81E+03		1.3E+01	C	7.5E+02
FMWP	VOC	Toluene	108-88-3	ID	5	2	1.97E-01	1.17E+00		2.2E+03	NC	5.3E-04
FMWP	VOC	1,1,1-Trichloroethane	71-55-6	ID	5	1	1.78E+00	1.78E+00		6.9E+03	NC	2.6E-04
FMWP	VOC	Trichloroethene	79-01-6	C-B2	5	5	1.12E-02	1.06E+02		6.1E+01	C	1.7E+00
FMWP	VOC	Xylenes (total)	1330-20-7	ID	5	2	3.18E-01	9.05E-01		9.0E+02	NC	1.0E-03
FMWP	INORG	Arsenic	7440-38-2	A	5	4	3.70E+00	1.45E+01	1.25E+01	1.6E+01	C	1.3E-01
FMWP	INORG	Barium	7440-39-3	NC	5	5	5.40E+00	9.43E+01	1.32E+02	6.7E+04	NC	
FMWP	INORG	Chromium (total)	7440-47-3		5	4	8.60E+00	1.22E+02	1.67E+01	2.5E+03	NC	4.1E-02
FMWP	INORG	Cobalt	7440-48-4	B1	5	4	3.50E+00	5.70E+00	1.09E+01	1.3E+04	NC	
FMWP	INORG	Copper	7440-50-8	D	5	4	1.22E+01	2.56E+01	3.66E+01	4.1E+04	NC	
FMWP	INORG	Lead	7439-92-1	B2	5	5	3.20E+00	7.70E+00	4.64E+01	8.0E+02	NC	
FMWP	INORG	Manganese	7439-96-5	D	5	5	2.19E+02	3.43E+02	5.45E+02	1.9E+04	NC	

**Table 2-1a: Soil Screening Summary - Current Industrial Properties
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Min Detected (mg/kg)	Max Detected (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)	Ratio of Max Detect to Industrial Criteria	
FMWP	INORG	Nickel	7440-02-0	A	5	5	2.30E+00	3.39E+01	1.91E+01	2.0E+04	NC	7.2E-04
FMWP	INORG	Thallium	7440-28-0		5	1	2.70E+00	2.70E+00	3.58E+00	6.7E+01	NC	
FMWP	INORG	Vanadium	7440-62-2		5	4	1.28E+01	1.78E+01	3.13E+01	1.0E+03	NC	
FMWP	INORG	Zinc	7440-66-6	ID	5	5	4.10E+00	3.73E+01	9.72E+01	3.1E+05	NC	
Off-Site West	INORG	Arsenic	7440-38-2	A	3	3	6.40E+00	8.68E+00	1.25E+01	1.6E+01	C	
Off-Site West	INORG	Barium	7440-39-3	NC	3	3	7.85E+01	9.89E+01	1.32E+02	6.7E+04	NC	
Off-Site West	INORG	Chromium (total)	7440-47-3		3	3	1.07E+01	1.45E+01	1.67E+01	2.5E+03	NC	
Off-Site West	INORG	Cobalt	7440-48-4	B1	3	3	4.87E+00	7.01E+00	1.09E+01	1.3E+04	NC	
Off-Site West	INORG	Copper	7440-50-8	D	3	3	1.53E+01	5.33E+01	3.66E+01	4.1E+04	NC	4.1E-04
Off-Site West	INORG	Lead	7439-92-1	B2	3	3	5.71E+00	6.91E+01	4.64E+01	8.0E+02	NC	2.8E-02
Off-Site West	INORG	Manganese	7439-96-5	D	3	3	2.04E+02	6.25E+02	5.45E+02	1.9E+04	NC	4.1E-03
Off-Site West	INORG	Nickel	7440-02-0	A	3	3	1.25E+01	1.58E+01	1.91E+01	2.0E+04	NC	
Off-Site West	INORG	Vanadium	7440-62-2		3	3	1.83E+01	2.43E+01	3.13E+01	1.0E+03	NC	
Off-Site West	INORG	Zinc	7440-66-6	ID	3	3	3.78E+01	1.29E+02	9.72E+01	3.1E+05	NC	1.0E-04
Notes:												
Only detected constituents are shown in each area.												
Ratios are calculated using site-related concentrations, which are those in excess of site-specific background for inorganics.												
Ratios of site-related concentrations to criteria greater than 1 are shaded in bold.												
The Industrial Screening Criteria are the 2004 USEPA Region 9 Industrial PRGs at a cancer risk of 1E-5 or a hazard quotient of 1. If a criterion is not available, no value is shown.												
The criteria presented are the lower of the criteria at either the target cancer risk of 1E-5 or target hazard quotient of 1.												
The PCBs (total) concentration is the sum of the detected Aroclor concentrations and ½ SQL of Aroclors not detected in the sample but detected in other samples of the same medium.												
The concentrations for the Xylene isomers (m/p and o) were summed before comparing to the criteria for Xylenes (total).												
The criteria for Chromium (total) are the USEPA Region 9 PRGs for Chromium VI.												
The criteria for Mercury are the USEPA Region 9 PRGs and are calculated by ENVIRON to account for the vapor inhalation pathway using USEPA Region 9 equations, RfC from IRIS, and chemical properties from USEPA's Soil Screening Guidance.												
The criteria for 2-Methylnaphthalene are USEPA Region 9 PRGs for Naphthalene.												
The criteria for PCBs (total) are the USEPA Region 9 PRGs, which are based on PCBs (total) for cancer effects and Aroclor 1254 for noncancer effects.												
The criteria for Phenanthrene are the USEPA Region 9 PRGs for Pyrene.												
The criteria for Trichloroethene are derived using the toxicity values presented in the USEPA Region 9 PRGs (2000) and an ingestion rate adjusted to be consistent with the 2004 USEPA Region 9 PRG calculations.												
Chem Group - chemical group												
Carc Class - USEPA Weight-of-Evidence Cancer Classification												
C - The criterion is based on cancer risk at a target cancer risk of 1E-5.												
NC - The criterion is based on noncancer effects at a target hazard quotient of 1.												
FMWP - Former Midwest Plating Corporation property												

**Table 2-1b: On-site Soil Concentrations that Exceed Screening Criteria
Former Delco Plant 5, Kokomo, Indiana**

Area	Location	Top Depth (ft)	Bottom Depth (ft)	Sample Date	Chem Group	Chemical	CASRN	Conc (mg/kg)	Site Specific Background (mg/kg)	Industrial Screening Criteria (mg/kg)	Ratio of Conc to Industrial Screening Criteria
AOI 3	SB-0506	0	2	09/12/05	INORG	Lead	7439-92-1	1.15E+03	4.6E+01	8.0E+02	1.4E+00
AOI 3	SB-0634	8	10	10/09/06	VOC	Trichloroethene	79-01-6	1.30E+02		6.1E+01	2.1E+00
AOI 3	SB-0634	8	10	10/09/06	VOC	Vinyl Chloride	75-01-4	7.90E+00		7.5E+00	1.1E+00
AOI 3	SB-0635	8	10	10/09/06	VOC	Trichloroethene	79-01-6	1.20E+02		6.1E+01	2.0E+00
AOI 3	SB-0638	8	10	11/13/06	VOC	Trichloroethene	79-01-6	9.20E+01		6.1E+01	1.5E+00
AOI 3	SB-0639	8	10	11/13/06	VOC	Trichloroethene	79-01-6	8.10E+01		6.1E+01	1.3E+00
AOI 3	SB-0705	14	15	09/01/07	VOC	Trichloroethene	79-01-6	8.69E+01		6.1E+01	1.4E+00
AOI 3	SB-0706	8	10	09/01/07	VOC	Trichloroethene	79-01-6	9.36E+01		6.1E+01	1.5E+00
AOI 3	SB-0721	8	10	09/01/07	VOC	Trichloroethene	79-01-6	1.24E+02		6.1E+01	2.0E+00
AOI 3	SB-0742	8	10	09/01/07	VOC	Trichloroethene	79-01-6	8.62E+01		6.1E+01	1.4E+00
AOI 3	SB-0743	12	14	09/01/07	VOC	Trichloroethene	79-01-6	1.20E+02		6.1E+01	2.0E+00
AOI 3	SB-0746	12	14	09/01/07	VOC	Trichloroethene	79-01-6	4.49E+02		6.1E+01	7.4E+00
AOI 3	SB-0749	14	15	09/01/07	VOC	Trichloroethene	79-01-6	1.25E+03		6.1E+01	2.0E+01
AOI 3	SB-0750	14	15	09/01/07	VOC	Trichloroethene	79-01-6	2.42E+02		6.1E+01	4.0E+00
AOI 3	SB-0751	14	15	09/01/07	VOC	Trichloroethene	79-01-6	8.14E+02		6.1E+01	1.3E+01
AOI 3	SB-0755	14	15	09/01/07	VOC	Trichloroethene	79-01-6	1.73E+02		6.1E+01	2.8E+00
AOI 3	SB-0756	14	15	09/01/07	VOC	Trichloroethene	79-01-6	8.76E+02		6.1E+01	1.4E+01
AOI 3	SB-0757	14	15	09/01/07	VOC	Trichloroethene	79-01-6	1.90E+03		6.1E+01	3.1E+01
AOI 5	P4	10	11	05/22/01	VOC	Trichloroethene	79-01-6	1.20E+02		6.1E+01	2.0E+00
AOI 5	P8	10	10	05/22/01	VOC	Trichloroethene	79-01-6	8.30E+01		6.1E+01	1.4E+00
AOI 5	SB-0513	8	10	09/16/05	VOC	Trichloroethene	79-01-6	1.50E+02		6.1E+01	2.5E+00
AOI 5	SB-0514	8	10	09/16/05	VOC	Trichloroethene	79-01-6	8.90E+01		6.1E+01	1.5E+00
AOI 5	SB-0612	14	16	01/31/06	VOC	Trichloroethene	79-01-6	1.30E+02		6.1E+01	2.1E+00
AOI 5	SB-0613	14	16	01/31/06	VOC	Trichloroethene	79-01-6	1.00E+02		6.1E+01	1.6E+00
AOI 5	SB-0613	8	10	01/31/06	VOC	Trichloroethene	79-01-6	6.50E+01		6.1E+01	1.1E+00
AOI 6	SB-0520	0	2	09/21/05	VOC	Tetrachloroethene	127-18-4	2.70E+01		1.3E+01	2.1E+00
AOI 6	SB-0521	14	16	09/20/05	VOC	Trichloroethene	79-01-6	2.70E+02		6.1E+01	4.4E+00
AOI 6	SB-18	4	6	03/19/97	VOC	Tetrachloroethene	127-18-4	1.90E+01		1.3E+01	1.5E+00
AOI 7	SB-0526	8	10	09/13/05	VOC	Trichloroethene	79-01-6	8.30E+01		6.1E+01	1.4E+00

Notes:

Ratios are calculated using site-related concentrations, which are those in excess of site-specific background concentrations for inorganics.

Ratios of site-related concentrations to criteria greater than 1 are shaded in bold.

The criteria presented are the lower of the criteria at either the target cancer risk of 1E-5 or target hazard quotient of 1.

The criteria for Trichloroethene are derived using the toxicity values presented in the USEPA Region 9 PRGs (2000) and an ingestion rate adjusted to be consistent with the 2004 USEPA Region 9 PRG calculations.

Chem Group - chemical group

**Table 2-2a: Groundwater Screening Summary
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	Analyzed	Detected	Max Detect (mg/L)	Drinking Water Criteria (mg/L)	Ratio of Max Detect to Drinking Water Criteria
On-Site	AOI 2	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	1.50E-01	7.00E-02	SM 2.1E+00
On-Site	AOI 2	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		1	1	3.70E-02	1.00E-01	SM 3.7E-01
On-Site	AOI 2	S1	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	1.30E-02	5.00E-03	SM 2.6E+00
On-Site	AOI 2	S1	SVOC	2-Methylnaphthalene	91-57-6	T	ID	1	1	6.50E-04	7.30E-01	NC 8.9E-04
On-Site	AOI 2	S1	INORG	Arsenic	7440-38-2	D	A	1	1	5.24E-03	1.00E-02	SM 5.2E-01
On-Site	AOI 2	S1	INORG	Arsenic	7440-38-2	T	A	1	1	7.74E-03	1.00E-02	SM 7.7E-01
On-Site	AOI 2	S1	INORG	Barium	7440-39-3	D	NC	1	1	1.72E-01	2.00E+00	SM 8.6E-02
On-Site	AOI 2	S1	INORG	Barium	7440-39-3	T	NC	1	1	1.96E-01	2.00E+00	SM 9.8E-02
On-Site	AOI 2	S1	INORG	Chromium (total)	7440-47-3	T		1	1	6.40E-03	1.00E-01	SM 6.4E-02
On-Site	AOI 2	S1	INORG	Cobalt	7440-48-4	T	B1	1	1	3.20E-03	7.30E-01	NC 4.4E-03
On-Site	AOI 2	S1	INORG	Copper	7440-50-8	T	D	1	1	6.96E-03	1.30E+00	SM 5.4E-03
On-Site	AOI 2	S1	INORG	Manganese	7439-96-5	D	D	1	1	1.62E-01	8.76E-01	NC 1.8E-01
On-Site	AOI 2	S1	INORG	Manganese	7439-96-5	T	D	1	1	3.12E-01	8.76E-01	NC 3.6E-01
On-Site	AOI 2	S1	INORG	Nickel	7440-02-0	T	A	1	1	8.44E-03	7.30E-01	NC 1.2E-02
On-Site	AOI 2	S1	INORG	Vanadium	7440-62-2	T		1	1	8.52E-03	3.65E-02	NC 2.3E-01
On-Site	AOI 2	S1	INORG	Zinc	7440-66-6	D	ID	1	1	3.28E-03	1.10E+01	NC 3.0E-04
On-Site	AOI 2	S1	INORG	Zinc	7440-66-6	T	ID	1	1	3.69E-02	1.10E+01	NC 3.4E-03
On-Site	AOI 3	S1	VOC	1,1-Dichloroethane	75-34-3	T	SC	6	2	4.00E-03	3.65E+00	NC 1.1E-03
On-Site	AOI 3	S1	VOC	1,1-Dichloroethene	75-35-4	T	C	6	2	3.90E-03	7.00E-03	SM 5.6E-01
On-Site	AOI 3	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	6	5	5.20E-01	7.00E-02	SM 7.4E+00
On-Site	AOI 3	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		6	4	2.60E-02	1.00E-01	SM 2.6E-01
On-Site	AOI 3	S1	VOC	Trichloroethene	79-01-6	T	C-B2	6	5	6.00E+00	5.00E-03	SM 1.2E+03
On-Site	AOI 3	S1	VOC	Vinyl Chloride	75-01-4	T	A	6	2	2.10E-03	2.00E-03	SM 1.1E+00
On-Site	AOI 3	S2	VOC	Chloroform	67-66-3	T	B2	2	1	3.10E-03	8.00E-02	SM 3.9E-02
On-Site	AOI 3	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	2	2	1.00E-01	7.00E-02	SM 1.4E+00
On-Site	AOI 3	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		2	1	7.80E-03	1.00E-01	SM 7.8E-02
On-Site	AOI 5	I2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	2	1	2.60E-02	7.00E-02	SM 3.7E-01
On-Site	AOI 5	I2	VOC	Trichloroethene	79-01-6	T	C-B2	2	1	6.00E-03	5.00E-03	SM 1.2E+00
On-Site	AOI 5	I2	INORG	Barium	7440-39-3	D	NC	1	1	1.78E-01	2.00E+00	SM 8.9E-02
On-Site	AOI 5	I2	INORG	Barium	7440-39-3	T	NC	2	2	3.69E-01	2.00E+00	SM 1.8E-01
On-Site	AOI 5	I2	INORG	Manganese	7439-96-5	D	D	1	1	1.20E-01	8.76E-01	NC 1.4E-01
On-Site	AOI 5	I2	INORG	Manganese	7439-96-5	T	D	2	2	1.77E-01	8.76E-01	NC 2.0E-01
On-Site	AOI 5	S1	VOC	Benzene	71-43-2	T	A	6	2	2.30E-03	5.00E-03	SM 4.6E-01
On-Site	AOI 5	S1	VOC	1,1-Dichloroethane	75-34-3	T	SC	6	4	1.20E-02	3.65E+00	NC 3.3E-03
On-Site	AOI 5	S1	VOC	1,1-Dichloroethene	75-35-4	T	C	6	4	9.35E-03	7.00E-03	SM 1.3E+00
On-Site	AOI 5	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	6	5	1.10E+00	7.00E-02	SM 1.6E+01
On-Site	AOI 5	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		6	5	7.60E-02	1.00E-01	SM 7.6E-01
On-Site	AOI 5	S1	VOC	Trichloroethene	79-01-6	T	C-B2	6	5	7.60E+00	5.00E-03	SM 1.5E+03
On-Site	AOI 5	S1	VOC	Vinyl Chloride	75-01-4	T	A	6	4	1.00E-01	2.00E-03	SM 5.0E+01
On-Site	AOI 5	S1	INORG	Arsenic	7440-38-2	T	A	5	2	8.37E-03	1.00E-02	SM 8.4E-01
On-Site	AOI 5	S1	INORG	Barium	7440-39-3	D	NC	5	2	1.35E-01	2.00E+00	SM 6.8E-02
On-Site	AOI 5	S1	INORG	Barium	7440-39-3	T	NC	5	3	2.15E-01	2.00E+00	SM 1.1E-01
On-Site	AOI 5	S1	INORG	Chromium (total)	7440-47-3	T		5	1	2.67E-02	1.00E-01	SM 2.7E-01

**Table 2-2a: Groundwater Screening Summary
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	Analized	Detected	Max Detect (mg/L)	Drinking Water Criteria (mg/L)	Ratio of Max Detect to Drinking Water Criteria
On-Site	AOI 5	S1	INORG	Copper	7440-50-8	T	D	5	1	2.70E-02	1.30E+00 SM	2.1E-02
On-Site	AOI 5	S1	INORG	Lead	7439-92-1	T	B2	5	1	1.42E-02	1.50E-02 SM	9.5E-01
On-Site	AOI 5	S1	INORG	Manganese	7439-96-5	D	D	5	5	3.69E-01	8.76E-01 NC	4.2E-01
On-Site	AOI 5	S1	INORG	Manganese	7439-96-5	T	D	5	5	8.01E-01	8.76E-01 NC	9.1E-01
On-Site	AOI 5	S1	INORG	Zinc	7440-66-6	T	ID	5	1	7.35E-02	1.10E+01 NC	6.7E-03
On-Site	AOI 5	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	3	3	3.00E-01	7.00E-02 SM	4.3E+00
On-Site	AOI 5	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		3	2	2.00E-02	1.00E-01 SM	2.0E-01
On-Site	AOI 5	S2	VOC	Trichloroethene	79-01-6	T	C-B2	3	3	1.00E-01	5.00E-03 SM	2.0E+01
On-Site	AOI 5	S2	INORG	Barium	7440-39-3	D	NC	1	1	2.36E-01	2.00E+00 SM	1.2E-01
On-Site	AOI 5	S2	INORG	Barium	7440-39-3	T	NC	1	1	2.24E-01	2.00E+00 SM	1.1E-01
On-Site	AOI 5	S2	INORG	Beryllium	7440-41-7	T	B1	1	1	2.05E-03	4.00E-03 SM	5.1E-01
On-Site	AOI 5	S2	INORG	Manganese	7439-96-5	D	D	1	1	1.56E-01	8.76E-01 NC	1.8E-01
On-Site	AOI 5	S2	INORG	Manganese	7439-96-5	T	D	1	1	1.60E-01	8.76E-01 NC	1.8E-01
On-Site	AOI 6	I2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	3.60E-03	7.00E-02 SM	5.1E-02
On-Site	AOI 6	I2	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	4.30E-03	5.00E-03 SM	8.6E-01
On-Site	AOI 6	I2	INORG	Arsenic	7440-38-2	D	A	1	1	5.61E-03	1.00E-02 SM	5.6E-01
On-Site	AOI 6	I2	INORG	Arsenic	7440-38-2	T	A	1	1	4.26E-03	1.00E-02 SM	4.3E-01
On-Site	AOI 6	I2	INORG	Barium	7440-39-3	D	NC	1	1	3.75E-01	2.00E+00 SM	1.9E-01
On-Site	AOI 6	I2	INORG	Barium	7440-39-3	T	NC	1	1	3.62E-01	2.00E+00 SM	1.8E-01
On-Site	AOI 6	I2	INORG	Manganese	7439-96-5	D	D	1	1	9.56E-02	8.76E-01 NC	1.1E-01
On-Site	AOI 6	I2	INORG	Manganese	7439-96-5	T	D	1	1	1.40E-01	8.76E-01 NC	1.6E-01
On-Site	AOI 6	I2	INORG	Zinc	7440-66-6	T	ID	1	1	2.31E-02	1.10E+01 NC	2.1E-03
On-Site	AOI 6	S1	VOC	1,1-Dichloroethane	75-34-3	T	SC	2	1	1.90E-01	3.65E+00 NC	5.2E-02
On-Site	AOI 6	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	2	1	3.10E-01	7.00E-02 SM	4.4E+00
On-Site	AOI 6	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		2	1	6.00E-03	1.00E-01 SM	6.0E-02
On-Site	AOI 6	S1	VOC	Toluene	108-88-3	T	ID	2	1	2.05E-03	1.00E+00 SM	2.1E-03
On-Site	AOI 6	S1	VOC	1,1,1-Trichloroethane	71-55-6	T	ID	2	1	2.10E-02	2.00E-01 SM	1.1E-01
On-Site	AOI 6	S1	VOC	Trichloroethene	79-01-6	T	C-B2	2	1	5.20E-02	5.00E-03 SM	1.0E+01
On-Site	AOI 6	S1	INORG	Barium	7440-39-3	T	NC	2	1	6.03E-02	2.00E+00 SM	3.0E-02
On-Site	AOI 6	S1	INORG	Manganese	7439-96-5	D	D	2	2	2.00E-01	8.76E-01 NC	2.3E-01
On-Site	AOI 6	S1	INORG	Manganese	7439-96-5	T	D	2	2	2.36E-01	8.76E-01 NC	2.7E-01
On-Site	AOI 6	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	6.20E-01	7.00E-02 SM	8.9E+00
On-Site	AOI 6	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		1	1	5.00E-02	1.00E-01 SM	5.0E-01
On-Site	AOI 6	S2	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	6.70E-01	5.00E-03 SM	1.3E+02
On-Site	AOI 6	S2	INORG	Arsenic	7440-38-2	T	A	1	1	7.79E-03	1.00E-02 SM	7.8E-01
On-Site	AOI 6	S2	INORG	Barium	7440-39-3	T	NC	1	1	3.18E-01	2.00E+00 SM	1.6E-01
On-Site	AOI 6	S2	INORG	Manganese	7439-96-5	T	D	1	1	8.62E-02	8.76E-01 NC	9.8E-02
On-Site	AOI 7	I2	INORG	Arsenic	7440-38-2	T	A	1	1	4.69E-03	1.00E-02 SM	4.7E-01
On-Site	AOI 7	I2	INORG	Barium	7440-39-3	D	NC	1	1	2.70E-01	2.00E+00 SM	1.4E-01
On-Site	AOI 7	I2	INORG	Barium	7440-39-3	T	NC	1	1	2.41E-01	2.00E+00 SM	1.2E-01
On-Site	AOI 7	I2	INORG	Manganese	7439-96-5	D	D	1	1	5.72E-02	8.76E-01 NC	6.5E-02
On-Site	AOI 7	I2	INORG	Manganese	7439-96-5	T	D	1	1	7.36E-02	8.76E-01 NC	8.4E-02
On-Site	AOI 7	I2	INORG	Zinc	7440-66-6	T	ID	1	1	1.02E-02	1.10E+01 NC	9.3E-04

**Table 2-2a: Groundwater Screening Summary
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	Analized	Detected	Max Detect (mg/L)	Drinking Water Criteria (mg/L)	Ratio of Max Detect to Drinking Water Criteria
On-Site	AOI 7	S1	VOC	1,1-Dichloroethene	75-35-4	T	C	3	1	4.50E-03	7.00E-03	SM 6.4E-01
On-Site	AOI 7	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	3	2	1.00E+00	7.00E-02	SM 1.4E+01
On-Site	AOI 7	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		3	1	8.80E-02	1.00E-01	SM 8.8E-01
On-Site	AOI 7	S1	VOC	Trichloroethene	79-01-6	T	C-B2	3	2	4.80E+00	5.00E-03	SM 9.6E+02
On-Site	AOI 7	S1	VOC	Vinyl Chloride	75-01-4	T	A	3	1	2.10E-02	2.00E-03	SM 1.1E+01
On-Site	AOI 7	S1	SVOC	2-Methylnaphthalene	91-57-6	T	ID	2	1	6.40E-04	7.30E-01	NC 8.8E-04
On-Site	AOI 7	S1	INORG	Arsenic	7440-38-2	T	A	3	2	4.55E-03	1.00E-02	SM 4.6E-01
On-Site	AOI 7	S1	INORG	Barium	7440-39-3	D	NC	3	3	1.85E-01	2.00E+00	SM 9.3E-02
On-Site	AOI 7	S1	INORG	Barium	7440-39-3	T	NC	3	3	2.09E-01	2.00E+00	SM 1.0E-01
On-Site	AOI 7	S1	INORG	Manganese	7439-96-5	D	D	3	3	2.64E-01	8.76E-01	NC 3.0E-01
On-Site	AOI 7	S1	INORG	Manganese	7439-96-5	T	D	3	3	3.74E-01	8.76E-01	NC 4.3E-01
On-Site	AOI 7	S1	INORG	Zinc	7440-66-6	T	ID	3	2	1.65E-02	1.10E+01	NC 1.5E-03
On-Site	AOI 7	S2	INORG	Barium	7440-39-3	D	NC	1	1	2.29E-01	2.00E+00	SM 1.1E-01
On-Site	AOI 7	S2	INORG	Barium	7440-39-3	T	NC	1	1	2.48E-01	2.00E+00	SM 1.2E-01
On-Site	AOI 7	S2	INORG	Manganese	7439-96-5	D	D	1	1	1.11E-01	8.76E-01	NC 1.3E-01
On-Site	AOI 7	S2	INORG	Manganese	7439-96-5	T	D	1	1	7.90E-02	8.76E-01	NC 9.0E-02
On-Site	Upgradient	P1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	2.00E-02	7.00E-02	SM 2.9E-01
On-Site	Upgradient	P1	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	1.30E-03	5.00E-03	SM 2.6E-01
On-Site	Upgradient	P1	VOC	Vinyl Chloride	75-01-4	T	A	1	1	6.80E-03	2.00E-03	SM 3.4E+00
On-Site	Upgradient	S2	VOC	Chloroform	67-66-3	T	B2	1	1	2.60E-02	8.00E-02	SM 3.3E-01
On-Site	Upgradient	S2	VOC	Dibromochloromethane	124-48-1	T	C	1	1	6.10E-03	8.00E-02	SM 7.6E-02
On-Site	Upgradient	S2	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	2.20E-03	5.00E-03	SM 4.4E-01
On-Site	Upgradient	S3	VOC	Bromodichloromethane	75-27-4	T	B2	1	1	1.30E-02	8.00E-02	SM 1.6E-01
On-Site	Upgradient	S3	VOC	Chloroform	67-66-3	T	B2	1	1	7.30E-02	8.00E-02	SM 9.1E-01
On-Site	Upgradient	S3	VOC	Dibromochloromethane	124-48-1	T	C	1	1	7.70E-03	8.00E-02	SM 9.6E-02
Off-Site	FMWP	B1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	1.05E-01	7.00E-02	SM 1.5E+00
Off-Site	FMWP	B1	VOC	trans-1,2-Dichloroethene	156-60-5	T		1	1	1.57E-02	1.00E-01	SM 1.6E-01
Off-Site	FMWP	S1	VOC	Tetrachloroethene	127-18-4	T	C-B2	1	1	4.81E-02	5.00E-03	SM 9.6E+00
Off-Site	FMWP	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	1	1	5.18E-01	7.00E-02	SM 7.4E+00
Off-Site	FMWP	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		1	1	7.45E-02	1.00E-01	SM 7.5E-01
Off-Site	FMWP	S2	VOC	Tetrachloroethene	127-18-4	T	C-B2	1	1	9.00E-03	5.00E-03	SM 1.8E+00
Off-Site	FMWP	S2	VOC	Trichloroethene	79-01-6	T	C-B2	1	1	3.86E-01	5.00E-03	SM 7.7E+01
Off-Site	Off-Site East	B1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	2	2	3.00E-01	7.00E-02	SM 4.3E+00
Off-Site	Off-Site East	B1	VOC	trans-1,2-Dichloroethene	156-60-5	T		2	2	1.50E-01	1.00E-01	SM 1.5E+00
Off-Site	Off-Site East	B1	VOC	Vinyl Chloride	75-01-4	T	A	2	2	1.60E-03	2.00E-03	SM 8.0E-01
Off-Site	Off-Site East	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	10	5	2.10E-01	7.00E-02	SM 3.0E+00
Off-Site	Off-Site East	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		10	5	4.30E-02	1.00E-01	SM 4.3E-01
Off-Site	Off-Site East	S1	VOC	Trichloroethene	79-01-6	T	C-B2	10	4	3.86E+00	5.00E-03	SM 7.7E+02
Off-Site	Off-Site East	S1	VOC	Vinyl Chloride	75-01-4	T	A	10	3	1.90E-03	2.00E-03	SM 9.5E-01
Off-Site	Off-Site East	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	5	3	8.27E-01	7.00E-02	SM 1.2E+01
Off-Site	Off-Site East	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		5	3	1.60E-01	1.00E-01	SM 1.6E+00
Off-Site	Off-Site East	S2	VOC	Trichloroethene	79-01-6	T	C-B2	5	3	1.32E+00	5.00E-03	SM 2.6E+02
Off-Site	Off-Site East	S2	VOC	Vinyl Chloride	75-01-4	T	A	5	1	4.10E-03	2.00E-03	SM 2.1E+00

Table 2-2a: Groundwater Screening Summary Former Delco Plant 5, Kokomo, Indiana													
On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	Analyzed	Detected	Max Detect (mg/L)	Drinking Water Criteria (mg/L)		Ratio of Max Detect to Drinking Water Criteria
Off-Site	Off-Site West	B1	VOC	Chloroform	67-66-3	T	B2	4	2	1.40E-02	8.00E-02	SM	1.8E-01
Off-Site	Off-Site West	B1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	4	3	6.20E-01	7.00E-02	SM	8.9E+00
Off-Site	Off-Site West	B1	VOC	trans-1,2-Dichloroethene	156-60-5	T		4	1	3.90E-02	1.00E-01	SM	3.9E-01
Off-Site	Off-Site West	B1	VOC	Trichloroethene	79-01-6	T	C-B2	4	1	1.01E-03	5.00E-03	SM	2.0E-01
Off-Site	Off-Site West	B1	VOC	Vinyl Chloride	75-01-4	T	A	4	1	2.00E-03	2.00E-03	SM	1.0E+00
Off-Site	Off-Site West	S1	VOC	1,1-Dichloroethene	75-35-4	T	C	3	1	2.10E-03	7.00E-03	SM	3.0E-01
Off-Site	Off-Site West	S1	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	3	1	8.80E-01	7.00E-02	SM	1.3E+01
Off-Site	Off-Site West	S1	VOC	trans-1,2-Dichloroethene	156-60-5	T		3	1	5.40E-02	1.00E-01	SM	5.4E-01
Off-Site	Off-Site West	S1	VOC	Trichloroethene	79-01-6	T	C-B2	3	1	5.70E-03	5.00E-03	SM	1.1E+00
Off-Site	Off-Site West	S1	VOC	Vinyl Chloride	75-01-4	T	A	3	1	3.70E-03	2.00E-03	SM	1.9E+00
Off-Site	Off-Site West	S2	VOC	Cumene	98-82-8	T	D	3	1	1.60E-03	3.65E+00	NC	4.4E-04
Off-Site	Off-Site West	S2	VOC	cis-1,2-Dichloroethene	156-59-2	T	ID	3	2	2.70E-01	7.00E-02	SM	3.9E+00
Off-Site	Off-Site West	S2	VOC	trans-1,2-Dichloroethene	156-60-5	T		3	1	8.70E-03	1.00E-01	SM	8.7E-02
Off-Site	Off-Site West	S2	VOC	Ethyl Benzene	100-41-4	T	D	3	1	4.50E-03	7.00E-01	SM	6.4E-03
Off-Site	Off-Site West	S2	VOC	1,1,2-Trichloroethane	79-00-5	T	C	3	1	1.20E-03	5.00E-03	SM	2.4E-01
Off-Site	Off-Site West	S2	VOC	Vinyl Chloride	75-01-4	T	A	3	1	2.00E-03	2.00E-03	SM	1.0E+00
Notes:													
Only detected constituents are shown in each area.													
The drinking water criteria are based on the following hierarchy: State MCL, Federal MCL, Region 9 Tap Water Ingestion value at the lower of the criteria calculated at either the target cancer risk of 1E-5 or target hazard quotient of 1.													
The criteria for non-drinking exposure are the lower of the criteria at either a target cancer risk of 1E-5 or target hazard quotient of 1.													
The criteria for Chromium (total) are the criteria provided by the agency for Chromium VI.													
The criteria for 2-Methylnaphthalene are the criteria provided by the agency for Naphthalene.													
Ratios of concentrations to criteria greater than 1 are shaded in bold.													
Chem Group - chemical group													
Meas Basis - measured basis; T = total, D = dissolved													
Carc Class - USEPA Weight-of-Evidence Cancer Classification													
SM - The criterion is the State MCL.													
NC - The criterion is based on noncancer effects at a target hazard quotient of 1.													

**Table 2-2b: Groundwater Concentrations that Exceed Screening Criteria
Former Delco Plant 5, Kokomo, Indiana**

On/Off Site	Area	Saturated Unit	Location	Sample Date	Chem Group	Chemical	CASRN	Conc (mg/L)	Drinking Water Criteria (mg/L)	Ratio of Conc to Drinking Water Criteria
On-Site	AOI 2	S1	MW-0103-S1U	03/22/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.50E-01	7.0E-02	2.1E+00
On-Site	AOI 2	S1	MW-0103-S1U	03/22/06	VOC	Trichloroethene	79-01-6	1.30E-02	5.0E-03	2.6E+00
On-Site	AOI 3	S1	MW-0605-S1	11/09/06	VOC	Trichloroethene	79-01-6	1.40E+00	5.0E-03	2.8E+02
On-Site	AOI 3	S1	MW-0619-S1	11/20/06	VOC	cis-1,2-Dichloroethene	156-59-2	3.90E-01	7.0E-02	5.6E+00
On-Site	AOI 3	S1	MW-0619-S1	11/20/06	VOC	Trichloroethene	79-01-6	1.90E+00	5.0E-03	3.8E+02
On-Site	AOI 3	S1	MW-0620-S1	11/21/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.10E-01	7.0E-02	1.6E+00
On-Site	AOI 3	S1	MW-0620-S1	11/21/06	VOC	Trichloroethene	79-01-6	5.90E+00	5.0E-03	1.2E+03
On-Site	AOI 3	S1	MW-0621-S1	11/20/06	VOC	cis-1,2-Dichloroethene	156-59-2	8.10E-02	7.0E-02	1.2E+00
On-Site	AOI 3	S1	MW-0621-S1	11/20/06	VOC	Trichloroethene	79-01-6	4.95E+00	5.0E-03	9.9E+02
On-Site	AOI 3	S1	MW-0622-S1	11/21/06	VOC	cis-1,2-Dichloroethene	156-59-2	5.20E-01	7.0E-02	7.4E+00
On-Site	AOI 3	S1	MW-0622-S1	11/21/06	VOC	Trichloroethene	79-01-6	6.00E+00	5.0E-03	1.2E+03
On-Site	AOI 3	S1	MW-0622-S1	11/21/06	VOC	Vinyl Chloride	75-01-4	2.10E-03	2.0E-03	1.1E+00
On-Site	AOI 3	S2	MW-0605-S2	11/09/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.00E-01	7.0E-02	1.4E+00
On-Site	AOI 5	I2	MW-0504-I2	03/27/06	VOC	Trichloroethene	79-01-6	6.00E-03	5.0E-03	1.2E+00
On-Site	AOI 5	S1	MW-0101-S1U	11/10/06	VOC	1,1-Dichloroethene	75-35-4	9.35E-03	7.0E-03	1.3E+00
On-Site	AOI 5	S1	MW-0101-S1U	11/10/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.10E+00	7.0E-02	1.6E+01
On-Site	AOI 5	S1	MW-0101-S1U	11/10/06	VOC	Trichloroethene	79-01-6	7.60E+00	5.0E-03	1.5E+03
On-Site	AOI 5	S1	MW-0101-S1U	11/10/06	VOC	Vinyl Chloride	75-01-4	1.00E-01	2.0E-03	5.0E+01
On-Site	AOI 5	S1	MW-0502-S1	11/10/06	VOC	Trichloroethene	79-01-6	1.80E-01	5.0E-03	3.6E+01
On-Site	AOI 5	S1	MW-0517-S1	03/22/06	VOC	cis-1,2-Dichloroethene	156-59-2	9.00E-01	7.0E-02	1.3E+01
On-Site	AOI 5	S1	MW-0517-S1	03/22/06	VOC	Trichloroethene	79-01-6	1.80E+00	5.0E-03	3.6E+02
On-Site	AOI 5	S1	MW-0517-S1	03/22/06	VOC	Vinyl Chloride	75-01-4	3.00E-02	2.0E-03	1.5E+01
On-Site	AOI 5	S1	MW-0604-S1	11/08/06	VOC	cis-1,2-Dichloroethene	156-59-2	6.00E-01	7.0E-02	8.6E+00
On-Site	AOI 5	S1	MW-0604-S1	11/08/06	VOC	Trichloroethene	79-01-6	2.70E+00	5.0E-03	5.4E+02
On-Site	AOI 5	S1	MW-0604-S1	11/08/06	VOC	Vinyl Chloride	75-01-4	3.10E-02	2.0E-03	1.6E+01
On-Site	AOI 5	S2	MW-0504-S2	11/07/06	VOC	cis-1,2-Dichloroethene	156-59-2	3.00E-01	7.0E-02	4.3E+00
On-Site	AOI 5	S2	MW-0504-S2	11/07/06	VOC	Trichloroethene	79-01-6	1.00E-01	5.0E-03	2.0E+01
On-Site	AOI 5	S2	MW-0604-S2	11/09/06	VOC	Trichloroethene	79-01-6	2.70E-02	5.0E-03	5.4E+00
On-Site	AOI 6	S1	MW-0507-S1	03/27/06	VOC	cis-1,2-Dichloroethene	156-59-2	3.10E-01	7.0E-02	4.4E+00
On-Site	AOI 6	S1	MW-0507-S1	03/27/06	VOC	Trichloroethene	79-01-6	5.20E-02	5.0E-03	1.0E+01
On-Site	AOI 6	S2	MW-0506-S2	03/27/06	VOC	cis-1,2-Dichloroethene	156-59-2	6.20E-01	7.0E-02	8.9E+00
On-Site	AOI 6	S2	MW-0506-S2	03/27/06	VOC	Trichloroethene	79-01-6	6.70E-01	5.0E-03	1.3E+02
On-Site	AOI 7	S1	MW-0102-S1U	03/22/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.00E+00	7.0E-02	1.4E+01
On-Site	AOI 7	S1	MW-0102-S1U	03/22/06	VOC	Trichloroethene	79-01-6	4.80E+00	5.0E-03	9.6E+02
On-Site	AOI 7	S1	MW-0102-S1U	03/22/06	VOC	Vinyl Chloride	75-01-4	2.10E-02	2.0E-03	1.1E+01
On-Site	AOI 7	S1	MW-0505-S1	03/23/06	VOC	Trichloroethene	79-01-6	6.00E-03	5.0E-03	1.2E+00
On-Site	Upgradient	P1	MW-0501-P1	03/22/06	VOC	Vinyl Chloride	75-01-4	6.80E-03	2.0E-03	3.4E+00
Off-Site	FMWP	B1	MW-0617-B1	03/07/07	VOC	cis-1,2-Dichloroethene	156-59-2	1.05E-01	7.0E-02	1.5E+00
Off-Site	FMWP	S1	MW-0617-S1	03/07/07	VOC	Tetrachloroethene	127-18-4	4.81E-02	5.0E-03	9.6E+00

**Table 2-2b: Groundwater Concentrations that Exceed Screening Criteria
Former Delco Plant 5, Kokomo, Indiana**

On/Off Site	Area	Saturated Unit	Location	Sample Date	Chem Group	Chemical	CASRN	Conc (mg/L)	Drinking Water Criteria (mg/L)	Ratio of Conc to Drinking Water Criteria
Off-Site	FMWP	S2	MW-0617-S2	03/07/07	VOC	cis-1,2-Dichloroethene	156-59-2	5.18E-01	7.0E-02	7.4E+00
Off-Site	FMWP	S2	MW-0617-S2	03/07/07	VOC	Tetrachloroethene	127-18-4	9.00E-03	5.0E-03	1.8E+00
Off-Site	FMWP	S2	MW-0617-S2	03/07/07	VOC	Trichloroethene	79-01-6	3.86E-01	5.0E-03	7.7E+01
Off-Site	Off-Site East	B1	MW-0602-B1	11/07/06	VOC	cis-1,2-Dichloroethene	156-59-2	3.00E-01	7.0E-02	4.3E+00
Off-Site	Off-Site East	B1	MW-0608-B1	11/07/06	VOC	cis-1,2-Dichloroethene	156-59-2	1.80E-01	7.0E-02	2.6E+00
Off-Site	Off-Site East	B1	MW-0608-B1	11/07/06	VOC	trans-1,2-Dichloroethene	156-60-5	1.50E-01	1.0E-01	1.5E+00
Off-Site	Off-Site East	S1	MW-0606-S1	11/06/06	VOC	cis-1,2-Dichloroethene	156-59-2	2.10E-01	7.0E-02	3.0E+00
Off-Site	Off-Site East	S1	MW-0606-S1	11/06/06	VOC	Trichloroethene	79-01-6	7.70E-01	5.0E-03	1.5E+02
Off-Site	Off-Site East	S1	MW-0609-S1	11/09/06	VOC	Trichloroethene	79-01-6	2.20E-01	5.0E-03	4.4E+01
Off-Site	Off-Site East	S1	MW-0612-S1	03/07/07	VOC	cis-1,2-Dichloroethene	156-59-2	1.47E-01	7.0E-02	2.1E+00
Off-Site	Off-Site East	S1	MW-0612-S1	03/07/07	VOC	Trichloroethene	79-01-6	3.86E+00	5.0E-03	7.7E+02
Off-Site	Off-Site East	S2	MW-0608-S2	11/07/06	VOC	cis-1,2-Dichloroethene	156-59-2	6.30E-01	7.0E-02	9.0E+00
Off-Site	Off-Site East	S2	MW-0608-S2	11/07/06	VOC	Trichloroethene	79-01-6	6.30E-02	5.0E-03	1.3E+01
Off-Site	Off-Site East	S2	MW-0609-S2	11/10/06	VOC	Vinyl Chloride	75-01-4	4.10E-03	2.0E-03	2.1E+00
Off-Site	Off-Site East	S2	MW-0612-S2	03/07/07	VOC	cis-1,2-Dichloroethene	156-59-2	8.27E-01	7.0E-02	1.2E+01
Off-Site	Off-Site East	S2	MW-0612-S2	03/07/07	VOC	trans-1,2-Dichloroethene	156-60-5	1.60E-01	1.0E-01	1.6E+00
Off-Site	Off-Site East	S2	MW-0612-S2	03/07/07	VOC	Trichloroethene	79-01-6	1.32E+00	5.0E-03	2.6E+02
Off-Site	Off-Site West	B1	MW-0603-B1	11/08/06	VOC	cis-1,2-Dichloroethene	156-59-2	6.20E-01	7.0E-02	8.9E+00
Off-Site	Off-Site West	S1	MW-0616-S1	11/13/06	VOC	cis-1,2-Dichloroethene	156-59-2	8.80E-01	7.0E-02	1.3E+01
Off-Site	Off-Site West	S1	MW-0616-S1	11/13/06	VOC	Trichloroethene	79-01-6	5.70E-03	5.0E-03	1.1E+00
Off-Site	Off-Site West	S1	MW-0616-S1	11/13/06	VOC	Vinyl Chloride	75-01-4	3.70E-03	2.0E-03	1.9E+00
Off-Site	Off-Site West	S2	MW-0603-S2	11/08/06	VOC	cis-1,2-Dichloroethene	156-59-2	2.70E-01	7.0E-02	3.9E+00
Notes:										
Ratios of concentrations to criteria greater than 1 are shaded in bold.										
The drinking water criteria for these constituents are the State MCLs.										
Chem Group - chemical group										

**Table 2-3: Soil Gas Screening Summary
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Carc Class	Analyzed	Detected	Max Detected (ppbv)	Max Limit (ppbv)	IDEM Res SGSL (ppbv)	Ratio of Max Detect to IDEM Res SGSL
VOC	1,1-Dichloroethene	75-35-4	C	14			1.20E+00	5.2E+03	
VOC	cis-1,2-Dichloroethene	156-59-2	ID	14	1	2.93E+00	1.20E+00	9.2E+02	3.2E-03
VOC	trans-1,2-Dichloroethene	156-60-5		14			1.20E+00	1.8E+03	
VOC	Trichloroethene	79-01-6	C-B2	14	2	1.20E+01	1.10E+00	2.2E+01	5.4E-01
VOC	Vinyl Chloride	75-01-4	A	14			1.20E+00	8.5E+01	
Notes:									
All chemicals analyzed in soil gas are shown.									
Duplicate results at location SGP-0704 have been averaged.									
Soil gas samples were collected in the vicinity of off-site monitoring well MW-0612-S1.									
Chem Group - chemical group									
Carc Class - USEPA Weight-of-Evidence Cancer Classification									
IDEM Res SGSL are from Appendix VIII of the IDEM Draft Vapor Intrusion Pilot Program Guidance (IDEM 2006):									
Trichloroethene is the 30-yr potential chronic level from Table 7 of Appendix VIII									
Remaining chemicals are the 30-yr chronic IAAL from Table 2 of Appendix VIII adjusted using the soil gas attenuation factor (0.01)									

**Table 2-4a: Upper-Bound Estimates of Cumulative Cancer Risk and Hazard Index
for Worker Exposures to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Routine Worker Soil Contact Cumulative Risk	Routine Worker Soil Contact HI	Maintenance Worker Cumulative Risk	Maintenance Worker HI
AOI 2	1E-08	5E-03	2E-08	1E-02
AOI 3	3E-04	1E+00	2E-06	3E-02
AOI 5	2E-05	3E-01	2E-07	1E-02
AOI 6	5E-05	3E-01	5E-07	1E-02
AOI 7	1E-05	3E-01	1E-07	7E-03
Notes:				
Highlighting in bold indicates cumulative cancer risks greater than 1E-4 or hazard quotients greater than 1.				
Cumulative cancer risks and HI estimates are based on the maximum detected site-related concentration in each AOI.				

**Table 2-4b: Refined Estimates of Cumulative Cancer Risk and Hazard Index
for Routine Worker Exposure to Soil at AOI 3
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Soil Conc (mg/kg)	Background Conc (mg/kg)	Cancer Risk	HQ
VOC	Acetone	67-64-1	1.20E-01			3E-07
VOC	Benzene	71-43-2	1.60E+00		1E-06	1E-02
VOC	Carbon Disulfide	75-15-0	5.70E-02			5E-05
VOC	Carbon Tetrachloride	56-23-5	2.70E+00		5E-06	7E-03
VOC	Chloroform	67-66-3	3.40E-01		7E-07	2E-03
VOC	Cumene	98-82-8	2.90E-03			7E-07
VOC	Cyclohexane	110-82-7	1.00E-03			7E-08
VOC	1,1-Dichloroethane	75-34-3	1.20E-01			7E-05
VOC	1,1-Dichloroethene	75-35-4	3.90E-01			1E-03
VOC	1,2-Dichloroethene (total)	540-59-0	2.50E-01			1E-05
VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			9E-01
VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01			4E-03
VOC	Ethyl Benzene	100-41-4	2.10E-02			3E-06
VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01			4E-06
VOC	Methylcyclohexane	108-87-2	5.70E-03			1E-06
VOC	Methylene Chloride	75-09-2	1.50E+00		7E-08	4E-04
VOC	Styrene	100-42-5	1.00E-01			5E-06
VOC	Tetrachloroethene	127-18-4	3.40E-03		1E-09	2E-06
VOC	Toluene	108-88-3	8.00E-03			3E-07
VOC	1,1,1-Trichloroethane	71-55-6	2.70E+00			4E-04
VOC	Trichloroethene	79-01-6	1.90E+03		6E-05	2E-01
VOC	Vinyl Chloride	75-01-4	7.90E+00		2E-05	6E-02
VOC	Xylenes (total)	1330-20-7	2.61E-02			3E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.60E-02		3E-10	3E-06
SVOC	Di-n-octylphthalate	117-84-0	3.10E-02			9E-07
SVOC	Fluoranthene	206-44-0	2.60E-02			9E-07
SVOC	Pyrene	129-00-0	2.40E-02			1E-06
INORG	Arsenic	7440-38-2	1.26E+01	1.25E+01	4E-08	2E-04
INORG	Barium	7440-39-3	1.49E+02	1.32E+02		4E-05
INORG	Beryllium	7440-41-7	1.53E+00		4E-10	4E-04
INORG	Cadmium	7440-43-9	1.80E-01		4E-11	1E-04
INORG	Chromium (total)	7440-47-3	1.59E+01	1.67E+01		
INORG	Cobalt	7440-48-4	5.99E+00	1.09E+01		
INORG	Copper	7440-50-8	2.80E+02	3.66E+01		3E-03
INORG	Lead	7439-92-1	1.15E+03	4.64E+01		
INORG	Manganese	7439-96-5	5.50E+02	5.45E+02		5E-05
INORG	Nickel	7440-02-0	1.90E+01	1.91E+01		
INORG	Thallium	7440-28-0	3.50E+00	3.58E+00		
INORG	Vanadium	7440-62-2	3.60E+01	3.13E+01		
INORG	Zinc	7440-66-6	2.42E+02	9.72E+01		
				Sum:	9E-05	1E+00

Notes:

Only detected constituents are shown.

Soil concentrations are the maximum detected concentration in surface or subsurface soil at AOI 3.

Cancer and non-cancer risk estimates are based on the maximum detected site-related concentration in AOI 3.

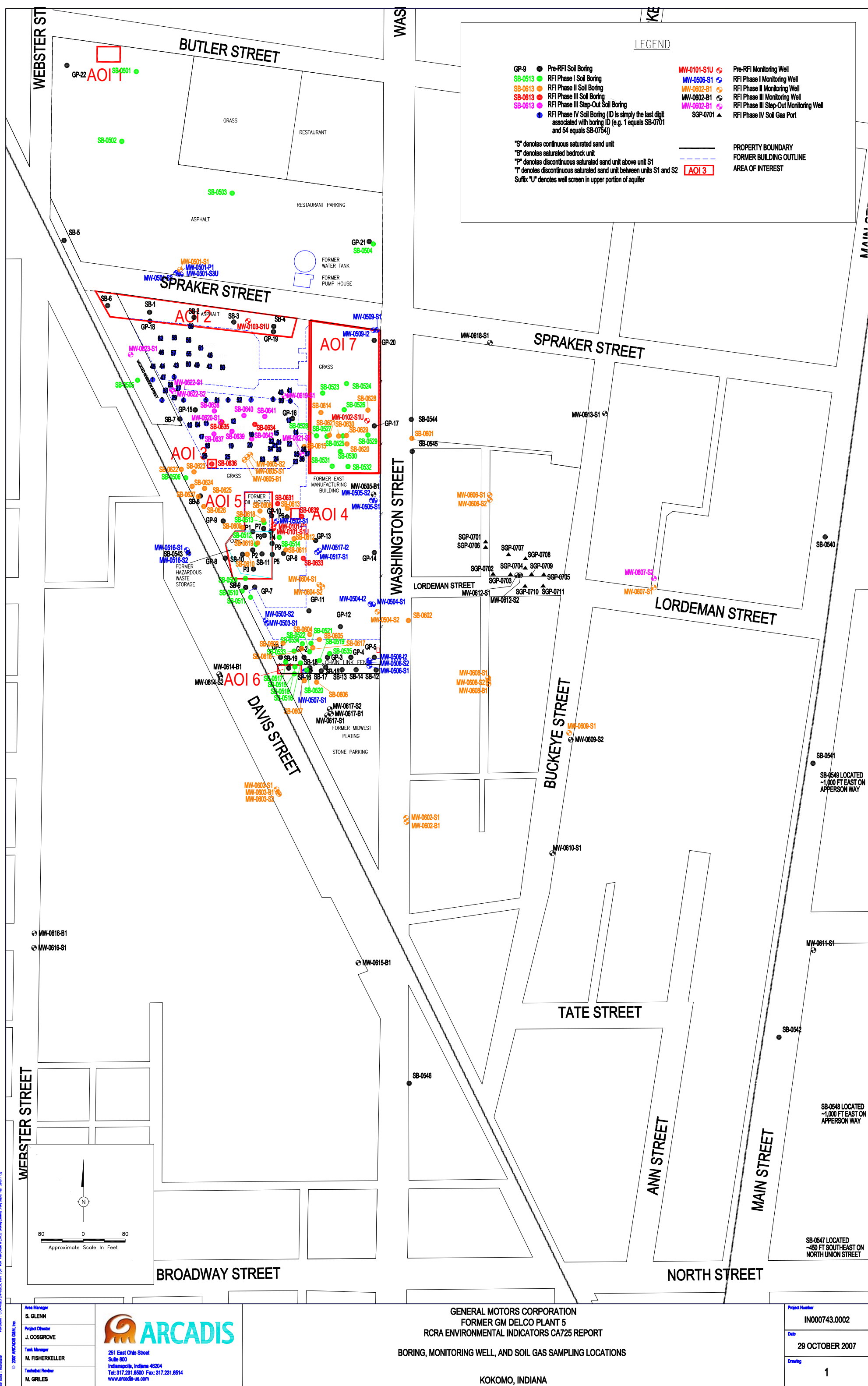
The cancer risk and HQ inhalation calculations for TCE includes 8 feet of non-TCE containing soil overlying the maximum concentration.

The cancer risk and HQ inhalation calculations for all other constituents assume the maximum concentrations occurs at all depths.

**Table 2-4c: Upper-Bound Estimates of Cumulative Cancer Risk and Hazard Index
for Inhalation and Contact Exposures to Constituents in Groundwater
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	AOI	Saturated Unit	Res Vol to Indoor Air Cumulative Cancer Risk	Res Vol to Indoor Air HI	Res Vol to Outdoor Air Cumulative Cancer Risk	Res Vol to Outdoor Air HI	Maintenance Worker Contact Cumulative Cancer Risk	Maintenance Worker Contact HI	Ind Vol to Outdoor Air Cumulative Cancer Risk	Ind Vol to Outdoor Air HI
Off-Site	Off-Site East	S1	1E-06	1E-03	2E-07	2E-03	NA	NA	1E-07	1E-03
Off-Site	Off-Site West	S1	2E-08	4E-03	5E-09	7E-03	NA	NA	3E-09	4E-03
On-Site	AOI 2	S1	NA	NA	NA	NA	NA	NA	4E-10	8E-04
On-Site	AOI 3	S1	NA	NA	NA	NA	NA	NA	2E-07	2E-03
On-Site	AOI 5	S1	NA	NA	NA	NA	NA	NA	3E-07	6E-03
On-Site	AOI 6	S1	NA	NA	NA	NA	NA	NA	2E-09	1E-03
On-Site	AOI 7	S1	NA	NA	NA	NA	NA	NA	2E-07	5E-03
On-Site	Upgradient	P1	NA	NA	NA	NA	4E-08	1E-03	5E-09	2E-04
Note:										
NA: Exposure pathway is not applicable.										

F I G U R E S



A P P E N D I X A

CA725 Form

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action

Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Former GM Delco Plant 5
Facility Address: 1723 North Washington Street, Kokomo, Indiana
Facility EPA ID #: IND 000 806 844

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes - check here and continue with #2 below.
 If no - re-evaluate existing data, or
 If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 2

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”¹ above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			TCE, cis-1,2-DCE, PCE, and vinyl chloride
Air (indoors) ²		X		
Surface Soil (e.g., <2 ft)	X			PCE and lead
Surface Water		X		
Sediment		X		
Subsurf. Soil (e.g., >2 ft)	X			TCE, PCE, and vinyl chloride
Air (outdoors)		X		

_____ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded

 X If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

[See the following page]

Footnotes:

¹ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 3

The presence of "contamination" is identified based on comparison of site characterization data for soil, groundwater, and soil gas samples with generic risk-based and other appropriately protective screening criteria. The screening criteria and the results of the comparison of site characterization data with these criteria are discussed below and in Section 2.2 of the RCRA Environmental Indicators (EI) CA725 Report (ENVIRON 2007).

The screening criteria used to identify "contamination" in soil are derived from the USEPA Region 9 Preliminary Remediation Goals (PRGs) for industrial soil (USEPA 2004). These PRG-based screening criteria were derived using a target cancer risk of 10^{-5} for carcinogenic constituents and a target hazard quotient (HQ) of 1 for non-carcinogenic constituents.

The screening criteria used to identify "contamination" from the most recent groundwater data in all groundwater-bearing units are drinking water criteria based on maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act, and similarly-derived drinking water concentration limits for chemicals that lack MCLs. Drinking water limits for chemicals that lack MCLs are derived from USEPA Region 9 PRGs for ingestion of tap water at a target cancer risk of 10^{-5} and a target HQ of 1. Although drinking water criteria are used for identifying "contamination", potable water at and around the Facility is supplied by the American Water Company, which has a well field located 1.1 miles northwest (upgradient) of the Facility and another well field located 1.5 miles southeast (downgradient) of the Facility. Based on water well logs from the American Water Company, the well field to the northwest extracts groundwater from sand and gravel units (which may be connected to S2 and S3) and the well field to the southeast extracts groundwater predominantly from the bedrock aquifer (which may be connected to B1).

The screening criteria used to identify "contamination" in soil gas are the generic soil gas screening levels that the Indiana Department of Environmental Management (IDEM) is using to decide whether further vapor intrusion investigation is warranted at a site (IDEM 2006). No soil gas concentration exceeds these screening levels.

No free-phase nonaqueous-phase liquid (NAPL) has been observed during the field investigations.

The presence of some constituents in on-site soil at AOIs 3, 5, 6, and 7 and on- and off-site groundwater is considered to meet the definition of "contamination" when the highest constituent concentrations in these areas are compared with the screening criteria. The comparison results for soil are shown on Tables 2-1a and 2-1b, and the comparison results for groundwater are shown on Table 2-2a and 2-2b.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)
Page 4

3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

<u>“Contaminated” Media</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	<u>Yes</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>			<u>No</u>
~~Air (indoors)~~	<u>-</u>	<u>-</u>	<u>-</u>				
Soil (surface, e.g., <2 ft)	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>Yes</u>	<u>No</u>	<u>No</u>
~~Surface Water~~	<u>-</u>	<u>-</u>			<u>-</u>	<u>-</u>	<u>-</u>
~~Sediment~~	<u>-</u>	<u>-</u>			<u>-</u>	<u>-</u>	<u>-</u>
Soil (subsurface e.g., >2 ft)				<u>Yes</u>			<u>No</u>
~~Air (outdoors)~~	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>		

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“___”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

 X If yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code..

Rationale and Reference(s):

[See the following page]

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 5

The Facility is not currently used or occupied. As discussed in the DOCC, demolition of the buildings, including the removal of floor slabs, was completed in 1993 and the majority of the Facility is currently a vacant grass field except for a 4.3 acre asphalt parking lot, a small concrete slab at AOI 5, and a dead end road (Spraker Street) in the northern portion of the Facility. Thus, exposure of on-site receptors to constituents via volatilization and inhalation of vapors in indoor air is not possible. Additionally, potable water at and around the Facility is supplied by the American Water Company. Therefore, the potential for exposure to contamination via usage of groundwater as a drinking water supply does not currently exist at or around the Facility. Current on-site and off-site receptors are as follows:

On-site

Landscapers who mow the grass are the only workers anticipated to be periodically at the Facility. It is also possible that utility maintenance workers may occasionally be on-site to service or repair underground utilities. Access by trespassers is possible, as the Facility is unfenced.

Potential exposure of trespassers and landscapers to constituents in surface soil via direct contact and in subsurface soil and groundwater in the upper-most saturated zones (P1 and S1) via volatilization into outdoor air is possible under current conditions. Potential exposure of maintenance workers via contact with surface and subsurface soil and groundwater in the P1 zone (which has only been found on-site during the RFI groundwater investigation) is possible during excavations.

Off-site

Potential off-site exposure to constituents in groundwater in the upper-most saturated zone (S1) via volatilization into occupied buildings (residential or commercial/industrial) or into outdoor air is possible. Maintenance worker exposure to contaminated groundwater in S1 is not reasonably expected, since S1 is deeper than reasonably expected excavation depths.

No potential on-site or off-site exposure to contaminated groundwater in I2, S2, S3, and B1 is possible for the following reasons: no well withdraws groundwater from these units where contaminated groundwater has been found during the investigation completed to date; these units are deeper than reasonably expected excavation depths; and volatile constituents in these units cannot volatilize into the unsaturated zone and migrate into indoor air.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 6

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be “**significant**”⁴ (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

 X If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

 If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

 If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

Rationale and Reference(s):

[See the following page]

⁴ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 7

The significance of potential exposures to soil and groundwater at the areas listed in Question 2 is discussed below and in Sections 2.4.1 and 2.4.2 of the EI CA725 Report.

On-site Landscapers and Trespassers

The upper-bound estimates of cumulative cancer and noncancer risks for each area identified as having soil contamination, which are based on the maximum detected concentration and the conservative exposure factors for evaluation of routine workers in generic commercial/industrial settings, are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1, respectively, except AOI 3.

These estimates are presented in Table 2-4a and are used as highly conservative surrogate estimates for trespassers and landscapers who are expected to have exposures that are at least an order of magnitude lower. Thus, the upper-bound cumulative cancer risk estimate of 3×10^{-4} at AOI 3 should be interpreted to mean that trespasser and landscaper exposures are insignificant. However, calculations were performed to correct the assumption in the vapor emission calculation that the maximum trichloroethene (TCE) concentration at AOI 3 (1,900 mg/kg) occurs from the ground surface to groundwater so that the routine worker cancer risk estimate can be used as a surrogate to show that trespasser and landscaper exposures are insignificant. Refinements to the vapor emission calculation to account for 8 ft of shallow soil with no significant TCE concentrations, result in a cumulative cancer risk estimate of 9×10^{-5} for routine workers (Table 2-4b). Therefore, risk estimates for trespasser and landscaper exposure to soil would be much lower and clearly not significant.

The potential significance of routine worker inhalation exposures to constituents in groundwater that migrate into outdoors is also evaluated as a highly conservative surrogate for trespassers and landscapers who are expected to have exposures that are at least an order of magnitude lower. Risk estimates for on-site exposures are conservatively evaluated using standard default exposure factors for routine workers and the highest groundwater concentrations in units P1 or S1 at each on-site area. These upper-bound estimates are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1 for all areas identified as having groundwater contamination (Table 2-4c). Therefore, risk estimates from potential volatilization to outdoor air are not significant.

On-site Maintenance Workers

The upper-bound estimates of cumulative cancer and noncancer risks for maintenance worker exposure are based on the maximum detected surface and subsurface soil or P1 groundwater concentrations and the exposure factors for evaluation of maintenance workers. These upper-bound estimates for maintenance worker contact with soil and P1 groundwater are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1, for all AOIs identified as having soil or groundwater contamination (Tables 2-4a and 2-4c). Therefore, risk estimates for maintenance workers are not significant.

Off-site Residents

Constituents in groundwater could migrate into off-site buildings. The potential significance of these inhalation exposures is evaluated based on residential exposures, which is also protective of commercial/industrial exposures and application of the Johnson and Ettinger model (1991) using the highest groundwater concentrations in S1 for each off-site area. The risk estimates for these assumed exposures are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1, for all areas identified as having groundwater contamination (Table 2-4c). Therefore, risk estimates from potential groundwater volatilization to indoor air are not significant.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 8

5. Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

_____ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code

Rationale and Reference(s):

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

Page 9

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

 YE YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Former GM Delco Plant 5 facility, EPA ID # IND 000 806 844, located at 1723 North Washington Street, Kokomo, Indiana under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

 NO - "Current Human Exposures" are NOT "Under Control."

 IN - More information is needed to make a determination.

Completed by (signature) _____ Date _____
 (print) _____
 (title) _____

Supervisor (signature) _____ Date _____
 (print) _____
 (title) _____
 (EPA Region or State) _____

Locations where References may be found:

*U.S. EPA Region 5 - Records Room
77 West Jackson Boulevard
Chicago, IL 60604*

All materials referenced in this document can be found in the following reports:

- *Description of Current Conditions Report (ARCADIS 2005a)*
- *RFI Work Plan (ARCADIS 2005b)*
- *RFI Data Report and Phase II Work Plan (ARCADIS 2006a)*
- *RFI Data Report (ARCADIS 2006b)*
- *RFI Phase III Work Plan (ARCADIS 2006c, 2007a)*
- *RFI Data Report (ARCADIS 2007b)*
- *RFI Work Plan Addendum – Soil Gas Pilot Test (ARCADIS 2007c)*
- *Draft: RFI Phase IV Soil Investigation Data Report (ARCADIS 2007d)*
- *RFI Soil Gas Data Report (ARCADIS 2007e)*
- *RCRA Environmental Indicators (EI) CA725 Report (ENVIRON 2007)*

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

Page 10

Contact telephone and e-mail numbers

(name)	_____
(phone #)	_____
(e-mail)	_____

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

APPENDIX B

HUMAN HEALTH RISK ASSESSMENT SUPPORTING INFORMATION AND CALCULATIONS

C O N T E N T S

B1	INTRODUCTION	1
B2	TOXICITY VALUES	1
B2.1	Toxicity Values for Carcinogens.....	2
B2.2	Toxicity Values for Noncarcinogens.....	2
B2.3	Extrapolation of Toxicity Values	3
B3	PHYSICAL AND CHEMICAL PROPERTIES	3
B4	ROUTINE WORKERS	4
B4.1	Soil Exposures	4
B4.2	Groundwater Vapor Inhalation Outdoors.....	7
B5	MAINTENANCE WORKERS	8
B5.1	Soil Exposures	9
B5.2	Groundwater Exposures	9
B6	RESIDENTS.....	10
B6.1	Indoor Air Exposure	10
B6.2	Outdoor Air Exposure	11
B7	REFERENCES	12

A t t a c h m e n t s

Attachment B1	Exposure Factors
Attachment B2	Toxicity Values
Attachment B3	Physical and Chemical Properties
Attachment B4.1	Exposure of Routine Workers to Soil
Attachment B4.2	Exposure of Routine Workers to Groundwater Vapor
Attachment B5.1	Exposure of Maintenance Workers to Soil
Attachment B5.2	Exposure of Maintenance Workers to Groundwater
Attachment B6	Exposure of Residents to Groundwater Vapor

B1 INTRODUCTION

This appendix provides information and calculations that support the Resource Conservation and Recovery Act (RCRA) Environmental Indicators (EI) Report for the CA725 determination at Former GM Delco Plant 5 (the Facility). The toxicity values and physical/chemical properties for the constituents evaluated in this CA725 determination are discussed in Section B2 and Section B3, respectively. The receptor-specific information in Section B4 to Section B6 is organized to correspond to the receptor populations that are used to evaluate the potential significance of current human exposures. As discussed in Section 2.3 of the CA725 Report, the following receptor populations could have current exposure to media that are considered “contaminated” for the purposes of the CA725 determination:

- trespassers (on-site)
- landscapers (on-site)
- maintenance workers (on-site)
- routine workers (off-site)
- residents (off-site)

As discussed in Section 2.4, current exposures of trespassers and landscapers to contaminated media at the Facility are conservatively evaluated in this CA725 determination by using routine worker risk estimates. As such, risk calculations were performed for hypothetical routine worker exposures rather than for trespasser and landscaper exposures. These risk calculations are discussed in Section B4. The risk calculations for maintenance worker exposures are discussed in Section B5. The risk calculations for off-site residential inhalation exposures are discussed in Section B6, including those for indoor air exposures which are also used to evaluate off-site worker indoor air exposures, as discussed in Section 2.4.

The references cited in this appendix are included in Section 3 of the CA725 Report.

B2 TOXICITY VALUES

The toxicity values used were compiled following USEPA's recommended hierarchy of sources (USEPA 2003):

1. Integrated Risk Information System (IRIS);

2. Provisional Peer Reviewed Toxicity Values (PPRTV); and
3. Other Toxicity Values (e.g., NCEA provisional values and ATSDR minimal risk levels).

When a toxicity value was not available from the first two tiers of the hierarchy, other USEPA and non-USEPA sources of toxicity values were consulted. The toxicity values and their sources are summarized in Attachment B2 and are discussed below.

B2.1 Toxicity Values for Carcinogens

USEPA considers chemicals belonging to the following USEPA cancer weight-of-evidence groups as human carcinogens:

- Group A: Known Human Carcinogen: Sufficient evidence of carcinogenicity in humans
- Group B1: Probable Human Carcinogen: Limited evidence of carcinogenicity in humans
- Group B2: Probable Human Carcinogen: Sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
- Group C: Possible Human Carcinogen: Limited evidence of carcinogenicity in animals and inadequate or lack of evidence in humans

As shown in Attachment B2, USEPA has designated some of the constituents as Group B2 or Group C, which means that USEPA acknowledges that there is either inadequate or a lack of evidence that these constituents actually cause cancer in humans. Therefore, evaluating these constituents as human carcinogens is highly conservative.

USEPA-derived oral cancer slope factors (*SFs*) and inhalation unit risk factors (*URFs*) for the constituents evaluated in this CA725 determination and their sources are shown in Attachment B2. The *SFs* and *URFs* represent 95% upper confidence bounds on the probability of getting cancer over a lifetime per unit dose. As recognized by USEPA, there is significant scientific evidence that some of the *SFs* and *URFs* may be overly conservative and may ignore the potential existence of threshold doses. Nonetheless, they are used here as conservative assessment tools.

B2.2 Toxicity Values for Noncarcinogens

Constituents designated by USEPA as belonging to the cancer weight-of-evidence Group D (Not Classifiable as to Human Carcinogenicity) are considered noncarcinogens. Constituents not designated as belonging to any cancer group lack sufficient information at this time to be evaluated as human carcinogens, and therefore, are evaluated as noncarcinogens. USEPA-

derived chronic oral reference doses (*RfDs*) and chronic inhalation reference concentrations (*RfCs*) for the constituents evaluated in this CA725 determination and their sources are shown in Attachment B2.

The *RfDs* and *RfCs* represent conservative estimates of the daily exposure to the human population, including sensitive subpopulations (e.g., children), which are likely to be without an appreciable risk of deleterious effects during a lifetime. These toxicity values typically incorporate several safety factors to account for uncertainties in their derivation, which, in combination, often result in overall uncertainty factors of 1,000 or more. For many constituents, there is significant scientific debate about the validity of these toxicity values, and the association of these doses and concentrations to potential adverse health consequences. Nonetheless, these reference doses and reference concentrations are used here as conservative assessment tools.

B2.3 Extrapolation of Toxicity Values

The USEPA sources of toxicity values listed above do not provide dermal toxicity values for any of the constituents. Therefore, oral toxicity values (*SFs* and *RfDs*) are used as dermal toxicity values. Adjustments to the oral toxicity values are made in this route-to-route extrapolation based on USEPA guidance (USEPA 2004b).

The USEPA sources of toxicity values listed above do not provide inhalation toxicity values (*URFs* and *RfCs*) for all of the constituents. For a constituent that has no inhalation toxicity value, the *SF* and/or *RfD*, if available, is converted to an *URF* and/or *RfC* using default USEPA assumptions (USEPA 1997).

B3 PHYSICAL AND CHEMICAL PROPERTIES

The physical and chemical properties used in the calculations and their sources are presented in Attachment B3. These properties were compiled from USEPA's Soil Screening Guidance (1996), and the sources cited in this document where values were not directly provided in the document. Other literature sources (including other USEPA guidance documents) that are more specific to certain chemicals were consulted to obtain more accurate values for some properties for some chemicals. These sources are also identified in Attachment B3.

B4 ROUTINE WORKERS

As discussed in Section 2.4 of the CA725 Report, the potential significance of trespasser and landscaper exposures is conservatively evaluated using risk estimates for hypothetical routine worker exposures. The computation of these risk estimates for exposure to soil via ingestion, dermal contact, and inhalation of soil constituents is discussed in Section B4.1. The computation of the risk estimates for exposure via inhalation of groundwater constituents that migrate through the vadose zone to outdoor air is discussed in Section B4.2.

B4.1 Soil Exposures

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.

The dose for evaluating cancer risk is averaged over a lifetime and is called a lifetime average daily dose ($LADD$). The $LADD$ for soil ingestion ($LADD_{ing}$) and soil dermal contact ($LADD_{derm}$) are calculated as follows:

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

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

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

For evaluating long-term (or chronic) noncancer effects, the dose is averaged over the period of exposure and is called an average daily dose (*ADD*). The *ADD* for soil ingestion (*ADD_{ing}*) and soil dermal contact (*ADD_{derm}*) are calculated as follows, respectively:

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

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

The exposure factors for the above equations (as well as for all the other risk equations discussed in this appendix) are summarized in Attachment B1.

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

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

$$HQ = \frac{C_{air}}{RfC} \cdot \frac{EF \cdot ED}{AT}$$

where *URF* is the inhalation unit risk factor and *RfC* is the reference concentration. The air concentration is estimated from:

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

where *C_{soil}* is the concentration in soil, *J* is the normalized average vapor or particulate flux, and *C/Q* is a normalized air concentration.

The normalized average vapor flux *J_v* of a chemical 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 chemicals are present in the soil to an infinite depth. The equation for *J_v* is given by:

$$J_v = 2 \rho_b \sqrt{\frac{D_E}{\pi T}}$$

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

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

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

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, are not repeated here. The effective diffusion coefficient D_E is calculated based on “silty-clay” soil type, which is representative of the vadose zone soil at the Facility. The soil moisture in the vadose zone is estimated using the mean soil moisture from site-specific soil data collected during the RFI. The soil moisture data reported by the laboratory in percent by weight were converted to percent by volume using a typical bulk density of 1.38 kg/L for silty-clay soil (USEPA 2004a). The soil moisture data are summarized in Attachment B4.1.

The normalized average vapor flux J_v from contaminated soil within the depth interval between Z_1 and Z_2 below ground surface, as discussed in Jury et al. (1983, 1990), is calculated by the following equation:

$$J_v = \frac{\rho_b}{T} \left(2 \left(\exp\left(\frac{-Z_1^2}{4D_E T}\right) - \exp\left(\frac{-Z_2^2}{4D_E T}\right) \right) \sqrt{\frac{D_E T}{\pi}} - Z_1 \operatorname{erfc}\left[\frac{Z_1}{2\sqrt{D_E T}}\right] + Z_2 \operatorname{erfc}\left[\frac{Z_2}{2\sqrt{D_E T}}\right] \right)$$

As discussed in Section 2.4.1 of the CA725 Report, this equation was used to estimate TCE vapor emission from the vadose zone soil at AOI 3.

The normalized, average particulate flux $J_{10,w}$ of a chemical from surface 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 details of this model can be found in USEPA guidance (1996), and therefore, are not repeated here.

The C/Q term is estimated using the empirical correlation in USEPA's Supplemental Soil Screening Guidance (2002). The correlation was applied conservatively assuming a 10.5-acre square source area, which is the size of the entire Facility. The correlation was applied using the correlation coefficients for Chicago, which is the nearest city among those available (USEPA 2002). 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 cumulative cancer risk and noncancer HI for exposure to a combination of constituents are conservatively estimated according to USEPA guidance (1989), as follows:

$$Cumulative\ Risk = \sum_i Risk_i$$

$$Hazard\ Index = \sum_i HQ_i$$

The computation of cancer risk and HQ estimates for individual constituents and the summation of these single-chemical estimates to obtain the cumulative cancer risk and HI estimates are shown in Attachment B4.1.

B4.2 Groundwater Vapor Inhalation Outdoors

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 B4.1).

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:

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

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

groundwater to the ground surface. The equilibrium vapor concentration in the above equations is related to the groundwater concentration using Henry's law:

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

where C_{gw} is the groundwater concentration and H is the Henry's law constant (which is adjusted to a subsurface temperature of 12.5 °C).

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

$$D_e = D_v + \frac{D_w}{H}$$

where D_v is the gas phase diffusion coefficient, D_w is the liquid phase diffusion coefficient, and H is the Henry's law constant. The gas and liquid phase diffusion coefficients are calculated using the Millington-Quirk tortuosity model, as follows:

$$D_v = D_{air} \cdot \frac{\theta_a^{(10/3)}}{\theta_t^2}$$
$$D_w = D_{water} \cdot \frac{\theta_w^{(10/3)}}{\theta_t^2}$$

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 θ_t is the total soil porosity. The values of the porosities used in these calculations are the same as those discussed in Section B4.1 for calculating vapor flux from the vadose zone soil.

The estimated outdoor air concentrations are used in the inhalation risk equations discussed in Section B4.1 to calculate inhalation cancer risk and HQ. These estimates and the associated cumulative cancer risk and HI estimates are shown in Attachment B4.2.

B5 MAINTENANCE WORKERS

As discussed in Section 2.4 of the CA725 Report, maintenance workers could be exposed to on-site surface and subsurface soil and shallow on-site groundwater. The computation of risk estimates associated with exposures to surface and subsurface soil is discussed in Section B5.1,

and the computation of risk estimates associated with exposures to groundwater is discussed in Section B5.2.

B5.1 Soil Exposures

The computation of risk estimates for worker exposure to soil via incidental ingestion, dermal contact, and inhalation of vapors and particulates during occasional, small-scale excavations is analogous to the computations discussed in Section B4.1, except these computations use the exposure factors for maintenance workers in Attachment B1 and a different approach for estimating airborne dust concentrations.

For this scenario, the airborne dust concentration is based on the 24-hour average National Ambient Air Quality Standard (NAAQS) of 150 ug/m^3 for PM_{10} . It is conservatively assumed that dust control measures necessary for compliance with the NAAQS would still result in a PM_{10} concentration at this limit during the entire period of excavation. This PM_{10} concentration was converted to $1.5 \times 10^{-7} \text{ kg/m}^3$ and used as the product of $J \cdot (C/Q)$ in the equation for C_{air} in Section B4.1.

The C/Q term for this scenario is also calculated using the empirical correlations recommended by USEPA (2002), but in this case, it is estimated using the correlations for the maximum 1-hour concentration at ground level and for a 15 ft by 15 ft excavation pit.

The risk calculations for these exposures are shown in Attachment B5.1.

B5.2 Groundwater Exposures

The computation of risk estimates for worker exposure to groundwater via incidental ingestion, dermal contact, and inhalation of vapors during occasional, small-scale excavations is analogous to the computations discussed in Section B4.1, except these computations use the groundwater exposure factors for maintenance workers in Attachment B1, and the methods discussed below for estimating dermal dose and vapor flux from exposed groundwater.

Dermal Dose

The absorbed dose (DA) for dermal contact with organic chemicals in water is estimated using the nonsteady-state approach described in USEPA guidance (USEPA 2004b). Derivation of the equations for the non-steady state dermal absorption model is provided in the 2004 USEPA guidance, and therefore, is not repeated here. For inorganic chemicals, the dermal dose is estimated using the steady-state approach, which is also described in USEPA guidance (USEPA 1989).

Vapor Flux

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

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

where H is the Henry's law constant, and k_l and k_g are the liquid-phase and gas-phase mass transfer coefficients (in cm/s) given by the following:

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

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

where MW , MW_o , and MW_w are the molecular weights of the chemical, oxygen, and water, T is the water's absolute temperature (12.5 °C in this case), $k_{l,o}$ 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 risk calculations for these exposures are shown in Attachment B5.2.

B6 RESIDENTS

As discussed in Section 2.3 of the EI CA725 Report, off-site residents could have inhalation exposure to groundwater constituents via vapor intrusion into buildings and via migration through the vadose zone into outdoor air. The computation of risk estimates associated with these exposures is discussed in below.

B6.1 Indoor Air Exposure

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

$$C_{bldg} = \alpha C_v$$

where C_v is the vapor concentration in equilibrium with the groundwater concentration (as discussed in Section B4.2), C_{bldg} is the indoor air concentration, and α is an attenuation coefficient that 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. The parameters in this equation that relate to building characteristics are assigned values based on a generic residential building with a basement, and the assumptions used by the Michigan Department of Environmental Quality for derivation of generic groundwater vapor intrusion criteria (MDEQ 1998). Based on the research that MDEQ performed in selecting its assumptions, the generic building characteristics used in this evaluation are believed to be representative of residential buildings in the Midwest. These assumptions are summarized in Attachment B6.

The effective diffusion coefficient D_T^{eff} in the above equation is calculated using assumptions consistent with those discussed in Section B4.1. The distance between groundwater and building foundation is approximately 4.1 m, based on the typical depth to groundwater in the vicinity of the Facility.

The estimated indoor air concentrations C_{bldg} are used in the inhalation risk equations discussed in Section B4.1 to calculate cancer risk and HQ estimates. The vapor intrusion risk calculations are summarized in Attachment B6.

B6.2 Outdoor Air Exposure

The computation of risk estimates for residential exposure to groundwater via volatilization to outdoor air is analogous to the computations discussed in Section B4.2, except these computations use the exposure factors for residents in Attachment B1. These calculations used the same vapor emission and air dispersion factors as discussed in Section B4.2, since the vadose zone soil on- and off-site are similar and the size of the area of contaminated

groundwater on- and off-site are similar. The outdoor vapor inhalation risk calculations are summarized in Attachment B6.

B7 REFERENCES

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Attachment B1
Exposure Factors

**Attachment B1: High-End Exposure Factors
Former Delco Plant 5, Kokomo, Indiana**

		Resident (Child)	Resident (Adult)		Routine Worker	Maintenance Worker	
Soil Ingestion							
Ingestion Rate (mg/d)	IR	200	100	b	50	b	200
Conversion Factor (kg/mg)	CF	1E-06	1E-06		1E-06		1E-06
Fraction Contacted (unitless)	FC	1.0	1.0		1.0		1.0
Exposure Frequency (d/yr)	EF	350	350	b	250	b	5
Exposure Duration (yr)	ED	6	30	b	25	b	10
Body Weight (kg-bw)	BW	15	70	a	70	a	70
Averaging Time, carc (d)	AT _c	25,550	25,550	a	25,550	a	25,550
Averaging Time, noncarc (d)	AT _{nc}	2,190	10,950	a	9,125	a	3,650
Soil Dermal Contact							
Adherence Factor (mg/cm ²)	AF	0.2	0.07	d	0.2	d	0.2
Skin Surface Area (cm ² /d)	SA	2,800	5,700	d	3,300	d	3,300
Conversion Factor (kg/mg)	CF	1E-06	1E-06		1E-06		1E-06
Fraction Contacted (unitless)	FC	1.0	1.0		1.0		1.0
Exposure Frequency (d/yr)	EF	350	350	b	250	b	5
Exposure Duration (yr)	ED	6	30	b	25	b	10
Body Weight (kg-bw)	BW	15	70	a	70	b	70
Averaging Time, carc (d)	AT _c	25,550	25,550	a	25,550	a	25,550
Averaging Time, noncarc (d)	AT _{nc}	2,190	10,950	a	9,125	a	3,650
Ambient Air Inhalation of Vapor and Particulates							
Fraction Contacted (unitless)	FC	1	1		1		1
Exposure Frequency (d/yr)	EF	350	350	b	250	b	5
Exposure Duration (yr)	ED	6	30	b	25	b	10
Averaging Time, carc (d)	AT _c	25,550	25,550	a	25,550	a	25,550
Averaging Time, noncarc (d)	AT _{nc}	2,190	10,950	a	9,125	a	3,650
Incidental Groundwater Ingestion							
Drinking Rate (L/hr per event)	DR						0.005
Exposure Time (h)	ET						2
Exposure Frequency (d/yr)	EF						5
Exposure Duration (yr)	ED						10
Body Weight (kg-bw)	BW						70
Averaging Time, carc (d)	AT _c						25,550
Averaging Time, noncanc (d)	AT _{nc}						3,650
Groundwater Dermal Contact							
Event Time (hr)	t						2
Skin Surface Area (cm ²)	SA						3,300
Events per Day (event/d)	EV						1
Exposure Frequency (d/yr)	EF						5
Exposure Duration (yr)	ED						10
Body Weight (kg)	BW						70
Averaging Time, cancer (days)	AT _c						25,550
Averaging Time, noncancer (days)	AT _{nc}						3,650

**Attachment B1: High-End Exposure Factors
Former Delco Plant 5, Kokomo, Indiana**

		Resident (Child)	Resident (Adult)		Routine Worker	Maintenance Worker	
Groundwater Vapor Inhalation							
Exposure Frequency (d/yr)	EF					5	e
Exposure Duration (yr)	ED					10	e
Averaging Time, carc (d)	AT _c					25,550	a
Averaging Time, noncarc (d)	AT _{nc}					3,650	a
Indoor Air Vapor Inhalation							
Exposure Time (h exposed/h in a day)	ET	1.00	1.00		1.00		
Exposure Frequency (d/yr)	EF	350	350	b	250	b	
Exposure Duration (yr)	ED	30	30	b	25	b	
Averaging Time, carc (d)	AT _c	25,550	25,550	a	25,550	a	
Averaging Time, noncarc (d)	AT _{nc}	10,950	10,950	a	9,125	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)							
d. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual: Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Final (EPA 2001)							
e. Based on professional judgement and site-specific considerations as follows:							
- Maintenance workers: The exposure time and frequency is based on anticipated excavation time for minor underground repairs by a worker. The exposure duration for a maintenance worker at a given site is assumed to be 10 years.							

Attachment B2
Toxicity Values

Attachment B2: Toxicity Values
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Cancer Classification			SF _{oral} (mg/kg/d) ⁻¹			SF _{dermal} (mg/kg/d) ⁻¹			URF (mg/m ³) ⁻¹			RfD _{oral} (mg/kg/d)				RfD _{dermal} (mg/kg/d)				RfC (mg/m ³)				
			Group	Ref	Note	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes	
VOC	Acetone	67-64-1	ID	1											9.0E-01	1,000	1		9.0E-01	1,000	125	104	3.1E+01	100	129	111	
VOC	Acrolein	107-02-8	ID	1											5.0E-04	100	1		5.0E-04	100	125	104	2.0E-05	1,000	1		
VOC	Acrylonitrile	107-13-1	B1	1		5.4E-01	1		5.4E-01	125	104	6.8E-02	1		4.0E-02	100	129	111	4.0E-02	100	125	104	2.0E-03	1,000	1		
VOC	Benzene	71-43-2	A	1		5.5E-02	1	68	5.5E-02	125	104	7.8E-03	1	60	4.0E-03	300	1		4.0E-03	300	125	104	3.0E-02	300	1		
VOC	Bromobenzene	108-86-1													2.0E-02		4		2.0E-02		125	104	1.0E-02		4	44	
VOC	Bromochloromethane	74-97-5	D	1																							
VOC	Bromodichloromethane	75-27-4	B2	1		6.2E-02	1		6.2E-02	125	104	1.8E-02	1	4, 45	2.0E-02	1,000	1		2.0E-02	1,000	125	104	7.0E-02	1,000	1	4, 44	
VOC	Bromoform	75-25-2	B2	1		7.9E-03	1		7.9E-03	125	104	1.1E-03	1		2.0E-02	1,000	1		2.0E-02	1,000	125	104		2		90	
VOC	Bromomethane	74-83-9	NC	126											1.4E-03	1,000	1		1.4E-03	1,000	125	104	5.0E-03	100	1		
VOC	2-Butanone	78-93-3	ID	1											6.0E-01	1,000	1		6.0E-01	1,000	125	104	5.0E+00	300	1		
VOC	n-Butylbenzene	104-51-8													4.0E-02		4		4.0E-02		125	104	1.4E-01		4	4, 44	
VOC	sec-Butylbenzene	135-98-8																									
VOC	tert-Butylbenzene	98-06-6													4.0E-02		4		4.0E-02		125	104	1.4E-01		4	4, 44	
VOC	Carbon Disulfide	75-15-0													1.0E-01	100	1		1.0E-01	100	125	104	7.0E-01	30	1		
VOC	Carbon Tetrachloride	56-23-5	B2	1		1.3E-01	1		1.3E-01	125	104	1.5E-02	1		7.0E-04	1,000	1		7.0E-04	1,000	125	104	1.9E-01	30	129	111	
VOC	Chlorobenzene	108-90-7	D	1											2.0E-02	1,000	1		2.0E-02	1,000	125	104	5.0E-02	1,000	126		
VOC	Chloroethane	75-00-3				2.9E-03	3		2.9E-03	125	104				4.0E-01		3		4.0E-01		125	104	1.0E+01	300	1		
VOC	2-Chloroethylvinyl ether	110-75-8																									
VOC	Chloroform	67-66-3	B2	1								2.3E-02	1		1.0E-02	1,000	1		1.0E-02	1,000	125	104	5.0E-02	100	117		
VOC	Chloromethane	74-87-3	D	1																			9.0E-02	1,000	1		
VOC	2-Chlorotoluene	95-49-8																									
VOC	4-Chlorotoluene	106-43-4	ID	126											7.0E-02	3,000	126		7.0E-02	3,000	125	104	2.5E-01	3,000	126	4, 44	
VOC	Cumene	98-82-8	D	1											1.0E-01	1,000	1		1.0E-01	1,000	125	104	4.0E-01	1,000	1		
VOC	Cyclohexane	110-82-7	ID	1																			6.0E+00	300	1		
VOC	p-Cymene	99-87-6																									
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	2		1.4E+00	2		1.4E+00	125	104	6.9E-04	2	45										2.0E-04	1,000	1	
VOC	Dibromochloromethane	124-48-1	C	1		8.4E-02	1		8.4E-02	125	104	2.4E-02	1	4, 45	2.0E-02	1,000	1		2.0E-02	1,000	125	104	7.0E-02	1,000	1	4, 44	
VOC	1,2-Dibromoethane	106-93-4	LC	1		2.0E+00	1		2.0E+00	125	104	6.0E-01	1		9.0E-03	3,000	1		9.0E-03	3,000	125	104	9.0E-03	300	1		
VOC	Dibromomethane	74-95-3													1.0E-02	1,000	2	3,26,108	1.0E-02	1,000	125	104	3.5E-02	1,000	2	26,108, 4,	
VOC	trans-1,4-Dichloro-2-butene	110-57-6																									
VOC	1,2-Dichlorobenzene	95-50-1	D	1											9.0E-02	1,000	1		9.0E-02	1,000	125	104	2.0E-01	1,000	2	3	
VOC	1,3-Dichlorobenzene	541-73-1	D	1											9.0E-02	1,000	1	10	9.0E-02	1,000	125	104	1.4E-01	1,000	2	3, 10, 44	
VOC	1,4-Dichlorobenzene	106-46-7	C	2		2.4E-02	2	6	2.4E-02	125	104	6.3E-03	3	45	3.0E-02		3		3.0E-02		125	104	8.0E-01	100	1		
VOC	Dichlorodifluoromethane	75-71-8													2.0E-01	100	1		2.0E-01	100	125	104	2.0E-01	10,000	2		
VOC	1,1-Dichloroethane	75-34-3	SC	126											2.0E-01	3,000	126		2.0E-01	3,000	125	104	5.0E-01	1,000	2	3	
VOC	1,2-Dichloroethane	107-06-2	B2	1		9.1E-02	1		9.1E-02	125	104	2.6E-02	1		2.0E-02		4		2.0E-02		125	104	5.0E-03	3,000	102	92	
VOC	1,1-Dichloroethene	75-35-4	C	1											5.0E-02	100	1		5.0E-02	100	125	104	2.0E-01	30	1		
VOC	1,2-Dichloroethene (total)	540-59-0													9.0E-03	1,000	2		9.0E-03	1,000	125	104	3.2E-02	1,000	2	4, 44	
VOC	cis-1,2-Dichloroethene	156-59-2	ID	126											1.0E-02	3,000	126		1.0E-02	3,000	125	104	3.5E-02	3,000	126	4, 44	
VOC	trans-1,2-Dichloroethene	156-60-5													2.0E-02	1,000	1		2.0E-02	1,000	125	104	6.0E-02	3,000	126		
VOC	1,2-Dichloropropane	78-87-5	B2	2		6.8E-02	2	6	6.8E-02	125	104				9.0E-02	1,000	129	111	9.0E-02	1,000	125	104	4.0E-03	300	1		
VOC	1,3-Dichloropropane	142-28-9	ID	126											2.0E-02	3,000	126		2.0E-02	3,000	125	104	7.0E-02	3,000	126	4, 44	
VOC	2,2-Dichloropropane	594-20-7																									
VOC	1,1-Dichloropropene	563-58-6																									
VOC	1,3-Dichloropropene (total)	542-75-6	B2	1		1.0E-01	1	77	1.0E-01	125	104	4.0E-03	1		3.0E-02	100	1		3.0E-02	100	125</						

Attachment B2: Toxicity Values
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Cancer Classification			SF _{oral} (mg/kg/d) ⁻¹			SF _{dermal} (mg/kg/d) ⁻¹			URF (mg/m ³) ⁻¹			RfD _{oral} (mg/kg/d)				RfD _{dermal} (mg/kg/d)				RfC (mg/m ³)			
			Group	Ref	Note	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes
VOC	1,2,3-Trichlorobenzene	87-61-6																								
VOC	1,2,4-Trichlorobenzene	120-82-1	D	1											1.0E-02	1,000	1		1.0E-02	1,000	125	104	3.5E-03		4	44
VOC	1,1,1-Trichloroethane	71-55-6	D	1											2.8E-01		3		2.8E-01		125	104	2.2E+00	90	126	
VOC	1,1,2-Trichloroethane	79-00-5	C	1		5.7E-02	1		5.7E-02	125	104	1.6E-02	1		4.0E-03	1,000	1		4.0E-03	1,000	125	104				
VOC	Trichloroethene	79-01-6	C-B2	49	18	1.1E-02	49		1.1E-02	125	104	1.7E-03	49		6.0E-03	3,000	46	6, 97	6.0E-03	3,000	125	104				
VOC	Trichlorofluoromethane	75-69-4													3.0E-01	1,000	1		3.0E-01	1,000	125	104	7.0E-01	10,000	2	3
VOC	1,2,3-Trichloropropane	96-18-4	B2	98		2.0E+00	98		2.0E+00	125	104				6.0E-03	1,000	1		6.0E-03	1,000	125	104	5.0E-03	300	97	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1													3.0E+01	10	1		3.0E+01	10	125	104	3.0E+01	100	2	
VOC	1,2,4-Trimethylbenzene	95-63-6	ID	126											5.0E-02	3,000	126		5.0E-02	3,000	125	104	6.0E-03	3,000	126	
VOC	1,3,5-Trimethylbenzene	108-67-8	ID	126											5.0E-02	3,000	126		5.0E-02	3,000	125	104	6.0E-03	3,000	126	
VOC	Vinyl Acetate	108-05-4													1.0E+00	100	2		1.0E+00	100	125	104	2.0E-01	30	1	
VOC	Vinyl Chloride	75-01-4	A	1		1.4E+00	1	78	1.4E+00	125	104	8.8E-03	1	79	3.0E-03	30	1		3.0E-03	30	125	104	1.0E-01	30	1	
VOC	Xylenes (total)	1330-20-7	ID	1											2.0E-01	1,000	1		2.0E-01	1,000	125	104	1.0E-01	300	1	
SVOC	Acenaphthene	83-32-9													6.0E-02	3,000	1		6.0E-02	3,000	125	104	2.1E-01	3,000	1	4, 44
SVOC	Acenaphthylene	208-96-8	D	1											3.0E-02	3,000	1	20	3.0E-02	3,000	125	104	1.1E-01	3,000	1	20, 4, 44
SVOC	Acetophenone	98-86-2	D	1											1.0E-01	3,000	1		1.0E-01	3,000	125	104	3.5E-01	3,000	1	4, 44
SVOC	Anthracene	120-12-7	D	1											3.0E-01	3,000	1		3.0E-01	3,000	125	104		2	90	
SVOC	Atrazine	1912-24-9	C	2		2.2E-01	2		2.2E-01	125	104	6.3E-02	2	4, 45	3.5E-02	100	1		3.5E-02	100	125	104	1.2E-01	100	1	4, 44
SVOC	Benzaldehyde	100-52-7													1.0E-01	1,000	1		1.0E-01	1,000	125	104	3.5E-01	1,000	1	4, 44
SVOC	Benzo(a)anthracene	56-55-3	B2	1		7.3E-01	10	5	7.3E-01	125	104	8.9E-02	128	45												
SVOC	Benzo(a)pyrene	50-32-8	B2	1		7.3E+00	1		7.3E+00	125	104	8.9E-01	128	45												
SVOC	Benzo(b)fluoranthene	205-99-2	B2	1		7.3E-01	10	5	7.3E-01	125	104	8.9E-02	128	45												
SVOC	Benzo(g,h,i)perylene	191-24-2	D	1											3.0E-02	3,000	1	20	3.0E-02	3,000	125	104	1.1E-01	3,000	1	20, 4, 44
SVOC	Benzo(k)fluoranthene	207-08-9	B2	1		7.3E-02	10	5	7.3E-02	125	104	8.9E-03	128	45												
SVOC	Benzoic Acid	65-85-0	D	1											4.0E+00	1	1		4.0E+00	1	125	104	1.4E+01	1	1	4, 44
SVOC	Benzyl Alcohol	100-51-6	ID	126											5.0E-01	300	126		5.0E-01	300	125	104	1.8E+00	300	126	4, 44
SVOC	Biphenyl	92-52-4	D	1											5.0E-02	1,000	1		5.0E-02	1,000	125	104	1.8E-01	1,000	1	4, 44
SVOC	bis(2-Chloroethoxy)methane	111-91-1	D	1											3.0E-03	3,000	126		3.0E-03	3,000	125	104	1.1E-02	3,000	126	4, 44
SVOC	bis(2-Chloroethyl) ether	111-44-4	B2	1		1.1E+00	1		1.1E+00	125	104	3.3E-01	1													
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	B2	1		1.4E-02	1		1.4E-02	125	104	4.0E-03	1	4, 45	2.0E-02	1,000	1		2.0E-02	1,000	125	104	7.0E-02	1,000	1	4, 44
SVOC	4-Bromophenyl-phenyl ether	101-55-3	D	1																						
SVOC	Butylbenzylphthalate	85-68-7	C	1											2.0E-01	1,000	1		2.0E-01	1,000	125	104	7.0E-01	1,000	1	4, 44
SVOC	Caprolactam	105-60-2													5.0E-01	100	1		5.0E-01	100	125	104	1.8E+00	100	1	4, 44
SVOC	Carbazole	86-74-8	B2	2		2.0E-02	2		2.0E-02	125	104	5.7E-03	2	4, 45												
SVOC	4-Chloro-3-methylphenol	59-50-7																								
SVOC	4-Chloroaniline	106-47-8													4.0E-03	3,000	1		4.0E-03	3,000	125	104	1.4E-02	3,000	1	4, 44
SVOC	2-Chloronaphthalene	91-58-7													8.0E-02	3,000	1		8.0E-02	3,000	125	104	2.8E-01	3,000	1	4, 44
SVOC	2-Chlorophenol	95-57-8													5.0E-03	1,000	1		5.0E-03	1,000	125	104	1.8E-02	1,000	1	4, 44
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3																								
SVOC	Chrysene	218-01-9	B2	1		7.3E-03	10	5	7.3E-03	125	104	8.9E-04	128	45												
SVOC	Dibenz(a,h)anthracene	53-70-3	B2	1		7.3E+00	10	5	7.3E+00	125	104	8.9E-01	128	45												
SVOC	Dibenzofuran	132-64-9	D	1											2.0E-03		4		2.0E-03		125	104	7.0E-03		4	4, 44
SVOC	3,3'-Dichlorobenzidine	91-94-1	B2	1		4.5E-01	1		4.5E-01	125	104	1.3E-01	1	4, 45												
SVOC	2,4-Dichlorophenol	120-83-2													3.0E-03	100	1		3.0E-03	100	125	104	1.1E-02	100	1	4, 44
SVOC	Diethylphthalate	84-66-2	D	1											8.0E-01	1,000	1		8.0E-01	1,000	125	104	2.8E+00	1,000	1	4, 44
SVOC	2,4-Dimethylphenol	105-67-9													2.0E-02	3,000	1		2.0E-02	3,000	125	104	7.0E-02	3,000	1	4, 44
SVOC	Dimethylphthalate	131-11-3	D	1											100	2	90		100	125	104			2	90	
SVOC	Di-n-butylphthalate	84-74-2	D	1											1.0E-01	1,000	1	6	1.0E-01	1,000	125	104			1	90
SVOC	4,6-Dinitro-2-methylphenol	534-52-1													1.0E-04		4		1.0E-04		125	104	3.5E-04		4	4, 44
SVOC	2,4-Dinitrophenol	51-28-5													2.0E-03	1,000	1		2.0E-03	1,000	125	104			2	90
SVOC	2,4-Dinitrotoluene	121-14-2	B2	1	28	6.8E-01	1	28	6.8E-01	125	104				2.0E-03	100	1		2.0E-03	100	125	104			2	90
SVOC	2,6-Dinitrotoluene	606-20-2	B2	1	28	6.8E-01	1	28	6.8E-01	125	104	1.9E-01	1	28, 4, 45	1.0E-03	3,000	126		1.0E-03	3,000	125	104	3.5E-03	3,000	126	4, 44
SVOC	Di-n-octylphthalate	117-84-0													4.0E-02	1,000	126		4.0E-02	1,000	125	104			126	90
SVOC	Fluoranthene	206-44-0	D	1											4.0E-02	3,000	1		4.0E-02	3,000	125	104	1.4E-01	3,000	1	4, 44
SVOC	Fluorene	86-73-7	D	1											4.0E-02	3,000	1		4.0E-02	3,000	125	104	1.4E-01	3,000	1	4, 44
SVOC	Hexachlorobenzene	118-74-1	B2	1		1.6E+00	1		1.6E+00	125	104	4.6E-01	1		8.0E-04	100	1		8.0E-04	100	125	104			1	90
SVOC	Hexachlorobutadiene	87-68-3	C	1		7.8E-02	1		7.8E-02	125	104	2.2E-02	1		3.0E-04		4		3.0E-04		125	104				
SVOC	Hexachlorocyclopentadiene	77-47-4	E	1											6.0E-03	1,000	1		6.0E-03	1,000	125	104	2.0E-04	100	1	
SVOC	Hexachloroethane	67-72-1	C	1		1.4E-02	1		1.4E-02	125	104	4.0E-03	1		1.0E-03	1,000	1		1.0E-03	1,000	125	104				
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	1		7.3E-01	10	5	7.3E-01	125	104	8.9E-02	128	45												

Attachment B2: Toxicity Values
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	Cancer Classification			SF _{oral} (mg/kg/d) ⁻¹			SF _{dermal} (mg/kg/d) ⁻¹			URF (mg/m ³) ⁻¹			RfD _{oral} (mg/kg/d)				RfD _{dermal} (mg/kg/d)				RfC (mg/m ³)			
			Group	Ref	Note	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes	Value	UF	Ref	Notes
SVOC	Isophorone	78-59-1	C	1		9.5E-04	1		9.5E-04	125	104				2.0E-01	1,000	1		2.0E-01	1,000	125	104			2	90
SVOC	2-Methylnaphthalene	91-57-6	ID	1											4.0E-03	1,000	1		4.0E-03	1,000	125	104	3.0E-03	3,000	1	61
SVOC	Methylphenol (total)	1319-77-3													5.0E-02	1,000	1	99	5.0E-02	1,000	125	104			1	90, 99
SVOC	Naphthalene	91-20-3	C	1											2.0E-02	3,000	1		2.0E-02	3,000	125	104	3.0E-03	3,000	1	
SVOC	2-Nitroaniline	88-74-4													3.0E-03		4		3.0E-03		125	104	1.1E-04		4	44
SVOC	3-Nitroaniline	99-09-2	C	112		2.1E-02	112		2.1E-02	125	104				3.0E-04	1,000	110		3.0E-04	1,000	125	104	1.0E-03	3,000	111	
SVOC	4-Nitroaniline	100-01-6	C	115		2.1E-02	115		2.1E-02	125	104				3.0E-03	100	113		3.0E-03	100	125	104	4.0E-03	1,000	114	
SVOC	Nitrobenzene	98-95-3	D	1											5.0E-04	10,000	1	6	5.0E-04	10,000	125	104	2.0E-03	10,000	2	3
SVOC	2-Nitrophenol	88-75-5																								
SVOC	4-Nitrophenol	100-02-7																								
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	1		4.9E-03	1		4.9E-03	125	104				2.0E-02	3,000	126		2.0E-02	3,000	125	104			126	90,98
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	1		7.0E+00	1		7.0E+00	125	104	2.0E+00	1	4, 45												
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	2		7.0E-02	2		7.0E-02	125	104	1.0E-02	2		4.0E-02		1		4.0E-02		125	104				
SVOC	Pentachlorophenol	87-86-5	B2	1		1.2E-01	1		1.2E-01	125	104	3.4E-02	1	4, 45	3.0E-02	100	1		3.0E-02	100	125	104	1.1E-01	100	1	4, 44
SVOC	Phenanthrene	85-01-8	D	1											3.0E-02	3,000	1	20	3.0E-02	3,000	125	104	1.1E-01	3,000	1	20, 4, 44
SVOC	Phenol	108-95-2	ID	1											3.0E-01	300	1		3.0E-01	300	125	104			1	90,98
SVOC	Pyrene	129-00-0	D	1											3.0E-02	3,000	1		3.0E-02	3,000	125	104	1.1E-01	3,000	1	4, 44
SVOC	2,4,5-Trichlorophenol	95-95-4													1.0E-01	1,000	1		1.0E-01	1,000	125	104			2	90
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	1		1.1E-02	1		1.1E-02	125	104	3.1E-03	1		1.0E-04		4		1.0E-04		125	104			2	90
PCB	PCBs (total)	1336-36-3	B2	1		2.0E+00	1	30,32	2.0E+00	125	104	5.7E-01	1	30,32, 45	2.0E-05	300	1	72	2.0E-05	300	125	104				
INORG	Antimony	7440-36-0													4.0E-04	1,000	1		6.0E-05	1,000	125	104	1.4E-03	1,000	1	4, 44
INORG	Arsenic	7440-38-2	A	1		1.5E+00	1		1.5E+00	125	104	4.3E+00	1		3.0E-04	3	1		3.0E-04	3	125	104				
INORG	Barium	7440-39-3	NC	1											2.0E-01	300	1		1.4E-02	300	125	104			1	90
INORG	Beryllium	7440-41-7	B1	1								2.4E+00	1		2.0E-03	300	1		1.4E-05	300	125	104	2.0E-05	10	1	
INORG	Cadmium	7440-43-9	B1	1								1.8E+00	1		1.0E-03	10	1	95	2.5E-05	10	125	104	2.0E-04		3	44
INORG	Chromium (total)	7440-47-3										1.2E+01	1	8	3.0E-03	900	1	8	7.5E-05	900	125	104	1.0E-04	300	1	59, 8
INORG	Cobalt	7440-48-4	B1	126								2.8E+00	126		2.0E-02	10	126		2.0E-02	10	125	104	2.0E-05	100	126	
INORG	Copper	7440-50-8	D	1											0.04	2	50	49	4.0E-02	2	125	104	0.14	2	50	49, 4, 44
INORG	Cyanide (total)	57-12-5	D	1											0.02	500	1		2.0E-02	500	125	104	0.07	500	1	4, 44
INORG	Lead	7439-92-1	B2	1																						
INORG	Manganese	7439-96-5	D	1											1.4E-01	1	1		8.4E-03	1	125	104	5.0E-05	1,000	1	
INORG	Mercury	7439-97-6	D	1											3.0E-04	1,000	1	51	2.1E-05	1,000	125	104	3.0E-04	30	1	
INORG	Nickel	7440-02-0	A	1								2.4E-01	1		2.0E-02	300	1		8.0E-04	300	125	104	9.0E-05	30	129	111
INORG	Selenium	7782-49-2	D	1											5.0E-03	3	1		5.0E-03	3	125	104	1.8E-02	3	1	4, 44
INORG	Silver	7440-22-4	D	1											5.0E-03	3	1		2.0E-04	3	125	104	1.0E-05	1,000	83	
INORG	Thallium	7440-28-0													7.0E-05	3,000	52	49	7.0E-05	3,000	125	104	2.5E-04	3,000	52	49, 4, 44
INORG	Vanadium	7440-62-2													1.0E-03		3		2.6E-05		125	104	3.5E-03		3	4, 44
INORG	Zinc	7440-66-6	ID	1											3.0E-01	3	1		3.0E-01	3	125	104	1.1E+00	3	1	4, 44

**Attachment B2: References and Notes for Toxicity Values
Former Delco Plant 5, Kokomo, Indiana**

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**Attachment B2: 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.
- 4 ENVIRON obtained value by route-to-route extrapolation.
- 5 Based on analogy to Benzo(a)pyrene [CASRN 50-32-8] using USEPA relative potency described in the indicated reference.
- 6 Under review, according to IRIS.
- 8 ENVIRON used Chromium VI [CASRN 18540-29-9] value from IRIS (reference 1) as a surrogate.
- 10 ENVIRON used 1,2-Dichlorobenzene [CASRN 95-50-1] value from the indicated reference as a surrogate.
- 11 ENVIRON used 1,3-Dichloropropene (total) [CASRN 542-75-6] value from the indicated reference as a surrogate.
- 12 ENVIRON used Chlordane [CASRN 57-74-9] value from IRIS (reference 1) or HEAST (reference 2) as a surrogate.
- 13 ENVIRON used Endosulfan [CASRN 115-29-7] value from IRIS (reference 1) or HEAST (reference 2) as a surrogate.
- 18 Not verifiable, according to IRIS.
- 20 ENVIRON used Pyrene [CASRN 129-00-0] value from IRIS (reference 1) as a surrogate.
- 26 USEPA obtained value by route-to-route extrapolation.
- 28 USEPA used 2,4-,2,6-Dinitrotolunene mixture value from IRIS (reference 1) 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.
- 34 Lowest risk & persistence tier. Criteria for use: congener or isomer analyses verify that congeners with more than 4 chlorines comprise less than 1/2 % of total PCBs.
- 44 ENVIRON derived inhalation RfC from inhalation RfD value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
- 45 ENVIRON derived inhalation URF from Inhalation Slope Factor value presented in the indicated reference, using standard USEPA methodology presented in HEAST.
- 48 ENVIRON used Endrin [CASRN 72-20-8] value from IRIS (reference 1) as a surrogate.
- 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.
- 61 ENVIRON used Naphthalene [CASRN 91-20-3] value from indicated reference as a surrogate.
- 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].
- 77 IRIS provides an alternate slope factor of 5E-2; however, EPA does not recommend its use, due to the higher uncertainty in the delivered dose in the supporting study.
- 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
- 83 ENVIRON used PCBs (total) [CASRN 1336-36-3] value as a surrogate.
- 86 This is a DRAFT toxicity value.
- 90 Inadequate data exist to derive a toxicity value, according to the indicated reference.
- 92 NCEA directed ENVIRON to use outdated value.
- 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
- 95 This RfD is for dietary exposure. The RfD for drinking water exposure is 0.0005 mg/kg/day.
- 97 ENVIRON used withdrawn source.
- 98 Route-to-route extrapolation is not appropriate, according to the indicated reference.
- 99 ENVIRON used 3-Methylphenol [CASRN 108-39-4] values from the indicated reference as a surrogate.
- 102 A dose equivalency factor of 4.5 was applied to the chronic RfC to derive the subchronic RfC.
- 104 Dermal toxicity value is extrapolated from oral toxicity value in accordance with the referenced EPA guidance.
- 105 Adjustment for gastrointestinal absorption efficiencies should not be applied according to the indicated reference.
- 106 This ABSGI is for dietary exposure. The ABSGI for drinking water exposure is 0.050.
- 107 Per Exhibit 4-1 in the indicated reference, the ABSGI value ranges from 30 to 80 percent.
- 108 Assumes an inhalation absorption factor of 0.5.

Attachment B3
Physical and Chemical Properties

Attachment B3: Physical and Chemical Properties																																																							
Former Delco Plant 5, Kokomo, Indiana																																																							
Chem Group	Chemical	CASRN	MW (g/mole)			K _{ow} (unitless)			K _{oc} (L/kg)			K _d (L/kg)			H (unitless)			s (mg/L)			VP (mm Hg)			D _{air} (m ² /d)			D _{water} (m ² /d)			K _p (cm/hr)			ABS _d (unitless)			FA (unitless)			ΔH _{v,b} (cal/mol)			T _c (Kelvin)			T _b (Kelvin)			HENRY Ref Temp (°C)							
			Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes	Value	Ref	Notes											
SVOC	4-Chloroaniline	106-47-8	1.3E+02	50.1		7.1E+01	44		6.6E+01	44				1.4E-05	44		5.3E+03	44		1.2E-02	50.1	92	4.2E-01	44		8.7E-05	44		5.1E-03	44	115	1.0E-01	62		1.0E+00	62	114	1.17E+04	44		118	7.54E+02	44		118	5.04E+02	44		118	2.5E+01					
SVOC	2-Chloronaphthalene	91-58-7	1.6E+02	50.1		1.3E+04	1		1.1E+04	1	82			1.3E-02	50.1	92	1.2E+01	50.1	92	8.0E-03	50.1	92	4.3E-01	69		7.6E-05	69		1.0E-01	1	115	1.0E-01	62		1.0E+00	62	114																		
SVOC	2-Chlorophenol	95-57-8	1.3E+02	50.1		1.4E+02	44		3.9E+02	44	43			1.6E-02	44		2.2E+04	44		2.3E+00	50.1	92	4.3E-01	44		8.2E-05	44		7.9E-03	44	115	1.0E-01	62		1.0E+00	62			9.57E+03	44		118	6.75E+02	44		118	4.48E+02	44		118	2.5E+01				
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	2.0E+02	50.1		1.2E+04	1		1.0E+04	1	82			9.0E-03	1	55	1.4E+00	50.1	90	2.7E-03	1		2.5E-01	69		6.6E-05	69		5.6E-02	1	115	1.0E-01	62		1.0E+00	62	114																		
SVOC	Chrysene	218-01-9	2.3E+02	50.1		5.0E+05	44		4.0E+05	44	82			3.9E-03	44		1.6E-03	44		6.2E-09	50.1	92	2.1E-01	44		5.4E-05	44		4.8E-01	44	115	1.3E-01	62		9.0E-01	62	117	1.65E+04	44		118	9.79E+02	44		118	7.14E+02	44		118	2.5E+01					
SVOC	Dibenz(a,h)anthracene	53-70-3	2.8E+02	50.1		4.9E+06	44		3.8E+06	44	82			6.0E-07	44		2.5E-03	44		1.0E-10	50.1	92	1.7E-01	44		4.5E-05	44		1.1E+00	44	115	1.3E-01	62		7.0E-01	62	117	3.00E+04	44		118	9.90E+02	44		118	7.43E+02	44		118	2.5E+01					
SVOC	Dibenzofuran	132-64-9	1.7E+02	50.1		2.5E+04	69		2.1E+04	69	82			5.1E-04	50.1	92	1.0E+01	50.1	93	1.8E-04	50.1	92	2.1E-01	69		5.2E-05	69		1.4E-01	69	115	1.0E-01	62		1.0E+00	62	114	6.64E+04	70			8.24E+02	70			5.60E+02	70								
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.5E+02	50.1		3.2E+03	44		7.2E+02	44	111			1.6E-07	44		3.1E+00	44		3.7E-08	50.1	92	1.7E-01	44		5.8E-05	44		1.3E-02	44	115	1.0E-01	62		1.0E+00	62			2.00E+04	44		118	7.54E+02	44		118	5.60E+02	44		118	2.5E+01				
SVOC	2,4-Dichlorophenol	120-83-2	1.6E+02	50.1		1.2E+03	44		1.5E+02	44	43			1.3E-04	44		4.5E+03	44		6.7E-02	50.1	92	3.0E-01	44		7.6E-05	44		2.1E-02	44	115	1.0E-01	62		1.0E+00	62			1.50E+04	44		118	7.08E+02	44		118	4.82E+02	44		118	2.5E+01				
SVOC	Diethylphthalate	84-66-2	2.2E+02	50.1		3.2E+02	44		2.9E+02	44	82			1.9E-05	44		1.1E+03	44		1.7E-03	50.1	92	2.2E-01	44		5.5E-05	44		4.0E-03	44	115	1.0E-01	62		1.0E+00	62			1.37E+04	44		118	7.57E+02	44		118	5.67E+02	44		118	2.5E+01				
SVOC	2,4-Dimethylphenol	105-67-9	1.2E+02	50.1		2.3E+02	44		2.1E+02	44				8.2E-05	44		7.9E+03	44		9.8E-02	50.1	92	5.0E-01	44		7.5E-05	44		1.2E-02	44	115	1.0E-01	62		1.0E+00	62			1.13E+04	44		118	7.08E+02	44		118	4.84E+02	44		118	2.5E+01				
SVOC	Dimethylphthalate	131-11-3	1.9E+02	50.1		7.4E+01	69		6.9E+01	69	82			4.3E-06	50.1	92	4.0E+03	50.1	92	1.7E-03	50.1	92	4.9E-01	69		5.4E-05	69		2.2E-03	69	115	1.0E-01	62		1.0E+00	62																			
SVOC	Di-n-butylphthalate	84-74-2	2.8E+02	50.1		4.1E+04	44		3.4E+04	44	82			3.9E-08	44		1.1E+01	44		7.3E-05	50.1	92	3.8E-01	44		6.8E-05	44		4.8E-02	44	115	1.0E-01	62		9.0E-01	62			1.48E+04	44		118	7.99E+02	44		118	6.13E+02	44		118	2.5E+01				
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.0E+02	50.1		1.3E+02	69		1.2E+02	69	82			1.7E-05	50.1	92	2.0E+02	50.1	92	3.2E-04	50.1	92	2.4E-01	69		6.0E-05	69		3.1E-03	69	115	1.0E-01	62		1.0E+00	62																			
SVOC	2,4-Dinitrophenol	51-28-5	1.8E+02	50.1		3.5E+01	44		1.0E-02	44	43			1.8E-05	44		2.8E+03	44		5.1E-03	50.1	92	2.4E-01	44		7.8E-05	44		1.6E-03	44	115	1.0E-01	62		1.0E+00	62			2.50E+04	44		118	8.28E+02	44		118	6.05E+02	44		118	2.5E+01				
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	50.1		1.0E+02	44		9.5E+01	44	82			3.8E-06	44		2.7E+02	44		1.5E-04	50.1	92	1.8E+00	44		6.1E-05	44		3.2E-03	44	115	1.0E-01	62		1.0E+00	62			1.35E+04	44		118	8.14E+02	44		118	5.90E+02	44		118	2.5E+01				
SVOC	2,6-Dinitrotoluene	606-20-2	1.8E+02	50.1		7.4E+01	44		8.9E+01	44	82			3.1E-05	44		1.8E+02	44		5.7E-04	50.1	92	2.8E-01	44		6.3E-05	44		2.6E-03	44	115	1.0E-01	62		1.0E+00	62			1.29E+04	44		118	7.70E+02	44		118	5.58E+02	44		118	2.5E+01				
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	50.1		1.1E+08	44		8.4E+07	44	82			2.7E-03	44		2.0E-02	44		2.6E-06	50.1	92	1.3E-01	44		3.1E-05	44		2.2E+00	44	115	1.0E-01	62		3.0E-01	62	117	1.40E+04	44		118	8.62E+02	44		118	7.04E+02	44		118	2.5E+01					
SVOC	Fluoranthene	206-44-0	2.0E+02	50.1		1.3E+05	44		1.1E+05	44	82			6.6E-04	44		2.1E-01	44		7.8E-06	50.1	94	2.6E-01	44		5.5E-05	44		2.8E-01	44	115	1.3E-01	62		1.0E+00	62			1.38E+04	44		118	9.05E+02	44		118	6.56E+02	44		118	2.5E+01				
SVOC	Fluorene	86-73-7	1.7E+02	50.1		1.6E+04	44		1.4E+04	44	82			2.6E-03	44		2.0E+00	44		6.3E-04	50.1	92	3.1E-01	44		6.8E-05	44		1.1E-01	44	115	1.3E-01	62		1.0E+00	62	114	1.27E+04	44		118	8.70E+02	44		118	5.70E+02	44		118	2.5E+01					
SVOC	Hexachlorobenzene	118-74-1	2.8E+02	50.1		7.8E+05	44		5.5E+04	44	111			5.4E-02	44		6.2E+00	44		1.8E-05	50.1	92	4.7E-01	44		5.1E-05	44		3.1E-01	44	115	1.0E-01	62		8.0E-01	62	117	1.44E+04	44		118	8.25E+02	44		118	5.83E+02	44		118	2.5E+01					
SVOC	Hexachlorobutadiene	87-68-3	2.6E+02	50.1		6.5E+04	44		5.4E+04	44	82			3.3E-01	44		3.2E+00	44		2.2E-01	50.1	92	4.8E-01	44		5.3E-05	44		8.2E-02	44	115	1.0E-01	62		9.0E-01																				

**Attachment B3: References and Notes For Physical and Chemical Properties
Former Delco Plant 5, Kokomo, Indiana**

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68	PHYSPROP data base. Syracuse Research Corporation.
69	USEPA. 2004. WATER9. Version 2.0.0. Office of Air Quality Planning and Standards. July.
70	USEPA. 2003. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. June 19.

**Attachment B3: References and Notes For Physical and Chemical Properties
Former Delco Plant 5, Kokomo, Indiana**

Notes:

43	pH associated with value is 6.8.
44	ENVIRON used the value for Chlordane [CASRN 57-74-9] value from reference 44 as a surrogate.
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
49	At 25 degrees Celsius
55	Reference temperature is unspecified.
60	Hydrolyzes
61	Insoluble
63	min temperature: max is 25C
66	Slightly soluble
82	ENVIRON used Equation (70) from Reference 44 to calculate Koc value using Log Kow value from indicated reference.
90	Indicated source cites CHEMCALC.
91	Indicated source cites CHEMEST.
92	Indicated source cites CHEMFATE.
93	Indicated source cites FATE.
94	Indicated source cites LIVECHEM.
99	ENVIRON used the value for 3-Methylphenol [CASRN 108-39-4] value as a surrogate.
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.
113	Personal communication with RCRA, Superfund & EPCRA Hotline on 9/15/2000; indicated reference presents the value which is off by an order of magnitude (1.23E-06 cm ² /s). The database has the correct value of 1.23E-05 cm ² /s.
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".
120	ENVIRON used the value for 4,4'-DDT [50-29-3] from the indicated reference as a surrogate.
121	ENVIRON used the value for gamma-BHC [CASRN 58-89-9] from the indicated reference as a surrogate

Attachment B3 - 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	$\Delta H_{v,rs}$ (cal/mol)	Henry Extrapolation Multiplier	Adjusted H (unitless)
VOC	Acetone	67-64-1	6.96E+03	5.08E+02	3.29E+02	3.0E+02	1.59E-03	6.48E-01	3.63E-01	7.53E+03	5.99E-01	9.52E-04
VOC	Acrolein	107-02-8	6.73E+03	5.06E+02	3.26E+02	2.9E+02	4.99E-03	6.43E-01	3.60E-01	7.23E+03	7.41E-01	3.69E-03
VOC	Acrylonitrile	107-13-1	7.79E+03	5.19E+02	3.50E+02	2.9E+02	4.21E-03	6.75E-01	3.83E-01	8.82E+03	6.90E-01	2.90E-03
VOC	Benzene	71-43-2	7.34E+03	5.62E+02	3.53E+02	3.0E+02	2.28E-01	6.28E-01	3.49E-01	8.10E+03	5.74E-01	1.31E-01
VOC	Bromobenzene	108-86-1				3.0E+02	8.53E-02					4.26E-02
VOC	Bromochloromethane	74-97-5				3.0E+02	5.89E-02					2.94E-02
VOC	Bromodichloromethane	75-27-4	7.80E+03	5.86E+02	3.63E+02	3.0E+02	6.56E-02	6.20E-01	3.43E-01	8.64E+03	5.51E-01	3.62E-02
VOC	Bromoform	75-25-2	9.48E+03	6.96E+02	4.22E+02	3.0E+02	2.19E-02	6.07E-01	3.33E-01	1.08E+04	4.68E-01	1.03E-02
VOC	Bromomethane	74-83-9	5.71E+03	4.67E+02	2.77E+02	3.0E+02	2.56E-01	5.93E-01	3.22E-01	5.63E+03	6.89E-01	1.76E-01
VOC	2-Butanone	78-93-3	7.48E+03	5.37E+02	3.53E+02	2.9E+02	2.28E-03	6.57E-01	3.70E-01	8.39E+03	7.03E-01	1.61E-03
VOC	n-Butylbenzene	104-51-8	9.29E+03	6.61E+02	4.56E+02	3.0E+02	5.11E-01	6.91E-01	3.95E-01	1.18E+04	4.36E-01	2.23E-01
VOC	sec-Butylbenzene	135-98-8	8.87E+04	6.79E+02	4.47E+02	3.0E+02	4.66E-01	6.58E-01	3.71E-01	1.08E+05	3.63E-04	1.69E-04
VOC	tert-Butylbenzene	98-06-6	8.98E+03	1.22E+03	4.42E+02	3.0E+02	4.78E-01	3.62E-01	3.00E-01	9.49E+03	5.18E-01	2.48E-01
VOC	Carbon Disulfide	75-15-0	6.39E+03	5.52E+02	3.19E+02	3.0E+02	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	3.0E+02	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	3.0E+02	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	2.9E+02	3.60E-01	6.20E-01	3.43E-01	5.88E+03	7.88E-01	2.84E-01
VOC	2-Chloroethylvinyl ether	110-75-8				2.9E+02						
VOC	Chloroform	67-66-3	6.99E+03	5.36E+02	3.34E+02	3.0E+02	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	2.9E+02	3.60E-01	5.98E-01	3.27E-01	4.72E+03	8.30E-01	2.99E-01
VOC	2-Chlorotoluene	95-49-8				3.0E+02	1.46E-01					7.30E-02
VOC	4-Chlorotoluene	106-43-4				2.9E+02						
VOC	Cumene	98-82-8	1.03E+04	6.31E+02	4.26E+02	3.0E+02	5.32E-01	6.74E-01	3.83E-01	1.26E+04	4.11E-01	2.19E-01
VOC	Cyclohexane	110-82-7				2.9E+02	7.97E+00					3.98E+00
VOC	p-Cymene	99-87-6				2.9E+02						
VOC	1,2-Dibromo-3-chloropropane	96-12-8				2.9E+02	6.01E-03					3.00E-03
VOC	Dibromochloromethane	124-48-1	5.90E+03	6.78E+02	4.16E+02	3.0E+02	3.21E-02	6.14E-01	3.38E-01	6.76E+03	6.33E-01	2.03E-02
VOC	1,2-Dibromomethane	106-93-4	8.31E+03	5.83E+02	4.05E+02	2.9E+02	3.04E-02	6.94E-01	3.98E-01	1.02E+04	6.49E-01	1.97E-02
VOC	Dibromomethane	74-95-3	7.87E+03	5.83E+02	3.70E+02	2.9E+02	3.52E-02	6.35E-01	3.54E-01	8.85E+03	6.89E-01	2.42E-02
VOC	trans-1,4-Dichloro-2-butene	110-57-6				3.0E+02	3.58E-03					1.79E-03
VOC	1,2-Dichlorobenzene	95-50-1	9.70E+03	7.05E+02	4.54E+02	3.0E+02	7.79E-02	6.43E-01	3.60E-01	1.17E+04	4.41E-01	3.44E-02
VOC	1,3-Dichlorobenzene	541-73-1	9.23E+03	6.84E+02	4.46E+02	2.9E+02	1.27E-01	6.52E-01	3.67E-01	1.11E+04	6.21E-01	7.87E-02
VOC	1,4-Dichlorobenzene	106-46-7	9.27E+03	6.85E+02	4.47E+02	3.0E+02	9.96E-02	6.53E-01	3.67E-01	1.12E+04	4.56E-01	4.54E-02
VOC	Dichlorodifluoromethane	75-71-8	9.42E+03	3.85E+02	2.43E+02	2.9E+02	1.40E+01	6.32E-01	3.52E-01	8.31E+03	7.06E-01	9.89E+00
VOC	1,1-Dichloroethane	75-34-3	6.90E+03	5.23E+02	3.31E+02	3.0E+02	2.30E-01	6.32E-01	3.52E-01	7.42E+03	6.03E-01	1.39E-01
VOC	1,2-Dichloroethane	107-06-2	7.64E+03	5.61E+02	3.57E+02	3.0E+02	4.01E-02	6.36E-01	3.54E-01	8.50E+03	5.57E-01	2.23E-02
VOC	1,1-Dichloroethene	75-35-4	6.25E+03	5.76E+02	3.05E+02	3.0E+02	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				2.9E+02	3.84E-01					1.92E-01
VOC	cis-1,2-Dichloroethene	156-59-2	7.19E+03	5.44E+02	3.34E+02	3.0E+02	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	3.0E+02	3.85E-01	6.21E-01	3.44E-01	7.11E+03	6.17E-01	2.38E-01
VOC	1,2-Dichloropropane	78-87-5	7.59E+03	5.72E+02	3.70E+02	3.0E+02	1.15E-01	6.46E-01	3.62E-01	8.60E+03	5.53E-01	6.36E-02
VOC	1,3-Dichloropropane	142-28-9				3.0E+02	4.05E-05					2.03E-05
VOC	2,2-Dichloropropane	594-20-7				3.0E+02	1.87E-01					9.36E-02
VOC	1,1-Dichloropropene	563-58-6				3.0E+02	2.04E+00					1.02E+00
VOC	1,3-Dichloropropene (total)	542-75-6	7.90E+03	5.87E+02	3.81E+02	3.0E+02	7.26E-01	6.49E-01	3.64E-01	9.07E+03	5.34E-01	3.88E-01
VOC	Ethyl Benzene	100-41-4	8.50E+03	6.17E+02	4.09E+02	3.0E+02	3.23E-01	6.63E-01	3.75E-01	1.01E+04	4.94E-01	1.60E-01
VOC	Ethyl Methacrylate	97-63-2	1.10E+04	5.71E+02	3.90E+02	2.9E+02	3.44E-02	6.83E-01	3.89E-01	1.31E+04	5.69E-01	1.96E-02
VOC	2-Hexanone	591-78-6				2.9E+02	7.15E-02					3.58E-02
VOC	Iodomethane	74-88-4				3.0E+02	2.24E-01					1.12E-01
VOC	Methyl Acetate	79-20-9	7.26E+03	5.07E+02	3.30E+02	3.0E+02	3.71E-03	6.51E-01	3.66E-01	7.88E+03	5.83E-01	2.16E-03
VOC	Methyl tert-butyl ether	1634-04-4	6.68E+03	4.97E+02	3.28E+02	3.0E+02	2.40E-02	6.60E-01	3.73E-01	7.26E+03	6.10E-01	1.46E-02
VOC	4-Methyl-2-pentanone	108-10-1	8.24E+03	5.71E+02	3.90E+02	2.9E+02	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	3.0E+02	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	3.0E+02	8.98E-02	6.14E-01	3.38E-01	7.01E+03	6.22E-01	5.59E-02
VOC	n-Propylbenzene	103-65-1	9.12E+03	6.30E+02	4.32E+02	3.0E+02	4.17E-01	6.86E-01	3.92E-01	1.13E+04	4.52E-01	1.89E-01
VOC	Styrene	100-42-5	8.74E+03	6.36E+02	4.18E+02	3.0E+02	1.13E-01	6.58E-01	3.71E-01	1.04E+04	4.83E-01	5.46E-02
VOC	1,1,1,2-Tetrachloroethane	630-20-6	9.77E+03	6.24E+02	4.04E+02	2.9E+02	9.89E-02	6.47E-01	3.63E-01	1.14E+04	6.14E-01	6.07E-02
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.00E+03	6.61E+02	4.20E+02	3.0E+02	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	3.0E+02	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	3.0E+02	2.72E-01	6.49E-01	3.64E-01	9.13E+03	5.32E-01	1.45E-01
VOC	1,2,3-Trichlorobenzene	87-61-6				2.9E+02	3.64E-01					1.82E-01
VOC	1,2,4-Trichlorobenzene	120-82-1	1.05E+04	7.25E+02	4.86E+02	3.0E+02	5.82E-02	6.71E-01	3.80E-01	1.32E+04	3.94E-01	2.29E-02
VOC	1,1,1-Trichloroethane	71-55-6	7.14E+03	5.45E+02	3.47E+02	3.0E+02	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	3.0E+02	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	3.0E+02	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	2.9E+02	3.96E+00	6.30E-01	3.50E-01	6.13E+03	7.79E-01	3.09E+00
VOC	1,2,3-Trichloropropane	96-18-4	9.17E+03	6.52E+02	4.30E+02	2.9E+02	1.67E-02	6.60E-01	3.72E-01	1.10E+04	6.24E-01	1.04E-02
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.46E+03	4.87E+02	3.21E+02	2.9E+02	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	3.0E+02	2.52E-01	6.81E-01	3.88E-01	1.17E+04	4.41E-01	1.11E-01
VOC	1,3,5-Trimethylbenzene	108-67-8	9.32E+03	6.37E+02	4.38E+02	3.0E+02	2.40E-01	6.87E-01	3.92E-01	1.16E+04	4.42E-01	1.06E-01
VOC	Vinyl Acetate	108-05-4	7.80E+03	5.19E+02	3.46E+02	3.0E+02	2.10E-02	6.66E-01	3.77E-01	8.72E+03	5.48E-01	1.15E-02
VOC	Vinyl Chloride	75-01-4	5.25E+03	4.32E+02	2.59E+02	3.0E+02	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	3.0E+02	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	3.0E+02	6.36E-03	6.85E-01	3.91E-01	1.61E+04	3.18E-01	2.02E-03
SVOC	Acenaphthylene	208-96-8				2.9E+02	4.62E-03					2.31E-03
SVOC	Acetophenone	98-86-2	1.17E+04	7.10E+02	4.75E+02	2.9E+02	4.37E-04	6.69E-01	3.79E-01	1.47E+04	5.29E-01	2.32E-04
SVOC	Anthracene	120-12-7	1.31E+04	8.73E+02	6.15E+02	3.0E+02	2.67E-03	7.05E-01	4.05E-01	1.83E+04	2.70E-01	7.20E-04
SVOC	Atrazine	1912-24-9				3.0E+02	2.50E-07					1.25E-07
SVOC	Benzaldehyde	100-52-7	1.17E+04	6.95E+02	4.52E+02	3.0E+02	9.73E-04	6.50E-01	3.65E-01	1.41E+04	3.68E-01	3.58E-04
SVOC	Benzo(a)anthracene	56-55-3	1.60E+04	1.00E+03	7.08E+02	3.0E+02	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	3.0E+02	4.63E-05	7.39E-01	4.10E-01	2.85E+		

Attachment B3 - 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	$\Delta H_{v,rs}$ (cal/mol)	Henry Extrapolation Multiplier	Adjusted H (unitless)
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.08E+04	6.60E+02	4.51E+02	3.0E+02	7.38E-04	6.84E-01	3.90E-01	1.36E+04	3.83E-01	2.83E-04
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.60E+04	8.06E+02	6.57E+02	3.0E+02	4.18E-06	8.15E-01	4.10E-01	2.67E+04	1.45E-01	6.06E-07
SVOC	4-Bromophenyl-phenyl ether	101-55-3				2.9E+02	4.78E-03					2.39E-03
SVOC	Butylbenzylphthalate	85-68-7	1.40E+04	8.40E+02	6.61E+02	3.0E+02	5.17E-05	7.87E-01	4.10E-01	2.22E+04	2.02E-01	1.04E-05
SVOC	Caprolactam	105-60-2				3.0E+02	2.06E-07					1.03E-07
SVOC	Carbazole	86-74-8	1.40E+04	8.99E+02	6.28E+02	3.0E+02	6.26E-07	6.98E-01	4.01E-01	1.94E+04	2.49E-01	1.56E-07
SVOC	4-Chloro-3-methylphenol	59-50-7				2.9E+02	1.63E-05					8.15E-06
SVOC	4-Chloroaniline	106-47-8	1.17E+04	7.54E+02	5.04E+02	3.0E+02	1.36E-05	6.68E-01	3.78E-01	1.48E+04	3.49E-01	4.75E-06
SVOC	2-Chloronaphthalene	91-58-7				2.9E+02	1.28E-02					6.42E-03
SVOC	2-Chlorophenol	95-57-8	9.57E+03	6.75E+02	4.48E+02	3.0E+02	1.60E-02	6.63E-01	3.75E-01	1.17E+04	4.40E-01	7.03E-03
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3				2.9E+02	8.99E-03					4.50E-03
SVOC	Chrysene	218-01-9	1.65E+04	9.79E+02	7.14E+02	3.0E+02	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	3.0E+02	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	2.9E+02	5.15E-04	6.80E-01	3.87E-01	8.75E+04	1.99E-02	1.02E-05
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.00E+04	7.54E+02	5.60E+02	3.0E+02	1.64E-07	7.43E-01	4.10E-01	2.87E+04	1.25E-01	2.05E-08
SVOC	2,4-Dichlorophenol	120-83-2	1.50E+04	7.08E+02	4.82E+02	3.0E+02	1.30E-04	6.81E-01	3.88E-01	1.91E+04	2.54E-01	3.31E-05
SVOC	Diethylphthalate	84-66-2	1.37E+04	7.57E+02	5.67E+02	3.0E+02	1.85E-05	7.49E-01	4.10E-01	1.99E+04	2.39E-01	4.43E-06
SVOC	2,4-Dimethylphenol	105-67-9	1.13E+04	7.08E+02	4.84E+02	3.0E+02	8.20E-05	6.84E-01	3.90E-01	1.45E+04	3.57E-01	2.93E-05
SVOC	Dimethylphthalate	131-11-3				2.9E+02	4.29E-06					2.15E-06
SVOC	Di-n-butylphthalate	84-74-2	1.48E+04	7.99E+02	6.13E+02	3.0E+02	3.85E-08	7.68E-01	4.10E-01	2.24E+04	2.00E-01	7.69E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1				2.9E+02	1.75E-05					8.73E-06
SVOC	2,4-Dinitrophenol	51-28-5	2.50E+04	8.28E+02	6.05E+02	3.0E+02	1.82E-05	7.31E-01	4.10E-01	3.60E+04	7.30E-02	1.33E-06
SVOC	2,4-Dinitrotoluene	121-14-2	1.35E+04	8.14E+02	5.90E+02	3.0E+02	3.80E-06	7.25E-01	4.10E-01	1.91E+04	2.54E-01	9.64E-07
SVOC	2,6-Dinitrotoluene	606-20-2	1.29E+04	7.70E+02	5.58E+02	3.0E+02	3.06E-05	7.25E-01	4.10E-01	1.82E+04	2.73E-01	8.36E-06
SVOC	Di-n-octylphthalate	117-84-0	1.40E+04	8.62E+02	7.04E+02	3.0E+02	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	3.0E+02	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	3.0E+02	2.61E-03	6.56E-01	3.69E-01	1.62E+04	3.15E-01	8.23E-04
SVOC	Hexachlorobenzene	118-74-1	1.44E+04	8.25E+02	5.83E+02	3.0E+02	5.41E-02	7.06E-01	4.07E-01	2.00E+04	2.38E-01	1.29E-02
SVOC	Hexachlorobutadiene	87-68-3	1.02E+04	7.38E+02	4.86E+02	3.0E+02	3.34E-01	6.59E-01	3.71E-01	1.27E+04	4.09E-01	1.37E-01
SVOC	Hexachlorocyclopentadiene	77-47-4	1.09E+04	7.46E+02	5.12E+02	3.0E+02	1.11E+00	6.87E-01	3.92E-01	1.43E+04	3.64E-01	4.04E-01
SVOC	Hexachloroethane	67-72-1	9.51E+03	6.95E+02	4.58E+02	3.0E+02	1.59E-01	6.59E-01	3.72E-01	1.17E+04	4.41E-01	7.02E-02
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.90E+04	1.08E+03	8.09E+02	3.0E+02	6.56E-05	7.50E-01	4.10E-01	2.96E+04	1.17E-01	7.70E-06
SVOC	Isophorone	78-59-1	1.03E+04	7.15E+02	4.88E+02	3.0E+02	2.72E-04	6.83E-01	3.89E-01	1.32E+04	3.95E-01	1.07E-04
SVOC	2-Methylnaphthalene	91-57-6	1.26E+04	7.61E+02	5.14E+02	2.9E+02	2.12E-02	6.76E-01	3.84E-01	1.62E+04	4.94E-01	1.05E-02
SVOC	Methylphenol (total)	1319-77-3				2.9E+02	3.54E-05					1.77E-05
SVOC	Naphthalene	91-20-3	1.04E+04	7.48E+02	4.91E+02	3.0E+02	1.98E-02	6.56E-01	3.70E-01	1.29E+04	4.03E-01	7.98E-03
SVOC	2-Nitroaniline	88-74-4				3.0E+02	6.53E-06					3.27E-06
SVOC	3-Nitroaniline	99-09-2				2.9E+02	5.89E-06					2.94E-06
SVOC	4-Nitroaniline	100-01-6				2.9E+02	8.46E-08					4.23E-08
SVOC	Nitrobenzene	98-95-3	1.06E+04	7.19E+02	4.84E+02	3.0E+02	9.84E-04	6.73E-01	3.82E-01	1.33E+04	3.89E-01	3.83E-04
SVOC	2-Nitrophenol	88-75-5				2.9E+02	3.87E-04					1.94E-04
SVOC	4-Nitrophenol	100-02-7				2.9E+02	1.70E-08					8.48E-09
SVOC	N-Nitrosodiphenylamine	86-30-6	7.30E+03	8.90E+02	6.32E+02	3.0E+02	2.05E-04	7.10E-01	4.10E-01	1.03E+04	4.86E-01	9.96E-05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	6.10E+03	7.47E+02	5.10E+02	3.0E+02	9.23E-05	6.82E-01	3.89E-01	7.90E+03	5.82E-01	5.38E-05
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1				2.9E+02	4.78E-03					2.39E-03
SVOC	Pentachlorophenol	87-86-5	1.61E+04	8.13E+02	5.82E+02	3.0E+02	1.00E-06	7.16E-01	4.10E-01	2.26E+04	1.97E-01	1.97E-07
SVOC	Phenanthrene	85-01-8				2.9E+02	9.52E-04					4.76E-04
SVOC	Phenol	108-95-2	1.09E+04	6.94E+02	4.55E+02	3.0E+02	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	3.0E+02	4.51E-04	7.14E-01	4.10E-01	2.07E+04	2.27E-01	1.02E-04
SVOC	2,4,5-Trichlorophenol	95-95-4	1.10E+04	7.59E+02	5.26E+02	3.0E+02	1.78E-04	6.93E-01	3.97E-01	1.46E+04	3.56E-01	6.33E-05
SVOC	2,4,6-Trichlorophenol	88-06-2	1.20E+04	7.49E+02	5.19E+02	3.0E+02	3.19E-04	6.93E-01	3.97E-01	1.58E+04	3.24E-01	1.03E-04
PCB	PCBs (total)	1336-36-3				2.9E+02	8.17E-02					4.09E-02
INORG	Antimony	7440-36-0				2.9E+02						
INORG	Arsenic	7440-38-2				2.9E+02						
INORG	Barium	7440-39-3				2.9E+02						
INORG	Beryllium	7440-41-7				2.9E+02						
INORG	Cadmium	7440-43-9				2.9E+02						
INORG	Chromium (total)	7440-47-3				2.9E+02						
INORG	Cobalt	7440-48-4				2.9E+02						
INORG	Copper	7440-50-8				2.9E+02						
INORG	Cyanide (total)	57-12-5				2.9E+02						
INORG	Lead	7439-92-1				2.9E+02						
INORG	Manganese	7439-96-5				2.9E+02						
INORG	Mercury	7439-97-6	1.41E+04	1.75E+03	6.30E+02	2.9E+02	2.90E-01	0.359931	0.3	1.53E+04	5.15E-01	1.49E-01
INORG	Nickel	7440-02-0				2.9E+02						
INORG	Selenium	7782-49-2				2.9E+02						
INORG	Silver	7440-22-4				2.9E+02						
INORG	Thallium	7440-28-0				2.9E+02						
INORG	Vanadium	7440-62-2				2.9E+02						
INORG	Zinc	7440-66-6				2.9E+02						
	Subsurface temperature:	12.5	°C									
	Subsurface temperature:	285.65	K									
	Gas constant	1.9872	cal/mol K									

Attachment B4.1
Exposure of Routine Workers to Soil

**Attachment B4.1: Soil Percent Moisture Summary by Depth Interval
Former Delco Plant 5, Kokomo, Indiana**

On/Off site	Area	Top Depth	Bottom Depth	Min Percent Moisture (%)	Avg Percent Moisture (%)	Max Percent Moisture (%)
On-Site	AOI 3		2	6.5	13.8	24.9
On-Site	AOI 3	2	4	20.4	20.4	20.4
On-Site	AOI 3	6	8	14.7	14.7	14.7
On-Site	AOI 3	8	8	10.7	15.1	19.4
On-Site	AOI 3	8	10	9.3	10.7	14.8
On-Site	AOI 3	12	14	6.5	8	10.7
On-Site	AOI 3	14	16	9	9	9
On-Site	AOI 3	18	20	9	9.5	10
On-Site	AOI 5		2	16.9	19.5	21.4
On-Site	AOI 5	8	10	6.4	10.0	14.1
On-Site	AOI 5	10	12	12.2	12.2	12.2
On-Site	AOI 5	12	14	5.5	7.4	9.2
On-Site	AOI 5	14	16	5.6	8.1	14.9
On-Site	AOI 6		2	7.7	16.4	24.5
On-Site	AOI 6	2	4	14.6	17.6	20.4
On-Site	AOI 6	4	6	12.7	19.4	26.1
On-Site	AOI 6	7	7	15.3	15.3	15.3
On-Site	AOI 6	8	10	9.9	10.7	12.2
On-Site	AOI 6	10	12	9.9	10.3	10.9
On-Site	AOI 6	12	14	7.8	8.5	9.1
On-Site	AOI 6	14	16	5.2	6.7	8.3
On-Site	AOI 6	16	18	5.4	5.4	5.4
On-Site	AOI 7		2	3.5	7.1	16.2
On-Site	AOI 7	2	4	15.3	15.3	15.3
On-Site	AOI 7	4	6	21	21.0	21
On-Site	AOI 7	8	10	6.3	9.5	13.7
On-Site	AOI 7	10	12	8.6	9.1	10.1
On-Site	AOI 7	12	14	6.7	8.1	10.2
On-Site	AOI 7	13	13.5	12.2	12.2	12.2
On-Site	AOI 7	14	16	6	7.5	10.3
On-Site	AOI 7	16	18	8.6	8.6	8.6
On-Site	AOI 7	18	20	8.6	8.9	9.2
On-Site	AOI 7	18.5	18.8	6.5	6.5	6.5
On-Site	AOI 7	19	21	9.1	9.1	9.1
On-Site	Background		2	7	14.2	18.4
On-Site	Background	2	4	20.1	21.5	22.5
On-Site	Background	4	6	20.6	20.6	20.6
On-Site	Background	6	8	13	16	19
On-Site	Background	7.5	8	7.5	7.5	7.5
On-Site	Background	8	10	9	13.1	16
On-Site	Upgradient		1	4.6	4.6	4.6
On-Site	Upgradient	2	4	20.1	20.1	20.1
On-Site	Upgradient	8.5	9	20	20	20

Attachment B4.1: Vapor Flux from Soil to Ambient 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	1.75E-01	9.36E-02	1.16E-06	5.16E-04	4.29E-06
VOC	Acrolein	107-02-8	1.02E+00		3.69E-03	9.50E-01	1.04E-04	1.79E-01	8.30E-02	1.22E-06	1.72E-03	7.82E-06
VOC	Acrylonitrile	107-13-1	2.24E-01		2.90E-03	1.04E+00	1.12E-04	1.72E-01	9.05E-02	1.32E-06	1.53E-03	7.38E-06
VOC	Benzene	71-43-2	5.82E+01		1.31E-01	7.60E-01	8.47E-05	6.92E-01	6.64E-02	9.98E-07	1.25E-02	2.11E-05
VOC	Bromobenzene	108-86-1	2.79E+02		4.26E-02							
VOC	Bromochloromethane	74-97-5	1.57E+01		2.94E-02	5.94E-01	8.64E-05	3.09E-01	5.19E-02	1.02E-06	4.95E-03	1.33E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.62E-02	2.57E-01	9.16E-05	6.37E-01	2.25E-02	1.08E-06	1.28E-03	6.74E-06
VOC	Bromoform	75-25-2	8.70E+01		1.03E-02	1.29E-01	8.90E-05	8.93E-01	1.12E-02	1.05E-06	1.30E-04	2.15E-06
VOC	Bromomethane	74-83-9	1.05E+01		1.76E-01	6.29E-01	1.05E-04	3.11E-01	5.49E-02	1.23E-06	3.11E-02	3.33E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.61E-03	6.98E-01	8.47E-05	1.87E-01	6.10E-02	9.98E-07	5.30E-04	4.34E-06
VOC	n-Butylbenzene	104-51-8	2.54E+03		2.23E-01							
VOC	sec-Butylbenzene	135-98-8	2.73E+03		1.69E-04							
VOC	tert-Butylbenzene	98-06-6	2.15E+03		2.48E-01							
VOC	Carbon Disulfide	75-15-0	4.59E+01		7.91E-01	8.99E-01	8.64E-05	7.95E-01	7.85E-02	1.02E-06	7.81E-02	5.27E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		7.32E-01	6.74E-01	7.60E-05	1.84E+00	5.88E-02	8.96E-07	2.34E-02	2.89E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.71E-02	6.31E-01	7.52E-05	2.02E+00	5.51E-02	8.86E-07	2.10E-03	8.65E-06
VOC	Chloroethane	75-00-3	1.62E+01		2.84E-01	2.34E+00	9.94E-05	3.92E-01	2.04E-01	1.17E-06	1.48E-01	7.26E-05
VOC	2-Chloroethylvinyl ether	110-75-8										
VOC	Chloroform	67-66-3	3.97E+01		8.98E-02	8.99E-01	8.64E-05	5.26E-01	7.85E-02	1.02E-06	1.34E-02	2.18E-05
VOC	Chloromethane	74-87-3	3.97E+01		2.99E-01	1.09E+00	5.62E-05	5.91E-01	9.51E-02	6.62E-07	4.81E-02	4.14E-05
VOC	2-Chlorotoluene	95-49-8	6.12E+02		7.30E-02	5.43E-01	7.52E-05	5.26E+00	4.74E-02	8.86E-07	6.58E-04	4.84E-06
VOC	4-Chlorotoluene	106-43-4	5.19E+02									
VOC	Cumene	98-82-8	7.05E+02		2.19E-01	5.62E-01	6.13E-05	6.08E+00	4.90E-02	7.23E-07	1.77E-03	7.93E-06
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	6.66E+00	6.33E-02	9.27E-07	3.79E-02	3.67E-05
VOC	p-Cymene	99-87-6	2.11E+03									
VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.45E+02		3.00E-03	6.91E-01	6.91E-05	1.37E+00	6.04E-02	8.15E-07	1.33E-04	2.17E-06
VOC	Dibromochloromethane	124-48-1	6.26E+01		2.03E-02	1.69E-01	9.07E-05	6.95E-01	1.48E-02	1.07E-06	4.34E-04	3.93E-06
VOC	1,2-Dibromoethane	106-93-4	2.22E+01		1.97E-02	6.91E-01	6.91E-05	3.59E-01	6.04E-02	8.15E-07	3.31E-03	1.09E-05
VOC	Dibromomethane	74-95-3	1.95E+01		2.42E-02	6.91E-01	6.91E-05	3.38E-01	6.04E-02	8.15E-07	4.32E-03	1.24E-05
VOC	trans-1,4-Dichloro-2-butene	110-57-6	5.88E+00		1.79E-03	5.73E-01	8.00E-05	2.19E-01	5.00E-02	9.43E-07	4.13E-04	3.84E-06
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.44E-02	5.96E-01	6.83E-05	5.34E+00	5.21E-02	8.05E-07	3.35E-04	3.45E-06
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		7.87E-02	5.98E-01	6.79E-05	4.90E+00	5.22E-02	8.01E-07	8.38E-04	5.46E-06
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.54E-02	5.96E-01	6.83E-05	5.25E+00	5.21E-02	8.05E-07	4.50E-04	4.00E-06
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		9.89E+00	6.91E-01	6.91E-05	3.74E+00	6.04E-02	8.15E-07	1.60E-01	7.54E-05
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.39E-01	6.41E-01	9.07E-05	4.72E-01	5.60E-02	1.07E-06	1.65E-02	2.42E-05
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.23E-02	8.99E-01	8.55E-05	3.21E-01	7.85E-02	1.01E-06	5.46E-03	1.39E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		6.97E-01	7.78E-01	8.99E-05	8.68E-01	6.79E-02	1.06E-06	5.46E-02	4.41E-05

Attachment B4.1: Vapor Flux from Soil to Ambient 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	1,2-Dichloroethene (total)	540-59-0	3.56E+01		1.92E-01							
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		9.86E-02	6.36E-01	9.76E-05	4.95E-01	5.55E-02	1.15E-06	1.11E-02	1.98E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		2.38E-01	6.11E-01	1.03E-04	6.75E-01	5.33E-02	1.21E-06	1.88E-02	2.58E-05
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		6.36E-02	6.76E-01	7.54E-05	5.50E-01	5.90E-02	8.89E-07	6.83E-03	1.56E-05
VOC	1,3-Dichloropropane	142-28-9	4.59E+01		2.03E-05	6.40E-01	8.53E-05	5.50E-01	5.59E-02	1.01E-06	3.89E-06	3.72E-07
VOC	2,2-Dichloropropane	594-20-7	3.85E+01		9.36E-02	6.22E-01	8.19E-05	5.18E-01	5.43E-02	9.66E-07	9.82E-03	1.87E-05
VOC	1,1-Dichloropropene	563-58-6	1.21E+02		1.02E+00							
VOC	1,3-Dichloropropene (total)	542-75-6	4.59E+01		3.88E-01	5.41E-01	8.64E-05	6.70E-01	4.72E-02	1.02E-06	2.73E-02	3.12E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.60E-01	6.48E-01	6.74E-05	3.26E+00	5.66E-02	7.95E-07	2.77E-03	9.93E-06
VOC	Ethyl Methacrylate	97-63-2	4.12E+01		1.96E-02	6.91E-01	6.91E-05	5.17E-01	6.04E-02	8.15E-07	2.29E-03	9.03E-06
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02	6.47E-01	7.10E-05	3.04E-01	5.65E-02	8.37E-07	6.66E-03	1.54E-05
VOC	Iodomethane	74-88-4	2.61E+01		1.12E-01	4.53E-01	6.70E-05	4.21E-01	3.95E-02	7.90E-07	1.05E-02	1.94E-05
VOC	Methyl Acetate	79-20-9	1.66E+00		2.16E-03	8.27E-01	9.50E-05	1.84E-01	7.22E-02	1.12E-06	8.54E-04	5.51E-06
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.46E-02	7.42E-01	8.73E-05	2.69E-01	6.48E-02	1.03E-06	3.53E-03	1.12E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		3.72E-03	6.48E-01	6.74E-05	2.58E-01	5.66E-02	7.95E-07	8.19E-04	5.40E-06
VOC	Methylcyclohexane	108-87-2	2.66E+02		9.74E+00	6.35E-01	7.36E-05	5.39E+00	5.55E-02	8.68E-07	1.00E-01	5.97E-05
VOC	Methylene Chloride	75-09-2	1.17E+01		5.59E-02	8.73E-01	1.01E-04	2.84E-01	7.62E-02	1.19E-06	1.50E-02	2.31E-05
VOC	n-Propylbenzene	103-65-1	9.83E+02		1.89E-01							
VOC	Styrene	100-42-5	7.77E+02		5.46E-02	6.13E-01	6.91E-05	6.62E+00	5.36E-02	8.15E-07	4.42E-04	3.97E-06
VOC	1,1,1,2-Tetrachloroethane	630-20-6	3.06E+02		6.07E-02	6.13E-01	6.83E-05	2.72E+00	5.36E-02	8.05E-07	1.19E-03	6.52E-06
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.35E+01		6.77E-03	6.13E-01	6.83E-05	9.46E-01	5.36E-02	8.05E-07	3.84E-04	3.70E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.89E-01	6.22E-01	7.08E-05	1.58E+00	5.43E-02	8.35E-07	1.34E-02	2.18E-05
VOC	Toluene	108-88-3	1.80E+02		1.45E-01	7.52E-01	7.43E-05	1.71E+00	6.56E-02	8.76E-07	5.56E-03	1.41E-05
VOC	1,2,3-Trichlorobenzene	87-61-6	2.27E+03		1.82E-01							
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.29E-02	2.59E-01	7.11E-05	1.50E+01	2.26E-02	8.38E-07	3.45E-05	1.11E-06
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		4.12E-01	6.74E-01	7.60E-05	1.21E+00	5.88E-02	8.96E-07	2.00E-02	2.67E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.93E-02	6.74E-01	7.60E-05	5.92E-01	5.88E-02	8.96E-07	1.92E-03	8.26E-06
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.63E+00	5.96E-02	9.27E-07	8.58E-03	1.75E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		3.09E+00	7.52E-01	8.38E-05	2.12E+00	6.56E-02	9.88E-07	9.53E-02	5.83E-05
VOC	1,2,3-Trichloropropane	96-18-4	4.43E+01		1.04E-02	6.13E-01	6.83E-05	5.40E-01	5.36E-02	8.05E-07	1.04E-03	6.07E-06
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		1.48E+01	6.74E-01	7.08E-05	7.89E+00	5.88E-02	8.35E-07	1.10E-01	6.26E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	1.18E+03		1.11E-01	5.24E-01	6.84E-05	9.97E+00	4.57E-02	8.07E-07	5.09E-04	4.26E-06
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.06E-01	5.20E-01	7.49E-05	1.48E+01	4.54E-02	8.83E-07	3.26E-04	3.41E-06
VOC	Vinyl Acetate	108-05-4	5.22E+00		1.15E-02	7.34E-01	7.95E-05	2.17E-01	6.41E-02	9.37E-07	3.41E-03	1.10E-05
VOC	Vinyl Chloride	75-01-4	1.85E+01		8.02E-01	9.16E-01	1.06E-04	5.71E-01	8.00E-02	1.25E-06	1.12E-01	6.33E-05
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.35E-01	6.74E-01	7.56E-05	3.40E+00	5.88E-02	8.91E-07	2.33E-03	9.11E-06
SVOC	Acenaphthene	83-32-9	7.14E+03		2.02E-03	3.64E-01	6.64E-05	5.93E+01	3.18E-02	7.83E-07	1.10E-06	1.98E-07

Attachment B4.1: Vapor Flux from Soil to Ambient 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)
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	6.20E+01	3.39E-02	7.11E-07	1.27E-06	2.13E-07
SVOC	Acetophenone	98-86-2	3.58E+01		2.32E-04	6.91E-01	6.91E-05	4.66E-01	6.04E-02	8.15E-07	3.17E-05	1.06E-06
SVOC	Anthracene	120-12-7	2.97E+04		7.20E-04	2.80E-01	6.69E-05	2.46E+02	2.44E-02	7.88E-07	7.47E-08	5.16E-08
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	3.22E+00	1.95E-02	6.79E-07	2.12E-07	8.69E-08
SVOC	Benzaldehyde	100-52-7	2.85E+01		3.58E-04	6.23E-01	7.84E-05	4.06E-01	5.44E-02	9.24E-07	5.03E-05	1.34E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		2.63E-05	4.41E-01	7.78E-05	3.32E+03	3.85E-02	9.17E-07	5.81E-10	4.55E-09
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		5.87E-06	3.72E-01	7.78E-05	8.40E+03	3.24E-02	9.17E-07	1.32E-10	2.17E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		7.20E-04	1.95E-01	4.80E-05	1.03E+04	1.71E-02	5.66E-07	1.25E-09	6.66E-09
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	1.06E+05	1.64E-02	5.36E-07	5.50E-12	4.42E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		4.74E-06	1.95E-01	4.80E-05	1.03E+04	1.71E-02	5.66E-07	6.28E-11	1.50E-09
SVOC	Benzoic Acid	65-85-0	6.00E-01		4.37E-06	4.63E-01	6.89E-05	1.75E-01	4.04E-02	8.12E-07	5.66E-06	4.49E-07
SVOC	Benzyl Alcohol	100-51-6	1.21E+01		7.95E-06	6.12E-01	7.75E-05	2.70E-01	5.34E-02	9.14E-07	4.96E-06	4.20E-07
SVOC	Biphenyl	92-52-4	1.05E+04		6.69E-03	3.49E-01	7.04E-05	8.70E+01	3.05E-02	8.30E-07	2.35E-06	2.89E-07
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	3.13E-01	3.29E-02	8.62E-07	3.12E-06	3.33E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		2.83E-04	5.98E-01	6.51E-05	2.98E-01	5.22E-02	7.67E-07	5.21E-05	1.36E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		6.06E-07	3.03E-01	3.16E-05	1.24E+05	2.65E-02	3.73E-07	3.13E-12	3.34E-10
SVOC	4-Bromophenyl-phenyl ether	101-55-3	1.61E+04		2.39E-03	2.26E-01	5.88E-05	1.34E+02	1.97E-02	6.93E-07	3.57E-07	1.13E-07
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		1.04E-05	1.50E-01	4.17E-05	4.74E+02	1.31E-02	4.92E-07	1.33E-09	6.87E-09
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	1.75E-01	5.22E-02	9.16E-07	5.26E-06	4.33E-07
SVOC	Carbazole	86-74-8	3.38E+03		1.56E-07	3.37E-01	6.07E-05	2.82E+01	2.94E-02	7.16E-07	2.56E-08	3.02E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	9.41E+00	4.57E-02	9.69E-07	1.43E-07	7.12E-08
SVOC	4-Chloroaniline	106-47-8	6.61E+01		4.75E-06	4.17E-01	8.73E-05	7.17E-01	3.64E-02	1.03E-06	1.68E-06	2.44E-07
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	9.31E+01	3.71E-02	8.95E-07	2.57E-06	3.02E-07
SVOC	2-Chlorophenol	95-57-8	3.88E+02		7.03E-03	4.33E-01	8.17E-05	3.38E+00	3.78E-02	9.64E-07	7.88E-05	1.68E-06
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	1.03E+04		4.50E-03	2.45E-01	6.61E-05	8.51E+01	2.14E-02	7.79E-07	1.14E-06	2.01E-07
SVOC	Chrysene	218-01-9	4.01E+05		6.67E-04	2.14E-01	5.37E-05	3.32E+03	1.87E-02	6.33E-07	3.95E-09	1.19E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		2.09E-08	1.75E-01	4.48E-05	3.12E+04	1.52E-02	5.28E-07	1.69E-11	7.76E-10
SVOC	Dibenzofuran	132-64-9	2.07E+04		1.02E-05	2.06E-01	5.18E-05	1.71E+02	1.80E-02	6.11E-07	4.64E-09	1.28E-08
SVOC	3,3'-Dichlorobenzidine	91-94-1	7.21E+02		2.05E-08	1.68E-01	5.82E-05	6.14E+00	1.46E-02	6.87E-07	1.12E-07	6.31E-08
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		3.31E-05	2.99E-01	7.58E-05	1.39E+00	2.61E-02	8.93E-07	1.27E-06	2.12E-07
SVOC	Diethylphthalate	84-66-2	2.87E+02		4.43E-06	2.21E-01	5.49E-05	2.55E+00	1.93E-02	6.47E-07	2.88E-07	1.01E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		2.93E-05	5.05E-01	7.51E-05	1.90E+00	4.41E-02	8.85E-07	1.14E-06	2.02E-07
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	7.41E-01	4.29E-02	6.41E-07	9.89E-07	1.88E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		7.69E-09	3.78E-01	6.79E-05	2.82E+02	3.30E-02	8.01E-07	2.84E-09	1.01E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	1.17E+00	2.08E-02	7.04E-07	7.54E-07	1.64E-07
SVOC	2,4-Dinitrophenol	51-28-5	1.00E-02		1.33E-06	2.36E-01	7.83E-05	1.70E-01	2.06E-02	9.23E-07	5.60E-06	4.46E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		9.64E-07	1.75E+00	6.10E-05	9.53E-01	1.53E-01	7.19E-07	9.09E-07	1.80E-07

Attachment B4.1: Vapor Flux from Soil to Ambient 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)
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		8.36E-06	2.83E-01	6.27E-05	7.41E-01	2.47E-02	7.40E-07	1.28E-06	2.13E-07
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		4.93E-04	1.30E-01	3.09E-05	6.94E+05	1.14E-02	3.65E-07	8.62E-12	5.54E-10
SVOC	Fluoranthene	206-44-0	1.08E+05		1.56E-04	2.61E-01	5.49E-05	8.94E+02	2.28E-02	6.47E-07	4.71E-09	1.29E-08
SVOC	Fluorene	86-73-7	1.38E+04		8.23E-04	3.14E-01	6.81E-05	1.14E+02	2.74E-02	8.03E-07	2.04E-07	8.53E-08
SVOC	Hexachlorobenzene	118-74-1	5.53E+04		1.29E-02	4.68E-01	5.11E-05	4.58E+02	4.09E-02	6.02E-07	1.15E-06	2.03E-07
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.37E-01	4.85E-01	5.32E-05	4.43E+02	4.23E-02	6.27E-07	1.30E-05	6.81E-07
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		4.04E-01	1.39E-01	6.23E-05	1.65E+03	1.21E-02	7.34E-07	2.98E-06	3.26E-07
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.02E-02	2.16E-02	5.88E-05	1.48E+01	1.89E-03	6.93E-07	9.00E-06	5.66E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		7.70E-06	1.64E-01	4.89E-05	2.85E+04	1.43E-02	5.77E-07	2.41E-11	9.26E-10
SVOC	Isophorone	78-59-1	4.69E+01		1.07E-04	5.38E-01	5.84E-05	5.58E-01	4.70E-02	6.89E-07	1.03E-05	6.05E-07
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.05E-02	4.51E-01	6.70E-05	5.18E+01	3.94E-02	7.89E-07	7.97E-06	5.33E-07
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	8.70E-01	5.58E-02	1.02E-06	2.31E-06	2.87E-07
SVOC	Naphthalene	91-20-3	2.01E+03		7.98E-03	5.10E-01	6.48E-05	1.68E+01	4.45E-02	7.64E-07	2.12E-05	8.68E-07
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	7.15E-01	5.51E-02	8.15E-07	1.39E-06	2.22E-07
SVOC	3-Nitroaniline	99-09-2	2.22E+01		2.94E-06							
SVOC	4-Nitroaniline	100-01-6	2.33E+01		4.23E-08	5.00E-01	7.41E-05	3.62E-01	4.37E-02	8.74E-07	2.42E-06	2.93E-07
SVOC	Nitrobenzene	98-95-3	6.44E+01		3.83E-04	6.57E-01	7.43E-05	7.03E-01	5.73E-02	8.76E-07	3.25E-05	1.08E-06
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	6.46E-01	4.07E-02	8.00E-07	1.34E-05	6.91E-07
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	7.95E-01	4.72E-02	9.79E-07	1.23E-06	2.09E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		9.96E-05	2.70E-01	5.49E-05	1.09E+01	2.35E-02	6.47E-07	2.76E-07	9.91E-08
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		5.38E-05	4.71E-01	7.06E-05	3.68E-01	4.11E-02	8.32E-07	8.26E-06	5.42E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	2.29E+00	4.54E-02	6.53E-07	4.77E-05	1.30E-06
SVOC	Pentachlorophenol	87-86-5	5.92E+02		1.97E-07	4.84E-01	5.27E-05	5.07E+00	4.22E-02	6.21E-07	1.24E-07	6.65E-08
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	2.01E+02	2.83E-02	7.61E-07	7.09E-08	5.02E-08
SVOC	Phenol	108-95-2	2.88E+01		6.37E-06	7.08E-01	7.86E-05	4.08E-01	6.19E-02	9.27E-07	3.24E-06	3.39E-07
SVOC	Pyrene	129-00-0	1.06E+05		1.02E-04	2.35E-01	6.26E-05	8.74E+02	2.05E-02	7.37E-07	3.25E-09	1.07E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		6.33E-05	2.51E-01	6.07E-05	1.34E+01	2.20E-02	7.16E-07	1.57E-07	7.48E-08
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.03E-04	2.75E-01	5.40E-05	3.32E+00	2.40E-02	6.37E-07	9.37E-07	1.83E-07
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	2.03E+04	1.52E-02	5.09E-07	3.07E-08	3.30E-08
INORG	Antimony	7440-36-0		4.50E+01								
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								

Attachment B4.1: Vapor Flux from Soil to Ambient 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	Cyanide (total)	57-12-5		9.90E+00								
INORG	Lead	7439-92-1		9.00E+02								
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	2.32E-02	6.42E-07	2.51E-06	2.99E-07
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+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	Silty-Clay							
	Soil porosity	L/L-soil	θ	0.48	Silty Clay							
	Soil water content	L/L-soil	θ _w	0.17	Silty Clay							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	porosity-water content							
	Soil organic carbon fraction	unitless	f _{oc}	0.006	assumed default							
	Averaging period	year	ED	25	exposure duration							
		s	ED	7.9E+08								
		(kg/m ³) /										
	Dispersion coefficient	(kg/m ² /s)	C/Q	16.9	from correlation equation in USEPA SSSG (2002)							

**Attachment B4.1: 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
Correction factor			1.25
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
u _m /u _t			0.379
x = 0.886 u _t /u _m			2.34
F(x)			0.100
Annual average PM₁₀ flux	kg-soil/m ² -s	J_{10,w}	2.72E-11

**Attachment B4.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 2	VOC	Acetone	67-64-1	1.70E-02			4E-08
AOI 2	VOC	Methylene Chloride	75-09-2	6.20E-03		3E-10	2E-06
AOI 2	VOC	Trichloroethene	79-01-6	7.70E-03		1E-09	6E-07
AOI 2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.60E-02		4E-10	4E-06
AOI 2	SVOC	Chrysene	218-01-9	3.50E-02		1E-10	
AOI 2	SVOC	Di-n-octylphthalate	117-84-0	5.90E-02			2E-06
AOI 2	INORG	Arsenic	7440-38-2	7.60E+00	1.25E+01		
AOI 2	INORG	Barium	7440-39-3	1.20E+02	1.32E+02		
AOI 2	INORG	Beryllium	7440-41-7	7.50E-01		2E-10	2E-04
AOI 2	INORG	Cadmium	7440-43-9	6.40E-01		1E-10	5E-04
AOI 2	INORG	Chromium (total)	7440-47-3	2.10E+01	1.67E+01	6E-09	7E-04
AOI 2	INORG	Cobalt	7440-48-4	1.90E+01	1.09E+01	3E-09	3E-04
AOI 2	INORG	Copper	7440-50-8	4.50E+01	3.66E+01		1E-04
AOI 2	INORG	Cyanide (total)	57-12-5	3.10E-01			8E-06
AOI 2	INORG	Lead	7439-92-1	3.00E+01	4.64E+01		
AOI 2	INORG	Manganese	7439-96-5	7.40E+02	5.45E+02		2E-03
AOI 2	INORG	Nickel	7440-02-0	4.70E+01	1.91E+01	8E-10	8E-04
AOI 2	INORG	Selenium	7782-49-2	6.90E-01			
AOI 2	INORG	Vanadium	7440-62-2	6.70E+01	3.13E+01		
AOI 2	INORG	Zinc	7440-66-6	1.50E+02	9.72E+01		
AOI 3	VOC	Acetone	67-64-1	1.20E-01			3E-07
AOI 3	VOC	Benzene	71-43-2	1.60E+00		1E-06	1E-02
AOI 3	VOC	Carbon Disulfide	75-15-0	5.70E-02			5E-05
AOI 3	VOC	Carbon Tetrachloride	56-23-5	2.70E+00		5E-06	7E-03
AOI 3	VOC	Chloroform	67-66-3	3.40E-01		7E-07	2E-03
AOI 3	VOC	Cumene	98-82-8	2.90E-03			7E-07
AOI 3	VOC	Cyclohexane	110-82-7	1.00E-03			7E-08
AOI 3	VOC	1,1-Dichloroethane	75-34-3	1.20E-01			7E-05
AOI 3	VOC	1,1-Dichloroethene	75-35-4	3.90E-01			1E-03
AOI 3	VOC	1,2-Dichloroethene (total)	540-59-0	2.50E-01			1E-05
AOI 3	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			9E-01
AOI 3	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01			4E-03
AOI 3	VOC	Ethyl Benzene	100-41-4	2.10E-02			3E-06
AOI 3	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01			4E-06
AOI 3	VOC	Methylcyclohexane	108-87-2	5.70E-03			1E-06
AOI 3	VOC	Methylene Chloride	75-09-2	1.50E+00		7E-08	4E-04
AOI 3	VOC	Styrene	100-42-5	1.00E-01			5E-06
AOI 3	VOC	Tetrachloroethene	127-18-4	3.40E-03		1E-09	2E-06
AOI 3	VOC	Toluene	108-88-3	8.00E-03			3E-07
AOI 3	VOC	1,1,1-Trichloroethane	71-55-6	2.70E+00			4E-04
AOI 3	VOC	Trichloroethene	79-01-6	1.90E+03		2E-04	2E-01

**Attachment B4.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 3	VOC	Vinyl Chloride	75-01-4	7.90E+00		2E-05	6E-02
AOI 3	VOC	Xylenes (total)	1330-20-7	2.61E-02			3E-05
AOI 3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.60E-02		3E-10	3E-06
AOI 3	SVOC	Di-n-octylphthalate	117-84-0	3.10E-02			9E-07
AOI 3	SVOC	Fluoranthene	206-44-0	2.60E-02			9E-07
AOI 3	SVOC	Pyrene	129-00-0	2.40E-02			1E-06
AOI 3	INORG	Arsenic	7440-38-2	1.26E+01	1.25E+01	4E-08	2E-04
AOI 3	INORG	Barium	7440-39-3	1.49E+02	1.32E+02		4E-05
AOI 3	INORG	Beryllium	7440-41-7	1.53E+00		4E-10	4E-04
AOI 3	INORG	Cadmium	7440-43-9	1.80E-01		4E-11	1E-04
AOI 3	INORG	Chromium (total)	7440-47-3	1.59E+01	1.67E+01		
AOI 3	INORG	Cobalt	7440-48-4	5.99E+00	1.09E+01		
AOI 3	INORG	Copper	7440-50-8	2.80E+02	3.66E+01		3E-03
AOI 3	INORG	Lead	7439-92-1	1.15E+03	4.64E+01		
AOI 3	INORG	Manganese	7439-96-5	5.50E+02	5.45E+02		5E-05
AOI 3	INORG	Nickel	7440-02-0	1.90E+01	1.91E+01		
AOI 3	INORG	Thallium	7440-28-0	3.50E+00	3.58E+00		
AOI 3	INORG	Vanadium	7440-62-2	3.60E+01	3.13E+01		
AOI 3	INORG	Zinc	7440-66-6	2.42E+02	9.72E+01		
AOI 5	VOC	Acetone	67-64-1	2.50E-02			5E-08
AOI 5	VOC	Benzene	71-43-2	3.50E-03		2E-09	3E-05
AOI 5	VOC	Chlorobenzene	108-90-7	3.60E-02			7E-05
AOI 5	VOC	1,1-Dichloroethane	75-34-3	1.40E-01			8E-05
AOI 5	VOC	1,1-Dichloroethene	75-35-4	5.40E-02			1E-04
AOI 5	VOC	cis-1,2-Dichloroethene	156-59-2	2.40E+01			2E-01
AOI 5	VOC	trans-1,2-Dichloroethene	156-60-5	1.70E-01			9E-04
AOI 5	VOC	Methyl Acetate	79-20-9	2.40E-01			4E-06
AOI 5	VOC	Methylene Chloride	75-09-2	3.60E-01		2E-08	1E-04
AOI 5	VOC	Tetrachloroethene	127-18-4	3.00E-03		9E-10	2E-06
AOI 5	VOC	Toluene	108-88-3	4.60E-02			2E-06
AOI 5	VOC	1,1,1-Trichloroethane	71-55-6	1.40E-01			2E-05
AOI 5	VOC	Trichloroethene	79-01-6	1.50E+02		2E-05	1E-02
AOI 5	VOC	Trichlorofluoromethane	75-69-4	2.70E-02			3E-05
AOI 5	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.60E+00			4E-05
AOI 5	VOC	Vinyl Chloride	75-01-4	1.70E-01		4E-07	1E-03
AOI 5	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.30E+00		1E-08	1E-04
AOI 5	SVOC	Di-n-octylphthalate	117-84-0	2.40E-01			7E-06
AOI 5	PCB	PCBs (total)	1336-36-3	2.27E+00		2E-06	2E-01
AOI 5	INORG	Arsenic	7440-38-2	9.00E+00	1.25E+01		
AOI 5	INORG	Barium	7440-39-3	1.00E+02	1.32E+02		
AOI 5	INORG	Beryllium	7440-41-7	4.80E-01		1E-10	1E-04

**Attachment B4.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 5	INORG	Cadmium	7440-43-9	5.70E-01		1E-10	4E-04
AOI 5	INORG	Chromium (total)	7440-47-3	1.50E+01	1.67E+01		
AOI 5	INORG	Cobalt	7440-48-4	6.30E+00	1.09E+01		
AOI 5	INORG	Copper	7440-50-8	2.50E+01	3.66E+01		
AOI 5	INORG	Cyanide (total)	57-12-5	2.30E-01			6E-06
AOI 5	INORG	Lead	7439-92-1	8.98E+01	4.64E+01		
AOI 5	INORG	Manganese	7439-96-5	3.40E+02	5.45E+02		
AOI 5	INORG	Nickel	7440-02-0	1.60E+01	1.91E+01		
AOI 5	INORG	Vanadium	7440-62-2	2.20E+01	3.13E+01		
AOI 5	INORG	Zinc	7440-66-6	7.60E+01	9.72E+01		
AOI 6	VOC	Acetone	67-64-1	7.10E-02			2E-07
AOI 6	VOC	Benzene	71-43-2	2.51E-02		2E-08	2E-04
AOI 6	VOC	2-Butanone	78-93-3	2.20E+00			2E-05
AOI 6	VOC	Carbon Disulfide	75-15-0	8.30E-03			7E-06
AOI 6	VOC	Chloroethane	75-00-3	3.03E-01		2E-10	3E-05
AOI 6	VOC	Chloroform	67-66-3	2.00E-03		4E-09	1E-05
AOI 6	VOC	Chloromethane	74-87-3	2.00E-03			1E-05
AOI 6	VOC	2-Chlorotoluene	95-49-8	7.70E-03			
AOI 6	VOC	Cumene	98-82-8	4.07E-02			1E-05
AOI 6	VOC	Cyclohexane	110-82-7	5.15E-02			4E-06
AOI 6	VOC	1,1-Dichloroethane	75-34-3	5.60E+00			3E-03
AOI 6	VOC	1,1-Dichloroethene	75-35-4	3.60E-01			9E-04
AOI 6	VOC	1,2-Dichloroethene (total)	540-59-0	9.50E-01			5E-05
AOI 6	VOC	cis-1,2-Dichloroethene	156-59-2	7.90E+00			5E-02
AOI 6	VOC	trans-1,2-Dichloroethene	156-60-5	5.30E-01			3E-03
AOI 6	VOC	Ethyl Benzene	100-41-4	3.36E-02			4E-06
AOI 6	VOC	4-Methyl-2-pentanone	108-10-1	4.00E-03			8E-08
AOI 6	VOC	Methylcyclohexane	108-87-2	3.40E-02			8E-06
AOI 6	VOC	Methylene Chloride	75-09-2	2.80E-01		1E-08	7E-05
AOI 6	VOC	1,1,2,2-Tetrachloroethane	79-34-5	2.00E-03		2E-09	2E-08
AOI 6	VOC	Tetrachloroethene	127-18-4	2.70E+01		8E-06	2E-02
AOI 6	VOC	Toluene	108-88-3	2.50E+00			1E-04
AOI 6	VOC	1,1,1-Trichloroethane	71-55-6	7.20E+01			1E-02
AOI 6	VOC	Trichloroethene	79-01-6	2.70E+02		3E-05	2E-02
AOI 6	VOC	Vinyl Chloride	75-01-4	2.00E-01		5E-07	1E-03
AOI 6	VOC	Xylenes (total)	1330-20-7	2.47E-01			3E-04
AOI 6	SVOC	Acenaphthene	83-32-9	3.90E-02			1E-06
AOI 6	SVOC	Benzo(a)anthracene	56-55-3	2.00E-01		7E-08	
AOI 6	SVOC	Benzo(a)pyrene	50-32-8	2.80E-01		1E-06	
AOI 6	SVOC	Benzo(b)fluoranthene	205-99-2	2.80E-01		1E-07	
AOI 6	SVOC	Benzo(g,h,i)perylene	191-24-2	2.20E-01			1E-05

**Attachment B4.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 6	SVOC	Benzo(k)fluoranthene	207-08-9	3.80E-01		1E-08	
AOI 6	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.20E+00		3E-08	3E-04
AOI 6	SVOC	Butylbenzylphthalate	85-68-7	7.50E-02			4E-07
AOI 6	SVOC	Chrysene	218-01-9	3.70E-01		1E-09	
AOI 6	SVOC	Dibenz(a,h)anthracene	53-70-3	5.90E-02		2E-07	
AOI 6	SVOC	Dibenzofuran	132-64-9	1.40E-01			8E-05
AOI 6	SVOC	Di-n-butylphthalate	84-74-2	1.40E-01			2E-06
AOI 6	SVOC	Di-n-octylphthalate	117-84-0	2.70E+00			8E-05
AOI 6	SVOC	Fluoranthene	206-44-0	2.30E-01			8E-06
AOI 6	SVOC	Fluorene	86-73-7	7.80E-02			3E-06
AOI 6	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.60E-01		6E-08	
AOI 6	SVOC	Phenanthrene	85-01-8	1.40E-01			7E-06
AOI 6	SVOC	Phenol	108-95-2	4.20E+00			2E-05
AOI 6	SVOC	Pyrene	129-00-0	3.10E-01			1E-05
AOI 6	PDIST	Petroleum Hydrocarbons - ERO	TPHERO	3.00E+03			
AOI 6	PDIST	Gasoline Range Organics	GRO	2.60E+00			
AOI 6	PCB	PCBs (total)	1336-36-3	1.97E+00		2E-06	1E-01
AOI 6	INORG	Arsenic	7440-38-2	8.90E+00	1.25E+01		
AOI 6	INORG	Barium	7440-39-3	1.06E+02	1.32E+02		
AOI 6	INORG	Beryllium	7440-41-7	8.53E-01		2E-10	2E-04
AOI 6	INORG	Cadmium	7440-43-9	1.30E+01		3E-09	1E-02
AOI 6	INORG	Chromium (total)	7440-47-3	4.91E+01	1.67E+01	4E-08	5E-03
AOI 6	INORG	Cobalt	7440-48-4	7.19E+00	1.09E+01		
AOI 6	INORG	Copper	7440-50-8	3.50E+01	3.66E+01		
AOI 6	INORG	Cyanide (total)	57-12-5	5.50E+01			1E-03
AOI 6	INORG	Lead	7439-92-1	4.35E+02	4.64E+01		
AOI 6	INORG	Manganese	7439-96-5	5.80E+02	5.45E+02		3E-04
AOI 6	INORG	Mercury	7439-97-6	3.10E-01			4E-03
AOI 6	INORG	Nickel	7440-02-0	3.10E+01	1.91E+01	3E-10	3E-04
AOI 6	INORG	Thallium	7440-28-0	2.92E+00	3.58E+00		
AOI 6	INORG	Vanadium	7440-62-2	3.17E+01	3.13E+01		
AOI 6	INORG	Zinc	7440-66-6	9.70E+01	9.72E+01		
AOI 7	VOC	Acetone	67-64-1	4.70E-03			1E-08
AOI 7	VOC	Chloroform	67-66-3	5.50E-03		1E-08	3E-05
AOI 7	VOC	Cumene	98-82-8	2.00E-03			5E-07
AOI 7	VOC	1,1-Dichloroethane	75-34-3	7.50E-03			4E-06
AOI 7	VOC	1,1-Dichloroethene	75-35-4	3.60E-02			9E-05
AOI 7	VOC	cis-1,2-Dichloroethene	156-59-2	4.10E+01			3E-01
AOI 7	VOC	trans-1,2-Dichloroethene	156-60-5	1.50E-01			8E-04
AOI 7	VOC	Ethyl Benzene	100-41-4	2.30E-02			3E-06
AOI 7	VOC	Methylcyclohexane	108-87-2	2.50E-03			6E-07

**Attachment B4.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 7	VOC	Methylene Chloride	75-09-2	3.90E-01		2E-08	1E-04
AOI 7	VOC	Tetrachloroethene	127-18-4	3.70E-03		1E-09	3E-06
AOI 7	VOC	Toluene	108-88-3	4.00E-03			2E-07
AOI 7	VOC	1,1,1-Trichloroethane	71-55-6	5.50E-03			8E-07
AOI 7	VOC	Trichloroethene	79-01-6	8.30E+01		1E-05	7E-03
AOI 7	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.90E-02			7E-07
AOI 7	VOC	Vinyl Chloride	75-01-4	6.60E-01		2E-06	5E-03
AOI 7	VOC	Xylenes (total)	1330-20-7	6.90E-02			7E-05
AOI 7	SVOC	2-Methylnaphthalene	91-57-6	6.60E-01			2E-03
AOI 7	SVOC	Phenanthrene	85-01-8	4.70E+00			2E-04
AOI 7	PDIST	Petroleum Hydrocarbons - ERO	TPHERO	1.40E+04			
AOI 7	PDIST	Gasoline Range Organics	GRO	1.80E+00			
AOI 7	INORG	Arsenic	7440-38-2	1.50E+01	1.25E+01	9E-07	6E-03
AOI 7	INORG	Barium	7440-39-3	7.33E+01	1.32E+02		
AOI 7	INORG	Beryllium	7440-41-7	3.69E-01		1E-10	1E-04
AOI 7	INORG	Chromium (total)	7440-47-3	1.86E+01	1.67E+01	3E-09	3E-04
AOI 7	INORG	Cobalt	7440-48-4	6.62E+00	1.09E+01		
AOI 7	INORG	Copper	7440-50-8	1.83E+01	3.66E+01		
AOI 7	INORG	Lead	7439-92-1	1.68E+01	4.64E+01		
AOI 7	INORG	Manganese	7439-96-5	3.73E+02	5.45E+02		
AOI 7	INORG	Nickel	7440-02-0	1.80E+01	1.91E+01		
AOI 7	INORG	Vanadium	7440-62-2	2.47E+01	3.13E+01		
AOI 7	INORG	Zinc	7440-66-6	4.35E+01	9.72E+01		
Notes:							
Only detected constituents are shown in each area.							
Soil concentrations are the maximum detected concentration in surface or subsurface soil in each area.							
Cancer and non-cancer risk estimates are calculated using site-related concentrations, which are those in excess of site-specific background for inorganics.							

Attachment B4.2
Exposure of Routine Workers to Groundwater Vapor

**Attachment B4.2: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/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	2.77E-07	4.68E-06
VOC	Acrolein	107-02-8	2.49E-03	9.50E-01	1.04E-04	8.40E-02	1.21E-06	8.44E-02	6.39E-07	1.08E-05
VOC	Acrylonitrile	107-13-1	2.10E-03	1.04E+00	1.12E-04	9.16E-02	1.31E-06	9.22E-02	5.90E-07	9.97E-06
VOC	Benzene	71-43-2	1.31E-01	7.60E-01	8.47E-05	6.72E-02	9.91E-07	6.72E-02	2.67E-05	4.51E-04
VOC	Bromobenzene	108-86-1	4.26E-02							
VOC	Bromochloromethane	74-97-5	2.94E-02	5.94E-01	8.64E-05	5.25E-02	1.01E-06	5.25E-02	4.70E-06	7.94E-05
VOC	Bromodichloromethane	75-27-4	3.62E-02	2.57E-01	9.16E-05	2.27E-02	1.07E-06	2.28E-02	2.50E-06	4.23E-05
VOC	Bromoform	75-25-2	1.03E-02	1.29E-01	8.90E-05	1.14E-02	1.04E-06	1.15E-02	3.58E-07	6.04E-06
VOC	Bromomethane	74-83-9	1.76E-01	6.29E-01	1.05E-04	5.56E-02	1.22E-06	5.56E-02	2.98E-05	5.03E-04
VOC	2-Butanone	78-93-3	1.14E-03	6.98E-01	8.47E-05	6.17E-02	9.91E-07	6.25E-02	2.17E-07	3.67E-06
VOC	n-Butylbenzene	104-51-8	2.23E-01							
VOC	sec-Butylbenzene	135-98-8	1.69E-04							
VOC	tert-Butylbenzene	98-06-6	2.48E-01							
VOC	Carbon Disulfide	75-15-0	7.91E-01	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	1.91E-04	3.22E-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	1.32E-04	2.24E-03
VOC	Chlorobenzene	108-90-7	7.71E-02	6.31E-01	7.52E-05	5.57E-02	8.80E-07	5.57E-02	1.30E-05	2.20E-04
VOC	Chloroethane	75-00-3	1.80E-01	2.34E+00	9.94E-05	2.07E-01	1.16E-06	2.07E-01	1.13E-04	1.91E-03
VOC	2-Chloroethylvinyl ether	110-75-8								
VOC	Chloroform	67-66-3	8.98E-02	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	2.17E-05	3.66E-04
VOC	Chloromethane	74-87-3	1.80E-01	1.09E+00	5.62E-05	9.62E-02	6.57E-07	9.62E-02	5.27E-05	8.90E-04
VOC	2-Chlorotoluene	95-49-8	7.30E-02	5.43E-01	7.52E-05	4.79E-02	8.80E-07	4.79E-02	1.06E-05	1.80E-04
VOC	4-Chlorotoluene	106-43-4								
VOC	Cumene	98-82-8	2.19E-01	5.62E-01	6.13E-05	4.96E-02	7.18E-07	4.96E-02	3.30E-05	5.57E-04
VOC	Cyclohexane	110-82-7	3.98E+00	7.25E-01	7.86E-05	6.40E-02	9.20E-07	6.40E-02	7.75E-04	1.31E-02
VOC	p-Cymene	99-87-6								
VOC	1,2-Dibromo-3-chloropropane	96-12-8	3.00E-03	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.13E-02	5.60E-07	9.46E-06
VOC	Dibromochloromethane	124-48-1	2.03E-02	1.69E-01	9.07E-05	1.50E-02	1.06E-06	1.50E-02	9.27E-07	1.57E-05
VOC	1,2-Dibromoethane	106-93-4	1.52E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	2.82E-06	4.76E-05
VOC	Dibromomethane	74-95-3	1.76E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	3.27E-06	5.52E-05
VOC	trans-1,4-Dichloro-2-butene	110-57-6	1.79E-03	5.73E-01	8.00E-05	5.06E-02	9.36E-07	5.11E-02	2.78E-07	4.70E-06
VOC	1,2-Dichlorobenzene	95-50-1	3.44E-02	5.96E-01	6.83E-05	5.27E-02	7.99E-07	5.27E-02	5.50E-06	9.30E-05
VOC	1,3-Dichlorobenzene	541-73-1	6.33E-02	5.98E-01	6.79E-05	5.28E-02	7.95E-07	5.28E-02	1.02E-05	1.72E-04
VOC	1,4-Dichlorobenzene	106-46-7	4.54E-02	5.96E-01	6.83E-05	5.27E-02	7.99E-07	5.27E-02	7.27E-06	1.23E-04
VOC	Dichlorodifluoromethane	75-71-8	7.01E+00	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	1.30E-03	2.20E-02
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	2.39E-05	4.04E-04
VOC	1,2-Dichloroethane	107-06-2	2.23E-02	8.99E-01	8.55E-05	7.94E-02	1.00E-06	7.94E-02	5.39E-06	9.11E-05
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	1.46E-04	2.46E-03
VOC	1,2-Dichloroethene (total)	540-59-0	1.92E-01							
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	1.68E-05	2.85E-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	3.90E-05	6.59E-04
VOC	1,2-Dichloropropane	78-87-5	6.36E-02	6.76E-01	7.54E-05	5.97E-02	8.83E-07	5.97E-02	1.15E-05	1.95E-04
VOC	1,3-Dichloropropane	142-28-9	2.03E-05	6.40E-01	8.53E-05	5.66E-02	9.98E-07	1.06E-01	6.51E-09	1.10E-07
VOC	2,2-Dichloropropane	594-20-7	9.36E-02	6.22E-01	8.19E-05	5.49E-02	9.59E-07	5.50E-02	1.56E-05	2.64E-04
VOC	1,1-Dichloropropene	563-58-6	1.02E+00							
VOC	1,3-Dichloropropene (total)	542-75-6	3.88E-01	5.41E-01	8.64E-05	4.78E-02	1.01E-06	4.78E-02	5.63E-05	9.51E-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	2.78E-05	4.69E-04
VOC	Ethyl Methacrylate	97-63-2	1.72E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	3.19E-06	5.40E-05
VOC	2-Hexanone	591-78-6	3.58E-02	6.47E-01	7.10E-05	5.72E-02	8.31E-07	5.72E-02	6.21E-06	1.05E-04
VOC	Iodomethane	74-88-4	1.12E-01	4.53E-01	6.70E-05	4.00E-02	7.85E-07	4.00E-02	1.36E-05	2.30E-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	4.83E-07	8.17E-06
VOC	Methyl tert-butyl ether	1634-04-4	1.46E-02	7.42E-01	8.73E-05	6.56E-02	1.02E-06	6.56E-02	2.92E-06	4.94E-05
VOC	4-Methyl-2-pentanone	108-10-1	2.82E-03	6.48E-01	6.74E-05	5.72E-02	7.89E-07	5.75E-02	4.93E-07	8.33E-06
VOC	Methylcyclohexane	108-87-2	9.74E+00	6.35E-01	7.36E-05	5.61E-02	8.62E-07	5.61E-02	1.66E-03	2.81E-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	1.31E-05	2.21E-04
VOC	n-Propylbenzene	103-65-1	1.89E-01							
VOC	Styrene	100-42-5	5.46E-02	6.13E-01	6.91E-05	5.42E-02	8.09E-07	5.42E-02	8.99E-06	1.52E-04
VOC	1,1,1,2-Tetrachloroethane	630-20-6	4.95E-02	6.13E-01	6.83E-05	5.42E-02	7.99E-07	5.42E-02	8.14E-06	1.38E-04
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	1.12E-06	1.89E-05
VOC	Tetrachloroethene	127-18-4	3.89E-01	6.22E-01	7.08E-05	5.49E-02	8.29E-07	5.50E-02	6.50E-05	1.10E-03
VOC	Toluene	108-88-3	1.45E-01	7.52E-01	7.43E-05	6.64E-02	8.70E-07	6.64E-02	2.92E-05	4.93E-04
VOC	1,2,3-Trichlorobenzene	87-61-6	1.82E-01							
VOC	1,2,4-Trichlorobenzene	120-82-1	2.29E-02	2.59E-01	7.11E-05	2.29E-02	8.32E-07	2.29E-02	1.60E-06	2.70E-05
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	7.45E-05	1.26E-03
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	3.49E-06	5.90E-05
VOC	Trichloroethene	79-01-6	2.35E-01	6.83E-01	7.86E-05	6.03E-02	9.20E-07	6.03E-02	4.30E-05	7.27E-04
VOC	Trichlorofluoromethane	75-69-4	1.98E+00	7.52E-01	8.38E-05	6.64E-02	9.81E-07	6.64E-02	4.00E-04	6.76E-03
VOC	1,2,3-Trichloropropane	96-18-4	8.35E-03	6.13E-01	6.83E-05	5.42E-02	7.99E-07	5.43E-02	1.38E-06	2.33E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.83E+00	6.74E-01	7.08E-05	5.95E-02	8.29E-07	5.95E-02	1.78E-03	3.00E-02

**Attachment B4.2: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/m ³)
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	1.56E-05	2.64E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	1.06E-01	5.20E-01	7.49E-05	4.59E-02	8.77E-07	4.60E-02	1.48E-05	2.51E-04
VOC	Vinyl Acetate	108-05-4	1.15E-02	7.34E-01	7.95E-05	6.49E-02	9.30E-07	6.50E-02	2.27E-06	3.84E-05
VOC	Vinyl Chloride	75-01-4	8.02E-01	9.16E-01	1.06E-04	8.09E-02	1.24E-06	8.09E-02	1.97E-04	3.33E-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	2.44E-05	4.12E-04
SVOC	Acenaphthene	83-32-9	2.02E-03	3.64E-01	6.64E-05	3.21E-02	7.78E-07	3.25E-02	2.00E-07	3.38E-06
SVOC	Acenaphthylene	208-96-8	2.31E-03	3.88E-01	6.03E-05	3.43E-02	7.06E-07	3.46E-02	2.43E-07	4.10E-06
SVOC	Acetophenone	98-86-2	2.19E-04	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.48E-02	4.30E-08	7.27E-07
SVOC	Anthracene	120-12-7	7.20E-04	2.80E-01	6.69E-05	2.47E-02	7.83E-07	2.58E-02	5.65E-08	9.55E-07
SVOC	Atrazine	1912-24-9	1.25E-07	2.24E-01	5.76E-05	1.98E-02	6.74E-07	5.42E+00	2.06E-09	3.48E-08
SVOC	Benzaldehyde	100-52-7	3.58E-04	6.23E-01	7.84E-05	5.50E-02	9.17E-07	5.76E-02	6.27E-08	1.06E-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	5.88E-09	9.94E-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	3.35E-09	5.66E-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	3.94E-08	6.67E-07
SVOC	Benzo(g,h,i)perylene	191-24-2	2.88E-06	1.88E-01	4.54E-05	1.66E-02	5.32E-07	2.01E-01	1.76E-09	2.98E-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	1.96E-09	3.31E-08
SVOC	Benzoic Acid	65-85-0	4.37E-06	4.63E-01	6.89E-05	4.09E-02	8.06E-07	2.25E-01	2.99E-09	5.06E-08
SVOC	Benzyl Alcohol	100-51-6	7.95E-06	6.12E-01	7.75E-05	5.40E-02	9.07E-07	1.68E-01	4.06E-09	6.86E-08
SVOC	Biphenyl	92-52-4	6.13E-03	3.49E-01	7.04E-05	3.08E-02	8.24E-07	3.10E-02	5.77E-07	9.75E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.47E-06	3.77E-01	7.31E-05	3.33E-02	8.55E-07	2.80E-01	2.95E-09	4.99E-08
SVOC	bis(2-Chloroethyl) ether	111-44-4	2.83E-04	5.98E-01	6.51E-05	5.28E-02	7.61E-07	5.55E-02	4.77E-08	8.06E-07
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	1.17E-09	1.98E-08
SVOC	4-Bromophenyl-phenyl ether	101-55-3	2.39E-03	2.26E-01	5.88E-05	1.99E-02	6.88E-07	2.02E-02	1.47E-07	2.48E-06
SVOC	Butylbenzylphthalate	85-68-7	1.04E-05	1.50E-01	4.17E-05	1.33E-02	4.88E-07	6.01E-02	1.90E-09	3.22E-08
SVOC	Caprolactam	105-60-2	1.03E-07	5.98E-01	7.77E-05	5.28E-02	9.09E-07	8.88E+00	2.78E-09	4.70E-08
SVOC	Carbazole	86-74-8	1.56E-07	3.37E-01	6.07E-05	2.98E-02	7.11E-07	4.58E+00	2.17E-09	3.67E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	8.15E-06	5.24E-01	8.22E-05	4.62E-02	9.62E-07	1.64E-01	4.07E-09	6.87E-08
SVOC	4-Chloroaniline	106-47-8	4.75E-06	4.17E-01	8.73E-05	3.69E-02	1.02E-06	2.52E-01	3.63E-09	6.14E-08
SVOC	2-Chloronaphthalene	91-58-7	6.42E-03	4.25E-01	7.59E-05	3.75E-02	8.89E-07	3.77E-02	7.35E-07	1.24E-05
SVOC	2-Chlorophenol	95-57-8	7.03E-03	4.33E-01	8.17E-05	3.82E-02	9.57E-07	4.84E-02	8.20E-07	1.39E-05
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	4.50E-03	2.45E-01	6.61E-05	2.16E-02	7.74E-07	2.18E-02	2.98E-07	5.04E-06
SVOC	Chrysene	218-01-9	6.67E-04	2.14E-01	5.37E-05	1.89E-02	6.28E-07	1.99E-02	4.03E-08	6.81E-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	1.59E-09	2.69E-08
SVOC	Dibenzofuran	132-64-9	2.57E-04	2.06E-01	5.18E-05	1.82E-02	6.07E-07	2.05E-02	1.61E-08	2.71E-07
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.05E-08	1.68E-01	5.82E-05	1.48E-02	6.82E-07	3.32E+01	2.07E-09	3.50E-08
SVOC	2,4-Dichlorophenol	120-83-2	3.31E-05	2.99E-01	7.58E-05	2.64E-02	8.87E-07	5.32E-02	5.35E-09	9.04E-08
SVOC	Diethylphthalate	84-66-2	4.43E-06	2.21E-01	5.49E-05	1.95E-02	6.42E-07	1.65E-01	2.21E-09	3.74E-08
SVOC	2,4-Dimethylphenol	105-67-9	2.93E-05	5.05E-01	7.51E-05	4.46E-02	8.79E-07	7.46E-02	6.64E-09	1.12E-07
SVOC	Dimethylphthalate	131-11-3	2.15E-06	4.91E-01	5.43E-05	4.33E-02	6.36E-07	3.40E-01	2.21E-09	3.74E-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	2.42E-09	4.08E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	8.73E-06	2.38E-01	5.97E-05	2.11E-02	6.99E-07	1.01E-01	2.68E-09	4.53E-08
SVOC	2,4-Dinitrophenol	51-28-5	1.33E-06	2.36E-01	7.83E-05	2.08E-02	9.16E-07	7.10E-01	2.87E-09	4.85E-08
SVOC	2,4-Dinitrotoluene	121-14-2	9.64E-07	1.75E+00	6.10E-05	1.55E-01	7.14E-07	8.95E-01	2.62E-09	4.43E-08
SVOC	2,6-Dinitrotoluene	606-20-2	8.36E-06	2.83E-01	6.27E-05	2.50E-02	7.34E-07	1.13E-01	2.86E-09	4.84E-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	1.84E-08	3.11E-07
SVOC	Fluoranthene	206-44-0	1.56E-04	2.61E-01	5.49E-05	2.30E-02	6.42E-07	2.72E-02	1.29E-08	2.18E-07
SVOC	Fluorene	86-73-7	8.23E-04	3.14E-01	6.81E-05	2.77E-02	7.97E-07	2.87E-02	7.17E-08	1.21E-06
SVOC	Hexachlorobenzene	118-74-1	1.29E-02	4.68E-01	5.11E-05	4.14E-02	5.98E-07	4.14E-02	1.62E-06	2.74E-05
SVOC	Hexachlorobutadiene	87-68-3	1.37E-01	4.85E-01	5.32E-05	4.28E-02	6.23E-07	4.28E-02	1.78E-05	3.00E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	4.04E-01	1.39E-01	6.23E-05	1.23E-02	7.29E-07	1.23E-02	1.51E-05	2.55E-04
SVOC	Hexachloroethane	67-72-1	7.02E-02	2.16E-02	5.88E-05	1.91E-03	6.88E-07	1.92E-03	4.09E-07	6.91E-06
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	2.08E-09	3.51E-08
SVOC	Isophorone	78-59-1	1.07E-04	5.38E-01	5.84E-05	4.75E-02	6.84E-07	5.39E-02	1.76E-08	2.97E-07
SVOC	2-Methylnaphthalene	91-57-6	1.06E-02	4.51E-01	6.70E-05	3.98E-02	7.84E-07	3.99E-02	1.28E-06	2.17E-05
SVOC	Methylphenol (total)	1319-77-3	1.77E-05	6.39E-01	8.64E-05	5.65E-02	1.01E-06	1.14E-01	6.10E-09	1.03E-07
SVOC	Naphthalene	91-20-3	7.98E-03	5.10E-01	6.48E-05	4.50E-02	7.58E-07	4.51E-02	1.09E-06	1.85E-05
SVOC	2-Nitroaniline	88-74-4	3.27E-06	6.31E-01	6.91E-05	5.57E-02	8.09E-07	3.03E-01	3.01E-09	5.09E-08
SVOC	3-Nitroaniline	99-09-2	2.94E-06							
SVOC	4-Nitroaniline	100-01-6	4.23E-08	5.00E-01	7.41E-05	4.42E-02	8.68E-07	2.06E+01	2.64E-09	4.46E-08
SVOC	Nitrobenzene	98-95-3	3.83E-04	6.57E-01	7.43E-05	5.80E-02	8.70E-07	6.03E-02	7.02E-08	1.19E-06
SVOC	2-Nitrophenol	88-75-5	1.94E-04	4.66E-01	6.78E-05	4.11E-02	7.94E-07	4.52E-02	2.66E-08	4.50E-07
SVOC	4-Nitrophenol	100-02-7	8.48E-09	5.40E-01	8.30E-05	4.77E-02	9.72E-07	1.15E+02	2.95E-09	4.99E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	9.96E-05	2.70E-01	5.49E-05	2.38E-02	6.42E-07	3.03E-02	9.16E-09	1.55E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	5.38E-05	4.71E-01	7.06E-05	4.16E-02	8.26E-07	5.70E-02	9.30E-09	1.57E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.39E-03	5.20E-01	5.54E-05	4.59E-02	6.48E-07	4.62E-02	3.36E-07	5.67E-06
SVOC	Pentachlorophenol	87-86-5	1.97E-07	4.84E-01	5.27E-05	4.27E-02	6.17E-07	3.18E+00	1.90E-09	3.21E-08
SVOC	Phenanthrene	85-01-8	4.76E-04	3.24E-01	6.45E-05	2.86E-02	7.55E-07	3.02E-02	4.37E-08	7.39E-07
SVOC	Phenol	108-95-2	6.37E-06	7.08E-01	7.86E-05	6.26E-02	9.20E-07	2.07E-01	4.01E-09	6.77E-08

**Attachment B4.2: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/m ³)
SVOC	Pyrene	129-00-0	1.02E-04	2.35E-01	6.26E-05	2.08E-02	7.32E-07	2.79E-02	8.67E-09	1.47E-07
SVOC	2,4,5-Trichlorophenol	95-95-4	6.33E-05	2.51E-01	6.07E-05	2.22E-02	7.11E-07	3.34E-02	6.43E-09	1.09E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	1.03E-04	2.75E-01	5.40E-05	2.43E-02	6.32E-07	3.04E-02	9.53E-09	1.61E-07
PCB	PCBs (total)	1336-36-3	4.09E-02	1.75E-01	4.32E-05	1.54E-02	5.06E-07	1.54E-02	1.92E-06	3.24E-05
INORG	Antimony	7440-36-0								
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	Lead	7439-92-1								
INORG	Manganese	7439-96-5								
INORG	Mercury	7439-97-6	1.45E-01	2.65E-01	5.44E-05	2.34E-02	6.37E-07	2.34E-02	1.03E-05	1.75E-04
INORG	Nickel	7440-02-0								
INORG	Selenium	7782-49-2								
INORG	Silver	7440-22-4								
INORG	Thallium	7440-28-0								
INORG	Vanadium	7440-62-2								
INORG	Zinc	7440-66-6								
Soil Parameters										
	Soil type			Silty Clay						
	Total porosity	L/L-soil	θ _T	0.481	Silty-Clay					
	Water-filled porosity	L/L-soil	θ _w	0.170	Silty Clay					
	Air-filled porosity	L/L-soil	θ _a	0.311	Silty Clay					
	Depth to groundwater	m	DTW	3.81	porosity-water content					
	Bulk density	kg/L	ρ _b	1.38						
	Dispersion coefficient	(kg/m ³) / (kg/m ² /s)	C/Q	16.9	from correlation equation in USEPA SSSG (2002)					

**Attachment B4.2: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Groundwater via Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
On-Site	AOI 2	S1	VOC	cis-1,2-Dichloroethene	156-59-2	1.50E-01		6E-04
On-Site	AOI 2	S1	VOC	trans-1,2-Dichloroethene	156-60-5	3.70E-02		2E-04
On-Site	AOI 2	S1	VOC	Trichloroethene	79-01-6	1.30E-02	4E-10	
On-Site	AOI 2	S1	SVOC	2-Methylnaphthalene	91-57-6	6.50E-04		2E-06
On-Site	AOI 2	S1	INORG	Arsenic	7440-38-2	5.24E-03		
On-Site	AOI 2	S1	INORG	Arsenic	7440-38-2	7.74E-03		
On-Site	AOI 2	S1	INORG	Barium	7440-39-3	1.72E-01		
On-Site	AOI 2	S1	INORG	Barium	7440-39-3	1.96E-01		
On-Site	AOI 2	S1	INORG	Chromium (total)	7440-47-3	6.40E-03		
On-Site	AOI 2	S1	INORG	Cobalt	7440-48-4	3.20E-03		
On-Site	AOI 2	S1	INORG	Copper	7440-50-8	6.96E-03		
On-Site	AOI 2	S1	INORG	Manganese	7439-96-5	1.62E-01		
On-Site	AOI 2	S1	INORG	Manganese	7439-96-5	3.12E-01		
On-Site	AOI 2	S1	INORG	Nickel	7440-02-0	8.44E-03		
On-Site	AOI 2	S1	INORG	Vanadium	7440-62-2	8.52E-03		
On-Site	AOI 2	S1	INORG	Zinc	7440-66-6	3.28E-03		
On-Site	AOI 2	S1	INORG	Zinc	7440-66-6	3.69E-02		
On-Site	AOI 3	S1	VOC	1,1-Dichloroethane	75-34-3	4.00E-03		2E-06
On-Site	AOI 3	S1	VOC	1,1-Dichloroethene	75-35-4	3.90E-03		2E-05
On-Site	AOI 3	S1	VOC	cis-1,2-Dichloroethene	156-59-2	5.20E-01		2E-03
On-Site	AOI 3	S1	VOC	trans-1,2-Dichloroethene	156-60-5	2.60E-02		1E-04
On-Site	AOI 3	S1	VOC	Trichloroethene	79-01-6	6.00E+00	2E-07	
On-Site	AOI 3	S1	VOC	Vinyl Chloride	75-01-4	2.10E-03	2E-09	3E-05
On-Site	AOI 5	S1	VOC	Benzene	71-43-2	2.30E-03	2E-10	2E-05
On-Site	AOI 5	S1	VOC	1,1-Dichloroethane	75-34-3	1.20E-02		5E-06
On-Site	AOI 5	S1	VOC	1,1-Dichloroethene	75-35-4	9.35E-03		5E-05
On-Site	AOI 5	S1	VOC	cis-1,2-Dichloroethene	156-59-2	1.10E+00		4E-03
On-Site	AOI 5	S1	VOC	trans-1,2-Dichloroethene	156-60-5	7.60E-02		4E-04
On-Site	AOI 5	S1	VOC	Trichloroethene	79-01-6	7.60E+00	2E-07	
On-Site	AOI 5	S1	VOC	Vinyl Chloride	75-01-4	1.00E-01	7E-08	2E-03
On-Site	AOI 5	S1	INORG	Arsenic	7440-38-2	8.37E-03		
On-Site	AOI 5	S1	INORG	Barium	7440-39-3	1.35E-01		
On-Site	AOI 5	S1	INORG	Barium	7440-39-3	2.15E-01		

**Attachment B4.2: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Groundwater via Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
On-Site	AOI 5	S1	INORG	Chromium (total)	7440-47-3	2.67E-02		
On-Site	AOI 5	S1	INORG	Copper	7440-50-8	2.70E-02		
On-Site	AOI 5	S1	INORG	Lead	7439-92-1	1.42E-02		
On-Site	AOI 5	S1	INORG	Manganese	7439-96-5	3.69E-01		
On-Site	AOI 5	S1	INORG	Manganese	7439-96-5	8.01E-01		
On-Site	AOI 5	S1	INORG	Zinc	7440-66-6	7.35E-02		
On-Site	AOI 6	S1	VOC	1,1-Dichloroethane	75-34-3	1.90E-01		7E-05
On-Site	AOI 6	S1	VOC	cis-1,2-Dichloroethene	156-59-2	3.10E-01		1E-03
On-Site	AOI 6	S1	VOC	trans-1,2-Dichloroethene	156-60-5	6.00E-03		3E-05
On-Site	AOI 6	S1	VOC	Toluene	108-88-3	2.05E-03		9E-08
On-Site	AOI 6	S1	VOC	1,1,1-Trichloroethane	71-55-6	2.10E-02		6E-06
On-Site	AOI 6	S1	VOC	Trichloroethene	79-01-6	5.20E-02	2E-09	
On-Site	AOI 6	S1	INORG	Barium	7440-39-3	6.03E-02		
On-Site	AOI 6	S1	INORG	Manganese	7439-96-5	2.00E-01		
On-Site	AOI 6	S1	INORG	Manganese	7439-96-5	2.36E-01		
On-Site	AOI 7	S1	VOC	1,1-Dichloroethene	75-35-4	4.50E-03		3E-05
On-Site	AOI 7	S1	VOC	cis-1,2-Dichloroethene	156-59-2	1.00E+00		4E-03
On-Site	AOI 7	S1	VOC	trans-1,2-Dichloroethene	156-60-5	8.80E-02		5E-04
On-Site	AOI 7	S1	VOC	Trichloroethene	79-01-6	4.80E+00	1E-07	
On-Site	AOI 7	S1	VOC	Vinyl Chloride	75-01-4	2.10E-02	2E-08	3E-04
On-Site	AOI 7	S1	SVOC	2-Methylnaphthalene	91-57-6	6.40E-04		2E-06
On-Site	AOI 7	S1	INORG	Arsenic	7440-38-2	4.55E-03		
On-Site	AOI 7	S1	INORG	Barium	7440-39-3	1.85E-01		
On-Site	AOI 7	S1	INORG	Barium	7440-39-3	2.09E-01		
On-Site	AOI 7	S1	INORG	Manganese	7439-96-5	2.64E-01		
On-Site	AOI 7	S1	INORG	Manganese	7439-96-5	3.74E-01		
On-Site	AOI 7	S1	INORG	Zinc	7440-66-6	1.65E-02		
On-Site	Upgradient	P1	VOC	cis-1,2-Dichloroethene	156-59-2	2.00E-02		8E-05
On-Site	Upgradient	P1	VOC	Trichloroethene	79-01-6	1.30E-03	4E-11	
On-Site	Upgradient	P1	VOC	Vinyl Chloride	75-01-4	6.80E-03	5E-09	1E-04
Off-Site	Off-Site East	S1	VOC	cis-1,2-Dichloroethene	156-59-2	2.10E-01		8E-04
Off-Site	Off-Site East	S1	VOC	trans-1,2-Dichloroethene	156-60-5	4.30E-02		2E-04
Off-Site	Off-Site East	S1	VOC	Trichloroethene	79-01-6	3.86E+00	1E-07	

**Attachment B4.2: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Routine Worker Exposure to Groundwater via Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
Off-Site	Off-Site East	S1	VOC	Vinyl Chloride	75-01-4	1.90E-03	1E-09	3E-05
Off-Site	Off-Site West	S1	VOC	1,1-Dichloroethene	75-35-4	2.10E-03		1E-05
Off-Site	Off-Site West	S1	VOC	cis-1,2-Dichloroethene	156-59-2	8.80E-01		3E-03
Off-Site	Off-Site West	S1	VOC	trans-1,2-Dichloroethene	156-60-5	5.40E-02		3E-04
Off-Site	Off-Site West	S1	VOC	Trichloroethene	79-01-6	5.70E-03	2E-10	
Off-Site	Off-Site West	S1	VOC	Vinyl Chloride	75-01-4	3.70E-03	3E-09	6E-05
Notes:								
Only detected constituents are shown in each area.								
Only concentrations in saturated units P1 and S1 are shown.								
Cancer and non-cancer risk estimates are calculated using the maximum groundwater concentrations detected in each AOI.								

Attachment B5.1
Exposure of Maintenance Workers to Soil

Attachment B5.1: Vapor Flux from Soil to Ambient 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	1.75E-01	9.36E-02	1.16E-06	5.16E-04	6.78E-06
VOC	Acrolein	107-02-8	1.02E+00		3.69E-03	9.50E-01	1.04E-04	1.79E-01	8.30E-02	1.22E-06	1.72E-03	1.24E-05
VOC	Acrylonitrile	107-13-1	2.24E-01		2.90E-03	1.04E+00	1.12E-04	1.72E-01	9.05E-02	1.32E-06	1.53E-03	1.17E-05
VOC	Benzene	71-43-2	5.82E+01		1.31E-01	7.60E-01	8.47E-05	6.92E-01	6.64E-02	9.98E-07	1.25E-02	3.34E-05
VOC	Bromobenzene	108-86-1	2.79E+02		4.26E-02							
VOC	Bromochloromethane	74-97-5	1.57E+01		2.94E-02	5.94E-01	8.64E-05	3.09E-01	5.19E-02	1.02E-06	4.95E-03	2.10E-05
VOC	Bromodichloromethane	75-27-4	5.51E+01		3.62E-02	2.57E-01	9.16E-05	6.37E-01	2.25E-02	1.08E-06	1.28E-03	1.07E-05
VOC	Bromoform	75-25-2	8.70E+01		1.03E-02	1.29E-01	8.90E-05	8.93E-01	1.12E-02	1.05E-06	1.30E-04	3.41E-06
VOC	Bromomethane	74-83-9	1.05E+01		1.76E-01	6.29E-01	1.05E-04	3.11E-01	5.49E-02	1.23E-06	3.11E-02	5.26E-05
VOC	2-Butanone	78-93-3	2.00E+00		1.61E-03	6.98E-01	8.47E-05	1.87E-01	6.10E-02	9.98E-07	5.30E-04	6.87E-06
VOC	n-Butylbenzene	104-51-8	2.54E+03		2.23E-01							
VOC	sec-Butylbenzene	135-98-8	2.73E+03		1.69E-04							
VOC	tert-Butylbenzene	98-06-6	2.15E+03		2.48E-01							
VOC	Carbon Disulfide	75-15-0	4.59E+01		7.91E-01	8.99E-01	8.64E-05	7.95E-01	7.85E-02	1.02E-06	7.81E-02	8.34E-05
VOC	Carbon Tetrachloride	56-23-5	1.74E+02		7.32E-01	6.74E-01	7.60E-05	1.84E+00	5.88E-02	8.96E-07	2.34E-02	4.57E-05
VOC	Chlorobenzene	108-90-7	2.20E+02		7.71E-02	6.31E-01	7.52E-05	2.02E+00	5.51E-02	8.86E-07	2.10E-03	1.37E-05
VOC	Chloroethane	75-00-3	1.62E+01		2.84E-01	2.34E+00	9.94E-05	3.92E-01	2.04E-01	1.17E-06	1.48E-01	1.15E-04
VOC	2-Chloroethylvinyl ether	110-75-8										
VOC	Chloroform	67-66-3	3.97E+01		8.98E-02	8.99E-01	8.64E-05	5.26E-01	7.85E-02	1.02E-06	1.34E-02	3.45E-05
VOC	Chloromethane	74-87-3	3.97E+01		2.99E-01	1.09E+00	5.62E-05	5.91E-01	9.51E-02	6.62E-07	4.81E-02	6.54E-05
VOC	2-Chlorotoluene	95-49-8	6.12E+02		7.30E-02	5.43E-01	7.52E-05	5.26E+00	4.74E-02	8.86E-07	6.58E-04	7.65E-06
VOC	4-Chlorotoluene	106-43-4	5.19E+02									
VOC	Cumene	98-82-8	7.05E+02		2.19E-01	5.62E-01	6.13E-05	6.08E+00	4.90E-02	7.23E-07	1.77E-03	1.25E-05
VOC	Cyclohexane	110-82-7	6.35E+02		3.98E+00	7.25E-01	7.86E-05	6.66E+00	6.33E-02	9.27E-07	3.79E-02	5.81E-05
VOC	p-Cymene	99-87-6	2.11E+03									
VOC	1,2-Dibromo-3-chloropropane	96-12-8	1.45E+02		3.00E-03	6.91E-01	6.91E-05	1.37E+00	6.04E-02	8.15E-07	1.33E-04	3.44E-06
VOC	Dibromochloromethane	124-48-1	6.26E+01		2.03E-02	1.69E-01	9.07E-05	6.95E-01	1.48E-02	1.07E-06	4.34E-04	6.22E-06
VOC	1,2-Dibromoethane	106-93-4	2.22E+01		1.97E-02	6.91E-01	6.91E-05	3.59E-01	6.04E-02	8.15E-07	3.31E-03	1.72E-05
VOC	Dibromomethane	74-95-3	1.95E+01		2.42E-02	6.91E-01	6.91E-05	3.38E-01	6.04E-02	8.15E-07	4.32E-03	1.96E-05
VOC	trans-1,4-Dichloro-2-butene	110-57-6	5.88E+00		1.79E-03	5.73E-01	8.00E-05	2.19E-01	5.00E-02	9.43E-07	4.13E-04	6.06E-06
VOC	1,2-Dichlorobenzene	95-50-1	6.23E+02		3.44E-02	5.96E-01	6.83E-05	5.34E+00	5.21E-02	8.05E-07	3.35E-04	5.46E-06
VOC	1,3-Dichlorobenzene	541-73-1	5.69E+02		7.87E-02	5.98E-01	6.79E-05	4.90E+00	5.22E-02	8.01E-07	8.38E-04	8.63E-06
VOC	1,4-Dichlorobenzene	106-46-7	6.12E+02		4.54E-02	5.96E-01	6.83E-05	5.25E+00	5.21E-02	8.05E-07	4.50E-04	6.33E-06
VOC	Dichlorodifluoromethane	75-71-8	6.15E+01		9.89E+00	6.91E-01	6.91E-05	3.74E+00	6.04E-02	8.15E-07	1.60E-01	1.19E-04
VOC	1,1-Dichloroethane	75-34-3	3.13E+01		1.39E-01	6.41E-01	9.07E-05	4.72E-01	5.60E-02	1.07E-06	1.65E-02	3.83E-05
VOC	1,2-Dichloroethane	107-06-2	1.75E+01		2.23E-02	8.99E-01	8.55E-05	3.21E-01	7.85E-02	1.01E-06	5.46E-03	2.20E-05
VOC	1,1-Dichloroethene	75-35-4	5.82E+01		6.97E-01	7.78E-01	8.99E-05	8.68E-01	6.79E-02	1.06E-06	5.46E-02	6.97E-05

Attachment B5.1: Vapor Flux from Soil to Ambient 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	1,2-Dichloroethene (total)	540-59-0	3.56E+01		1.92E-01							
VOC	cis-1,2-Dichloroethene	156-59-2	3.56E+01		9.86E-02	6.36E-01	9.76E-05	4.95E-01	5.55E-02	1.15E-06	1.11E-02	3.14E-05
VOC	trans-1,2-Dichloroethene	156-60-5	5.22E+01		2.38E-01	6.11E-01	1.03E-04	6.75E-01	5.33E-02	1.21E-06	1.88E-02	4.09E-05
VOC	1,2-Dichloropropane	78-87-5	4.35E+01		6.36E-02	6.76E-01	7.54E-05	5.50E-01	5.90E-02	8.89E-07	6.83E-03	2.46E-05
VOC	1,3-Dichloropropane	142-28-9	4.59E+01		2.03E-05	6.40E-01	8.53E-05	5.50E-01	5.59E-02	1.01E-06	3.89E-06	5.88E-07
VOC	2,2-Dichloropropane	594-20-7	3.85E+01		9.36E-02	6.22E-01	8.19E-05	5.18E-01	5.43E-02	9.66E-07	9.82E-03	2.96E-05
VOC	1,1-Dichloropropene	563-58-6	1.21E+02		1.02E+00							
VOC	1,3-Dichloropropene (total)	542-75-6	4.59E+01		3.88E-01	5.41E-01	8.64E-05	6.70E-01	4.72E-02	1.02E-06	2.73E-02	4.93E-05
VOC	Ethyl Benzene	100-41-4	3.67E+02		1.60E-01	6.48E-01	6.74E-05	3.26E+00	5.66E-02	7.95E-07	2.77E-03	1.57E-05
VOC	Ethyl Methacrylate	97-63-2	4.12E+01		1.96E-02	6.91E-01	6.91E-05	5.17E-01	6.04E-02	8.15E-07	2.29E-03	1.43E-05
VOC	2-Hexanone	591-78-6	1.48E+01		3.58E-02	6.47E-01	7.10E-05	3.04E-01	5.65E-02	8.37E-07	6.66E-03	2.43E-05
VOC	Iodomethane	74-88-4	2.61E+01		1.12E-01	4.53E-01	6.70E-05	4.21E-01	3.95E-02	7.90E-07	1.05E-02	3.06E-05
VOC	Methyl Acetate	79-20-9	1.66E+00		2.16E-03	8.27E-01	9.50E-05	1.84E-01	7.22E-02	1.12E-06	8.54E-04	8.72E-06
VOC	Methyl tert-butyl ether	1634-04-4	1.15E+01		1.46E-02	7.42E-01	8.73E-05	2.69E-01	6.48E-02	1.03E-06	3.53E-03	1.77E-05
VOC	4-Methyl-2-pentanone	108-10-1	1.05E+01		3.72E-03	6.48E-01	6.74E-05	2.58E-01	5.66E-02	7.95E-07	8.19E-04	8.54E-06
VOC	Methylcyclohexane	108-87-2	2.66E+02		9.74E+00	6.35E-01	7.36E-05	5.39E+00	5.55E-02	8.68E-07	1.00E-01	9.44E-05
VOC	Methylene Chloride	75-09-2	1.17E+01		5.59E-02	8.73E-01	1.01E-04	2.84E-01	7.62E-02	1.19E-06	1.50E-02	3.65E-05
VOC	n-Propylbenzene	103-65-1	9.83E+02		1.89E-01							
VOC	Styrene	100-42-5	7.77E+02		5.46E-02	6.13E-01	6.91E-05	6.62E+00	5.36E-02	8.15E-07	4.42E-04	6.27E-06
VOC	1,1,1,2-Tetrachloroethane	630-20-6	3.06E+02		6.07E-02	6.13E-01	6.83E-05	2.72E+00	5.36E-02	8.05E-07	1.19E-03	1.03E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	9.35E+01		6.77E-03	6.13E-01	6.83E-05	9.46E-01	5.36E-02	8.05E-07	3.84E-04	5.85E-06
VOC	Tetrachloroethene	127-18-4	1.56E+02		3.89E-01	6.22E-01	7.08E-05	1.58E+00	5.43E-02	8.35E-07	1.34E-02	3.45E-05
VOC	Toluene	108-88-3	1.80E+02		1.45E-01	7.52E-01	7.43E-05	1.71E+00	6.56E-02	8.76E-07	5.56E-03	2.22E-05
VOC	1,2,3-Trichlorobenzene	87-61-6	2.27E+03		1.82E-01							
VOC	1,2,4-Trichlorobenzene	120-82-1	1.79E+03		2.29E-02	2.59E-01	7.11E-05	1.50E+01	2.26E-02	8.38E-07	3.45E-05	1.75E-06
VOC	1,1,1-Trichloroethane	71-55-6	1.10E+02		4.12E-01	6.74E-01	7.60E-05	1.21E+00	5.88E-02	8.96E-07	2.00E-02	4.22E-05
VOC	1,1,2-Trichloroethane	79-00-5	5.03E+01		1.93E-02	6.74E-01	7.60E-05	5.92E-01	5.88E-02	8.96E-07	1.92E-03	1.31E-05
VOC	Trichloroethene	79-01-6	1.68E+02		2.35E-01	6.83E-01	7.86E-05	1.63E+00	5.96E-02	9.27E-07	8.58E-03	2.76E-05
VOC	Trichlorofluoromethane	75-69-4	1.21E+02		3.09E+00	7.52E-01	8.38E-05	2.12E+00	6.56E-02	9.88E-07	9.53E-02	9.21E-05
VOC	1,2,3-Trichloropropane	96-18-4	4.43E+01		1.04E-02	6.13E-01	6.83E-05	5.40E-01	5.36E-02	8.05E-07	1.04E-03	9.60E-06
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.81E+02		1.48E+01	6.74E-01	7.08E-05	7.89E+00	5.88E-02	8.35E-07	1.10E-01	9.90E-05
VOC	1,2,4-Trimethylbenzene	95-63-6	1.18E+03		1.11E-01	5.24E-01	6.84E-05	9.97E+00	4.57E-02	8.07E-07	5.09E-04	6.73E-06
VOC	1,3,5-Trimethylbenzene	108-67-8	1.76E+03		1.06E-01	5.20E-01	7.49E-05	1.48E+01	4.54E-02	8.83E-07	3.26E-04	5.39E-06
VOC	Vinyl Acetate	108-05-4	5.22E+00		1.15E-02	7.34E-01	7.95E-05	2.17E-01	6.41E-02	9.37E-07	3.41E-03	1.74E-05
VOC	Vinyl Chloride	75-01-4	1.85E+01		8.02E-01	9.16E-01	1.06E-04	5.71E-01	8.00E-02	1.25E-06	1.12E-01	1.00E-04
VOC	Xylenes (total)	1330-20-7	3.86E+02		1.35E-01	6.74E-01	7.56E-05	3.40E+00	5.88E-02	8.91E-07	2.33E-03	1.44E-05
SVOC	Acenaphthene	83-32-9	7.14E+03		2.02E-03	3.64E-01	6.64E-05	5.93E+01	3.18E-02	7.83E-07	1.10E-06	3.12E-07

Attachment B5.1: Vapor Flux from Soil to Ambient 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)
SVOC	Acenaphthylene	208-96-8	7.47E+03		2.31E-03	3.88E-01	6.03E-05	6.20E+01	3.39E-02	7.11E-07	1.27E-06	3.37E-07
SVOC	Acetophenone	98-86-2	3.58E+01		2.32E-04	6.91E-01	6.91E-05	4.66E-01	6.04E-02	8.15E-07	3.17E-05	1.68E-06
SVOC	Anthracene	120-12-7	2.97E+04		7.20E-04	2.80E-01	6.69E-05	2.46E+02	2.44E-02	7.88E-07	7.47E-08	8.15E-08
SVOC	Atrazine	1912-24-9	3.68E+02		1.25E-07	2.24E-01	5.76E-05	3.22E+00	1.95E-02	6.79E-07	2.12E-07	1.37E-07
SVOC	Benzaldehyde	100-52-7	2.85E+01		3.58E-04	6.23E-01	7.84E-05	4.06E-01	5.44E-02	9.24E-07	5.03E-05	2.12E-06
SVOC	Benzo(a)anthracene	56-55-3	4.01E+05		2.63E-05	4.41E-01	7.78E-05	3.32E+03	3.85E-02	9.17E-07	5.81E-10	7.19E-09
SVOC	Benzo(a)pyrene	50-32-8	1.01E+06		5.87E-06	3.72E-01	7.78E-05	8.40E+03	3.24E-02	9.17E-07	1.32E-10	3.42E-09
SVOC	Benzo(b)fluoranthene	205-99-2	1.24E+06		7.20E-04	1.95E-01	4.80E-05	1.03E+04	1.71E-02	5.66E-07	1.25E-09	1.05E-08
SVOC	Benzo(g,h,i)perylene	191-24-2	1.28E+07		2.88E-06	1.88E-01	4.54E-05	1.06E+05	1.64E-02	5.36E-07	5.50E-12	7.00E-10
SVOC	Benzo(k)fluoranthene	207-08-9	1.24E+06		4.74E-06	1.95E-01	4.80E-05	1.03E+04	1.71E-02	5.66E-07	6.28E-11	2.36E-09
SVOC	Benzoic Acid	65-85-0	6.00E-01		4.37E-06	4.63E-01	6.89E-05	1.75E-01	4.04E-02	8.12E-07	5.66E-06	7.10E-07
SVOC	Benzyl Alcohol	100-51-6	1.21E+01		7.95E-06	6.12E-01	7.75E-05	2.70E-01	5.34E-02	9.14E-07	4.96E-06	6.65E-07
SVOC	Biphenyl	92-52-4	1.05E+04		6.69E-03	3.49E-01	7.04E-05	8.70E+01	3.05E-02	8.30E-07	2.35E-06	4.58E-07
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.73E+01		3.47E-06	3.77E-01	7.31E-05	3.13E-01	3.29E-02	8.62E-07	3.12E-06	5.27E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.55E+01		2.83E-04	5.98E-01	6.51E-05	2.98E-01	5.22E-02	7.67E-07	5.21E-05	2.15E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	1.50E+07		6.06E-07	3.03E-01	3.16E-05	1.24E+05	2.65E-02	3.73E-07	3.13E-12	5.28E-10
SVOC	4-Bromophenyl-phenyl ether	101-55-3	1.61E+04		2.39E-03	2.26E-01	5.88E-05	1.34E+02	1.97E-02	6.93E-07	3.57E-07	1.78E-07
SVOC	Butylbenzylphthalate	85-68-7	5.73E+04		1.04E-05	1.50E-01	4.17E-05	4.74E+02	1.31E-02	4.92E-07	1.33E-09	1.09E-08
SVOC	Caprolactam	105-60-2	6.51E-01		1.03E-07	5.98E-01	7.77E-05	1.75E-01	5.22E-02	9.16E-07	5.26E-06	6.84E-07
SVOC	Carbazole	86-74-8	3.38E+03		1.56E-07	3.37E-01	6.07E-05	2.82E+01	2.94E-02	7.16E-07	2.56E-08	4.77E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	1.12E+03		8.15E-06	5.24E-01	8.22E-05	9.41E+00	4.57E-02	9.69E-07	1.43E-07	1.13E-07
SVOC	4-Chloroaniline	106-47-8	6.61E+01		4.75E-06	4.17E-01	8.73E-05	7.17E-01	3.64E-02	1.03E-06	1.68E-06	3.86E-07
SVOC	2-Chloronaphthalene	91-58-7	1.12E+04		6.42E-03	4.25E-01	7.59E-05	9.31E+01	3.71E-02	8.95E-07	2.57E-06	4.78E-07
SVOC	2-Chlorophenol	95-57-8	3.88E+02		7.03E-03	4.33E-01	8.17E-05	3.38E+00	3.78E-02	9.64E-07	7.88E-05	2.65E-06
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	1.03E+04		4.50E-03	2.45E-01	6.61E-05	8.51E+01	2.14E-02	7.79E-07	1.14E-06	3.18E-07
SVOC	Chrysene	218-01-9	4.01E+05		6.67E-04	2.14E-01	5.37E-05	3.32E+03	1.87E-02	6.33E-07	3.95E-09	1.87E-08
SVOC	Dibenz(a,h)anthracene	53-70-3	3.77E+06		2.09E-08	1.75E-01	4.48E-05	3.12E+04	1.52E-02	5.28E-07	1.69E-11	1.23E-09
SVOC	Dibenzofuran	132-64-9	2.07E+04		1.02E-05	2.06E-01	5.18E-05	1.71E+02	1.80E-02	6.11E-07	4.64E-09	2.03E-08
SVOC	3,3'-Dichlorobenzidine	91-94-1	7.21E+02		2.05E-08	1.68E-01	5.82E-05	6.14E+00	1.46E-02	6.87E-07	1.12E-07	9.98E-08
SVOC	2,4-Dichlorophenol	120-83-2	1.47E+02		3.31E-05	2.99E-01	7.58E-05	1.39E+00	2.61E-02	8.93E-07	1.27E-06	3.36E-07
SVOC	Diethylphthalate	84-66-2	2.87E+02		4.43E-06	2.21E-01	5.49E-05	2.55E+00	1.93E-02	6.47E-07	2.88E-07	1.60E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.09E+02		2.93E-05	5.05E-01	7.51E-05	1.90E+00	4.41E-02	8.85E-07	1.14E-06	3.19E-07
SVOC	Dimethylphthalate	131-11-3	6.89E+01		2.15E-06	4.91E-01	5.43E-05	7.41E-01	4.29E-02	6.41E-07	9.89E-07	2.97E-07
SVOC	Di-n-butylphthalate	84-74-2	3.40E+04		7.69E-09	3.78E-01	6.79E-05	2.82E+02	3.30E-02	8.01E-07	2.84E-09	1.59E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	1.21E+02		8.73E-06	2.38E-01	5.97E-05	1.17E+00	2.08E-02	7.04E-07	7.54E-07	2.59E-07
SVOC	2,4-Dinitrophenol	51-28-5	1.00E-02		1.33E-06	2.36E-01	7.83E-05	1.70E-01	2.06E-02	9.23E-07	5.60E-06	7.06E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.46E+01		9.64E-07	1.75E+00	6.10E-05	9.53E-01	1.53E-01	7.19E-07	9.09E-07	2.84E-07

Attachment B5.1: Vapor Flux from Soil to Ambient 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)
SVOC	2,6-Dinitrotoluene	606-20-2	6.89E+01		8.36E-06	2.83E-01	6.27E-05	7.41E-01	2.47E-02	7.40E-07	1.28E-06	3.37E-07
SVOC	Di-n-octylphthalate	117-84-0	8.38E+07		4.93E-04	1.30E-01	3.09E-05	6.94E+05	1.14E-02	3.65E-07	8.62E-12	8.76E-10
SVOC	Fluoranthene	206-44-0	1.08E+05		1.56E-04	2.61E-01	5.49E-05	8.94E+02	2.28E-02	6.47E-07	4.71E-09	2.05E-08
SVOC	Fluorene	86-73-7	1.38E+04		8.23E-04	3.14E-01	6.81E-05	1.14E+02	2.74E-02	8.03E-07	2.04E-07	1.35E-07
SVOC	Hexachlorobenzene	118-74-1	5.53E+04		1.29E-02	4.68E-01	5.11E-05	4.58E+02	4.09E-02	6.02E-07	1.15E-06	3.20E-07
SVOC	Hexachlorobutadiene	87-68-3	5.35E+04		1.37E-01	4.85E-01	5.32E-05	4.43E+02	4.23E-02	6.27E-07	1.30E-05	1.08E-06
SVOC	Hexachlorocyclopentadiene	77-47-4	1.99E+05		4.04E-01	1.39E-01	6.23E-05	1.65E+03	1.21E-02	7.34E-07	2.98E-06	5.15E-07
SVOC	Hexachloroethane	67-72-1	1.76E+03		7.02E-02	2.16E-02	5.88E-05	1.48E+01	1.89E-03	6.93E-07	9.00E-06	8.95E-07
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	3.45E+06		7.70E-06	1.64E-01	4.89E-05	2.85E+04	1.43E-02	5.77E-07	2.41E-11	1.46E-09
SVOC	Isophorone	78-59-1	4.69E+01		1.07E-04	5.38E-01	5.84E-05	5.58E-01	4.70E-02	6.89E-07	1.03E-05	9.56E-07
SVOC	2-Methylnaphthalene	91-57-6	6.23E+03		1.05E-02	4.51E-01	6.70E-05	5.18E+01	3.94E-02	7.89E-07	7.97E-06	8.42E-07
SVOC	Methylphenol (total)	1319-77-3	8.45E+01		1.77E-05	6.39E-01	8.64E-05	8.70E-01	5.58E-02	1.02E-06	2.31E-06	4.53E-07
SVOC	Naphthalene	91-20-3	2.01E+03		7.98E-03	5.10E-01	6.48E-05	1.68E+01	4.45E-02	7.64E-07	2.12E-05	1.37E-06
SVOC	2-Nitroaniline	88-74-4	6.59E+01		3.27E-06	6.31E-01	6.91E-05	7.15E-01	5.51E-02	8.15E-07	1.39E-06	3.52E-07
SVOC	3-Nitroaniline	99-09-2	2.22E+01		2.94E-06							
SVOC	4-Nitroaniline	100-01-6	2.33E+01		4.23E-08	5.00E-01	7.41E-05	3.62E-01	4.37E-02	8.74E-07	2.42E-06	4.64E-07
SVOC	Nitrobenzene	98-95-3	6.44E+01		3.83E-04	6.57E-01	7.43E-05	7.03E-01	5.73E-02	8.76E-07	3.25E-05	1.70E-06
SVOC	2-Nitrophenol	88-75-5	5.75E+01		1.94E-04	4.66E-01	6.78E-05	6.46E-01	4.07E-02	8.00E-07	1.34E-05	1.09E-06
SVOC	4-Nitrophenol	100-02-7	7.55E+01		8.48E-09	5.40E-01	8.30E-05	7.95E-01	4.72E-02	9.79E-07	1.23E-06	3.31E-07
SVOC	N-Nitrosodiphenylamine	86-30-6	1.29E+03		9.96E-05	2.70E-01	5.49E-05	1.09E+01	2.35E-02	6.47E-07	2.76E-07	1.57E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	2.40E+01		5.38E-05	4.71E-01	7.06E-05	3.68E-01	4.11E-02	8.32E-07	8.26E-06	8.57E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.56E+02		2.39E-03	5.20E-01	5.54E-05	2.29E+00	4.54E-02	6.53E-07	4.77E-05	2.06E-06
SVOC	Pentachlorophenol	87-86-5	5.92E+02		1.97E-07	4.84E-01	5.27E-05	5.07E+00	4.22E-02	6.21E-07	1.24E-07	1.05E-07
SVOC	Phenanthrene	85-01-8	2.42E+04		4.76E-04	3.24E-01	6.45E-05	2.01E+02	2.83E-02	7.61E-07	7.09E-08	7.94E-08
SVOC	Phenol	108-95-2	2.88E+01		6.37E-06	7.08E-01	7.86E-05	4.08E-01	6.19E-02	9.27E-07	3.24E-06	5.37E-07
SVOC	Pyrene	129-00-0	1.06E+05		1.02E-04	2.35E-01	6.26E-05	8.74E+02	2.05E-02	7.37E-07	3.25E-09	1.70E-08
SVOC	2,4,5-Trichlorophenol	95-95-4	1.60E+03		6.33E-05	2.51E-01	6.07E-05	1.34E+01	2.20E-02	7.16E-07	1.57E-07	1.18E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	3.81E+02		1.03E-04	2.75E-01	5.40E-05	3.32E+00	2.40E-02	6.37E-07	9.37E-07	2.89E-07
PCB	PCBs (total)	1336-36-3	2.45E+06		4.09E-02	1.75E-01	4.32E-05	2.03E+04	1.52E-02	5.09E-07	3.07E-08	5.23E-08
INORG	Antimony	7440-36-0		4.50E+01								
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								

Attachment B5.1: Vapor Flux from Soil to Ambient 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	Cyanide (total)	57-12-5		9.90E+00								
INORG	Lead	7439-92-1		9.00E+02								
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	2.32E-02	6.42E-07	2.51E-06	4.72E-07
INORG	Nickel	7440-02-0		6.50E+01								
INORG	Selenium	7782-49-2		5.00E+00								
INORG	Silver	7440-22-4		8.30E+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	Silty-Clay							
	Soil porosity	L/L-soil	θ	0.48	Silty Clay							
	Soil water content	L/L-soil	θ _w	0.17	Silty Clay							
	Soil air-filled porosity	L/L-soil	θ _a	0.31	porosity-water content							
	Soil organic carbon fraction	unitless	f _{oc}	0.006	assumed default							
	Averaging period	year	ED	10	exposure duration							
		s	ED	3.2E+08								
		(kg/m ³) /										
	Dispersion coefficient	(kg/m ² /s)	C/Q	11.0	15' x 15' excavation							

**Attachment B5.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 2	VOC	Acetone	67-64-1	1.70E-02			1.E-09
AOI 2	VOC	Methylene Chloride	75-09-2	6.20E-03		3.E-12	4.E-08
AOI 2	VOC	Trichloroethene	79-01-6	7.70E-03		8.E-12	5.E-08
AOI 2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.60E-02		7.E-12	2.E-07
AOI 2	SVOC	Chrysene	218-01-9	3.50E-02		2.E-12	
AOI 2	SVOC	Di-n-octylphthalate	117-84-0	5.90E-02			8.E-08
AOI 2	INORG	Arsenic	7440-38-2	7.60E+00	1.25E+01		
AOI 2	INORG	Barium	7440-39-3	1.20E+02	1.32E+02		
AOI 2	INORG	Beryllium	7440-41-7	7.50E-01		5.E-10	9.E-05
AOI 2	INORG	Cadmium	7440-43-9	6.40E-01		3.E-10	3.E-05
AOI 2	INORG	Chromium (total)	7440-47-3	2.10E+01	1.67E+01	2.E-08	1.E-04
AOI 2	INORG	Cobalt	7440-48-4	1.90E+01	1.09E+01	7.E-09	8.E-04
AOI 2	INORG	Copper	7440-50-8	4.50E+01	3.66E+01		8.E-06
AOI 2	INORG	Cyanide (total)	57-12-5	3.10E-01			6.E-07
AOI 2	INORG	Lead	7439-92-1	3.00E+01	4.64E+01		
AOI 2	INORG	Manganese	7439-96-5	7.40E+02	5.45E+02		8.E-03
AOI 2	INORG	Nickel	7440-02-0	4.70E+01	1.91E+01	2.E-09	7.E-04
AOI 2	INORG	Selenium	7782-49-2	6.90E-01			
AOI 2	INORG	Vanadium	7440-62-2	6.70E+01	3.13E+01		
AOI 2	INORG	Zinc	7440-66-6	1.50E+02	9.72E+01		
AOI 3	VOC	Acetone	67-64-1	1.20E-01			9.E-09
AOI 3	VOC	Benzene	71-43-2	1.60E+00		9.E-09	3.E-04
AOI 3	VOC	Carbon Disulfide	75-15-0	5.70E-02			1.E-06
AOI 3	VOC	Carbon Tetrachloride	56-23-5	2.70E+00		4.E-08	2.E-04
AOI 3	VOC	Chloroform	67-66-3	3.40E-01		6.E-09	4.E-05
AOI 3	VOC	Cumene	98-82-8	2.90E-03			1.E-08
AOI 3	VOC	Cyclohexane	110-82-7	1.00E-03			1.E-09
AOI 3	VOC	1,1-Dichloroethane	75-34-3	1.20E-01			1.E-06
AOI 3	VOC	1,1-Dichloroethene	75-35-4	3.90E-01			2.E-05
AOI 3	VOC	1,2-Dichloroethene (total)	540-59-0	2.50E-01			1.E-06
AOI 3	VOC	cis-1,2-Dichloroethene	156-59-2	1.40E+02			2.E-02
AOI 3	VOC	trans-1,2-Dichloroethene	156-60-5	8.70E-01			9.E-05
AOI 3	VOC	Ethyl Benzene	100-41-4	2.10E-02			6.E-08
AOI 3	VOC	4-Methyl-2-pentanone	108-10-1	2.00E-01			9.E-08
AOI 3	VOC	Methylcyclohexane	108-87-2	5.70E-03			3.E-08
AOI 3	VOC	Methylene Chloride	75-09-2	1.50E+00		6.E-10	9.E-06
AOI 3	VOC	Styrene	100-42-5	1.00E-01			1.E-07
AOI 3	VOC	Tetrachloroethene	127-18-4	3.40E-03		9.E-12	6.E-08
AOI 3	VOC	Toluene	108-88-3	8.00E-03			9.E-09
AOI 3	VOC	1,1,1-Trichloroethane	71-55-6	2.70E+00			8.E-06
AOI 3	VOC	Trichloroethene	79-01-6	1.90E+03		2.E-06	1.E-02

**Attachment B5.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 3	VOC	Vinyl Chloride	75-01-4	7.90E+00		2.E-07	1.E-03
AOI 3	VOC	Xylenes (total)	1330-20-7	2.61E-02			6.E-07
AOI 3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.60E-02		6.E-12	1.E-07
AOI 3	SVOC	Di-n-octylphthalate	117-84-0	3.10E-02			4.E-08
AOI 3	SVOC	Fluoranthene	206-44-0	2.60E-02			4.E-08
AOI 3	SVOC	Pyrene	129-00-0	2.40E-02			5.E-08
AOI 3	INORG	Arsenic	7440-38-2	1.26E+01	1.25E+01	1.E-09	1.E-05
AOI 3	INORG	Barium	7440-39-3	1.49E+02	1.32E+02		3.E-06
AOI 3	INORG	Beryllium	7440-41-7	1.53E+00		1.E-09	2.E-04
AOI 3	INORG	Cadmium	7440-43-9	1.80E-01		1.E-10	1.E-05
AOI 3	INORG	Chromium (total)	7440-47-3	1.59E+01	1.67E+01		
AOI 3	INORG	Cobalt	7440-48-4	5.99E+00	1.09E+01		
AOI 3	INORG	Copper	7440-50-8	2.80E+02	3.66E+01		2.E-04
AOI 3	INORG	Lead	7439-92-1	1.15E+03	4.64E+01		
AOI 3	INORG	Manganese	7439-96-5	5.50E+02	5.45E+02		2.E-04
AOI 3	INORG	Nickel	7440-02-0	1.90E+01	1.91E+01		
AOI 3	INORG	Thallium	7440-28-0	3.50E+00	3.58E+00		
AOI 3	INORG	Vanadium	7440-62-2	3.60E+01	3.13E+01		
AOI 3	INORG	Zinc	7440-66-6	2.42E+02	9.72E+01		
AOI 5	VOC	Acetone	67-64-1	2.50E-02			2.E-09
AOI 5	VOC	Benzene	71-43-2	3.50E-03		2.E-11	6.E-07
AOI 5	VOC	Chlorobenzene	108-90-7	3.60E-02			2.E-06
AOI 5	VOC	1,1-Dichloroethane	75-34-3	1.40E-01			2.E-06
AOI 5	VOC	1,1-Dichloroethene	75-35-4	5.40E-02			3.E-06
AOI 5	VOC	cis-1,2-Dichloroethene	156-59-2	2.40E+01			3.E-03
AOI 5	VOC	trans-1,2-Dichloroethene	156-60-5	1.70E-01			2.E-05
AOI 5	VOC	Methyl Acetate	79-20-9	2.40E-01			1.E-07
AOI 5	VOC	Methylene Chloride	75-09-2	3.60E-01		1.E-10	2.E-06
AOI 5	VOC	Tetrachloroethene	127-18-4	3.00E-03		8.E-12	5.E-08
AOI 5	VOC	Toluene	108-88-3	4.60E-02			5.E-08
AOI 5	VOC	1,1,1-Trichloroethane	71-55-6	1.40E-01			4.E-07
AOI 5	VOC	Trichloroethene	79-01-6	1.50E+02		2.E-07	1.E-03
AOI 5	VOC	Trichlorofluoromethane	75-69-4	2.70E-02			5.E-07
AOI 5	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.60E+00			8.E-07
AOI 5	VOC	Vinyl Chloride	75-01-4	1.70E-01		5.E-09	3.E-05
AOI 5	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	2.30E+00		2.E-10	6.E-06
AOI 5	SVOC	Di-n-octylphthalate	117-84-0	2.40E-01			3.E-07
AOI 5	PCB	PCBs (total)	1336-36-3	2.27E+00		4.E-08	6.E-03
AOI 5	INORG	Arsenic	7440-38-2	9.00E+00	1.25E+01		
AOI 5	INORG	Barium	7440-39-3	1.00E+02	1.32E+02		
AOI 5	INORG	Beryllium	7440-41-7	4.80E-01		3.E-10	6.E-05

**Attachment B5.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 5	INORG	Cadmium	7440-43-9	5.70E-01		3.E-10	3.E-05
AOI 5	INORG	Chromium (total)	7440-47-3	1.50E+01	1.67E+01		
AOI 5	INORG	Cobalt	7440-48-4	6.30E+00	1.09E+01		
AOI 5	INORG	Copper	7440-50-8	2.50E+01	3.66E+01		
AOI 5	INORG	Cyanide (total)	57-12-5	2.30E-01			5.E-07
AOI 5	INORG	Lead	7439-92-1	8.98E+01	4.64E+01		
AOI 5	INORG	Manganese	7439-96-5	3.40E+02	5.45E+02		
AOI 5	INORG	Nickel	7440-02-0	1.60E+01	1.91E+01		
AOI 5	INORG	Vanadium	7440-62-2	2.20E+01	3.13E+01		
AOI 5	INORG	Zinc	7440-66-6	7.60E+01	9.72E+01		
AOI 6	VOC	Acetone	67-64-1	7.10E-02			5.E-09
AOI 6	VOC	Benzene	71-43-2	2.51E-02		1.E-10	4.E-06
AOI 6	VOC	2-Butanone	78-93-3	2.20E+00			6.E-07
AOI 6	VOC	Carbon Disulfide	75-15-0	8.30E-03			2.E-07
AOI 6	VOC	Chloroethane	75-00-3	3.03E-01		5.E-12	6.E-07
AOI 6	VOC	Chloroform	67-66-3	2.00E-03		3.E-11	2.E-07
AOI 6	VOC	Chloromethane	74-87-3	2.00E-03			2.E-07
AOI 6	VOC	2-Chlorotoluene	95-49-8	7.70E-03			
AOI 6	VOC	Cumene	98-82-8	4.07E-02			2.E-07
AOI 6	VOC	Cyclohexane	110-82-7	5.15E-02			7.E-08
AOI 6	VOC	1,1-Dichloroethane	75-34-3	5.60E+00			7.E-05
AOI 6	VOC	1,1-Dichloroethene	75-35-4	3.60E-01			2.E-05
AOI 6	VOC	1,2-Dichloroethene (total)	540-59-0	9.50E-01			4.E-06
AOI 6	VOC	cis-1,2-Dichloroethene	156-59-2	7.90E+00			1.E-03
AOI 6	VOC	trans-1,2-Dichloroethene	156-60-5	5.30E-01			6.E-05
AOI 6	VOC	Ethyl Benzene	100-41-4	3.36E-02			9.E-08
AOI 6	VOC	4-Methyl-2-pentanone	108-10-1	4.00E-03			2.E-09
AOI 6	VOC	Methylcyclohexane	108-87-2	3.40E-02			2.E-07
AOI 6	VOC	Methylene Chloride	75-09-2	2.80E-01		1.E-10	2.E-06
AOI 6	VOC	1,1,2,2-Tetrachloroethane	79-34-5	2.00E-03		2.E-11	1.E-09
AOI 6	VOC	Tetrachloroethene	127-18-4	2.70E+01		7.E-08	5.E-04
AOI 6	VOC	Toluene	108-88-3	2.50E+00			3.E-06
AOI 6	VOC	1,1,1-Trichloroethane	71-55-6	7.20E+01			2.E-04
AOI 6	VOC	Trichloroethene	79-01-6	2.70E+02		3.E-07	2.E-03
AOI 6	VOC	Vinyl Chloride	75-01-4	2.00E-01		5.E-09	3.E-05
AOI 6	VOC	Xylenes (total)	1330-20-7	2.47E-01			5.E-06
AOI 6	SVOC	Acenaphthene	83-32-9	3.90E-02			5.E-08
AOI 6	SVOC	Benzo(a)anthracene	56-55-3	2.00E-01		1.E-09	
AOI 6	SVOC	Benzo(a)pyrene	50-32-8	2.80E-01		2.E-08	
AOI 6	SVOC	Benzo(b)fluoranthene	205-99-2	2.80E-01		2.E-09	
AOI 6	SVOC	Benzo(g,h,i)perylene	191-24-2	2.20E-01			4.E-07

**Attachment B5.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 6	SVOC	Benzo(k)fluoranthene	207-08-9	3.80E-01		2.E-10	
AOI 6	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	5.20E+00		5.E-10	1.E-05
AOI 6	SVOC	Butylbenzylphthalate	85-68-7	7.50E-02			2.E-08
AOI 6	SVOC	Chrysene	218-01-9	3.70E-01		2.E-11	
AOI 6	SVOC	Dibenz(a,h)anthracene	53-70-3	5.90E-02		3.E-09	
AOI 6	SVOC	Dibenzofuran	132-64-9	1.40E-01			4.E-06
AOI 6	SVOC	Di-n-butylphthalate	84-74-2	1.40E-01			7.E-08
AOI 6	SVOC	Di-n-octylphthalate	117-84-0	2.70E+00			4.E-06
AOI 6	SVOC	Fluoranthene	206-44-0	2.30E-01			3.E-07
AOI 6	SVOC	Fluorene	86-73-7	7.80E-02			1.E-07
AOI 6	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.60E-01		9.E-10	
AOI 6	SVOC	Phenanthrene	85-01-8	1.40E-01			3.E-07
AOI 6	SVOC	Phenol	108-95-2	4.20E+00			7.E-07
AOI 6	SVOC	Pyrene	129-00-0	3.10E-01			6.E-07
AOI 6	PDIST	Petroleum Hydrocarbons - ERO	TPHERO	3.00E+03			
AOI 6	PDIST	Gasoline Range Organics	GRO	2.60E+00			
AOI 6	PCB	PCBs (total)	1336-36-3	1.97E+00		3.E-08	6.E-03
AOI 6	INORG	Arsenic	7440-38-2	8.90E+00	1.25E+01		
AOI 6	INORG	Barium	7440-39-3	1.06E+02	1.32E+02		
AOI 6	INORG	Beryllium	7440-41-7	8.53E-01		6.E-10	1.E-04
AOI 6	INORG	Cadmium	7440-43-9	1.30E+01		7.E-09	7.E-04
AOI 6	INORG	Chromium (total)	7440-47-3	4.91E+01	1.67E+01	1.E-07	1.E-03
AOI 6	INORG	Cobalt	7440-48-4	7.19E+00	1.09E+01		
AOI 6	INORG	Copper	7440-50-8	3.50E+01	3.66E+01		
AOI 6	INORG	Cyanide (total)	57-12-5	5.50E+01			1.E-04
AOI 6	INORG	Lead	7439-92-1	4.35E+02	4.64E+01		
AOI 6	INORG	Manganese	7439-96-5	5.80E+02	5.45E+02		1.E-03
AOI 6	INORG	Mercury	7439-97-6	3.10E-01			1.E-04
AOI 6	INORG	Nickel	7440-02-0	3.10E+01	1.91E+01	8.E-10	3.E-04
AOI 6	INORG	Thallium	7440-28-0	2.92E+00	3.58E+00		
AOI 6	INORG	Vanadium	7440-62-2	3.17E+01	3.13E+01		
AOI 6	INORG	Zinc	7440-66-6	9.70E+01	9.72E+01		
AOI 7	VOC	Acetone	67-64-1	4.70E-03			4.E-10
AOI 7	VOC	Chloroform	67-66-3	5.50E-03		9.E-11	6.E-07
AOI 7	VOC	Cumene	98-82-8	2.00E-03			1.E-08
AOI 7	VOC	1,1-Dichloroethane	75-34-3	7.50E-03			9.E-08
AOI 7	VOC	1,1-Dichloroethene	75-35-4	3.60E-02			2.E-06
AOI 7	VOC	cis-1,2-Dichloroethene	156-59-2	4.10E+01			6.E-03
AOI 7	VOC	trans-1,2-Dichloroethene	156-60-5	1.50E-01			2.E-05
AOI 7	VOC	Ethyl Benzene	100-41-4	2.30E-02			6.E-08
AOI 7	VOC	Methylcyclohexane	108-87-2	2.50E-03			1.E-08

**Attachment B5.1: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Soil
Former Delco Plant 5, Kokomo, Indiana**

Area	Chem Group	Chemical	CASRN	Max Soil Conc (mg/kg)	Site Specific Background (mg/kg)	Cancer Risk	HQ
AOI 7	VOC	Methylene Chloride	75-09-2	3.90E-01		2.E-10	2.E-06
AOI 7	VOC	Tetrachloroethene	127-18-4	3.70E-03		9.E-12	6.E-08
AOI 7	VOC	Toluene	108-88-3	4.00E-03			5.E-09
AOI 7	VOC	1,1,1-Trichloroethane	71-55-6	5.50E-03			2.E-08
AOI 7	VOC	Trichloroethene	79-01-6	8.30E+01		9.E-08	5.E-04
AOI 7	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2.90E-02			1.E-08
AOI 7	VOC	Vinyl Chloride	75-01-4	6.60E-01		2.E-08	1.E-04
AOI 7	VOC	Xylenes (total)	1330-20-7	6.90E-02			2.E-06
AOI 7	SVOC	2-Methylnaphthalene	91-57-6	6.60E-01			4.E-05
AOI 7	SVOC	Phenanthrene	85-01-8	4.70E+00			9.E-06
AOI 7	PDIST	Petroleum Hydrocarbons - ERO	TPHERO	1.40E+04			
AOI 7	PDIST	Gasoline Range Organics	GRO	1.80E+00			
AOI 7	INORG	Arsenic	7440-38-2	1.50E+01	1.25E+01	3.E-08	4.E-04
AOI 7	INORG	Barium	7440-39-3	7.33E+01	1.32E+02		
AOI 7	INORG	Beryllium	7440-41-7	3.69E-01		3.E-10	5.E-05
AOI 7	INORG	Chromium (total)	7440-47-3	1.86E+01	1.67E+01	7.E-09	6.E-05
AOI 7	INORG	Cobalt	7440-48-4	6.62E+00	1.09E+01		
AOI 7	INORG	Copper	7440-50-8	1.83E+01	3.66E+01		
AOI 7	INORG	Lead	7439-92-1	1.68E+01	4.64E+01		
AOI 7	INORG	Manganese	7439-96-5	3.73E+02	5.45E+02		
AOI 7	INORG	Nickel	7440-02-0	1.80E+01	1.91E+01		
AOI 7	INORG	Vanadium	7440-62-2	2.47E+01	3.13E+01		
AOI 7	INORG	Zinc	7440-66-6	4.35E+01	9.72E+01		
Notes:							
Only detected constituents are shown in each area.							
Soil concentrations are the maximum detected concentration in surface or subsurface soil in each area.							
Cancer and non-cancer risk estimates are calculated using site-related concentrations, which are those in excess of site-specific background for inorganics.							

Attachment B5.2
Exposure of Maintenance Workers to Groundwater

**Attachment B5.2: Normalized Vapor Flux to Ambient Air from Exposed Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K _G (cm/s)	K _L (cm/s)	1/K _L (s/cm)	K _L (cm/s)	J _L (L/m ² -s)
VOC	Acetone	67-64-1	9.5E-04	5.8E+01	2.32E-02	6.23E-05	6.13E+04	1.63E-05	1.63E-04
VOC	Acrolein	107-02-8	3.7E-03	5.6E+01	2.35E-02	6.34E-05	2.73E+04	3.66E-05	3.66E-04
VOC	Acrylonitrile	107-13-1	2.9E-03	5.3E+01	2.39E-02	6.52E-05	2.97E+04	3.36E-05	3.36E-04
VOC	Benzene	71-43-2	1.3E-01	7.8E+01	2.10E-02	5.37E-05	1.90E+04	5.27E-05	5.27E-04
VOC	Bromobenzene	108-86-1	4.3E-02	1.6E+02	1.66E-02	3.79E-05	2.78E+04	3.60E-05	3.60E-04
VOC	Bromochloromethane	74-97-5	2.9E-02	1.3E+02	1.78E-02	4.17E-05	2.59E+04	3.86E-05	3.86E-04
VOC	Bromodichloromethane	75-27-4	3.6E-02	1.6E+02	1.64E-02	3.71E-05	2.87E+04	3.49E-05	3.49E-04
VOC	Bromoform	75-25-2	1.0E-02	2.5E+02	1.42E-02	2.99E-05	4.04E+04	2.48E-05	2.48E-04
VOC	Bromomethane	74-83-9	1.8E-01	9.5E+01	1.97E-02	4.87E-05	2.08E+04	4.80E-05	4.80E-04
VOC	2-Butanone	78-93-3	1.6E-03	7.2E+01	2.16E-02	5.59E-05	4.67E+04	2.14E-05	2.14E-04
VOC	n-Butylbenzene	104-51-8	2.2E-01	1.3E+02	1.75E-02	4.10E-05	2.47E+04	4.05E-05	4.05E-04
VOC	sec-Butylbenzene	135-98-8	1.7E-04	1.3E+02	1.75E-02	4.10E-05	3.61E+05	2.77E-06	2.77E-05
VOC	tert-Butylbenzene	98-06-6	2.5E-01	1.3E+02	1.75E-02	4.10E-05	2.46E+04	4.06E-05	4.06E-04
VOC	Carbon Disulfide	75-15-0	7.9E-01	7.6E+01	2.12E-02	5.44E-05	1.84E+04	5.42E-05	5.42E-04
VOC	Carbon Tetrachloride	56-23-5	7.3E-01	1.5E+02	1.68E-02	3.83E-05	2.62E+04	3.81E-05	3.81E-04
VOC	Chlorobenzene	108-90-7	7.7E-02	1.1E+02	1.86E-02	4.47E-05	2.31E+04	4.34E-05	4.34E-04
VOC	Chloroethane	75-00-3	2.8E-01	6.5E+01	2.24E-02	5.91E-05	1.71E+04	5.85E-05	5.85E-04
VOC	2-Chloroethylvinyl ether	110-75-8							
VOC	Chloroform	67-66-3	9.0E-02	1.2E+02	1.82E-02	4.34E-05	2.36E+04	4.23E-05	4.23E-04
VOC	Chloromethane	74-87-3	3.0E-01	5.0E+01	2.43E-02	6.68E-05	1.51E+04	6.62E-05	6.62E-04
VOC	2-Chlorotoluene	95-49-8	7.3E-02	1.3E+02	1.79E-02	4.22E-05	2.45E+04	4.09E-05	4.09E-04
VOC	4-Chlorotoluene	106-43-4							
VOC	Cumene	98-82-8	2.2E-01	1.2E+02	1.82E-02	4.33E-05	2.34E+04	4.28E-05	4.28E-04
VOC	Cyclohexane	110-82-7	4.0E+00	8.4E+01	2.05E-02	5.17E-05	1.93E+04	5.17E-05	5.17E-04
VOC	p-Cymene	99-87-6		1.3E+02	1.75E-02	4.10E-05			
VOC	1,2-Dibromo-3-chloropropane	96-12-8	3.0E-03	2.4E+02	1.45E-02	3.09E-05	5.53E+04	1.81E-05	1.81E-04
VOC	Dibromochloromethane	124-48-1	2.0E-02	2.1E+02	1.51E-02	3.29E-05	3.37E+04	2.97E-05	2.97E-04
VOC	1,2-Dibromoethane	106-93-4	2.0E-02	1.9E+02	1.57E-02	3.46E-05	3.21E+04	3.11E-05	3.11E-04
VOC	Dibromomethane	74-95-3	2.4E-02	1.7E+02	1.61E-02	3.60E-05	3.03E+04	3.30E-05	3.30E-04
VOC	trans-1,4-Dichloro-2-butene	110-57-6	1.8E-03	1.3E+02	1.80E-02	4.24E-05	5.46E+04	1.83E-05	1.83E-04
VOC	1,2-Dichlorobenzene	95-50-1	3.4E-02	1.5E+02	1.70E-02	3.91E-05	2.73E+04	3.67E-05	3.67E-04
VOC	1,3-Dichlorobenzene	541-73-1	7.9E-02	1.5E+02	1.70E-02	3.91E-05	2.63E+04	3.80E-05	3.80E-04
VOC	1,4-Dichlorobenzene	106-46-7	4.5E-02	1.5E+02	1.70E-02	3.91E-05	2.68E+04	3.73E-05	3.73E-04
VOC	Dichlorodifluoromethane	75-71-8	9.9E+00	1.2E+02	1.82E-02	4.32E-05	2.32E+04	4.31E-05	4.31E-04
VOC	1,1-Dichloroethane	75-34-3	1.4E-01	9.9E+01	1.94E-02	4.77E-05	2.13E+04	4.69E-05	4.69E-04
VOC	1,2-Dichloroethane	107-06-2	2.2E-02	9.9E+01	1.94E-02	4.77E-05	2.33E+04	4.30E-05	4.30E-04
VOC	1,1-Dichloroethene	75-35-4	7.0E-01	9.7E+01	1.96E-02	4.82E-05	2.08E+04	4.80E-05	4.80E-04
VOC	1,2-Dichloroethene (total)	540-59-0	1.9E-01	9.7E+01	1.96E-02	4.82E-05	2.10E+04	4.76E-05	4.76E-04
VOC	cis-1,2-Dichloroethene	156-59-2	9.9E-02	9.7E+01	1.96E-02	4.82E-05	2.13E+04	4.70E-05	4.70E-04
VOC	trans-1,2-Dichloroethene	156-60-5	2.4E-01	9.7E+01	1.96E-02	4.82E-05	2.10E+04	4.77E-05	4.77E-04
VOC	1,2-Dichloropropane	78-87-5	6.4E-02	1.1E+02	1.86E-02	4.46E-05	2.32E+04	4.30E-05	4.30E-04
VOC	1,3-Dichloropropane	142-28-9	2.0E-05	1.1E+02	1.86E-02	4.46E-05	2.68E+06	3.74E-07	3.74E-06
VOC	2,2-Dichloropropane	594-20-7	9.4E-02	1.1E+02	1.86E-02	4.46E-05	2.30E+04	4.35E-05	4.35E-04
VOC	1,1-Dichloropropene	563-58-6	1.0E+00	1.1E+02	1.87E-02	4.50E-05	2.23E+04	4.49E-05	4.49E-04
VOC	1,3-Dichloropropene (total)	542-75-6	3.9E-01	1.1E+02	1.87E-02	4.50E-05	2.23E+04	4.48E-05	4.48E-04
VOC	Ethyl Benzene	100-41-4	1.6E-01	1.1E+02	1.90E-02	4.61E-05	2.20E+04	4.54E-05	4.54E-04
VOC	Ethyl Methacrylate	97-63-2	2.0E-02	1.1E+02	1.85E-02	4.44E-05	2.53E+04	3.96E-05	3.96E-04
VOC	2-Hexanone	591-78-6	3.6E-02	1.0E+02	1.94E-02	4.74E-05	2.25E+04	4.44E-05	4.44E-04
VOC	Iodomethane	74-88-4	1.1E-01	1.4E+02	1.72E-02	3.98E-05	2.56E+04	3.90E-05	3.90E-04
VOC	Methyl Acetate	79-20-9	2.2E-03	7.4E+01	2.14E-02	5.51E-05	3.97E+04	2.52E-05	2.52E-04
VOC	Methyl tert-butyl ether	1634-04-4	1.5E-02	8.8E+01	2.02E-02	5.05E-05	2.32E+04	4.32E-05	4.32E-04
VOC	4-Methyl-2-pentanone	108-10-1	3.7E-03	1.0E+02	1.94E-02	4.74E-05	3.50E+04	2.86E-05	2.86E-04
VOC	Methylcyclohexane	108-87-2	9.7E+00	9.8E+01	1.95E-02	4.79E-05	2.09E+04	4.79E-05	4.79E-04
VOC	Methylene Chloride	75-09-2	5.6E-02	8.5E+01	2.05E-02	5.15E-05	2.03E+04	4.93E-05	4.93E-04
VOC	n-Propylbenzene	103-65-1	1.9E-01	1.2E+02	1.82E-02	4.33E-05	2.34E+04	4.27E-05	4.27E-04
VOC	Styrene	100-42-5	5.5E-02	1.0E+02	1.91E-02	4.65E-05	2.25E+04	4.45E-05	4.45E-04
VOC	1,1,1,2-Tetrachloroethane	630-20-6	6.1E-02	1.7E+02	1.63E-02	3.66E-05	2.83E+04	3.53E-05	3.53E-04
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.8E-03	1.7E+02	1.63E-02	3.66E-05	3.64E+04	2.75E-05	2.75E-04
VOC	Tetrachloroethene	127-18-4	3.9E-01	1.7E+02	1.63E-02	3.69E-05	2.73E+04	3.66E-05	3.66E-04
VOC	Toluene	108-88-3	1.4E-01	9.2E+01	1.99E-02	4.94E-05	2.06E+04	4.86E-05	4.86E-04
VOC	1,2,3-Trichlorobenzene	87-61-6	1.8E-01						
VOC	1,2,4-Trichlorobenzene	120-82-1	2.3E-02	1.8E+02	1.59E-02	3.52E-05	3.11E+04	3.21E-05	3.21E-04
VOC	1,1,1-Trichloroethane	71-55-6	4.1E-01	1.3E+02	1.76E-02	4.11E-05	2.45E+04	4.09E-05	4.09E-04
VOC	1,1,2-Trichloroethane	79-00-5	1.9E-02	1.3E+02	1.76E-02	4.11E-05	2.73E+04	3.66E-05	3.66E-04
VOC	Trichloroethene	79-01-6	2.3E-01	1.3E+02	1.77E-02	4.14E-05	2.44E+04	4.10E-05	4.10E-04
VOC	Trichlorofluoromethane	75-69-4	3.1E+00	1.4E+02	1.74E-02	4.05E-05	2.47E+04	4.05E-05	4.05E-04
VOC	1,2,3-Trichloropropane	96-18-4	1.0E-02	1.5E+02	1.70E-02	3.91E-05	3.12E+04	3.20E-05	3.20E-04

Attachment B5.2: Normalized Vapor Flux to Ambient Air from Exposed Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	K _G (cm/s)	K _L (cm/s)	1/K _L (s/cm)	K _L (cm/s)	J _L (L/m ² -s)
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.5E+01	1.9E+02	1.57E-02	3.47E-05	2.88E+04	3.47E-05	3.47E-04
VOC	1,2,4-Trimethylbenzene	95-63-6	1.1E-01	1.2E+02	1.82E-02	4.33E-05	2.36E+04	4.24E-05	4.24E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	1.1E-01	1.2E+02	1.82E-02	4.33E-05	2.36E+04	4.23E-05	4.23E-04
VOC	Vinyl Acetate	108-05-4	1.2E-02	8.6E+01	2.04E-02	5.11E-05	2.38E+04	4.20E-05	4.20E-04
VOC	Vinyl Chloride	75-01-4	8.0E-01	6.3E+01	2.27E-02	6.00E-05	1.67E+04	5.98E-05	5.98E-04
VOC	Xylenes (total)	1330-20-7	1.3E-01	1.1E+02	1.90E-02	4.61E-05	2.21E+04	4.52E-05	4.52E-04
SVOC	Acenaphthene	83-32-9	2.0E-03	1.5E+02	1.67E-02	3.82E-05	5.57E+04	1.80E-05	1.80E-04
SVOC	Acenaphthylene	208-96-8	2.3E-03	1.5E+02	1.68E-02	3.85E-05	5.17E+04	1.93E-05	1.93E-04
SVOC	Acetophenone	98-86-2	2.3E-04	1.2E+02	1.82E-02	4.33E-05	2.60E+05	3.84E-06	3.84E-05
SVOC	Anthracene	120-12-7	7.2E-04	1.8E+02	1.60E-02	3.55E-05	1.15E+05	8.68E-06	8.68E-05
SVOC	Atrazine	1912-24-9	1.2E-07	2.2E+02	1.50E-02	3.23E-05	5.35E+08	1.87E-09	1.87E-08
SVOC	Benzaldehyde	100-52-7	3.6E-04	1.1E+02	1.90E-02	4.61E-05	1.69E+05	5.93E-06	5.93E-05
SVOC	Benzo(a)anthracene	56-55-3	2.6E-05	2.3E+02	1.47E-02	3.14E-05	2.62E+06	3.82E-07	3.82E-06
SVOC	Benzo(a)pyrene	50-32-8	5.9E-06	2.5E+02	1.42E-02	2.99E-05	1.20E+07	8.31E-08	8.31E-07
SVOC	Benzo(b)fluoranthene	205-99-2	7.2E-04	2.5E+02	1.42E-02	2.99E-05	1.31E+05	7.62E-06	7.62E-05
SVOC	Benzo(g,h,i)perylene	191-24-2	2.9E-06	2.8E+02	1.38E-02	2.85E-05	2.52E+07	3.96E-08	3.96E-07
SVOC	Benzo(k)fluoranthene	207-08-9	4.7E-06	2.5E+02	1.42E-02	2.99E-05	1.49E+07	6.71E-08	6.71E-07
SVOC	Benzoic Acid	65-85-0	4.4E-06	1.2E+02	1.81E-02	4.29E-05	1.27E+07	7.90E-08	7.90E-07
SVOC	Benzyl Alcohol	100-51-6	8.0E-06	1.1E+02	1.89E-02	4.56E-05	6.69E+06	1.49E-07	1.49E-06
SVOC	Biphenyl	92-52-4	6.7E-03	1.5E+02	1.67E-02	3.82E-05	3.51E+04	2.85E-05	2.85E-04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.5E-06	1.7E+02	1.61E-02	3.61E-05	1.79E+07	5.59E-08	5.59E-07
SVOC	bis(2-Chloroethyl) ether	111-44-4	2.8E-04	1.4E+02	1.72E-02	3.97E-05	2.31E+05	4.33E-06	4.33E-05
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	6.1E-07	3.9E+02	1.23E-02	2.40E-05	1.35E+08	7.43E-09	7.43E-08
SVOC	4-Bromophenyl-phenyl ether	101-55-3	2.4E-03	2.5E+02	1.43E-02	3.01E-05	6.26E+04	1.60E-05	1.60E-04
SVOC	Butylbenzylphthalate	85-68-7	1.0E-05	3.1E+02	1.32E-02	2.69E-05	7.28E+06	1.37E-07	1.37E-06
SVOC	Caprolactam	105-60-2	1.0E-07	1.1E+02	1.86E-02	4.46E-05	5.23E+08	1.91E-09	1.91E-08
SVOC	Carbazole	86-74-8	1.6E-07	1.7E+02	1.63E-02	3.67E-05	3.93E+08	2.54E-09	2.54E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	8.2E-06	1.4E+02	1.72E-02	3.97E-05	7.16E+06	1.40E-07	1.40E-06
SVOC	4-Chloroaniline	106-47-8	4.8E-06	1.3E+02	1.78E-02	4.20E-05	1.18E+07	8.46E-08	8.46E-07
SVOC	2-Chloronaphthalene	91-58-7	6.4E-03	1.6E+02	1.65E-02	3.72E-05	3.63E+04	2.75E-05	2.75E-04
SVOC	2-Chlorophenol	95-57-8	7.0E-03	1.3E+02	1.78E-02	4.19E-05	3.19E+04	3.14E-05	3.14E-04
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	4.5E-03	2.0E+02	1.52E-02	3.32E-05	4.47E+04	2.23E-05	2.23E-04
SVOC	Chrysene	218-01-9	6.7E-04	2.3E+02	1.47E-02	3.14E-05	1.34E+05	7.47E-06	7.47E-05
SVOC	Dibenz(a,h)anthracene	53-70-3	2.1E-08	2.8E+02	1.37E-02	2.84E-05	3.48E+09	2.87E-10	2.87E-09
SVOC	Dibenzofuran	132-64-9	1.0E-05	1.7E+02	1.63E-02	3.66E-05	6.02E+06	1.66E-07	1.66E-06
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.1E-08	2.5E+02	1.42E-02	2.98E-05	3.44E+09	2.91E-10	2.91E-09
SVOC	2,4-Dichlorophenol	120-83-2	3.3E-05	1.6E+02	1.64E-02	3.72E-05	1.87E+06	5.36E-07	5.36E-06
SVOC	Diethylphthalate	84-66-2	4.4E-06	2.2E+02	1.48E-02	3.18E-05	1.53E+07	6.55E-08	6.55E-07
SVOC	2,4-Dimethylphenol	105-67-9	2.9E-05	1.2E+02	1.81E-02	4.29E-05	1.91E+06	5.24E-07	5.24E-06
SVOC	Dimethylphthalate	131-11-3	2.1E-06	1.9E+02	1.55E-02	3.41E-05	3.01E+07	3.32E-08	3.32E-07
SVOC	Di-n-butylphthalate	84-74-2	7.7E-09	2.8E+02	1.37E-02	2.84E-05	9.46E+09	1.06E-10	1.06E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	8.7E-06	2.0E+02	1.54E-02	3.37E-05	7.47E+06	1.34E-07	1.34E-06
SVOC	2,4-Dinitrophenol	51-28-5	1.3E-06	1.8E+02	1.58E-02	3.50E-05	4.77E+07	2.10E-08	2.10E-07
SVOC	2,4-Dinitrotoluene	121-14-2	9.6E-07	1.8E+02	1.58E-02	3.52E-05	6.55E+07	1.53E-08	1.53E-07
SVOC	2,6-Dinitrotoluene	606-20-2	8.4E-06	1.8E+02	1.58E-02	3.52E-05	7.58E+06	1.32E-07	1.32E-06
SVOC	Di-n-octylphthalate	117-84-0	4.9E-04	3.9E+02	1.23E-02	2.40E-05	2.07E+05	4.83E-06	4.83E-05
SVOC	Fluoranthene	206-44-0	1.6E-04	2.0E+02	1.53E-02	3.34E-05	4.48E+05	2.23E-06	2.23E-05
SVOC	Fluorene	86-73-7	8.2E-04	1.7E+02	1.63E-02	3.68E-05	1.02E+05	9.84E-06	9.84E-05
SVOC	Hexachlorobenzene	118-74-1	1.3E-02	2.8E+02	1.36E-02	2.81E-05	4.12E+04	2.42E-05	2.42E-04
SVOC	Hexachlorobutadiene	87-68-3	1.4E-01	2.6E+02	1.40E-02	2.94E-05	3.45E+04	2.89E-05	2.89E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	4.0E-01	2.7E+02	1.38E-02	2.87E-05	3.50E+04	2.86E-05	2.86E-04
SVOC	Hexachloroethane	67-72-1	7.0E-02	2.4E+02	1.45E-02	3.08E-05	3.34E+04	2.99E-05	2.99E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	7.7E-06	2.8E+02	1.38E-02	2.85E-05	9.46E+06	1.06E-07	1.06E-06
SVOC	Isophorone	78-59-1	1.1E-04	1.4E+02	1.74E-02	4.04E-05	5.61E+05	1.78E-06	1.78E-05
SVOC	2-Methylnaphthalene	91-57-6	1.0E-02	1.4E+02	1.72E-02	3.98E-05	3.07E+04	3.26E-05	3.26E-04
SVOC	Methylphenol (total)	1319-77-3	1.8E-05	1.1E+02	1.89E-02	4.56E-05	3.02E+06	3.31E-07	3.31E-06
SVOC	Naphthalene	91-20-3	8.0E-03	1.3E+02	1.78E-02	4.19E-05	3.09E+04	3.24E-05	3.24E-04
SVOC	2-Nitroaniline	88-74-4	3.3E-06	1.4E+02	1.74E-02	4.04E-05	1.76E+07	5.67E-08	5.67E-07
SVOC	3-Nitroaniline	99-09-2	2.9E-06	1.4E+02	1.74E-02	4.04E-05	1.96E+07	5.11E-08	5.11E-07
SVOC	4-Nitroaniline	100-01-6	4.2E-08	1.4E+02	1.74E-02	4.04E-05	1.36E+09	7.35E-10	7.35E-09
SVOC	Nitrobenzene	98-95-3	3.8E-04	1.2E+02	1.81E-02	4.28E-05	1.68E+05	5.96E-06	5.96E-05
SVOC	2-Nitrophenol	88-75-5	1.9E-04	1.4E+02	1.73E-02	4.02E-05	3.23E+05	3.10E-06	3.10E-05
SVOC	4-Nitrophenol	100-02-7	8.5E-09	1.4E+02	1.73E-02	4.02E-05	6.80E+09	1.47E-10	1.47E-09
SVOC	N-Nitrosodiphenylamine	86-30-6	1.0E-04	2.0E+02	1.54E-02	3.37E-05	6.82E+05	1.47E-06	1.47E-05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	5.4E-05	1.3E+02	1.77E-02	4.16E-05	1.07E+06	9.31E-07	9.31E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.4E-03	1.7E+02	1.62E-02	3.63E-05	5.34E+04	1.87E-05	1.87E-04
SVOC	Pentachlorophenol	87-86-5	2.0E-07	2.7E+02	1.39E-02	2.91E-05	3.65E+08	2.74E-09	2.74E-08

**Attachment B5.2: Normalized Vapor Flux to Ambient Air from Exposed Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	H (unitless)	MW (g/mol)	k _G (cm/s)	k _L (cm/s)	1/K _L (s/cm)	K _L (cm/s)	J _L (L/m ² -s)
SVOC	Phenanthrene	85-01-8	4.8E-04	1.8E+02	1.60E-02	3.55E-05	1.60E+05	6.26E-06	6.26E-05
SVOC	Phenol	108-95-2	6.4E-06	9.4E+01	1.98E-02	4.89E-05	7.97E+06	1.26E-07	1.26E-06
SVOC	Pyrene	129-00-0	1.0E-04	2.0E+02	1.53E-02	3.34E-05	6.69E+05	1.49E-06	1.49E-05
SVOC	2,4,5-Trichlorophenol	95-95-4	6.3E-05	2.0E+02	1.54E-02	3.38E-05	1.05E+06	9.49E-07	9.49E-06
SVOC	2,4,6-Trichlorophenol	88-06-2	1.0E-04	2.0E+02	1.54E-02	3.38E-05	6.58E+05	1.52E-06	1.52E-05
PCB	PCBs (total)	1336-36-3	4.1E-02	3.3E+02	1.30E-02	2.62E-05	4.00E+04	2.50E-05	2.50E-04
INORG	Antimony	7440-36-0		1.2E+02	1.81E-02	4.30E-05			
INORG	Arsenic	7440-38-2		7.5E+01	2.13E-02	5.48E-05			
INORG	Barium	7440-39-3		1.4E+02	1.74E-02	4.05E-05			
INORG	Beryllium	7440-41-7		9.0E+00	4.34E-02	1.58E-04			
INORG	Cadmium	7440-43-9		1.1E+02	1.86E-02	4.48E-05			
INORG	Chromium (total)	7440-47-3		5.2E+01	2.41E-02	6.58E-05			
INORG	Cobalt	7440-48-4		5.9E+01	2.31E-02	6.18E-05			
INORG	Copper	7440-50-8		6.4E+01	2.25E-02	5.95E-05			
INORG	Cyanide (total)	57-12-5		2.6E+01	3.04E-02	9.30E-05			
INORG	Lead	7439-92-1		2.1E+02	1.52E-02	3.30E-05			
INORG	Manganese	7439-96-5		5.5E+01	2.37E-02	6.40E-05			
INORG	Mercury	7439-97-6	1.5E-01	2.0E+02	1.53E-02	3.35E-05	3.03E+04	3.30E-05	3.30E-04
INORG	Nickel	7440-02-0		5.9E+01	2.31E-02	6.19E-05			
INORG	Selenium	7782-49-2		7.9E+01	2.10E-02	5.34E-05			
INORG	Silver	7440-22-4		1.1E+02	1.89E-02	4.57E-05			
INORG	Thallium	7440-28-0		2.0E+02	1.52E-02	3.32E-05			
INORG	Vanadium	7440-62-2		5.1E+01	2.43E-02	6.65E-05			
INORG	Zinc	7440-66-6		6.5E+01	2.23E-02	5.87E-05			
	Molecular Weight of Oxygen	g/mol	MW _{O2}	32					
	Molecular Weight of Water	g/mol	MW _{H2O}	18					
	Temperature	K	T	12.5					
	Liquid-phase Mass Transfer Coefficient for Oxygen	cm/s	k _{L,O2}	0.002					
	Gas-Phase Mass Transfer Coefficient for Water Vapor at 25 °C	cm/s	K _{G,H2O}	0.833					
	Dispersion coefficient	(kg/m ³) / (kg/m ² /s)	C/Q	11.0					

Attachment B5.2: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	K _p (cm/hr)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA (L/cm ² -event)
VOC	Acetone	67-64-1	5.8E+01	5.2E-04	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	Acrolein	107-02-8	5.6E+01	6.7E-04	1.0E+00	6.7E-04	1.9E-03	2.2E-01	3.3E-01	3.0E-01	5.2E-01	1.63E-06
VOC	Acrylonitrile	107-13-1	5.3E+01	2.0E-04	1.0E+00	2.0E-04	5.5E-04	2.1E-01	3.3E-01	3.0E-01	5.0E-01	4.77E-07
VOC	Benzene	71-43-2	7.8E+01	1.5E-02	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	Bromobenzene	108-86-1	1.6E+02	2.0E-02	1.0E+00	2.0E-02	9.5E-02	8.0E-01	4.0E-01	3.6E-01	1.9E+00	7.03E-05
VOC	Bromochloromethane	74-97-5	1.3E+02	2.5E-03	1.0E+00	2.5E-03	1.1E-02	5.6E-01	3.4E-01	3.1E-01	1.3E+00	7.91E-06
VOC	Bromodichloromethane	75-27-4	1.6E+02	4.7E-03	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	Bromoform	75-25-2	2.5E+02	2.2E-03	1.0E+00	2.2E-03	1.3E-02	2.7E+00	3.4E-01	3.1E-01	6.6E+00	1.40E-05
VOC	Bromomethane	74-83-9	9.5E+01	2.8E-03	1.0E+00	2.8E-03	1.1E-02	3.6E-01	3.4E-01	3.1E-01	8.6E-01	7.68E-06
VOC	2-Butanone	78-93-3	7.2E+01	9.6E-04	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	n-Butylbenzene	104-51-8	1.3E+02	1.7E-01	1.0E+00	1.7E-01	7.4E-01	5.9E-01	9.3E-01	1.0E+00	2.3E+00	5.00E-04
VOC	sec-Butylbenzene	135-98-8	1.3E+02	1.8E-01	1.0E+00	1.8E-01	7.9E-01	5.9E-01	9.7E-01	1.1E+00	2.3E+00	5.32E-04
VOC	tert-Butylbenzene	98-06-6	1.3E+02	1.4E-01	1.0E+00	1.4E-01	6.5E-01	5.9E-01	8.5E-01	8.8E-01	2.3E+00	4.36E-04
VOC	Carbon Disulfide	75-15-0	7.6E+01	1.2E-02	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	1.4E-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	2.9E-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	6.1E-03	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	2-Chloroethylvinyl ether	110-75-8			1.0E+00							
VOC	Chloroform	67-66-3	1.2E+02	6.3E-03	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	1.5E-02	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	5.6E-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	4-Chlorotoluene	106-43-4			1.0E+00							
VOC	Cumene	98-82-8	1.2E+02	6.8E-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-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	p-Cymene	99-87-6	1.3E+02	1.4E-01	1.0E+00	1.4E-01	6.4E-01	5.9E-01	8.4E-01	8.6E-01	2.4E+00	4.30E-04
VOC	1,2-Dibromo-3-chloropropane	96-12-8	2.4E+02	4.1E-03	1.0E+00	4.1E-03	2.4E-02	2.2E+00	3.5E-01	3.2E-01	5.3E+00	2.38E-05
VOC	Dibromochloromethane	124-48-1	2.1E+02	2.9E-03	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	1,2-Dibromoethane	106-93-4	1.9E+02	1.6E-03	1.0E+00	1.6E-03	8.4E-03	1.2E+00	3.4E-01	3.1E-01	2.8E+00	6.81E-06
VOC	Dibromomethane	74-95-3	1.7E+02	1.7E-03	1.0E+00	1.7E-03	8.7E-03	9.9E-01	3.4E-01	3.1E-01	2.4E+00	6.69E-06
VOC	trans-1,4-Dichloro-2-butene	110-57-6	1.3E+02	1.2E-03	1.0E+00	1.2E-03	5.1E-03	5.3E-01	3.4E-01	3.1E-01	1.3E+00	3.63E-06
VOC	1,2-Dichlorobenzene	95-50-1	1.5E+02	4.4E-02	1.0E+00	4.4E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.46E-04
VOC	1,3-Dichlorobenzene	541-73-1	1.5E+02	4.1E-02	1.0E+00	4.1E-02	1.9E-01	7.0E-01	4.7E-01	4.3E-01	1.7E+00	1.35E-04
VOC	1,4-Dichlorobenzene	106-46-7	1.5E+02	4.3E-02	1.0E+00	4.3E-02	2.0E-01	7.0E-01	4.8E-01	4.4E-01	1.7E+00	1.44E-04
VOC	Dichlorodifluoromethane	75-71-8	1.2E+02	8.9E-03	1.0E+00	8.9E-03	3.8E-02	5.0E-01	3.6E-01	3.3E-01	1.2E+00	2.63E-05
VOC	1,1-Dichloroethane	75-34-3	9.9E+01	6.7E-03	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	1,2-Dichloroethane	107-06-2	9.9E+01	4.1E-03	1.0E+00	4.1E-03	1.6E-02	3.8E-01	3.4E-01	3.1E-01	9.0E-01	1.13E-05
VOC	1,1-Dichloroethene	75-35-4	9.7E+01	1.2E-02	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	7.7E-03	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	7.7E-03	1.0E+00	7.7E-03	2.9E-02	3.7E-01	3.5E-01	3.2E-01	8.8E-01	2.07E-05

Attachment B5.2: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	K _p (cm/hr)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA (L/cm ² -event)
VOC	trans-1,2-Dichloroethene	156-60-5	9.7E+01	1.1E-02	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	1,2-Dichloropropane	78-87-5	1.1E+02	7.4E-03	1.0E+00	7.4E-03	3.0E-02	4.5E-01	3.5E-01	3.2E-01	1.1E+00	2.12E-05
VOC	1,3-Dichloropropane	142-28-9	1.1E+02	7.7E-03	1.0E+00	7.7E-03	3.2E-02	4.5E-01	3.5E-01	3.2E-01	1.1E+00	2.21E-05
VOC	2,2-Dichloropropane	594-20-7	1.1E+02	6.7E-03	1.0E+00	6.7E-03	2.7E-02	4.5E-01	3.5E-01	3.2E-01	1.1E+00	1.91E-05
VOC	1,1-Dichloropropene	563-58-6	1.1E+02	1.8E-02	1.0E+00	1.8E-02	7.2E-02	4.4E-01	3.8E-01	3.5E-01	1.1E+00	4.97E-05
VOC	1,3-Dichloropropene (total)	542-75-6	1.1E+02	7.9E-03	1.0E+00	7.9E-03	3.2E-02	4.4E-01	3.6E-01	3.2E-01	1.1E+00	2.25E-05
VOC	Ethyl Benzene	100-41-4	1.1E+02	4.8E-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	Ethyl Methacrylate	97-63-2	1.1E+02	6.9E-03	1.0E+00	6.9E-03	2.9E-02	4.6E-01	3.5E-01	3.2E-01	1.1E+00	2.00E-05
VOC	2-Hexanone	591-78-6	1.0E+02	3.5E-03	1.0E+00	3.5E-03	1.4E-02	3.8E-01	3.4E-01	3.1E-01	9.2E-01	9.75E-06
VOC	Iodomethane	74-88-4	1.4E+02	3.3E-03	1.0E+00	3.3E-03	1.5E-02	6.6E-01	3.4E-01	3.1E-01	1.6E+00	1.09E-05
VOC	Methyl Acetate	79-20-9	7.4E+01	8.0E-04	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	Methyl tert-butyl ether	1634-04-4	8.8E+01	3.3E-03	1.0E+00	3.3E-03	1.2E-02	3.3E-01	3.4E-01	3.1E-01	7.9E-01	8.84E-06
VOC	4-Methyl-2-pentanone	108-10-1	1.0E+02	2.7E-03	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	4.0E-02	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	3.5E-03	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	n-Propylbenzene	103-65-1	1.2E+02	9.0E-02	1.0E+00	9.0E-02	3.8E-01	5.0E-01	6.2E-01	5.9E-01	1.2E+00	2.52E-04
VOC	Styrene	100-42-5	1.0E+02	3.6E-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	1,1,1,2-Tetrachloroethane	630-20-6	1.7E+02	1.8E-02	1.0E+00	1.8E-02	9.2E-02	9.2E-01	4.0E-01	3.6E-01	2.2E+00	6.91E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	1.7E+02	6.9E-03	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	1.1E-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	3.2E-02	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	1,2,3-Trichlorobenzene	87-61-6			1.0E+00							
VOC	1,2,4-Trichlorobenzene	120-82-1	1.8E+02	6.8E-02	1.0E+00	6.8E-02	3.5E-01	1.1E+00	6.0E-01	5.6E-01	2.6E+00	2.76E-04
VOC	1,1,1-Trichloroethane	71-55-6	1.3E+02	1.2E-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	6.4E-03	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	1.8E-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	1.3E-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	1,2,3-Trichloropropane	96-18-4	1.5E+02	4.8E-03	1.0E+00	4.8E-03	2.2E-02	7.0E-01	3.5E-01	3.2E-01	1.7E+00	1.63E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.9E+02	1.7E-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	1.1E-01	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	1,3,5-Trimethylbenzene	108-67-8	1.2E+02	1.5E-01	1.0E+00	1.5E-01	6.2E-01	5.0E-01	8.2E-01	8.4E-01	2.0E+00	4.04E-04
VOC	Vinyl Acetate	108-05-4	8.6E+01	1.6E-03	1.0E+00	1.6E-03	5.7E-03	3.2E-01	3.4E-01	3.1E-01	7.7E-01	4.17E-06
VOC	Vinyl Chloride	75-01-4	6.3E+01	6.9E-03	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	5.0E-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	8.4E-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	Acenaphthylene	208-96-8	1.5E+02	8.9E-02	1.0E+00	8.9E-02	4.2E-01	7.5E-01	6.6E-01	6.3E-01	1.8E+00	3.09E-04
SVOC	Acetophenone	98-86-2	1.2E+02	3.7E-03	1.0E+00	3.7E-03	1.6E-02	5.0E-01	3.4E-01	3.1E-01	1.2E+00	1.11E-05
SVOC	Anthracene	120-12-7	1.8E+02	1.6E-01	1.0E+00	1.6E-01	8.2E-01	1.0E+00	1.0E+00	1.1E+00	4.0E+00	6.41E-04

Attachment B5.2: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	K _p (cm/hr)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA (L/cm ² -event)
SVOC	Atrazine	1912-24-9	2.2E+02	5.2E-03	1.0E+00	5.2E-03	2.9E-02	1.7E+00	3.5E-01	3.2E-01	4.1E+00	2.64E-05
SVOC	Benzaldehyde	100-52-7	1.1E+02	3.8E-03	1.0E+00	3.8E-03	1.5E-02	4.1E-01	3.4E-01	3.1E-01	9.9E-01	1.07E-05
SVOC	Benzo(a)anthracene	56-55-3	2.3E+02	4.8E-01	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	Benzo(a)pyrene	50-32-8	2.5E+02	6.6E-01	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	7.6E-01	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	2.7E+00	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	7.6E-01	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	Benzoic Acid	65-85-0	1.2E+02	5.5E-03	1.0E+00	5.5E-03	2.4E-02	5.1E-01	3.5E-01	3.2E-01	1.2E+00	1.66E-05
SVOC	Benzyl Alcohol	100-51-6	1.1E+02	2.1E-03	1.0E+00	2.1E-03	8.4E-03	4.2E-01	3.4E-01	3.1E-01	1.0E+00	5.94E-06
SVOC	Biphenyl	92-52-4	1.5E+02	1.1E-01	1.0E+00	1.1E-01	5.2E-01	7.7E-01	7.4E-01	7.3E-01	1.8E+00	3.86E-04
SVOC	bis(2-Chloroethoxy)methane	111-91-1	1.7E+02	1.2E-03	1.0E+00	1.2E-03	5.8E-03	9.8E-01	3.4E-01	3.1E-01	2.3E+00	4.47E-06
SVOC	bis(2-Chloroethyl) ether	111-44-4	1.4E+02	1.6E-03	1.0E+00	1.6E-03	7.3E-03	6.6E-01	3.4E-01	3.1E-01	1.6E+00	5.24E-06
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.9E+02	6.8E-01	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	4-Bromophenyl-phenyl ether	101-55-3	2.5E+02	4.3E-02	1.0E+00	4.3E-02	2.6E-01	2.6E+00	5.2E-01	4.9E-01	6.3E+00	2.69E-04
SVOC	Butylbenzylphthalate	85-68-7	3.1E+02	4.4E-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	Caprolactam	105-60-2	1.1E+02	2.8E-04	1.0E+00	2.8E-04	1.1E-03	4.5E-01	3.3E-01	3.0E-01	1.1E+00	8.01E-07
SVOC	Carbazole	86-74-8	1.7E+02	4.3E-02	1.0E+00	4.3E-02	2.1E-01	9.1E-01	4.9E-01	4.5E-01	2.2E+00	1.60E-04
SVOC	4-Chloro-3-methylphenol	59-50-7	1.4E+02	2.8E-02	1.0E+00	2.8E-02	1.3E-01	6.6E-01	4.2E-01	3.9E-01	1.6E+00	9.14E-05
SVOC	4-Chloroaniline	106-47-8	1.3E+02	5.1E-03	1.0E+00	5.1E-03	2.2E-02	5.4E-01	3.5E-01	3.2E-01	1.3E+00	1.56E-05
SVOC	2-Chloronaphthalene	91-58-7	1.6E+02	1.0E-01	1.0E+00	1.0E-01	5.0E-01	8.6E-01	7.2E-01	7.1E-01	2.1E+00	3.69E-04
SVOC	2-Chlorophenol	95-57-8	1.3E+02	7.9E-03	1.0E+00	7.9E-03	3.5E-02	5.5E-01	3.6E-01	3.2E-01	1.3E+00	2.44E-05
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	2.0E+02	5.6E-02	1.0E+00	5.6E-02	3.1E-01	1.5E+00	5.6E-01	5.3E-01	3.5E+00	2.65E-04
SVOC	Chrysene	218-01-9	2.3E+02	4.8E-01	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	1.1E+00	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	1.4E-01	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	3,3'-Dichlorobenzidine	91-94-1	2.5E+02	1.3E-02	1.0E+00	1.3E-02	7.7E-02	2.8E+00	3.9E-01	3.5E-01	6.6E+00	8.14E-05
SVOC	2,4-Dichlorophenol	120-83-2	1.6E+02	2.1E-02	1.0E+00	2.1E-02	1.0E-01	8.6E-01	4.0E-01	3.7E-01	2.1E+00	7.57E-05
SVOC	Diethylphthalate	84-66-2	2.2E+02	4.0E-03	1.0E+00	4.0E-03	2.3E-02	1.8E+00	3.5E-01	3.2E-01	4.4E+00	2.14E-05
SVOC	2,4-Dimethylphenol	105-67-9	1.2E+02	1.2E-02	1.0E+00	1.2E-02	5.0E-02	5.1E-01	3.7E-01	3.3E-01	1.2E+00	3.52E-05
SVOC	Dimethylphthalate	131-11-3	1.9E+02	2.2E-03	1.0E+00	2.2E-03	1.2E-02	1.3E+00	3.4E-01	3.1E-01	3.1E+00	9.85E-06
SVOC	Di-n-butylphthalate	84-74-2	2.8E+02	4.8E-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	4,6-Dinitro-2-methylphenol	534-52-1	2.0E+02	3.1E-03	1.0E+00	3.1E-03	1.7E-02	1.4E+00	3.4E-01	3.1E-01	3.2E+00	1.40E-05
SVOC	2,4-Dinitrophenol	51-28-5	1.8E+02	1.6E-03	1.0E+00	1.6E-03	8.1E-03	1.1E+00	3.4E-01	3.1E-01	2.7E+00	6.46E-06
SVOC	2,4-Dinitrotoluene	121-14-2	1.8E+02	3.2E-03	1.0E+00	3.2E-03	1.7E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.32E-05
SVOC	2,6-Dinitrotoluene	606-20-2	1.8E+02	2.6E-03	1.0E+00	2.6E-03	1.3E-02	1.1E+00	3.4E-01	3.1E-01	2.6E+00	1.06E-05
SVOC	Di-n-octylphthalate	117-84-0	3.9E+02	2.2E+00	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	2.8E-01	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	1.1E-01	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	Hexachlorobenzene	118-74-1	2.8E+02	3.1E-01	8.0E-01	3.1E-01	2.0E+00	4.1E+00	2.1E+00	3.7E+00	1.7E+01	1.98E-03

Attachment B5.2: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana

Chem Group	Chemical	CASRN	MW (g/mole)	K _p (cm/hr)	FA (unitless)	K _p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA (L/cm ² -event)
SVOC	Hexachlorobutadiene	87-68-3	2.6E+02	8.2E-02	9.0E-01	8.2E-02	5.1E-01	3.0E+00	7.3E-01	7.2E-01	7.3E+00	5.03E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	2.7E+02	1.7E-01	9.0E-01	1.7E-01	1.1E+00	3.5E+00	1.2E+00	1.5E+00	1.4E+01	1.12E-03
SVOC	Hexachloroethane	67-72-1	2.4E+02	3.3E-02	1.0E+00	3.3E-02	1.9E-01	2.2E+00	4.7E-01	4.3E-01	5.3E+00	1.91E-04
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	2.8E+02	1.1E+00	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	Isophorone	78-59-1	1.4E+02	3.5E-03	1.0E+00	3.5E-03	1.6E-02	6.2E-01	3.4E-01	3.1E-01	1.5E+00	1.14E-05
SVOC	2-Methylnaphthalene	91-57-6	1.4E+02	8.9E-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	Methylphenol (total)	1319-77-3	1.1E+02	7.7E-03	1.0E+00	7.7E-03	3.1E-02	4.2E-01	3.5E-01	3.2E-01	1.0E+00	2.17E-05
SVOC	Naphthalene	91-20-3	1.3E+02	5.0E-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	2-Nitroaniline	88-74-4	1.4E+02	4.4E-03	1.0E+00	4.4E-03	2.0E-02	6.2E-01	3.5E-01	3.2E-01	1.5E+00	1.44E-05
SVOC	3-Nitroaniline	99-09-2	1.4E+02	2.1E-03	1.0E+00	2.1E-03	9.7E-03	6.2E-01	3.4E-01	3.1E-01	1.5E+00	6.94E-06
SVOC	4-Nitroaniline	100-01-6	1.4E+02	2.2E-03	1.0E+00	2.2E-03	1.0E-02	6.2E-01	3.4E-01	3.1E-01	1.5E+00	7.15E-06
SVOC	Nitrobenzene	98-95-3	1.2E+02	5.3E-03	1.0E+00	5.3E-03	2.3E-02	5.1E-01	3.5E-01	3.2E-01	1.2E+00	1.60E-05
SVOC	2-Nitrophenol	88-75-5	1.4E+02	4.0E-03	1.0E+00	4.0E-03	1.8E-02	6.3E-01	3.5E-01	3.1E-01	1.5E+00	1.30E-05
SVOC	4-Nitrophenol	100-02-7	1.4E+02	4.8E-03	1.0E+00	4.8E-03	2.2E-02	6.3E-01	3.5E-01	3.2E-01	1.5E+00	1.56E-05
SVOC	N-Nitrosodiphenylamine	86-30-6	2.0E+02	1.5E-02	1.0E+00	1.5E-02	8.1E-02	1.4E+00	3.9E-01	3.5E-01	3.3E+00	6.82E-05
SVOC	N-Nitroso-di-n-propylamine	621-64-7	1.3E+02	2.5E-03	1.0E+00	2.5E-03	1.1E-02	5.6E-01	3.4E-01	3.1E-01	1.4E+00	7.74E-06
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	1.7E+02	7.2E-03	1.0E+00	7.2E-03	3.6E-02	9.5E-01	3.6E-01	3.3E-01	2.3E+00	2.76E-05
SVOC	Pentachlorophenol	87-86-5	2.7E+02	1.2E-01	9.0E-01	1.2E-01	7.3E-01	3.3E+00	9.3E-01	9.9E-01	1.3E+01	7.43E-04
SVOC	Phenanthrene	85-01-8	1.8E+02	1.4E-01	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	4.5E-03	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	2.8E-01	1.0E+00	2.8E-01	1.5E+00	1.4E+00	1.6E+00	2.4E+00	5.7E+00	1.29E-03
SVOC	2,4,5-Trichlorophenol	95-95-4	2.0E+02	4.7E-02	1.0E+00	4.7E-02	2.5E-01	1.3E+00	5.2E-01	4.8E-01	3.2E+00	2.11E-04
SVOC	2,4,6-Trichlorophenol	88-06-2	2.0E+02	3.4E-02	1.0E+00	3.4E-02	1.9E-01	1.3E+00	4.7E-01	4.3E-01	3.2E+00	1.56E-04
PCB	PCBs (total)	1336-36-3	3.3E+02	4.5E-01	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	Antimony	7440-36-0	1.2E+02	1.0E-03								
INORG	Arsenic	7440-38-2	7.5E+01	1.0E-03								
INORG	Barium	7440-39-3	1.4E+02	1.0E-03								
INORG	Beryllium	7440-41-7	9.0E+00	1.0E-03								
INORG	Cadmium	7440-43-9	1.1E+02	1.0E-03								
INORG	Chromium (total)	7440-47-3	5.2E+01	2.0E-03								
INORG	Cobalt	7440-48-4	5.9E+01	4.0E-04								
INORG	Copper	7440-50-8	6.4E+01	1.0E-03								
INORG	Cyanide (total)	57-12-5	2.6E+01	1.0E-03								
INORG	Lead	7439-92-1	2.1E+02	1.0E-04								
INORG	Manganese	7439-96-5	5.5E+01	1.0E-03								
INORG	Mercury	7439-97-6	2.0E+02	1.0E-03								
INORG	Nickel	7440-02-0	5.9E+01	2.0E-04								
INORG	Selenium	7782-49-2	7.9E+01	1.0E-03								
INORG	Silver	7440-22-4	1.1E+02	6.0E-04								

**Attachment B5.2: Nonsteady State Dermal Absorption from Water
Former Delco Plant 5, Kokomo, Indiana**

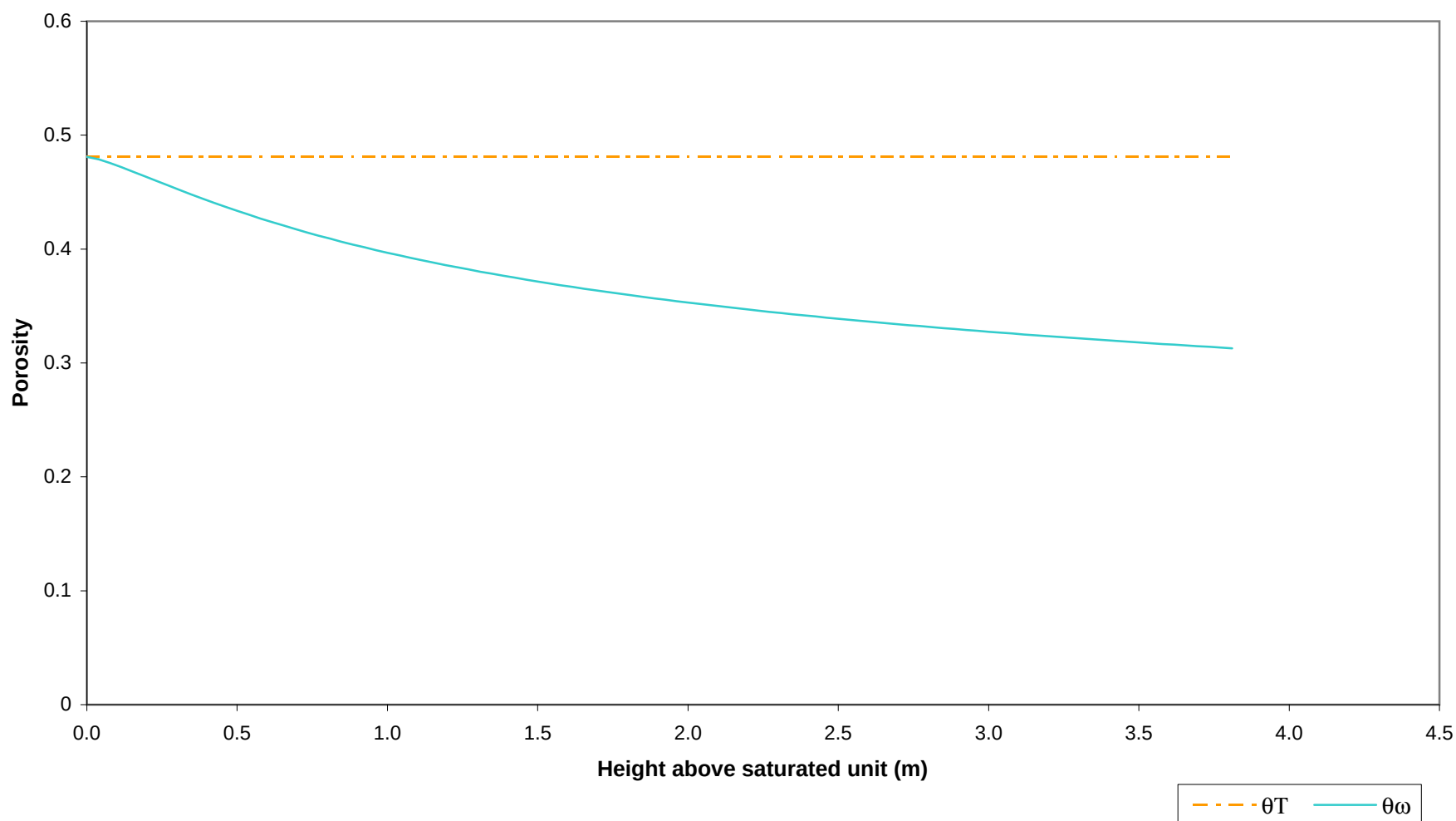
Chem Group	Chemical	CASRN	MW (g/mole)	K_p (cm/hr)	FA (unitless)	K_p (cm/hr)	B (unitless)	τ (hr)	c	b	ts (hr)	DA (L/cm²-event)
INORG	Thallium	7440-28-0	2.0E+02	1.0E-03								
INORG	Vanadium	7440-62-2	5.1E+01	1.0E-03								
INORG	Zinc	7440-66-6	6.5E+01	6.0E-04								
Notes:												
	Event Time	hours	t	2								
	K _p capped at 1 cm/hr (USEPA 1992).											

**Attachment B5.2: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Maintenance Worker Exposure to Groundwater in Excavations
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
On-Site	Upgradient	P1	VOC	cis-1,2-Dichloroethene	156-59-2	2.00E-02		9E-04
On-Site	Upgradient	P1	VOC	Trichloroethene	79-01-6	1.30E-03	5E-10	8E-06
On-Site	Upgradient	P1	VOC	Vinyl Chloride	75-01-4	6.80E-03	3E-08	2E-04
Notes:								
Only detected constituents are shown in each area.								
Only concentrations in saturated unit P1 are shown.								
Cancer and non-cancer risk estimates are calculated using the maximum groundwater concentrations detected in each AOI.								

Attachment B6
Exposure of Residents to Groundwater Vapor

**Attachment B6: Soil Moisture Profile for Building with Basement
Former Delco Plant 5, Kokomo, Indiana**



**Attachment B6: Normalized Indoor Air Concentration in a Residential Building with Basement
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 _{bldg} (L-water/m ³)
VOC	Acetone	67-64-1	1.07E+00	9.85E-05	9.52E-04	9.58E-02	9.58E-02	1.93E-06	1.83E-06
VOC	Acrolein	107-02-8	9.50E-01	1.04E-04	2.49E-03	8.44E-02	8.44E-02	1.82E-06	4.55E-06
VOC	Acrylonitrile	107-13-1	1.04E+00	1.12E-04	2.10E-03	9.22E-02	9.22E-02	1.89E-06	3.99E-06
VOC	Benzene	71-43-2	7.60E-01	8.47E-05	1.31E-01	6.72E-02	6.72E-02	1.68E-06	2.20E-04
VOC	Bromobenzene	108-86-1			4.26E-02				
VOC	Bromochloromethane	74-97-5	5.94E-01	8.64E-05	2.94E-02	5.25E-02	5.25E-02	1.58E-06	4.64E-05
VOC	Bromodichloromethane	75-27-4	2.57E-01	9.16E-05	3.62E-02	2.28E-02	2.28E-02	1.46E-06	5.26E-05
VOC	Bromoform	75-25-2	1.29E-01	8.90E-05	1.03E-02	1.15E-02	1.15E-02	1.44E-06	1.48E-05
VOC	Bromomethane	74-83-9	6.29E-01	1.05E-04	1.76E-01	5.56E-02	5.56E-02	1.60E-06	2.82E-04
VOC	2-Butanone	78-93-3	6.98E-01	8.47E-05	1.14E-03	6.25E-02	6.25E-02	1.65E-06	1.88E-06
VOC	n-Butylbenzene	104-51-8			2.23E-01				
VOC	sec-Butylbenzene	135-98-8			1.69E-04				
VOC	tert-Butylbenzene	98-06-6			2.48E-01				
VOC	Carbon Disulfide	75-15-0	8.99E-01	8.64E-05	7.91E-01	7.94E-02	7.94E-02	1.78E-06	1.41E-03
VOC	Carbon Tetrachloride	56-23-5	6.74E-01	7.60E-05	7.32E-01	5.95E-02	5.95E-02	1.62E-06	1.19E-03
VOC	Chlorobenzene	108-90-7	6.31E-01	7.52E-05	7.71E-02	5.57E-02	5.57E-02	1.60E-06	1.23E-04
VOC	Chloroethane	75-00-3	2.34E+00	9.94E-05	1.80E-01	2.07E-01	2.07E-01	3.04E-06	5.47E-04
VOC	2-Chloroethylvinyl ether	110-75-8							
VOC	Chloroform	67-66-3	8.99E-01	8.64E-05	8.98E-02	7.94E-02	7.94E-02	1.78E-06	1.60E-04
VOC	Chloromethane	74-87-3	1.09E+00	5.62E-05	1.80E-01	9.62E-02	9.62E-02	1.93E-06	3.48E-04
VOC	2-Chlorotoluene	95-49-8	5.43E-01	7.52E-05	7.30E-02	4.79E-02	4.79E-02	1.55E-06	1.13E-04
VOC	4-Chlorotoluene	106-43-4							
VOC	Cumene	98-82-8	5.62E-01	6.13E-05	2.19E-01	4.96E-02	4.96E-02	1.56E-06	3.41E-04
VOC	Cyclohexane	110-82-7	7.25E-01	7.86E-05	3.98E+00	6.40E-02	6.40E-02	1.66E-06	6.60E-03
VOC	p-Cymene	99-87-6							
VOC	1,2-Dibromo-3-chloropropane	96-12-8	6.91E-01	6.91E-05	3.00E-03	6.13E-02	6.13E-02	1.64E-06	4.92E-06
VOC	Dibromochloromethane	124-48-1	1.69E-01	9.07E-05	2.03E-02	1.50E-02	1.50E-02	1.45E-06	2.94E-05
VOC	1,2-Dibromoethane	106-93-4	6.91E-01	6.91E-05	1.52E-02	6.11E-02	6.11E-02	1.64E-06	2.48E-05
VOC	Dibromomethane	74-95-3	6.91E-01	6.91E-05	1.76E-02	6.11E-02	6.11E-02	1.64E-06	2.88E-05
VOC	trans-1,4-Dichloro-2-butene	110-57-6	5.73E-01	8.00E-05	1.79E-03	5.11E-02	5.11E-02	1.57E-06	2.81E-06
VOC	1,2-Dichlorobenzene	95-50-1	5.96E-01	6.83E-05	3.44E-02	5.27E-02	5.27E-02	1.58E-06	5.42E-05
VOC	1,3-Dichlorobenzene	541-73-1	5.98E-01	6.79E-05	6.33E-02	5.28E-02	5.28E-02	1.58E-06	1.00E-04
VOC	1,4-Dichlorobenzene	106-46-7	5.96E-01	6.83E-05	4.54E-02	5.27E-02	5.27E-02	1.58E-06	7.16E-05
VOC	Dichlorodifluoromethane	75-71-8	6.91E-01	6.91E-05	7.01E+00	6.11E-02	6.11E-02	1.63E-06	1.15E-02
VOC	1,1-Dichloroethane	75-34-3	6.41E-01	9.07E-05	1.39E-01	5.66E-02	5.66E-02	1.60E-06	2.22E-04
VOC	1,2-Dichloroethane	107-06-2	8.99E-01	8.55E-05	2.23E-02	7.94E-02	7.94E-02	1.78E-06	3.98E-05
VOC	1,1-Dichloroethene	75-35-4	7.78E-01	8.99E-05	6.97E-01	6.87E-02	6.87E-02	1.69E-06	1.18E-03
VOC	1,2-Dichloroethene (total)	540-59-0			1.92E-01				
VOC	cis-1,2-Dichloroethene	156-59-2	6.36E-01	9.76E-05	9.86E-02	5.62E-02	5.62E-02	1.60E-06	1.58E-04
VOC	trans-1,2-Dichloroethene	156-60-5	6.11E-01	1.03E-04	2.38E-01	5.40E-02	5.40E-02	1.59E-06	3.77E-04
VOC	1,2-Dichloropropane	78-87-5	6.76E-01	7.54E-05	6.36E-02	5.97E-02	5.97E-02	1.63E-06	1.03E-04
VOC	1,3-Dichloropropane	142-28-9	6.40E-01	8.53E-05	2.03E-05	1.06E-01	1.06E-01	2.02E-06	4.09E-08
VOC	2,2-Dichloropropane	594-20-7	6.22E-01	8.19E-05	9.36E-02	5.50E-02	5.50E-02	1.59E-06	1.49E-04
VOC	1,1-Dichloropropene	563-58-6			1.02E+00				
VOC	1,3-Dichloropropene (total)	542-75-6	5.41E-01	8.64E-05	3.88E-01	4.78E-02	4.78E-02	1.55E-06	6.00E-04
VOC	Ethyl Benzene	100-41-4	6.48E-01	6.74E-05	1.60E-01	5.72E-02	5.72E-02	1.61E-06	2.57E-04
VOC	Ethyl Methacrylate	97-63-2	6.91E-01	6.91E-05	1.72E-02	6.11E-02	6.11E-02	1.64E-06	2.81E-05
VOC	2-Hexanone	591-78-6	6.47E-01	7.10E-05	3.58E-02	5.72E-02	5.72E-02	1.61E-06	5.75E-05
VOC	Iodomethane	74-88-4	4.53E-01	6.70E-05	1.12E-01	4.00E-02	4.00E-02	1.51E-06	1.69E-04
VOC	Methyl Acetate	79-20-9	8.27E-01	9.50E-05	2.16E-03	7.36E-02	7.36E-02	1.73E-06	3.75E-06
VOC	Methyl tert-butyl ether	1634-04-4	7.42E-01	8.73E-05	1.46E-02	6.56E-02	6.56E-02	1.67E-06	2.44E-05
VOC	4-Methyl-2-pentanone	108-10-1	6.48E-01	6.74E-05	2.82E-03	5.75E-02	5.75E-02	1.61E-06	4.54E-06
VOC	Methylcyclohexane	108-87-2	6.35E-01	7.36E-05	9.74E+00	5.61E-02	5.61E-02	1.60E-06	1.56E-02
VOC	Methylene Chloride	75-09-2	8.73E-01	1.01E-04	5.59E-02	7.71E-02	7.71E-02	1.76E-06	9.84E-05
VOC	n-Propylbenzene	103-65-1			1.89E-01				
VOC	Styrene	100-42-5	6.13E-01	6.91E-05	5.46E-02	5.42E-02	5.42E-02	1.59E-06	8.67E-05

**Attachment B6: Normalized Indoor Air Concentration in a Residential Building with Basement
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 _{bldg} (L-water/m ³)
VOC	1,1,1,2-Tetrachloroethane	630-20-6	6.13E-01	6.83E-05	4.95E-02	5.42E-02	5.42E-02	1.59E-06	7.85E-05
VOC	1,1,2,2-Tetrachloroethane	79-34-5	6.13E-01	6.83E-05	6.77E-03	5.43E-02	5.43E-02	1.59E-06	1.07E-05
VOC	Tetrachloroethene	127-18-4	6.22E-01	7.08E-05	3.89E-01	5.50E-02	5.50E-02	1.59E-06	6.20E-04
VOC	Toluene	108-88-3	7.52E-01	7.43E-05	1.45E-01	6.64E-02	6.64E-02	1.68E-06	2.42E-04
VOC	1,2,3-Trichlorobenzene	87-61-6			1.82E-01				
VOC	1,2,4-Trichlorobenzene	120-82-1	2.59E-01	7.11E-05	2.29E-02	2.29E-02	2.29E-02	1.46E-06	3.33E-05
VOC	1,1,1-Trichloroethane	71-55-6	6.74E-01	7.60E-05	4.12E-01	5.95E-02	5.95E-02	1.62E-06	6.69E-04
VOC	1,1,2-Trichloroethane	79-00-5	6.74E-01	7.60E-05	1.93E-02	5.96E-02	5.96E-02	1.62E-06	3.13E-05
VOC	Trichloroethene	79-01-6	6.83E-01	7.86E-05	2.35E-01	6.03E-02	6.03E-02	1.63E-06	3.82E-04
VOC	Trichlorofluoromethane	75-69-4	7.52E-01	8.38E-05	1.98E+00	6.64E-02	6.64E-02	1.68E-06	3.32E-03
VOC	1,2,3-Trichloropropane	96-18-4	6.13E-01	6.83E-05	8.35E-03	5.43E-02	5.43E-02	1.59E-06	1.33E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	6.74E-01	7.08E-05	9.83E+00	5.95E-02	5.95E-02	1.62E-06	1.60E-02
VOC	1,2,4-Trimethylbenzene	95-63-6	5.24E-01	6.84E-05	1.11E-01	4.63E-02	4.63E-02	1.54E-06	1.71E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	5.20E-01	7.49E-05	1.06E-01	4.60E-02	4.60E-02	1.54E-06	1.63E-04
VOC	Vinyl Acetate	108-05-4	7.34E-01	7.95E-05	1.15E-02	6.50E-02	6.50E-02	1.66E-06	1.91E-05
VOC	Vinyl Chloride	75-01-4	9.16E-01	1.06E-04	8.02E-01	8.09E-02	8.09E-02	1.79E-06	1.44E-03
VOC	Xylenes (total)	1330-20-7	6.74E-01	7.56E-05	1.35E-01	5.95E-02	5.95E-02	1.62E-06	2.19E-04
SVOC	Acenaphthene	83-32-9	3.64E-01	6.64E-05	2.02E-03	3.25E-02	3.25E-02	1.48E-06	2.99E-06
SVOC	Acenaphthylene	208-96-8	3.88E-01	6.03E-05	2.31E-03	3.46E-02	3.46E-02	1.48E-06	3.43E-06
SVOC	Acetophenone	98-86-2	6.91E-01	6.91E-05	2.19E-04	6.48E-02	6.48E-02	1.66E-06	3.64E-07
SVOC	Anthracene	120-12-7	2.80E-01	6.69E-05	7.20E-04	2.58E-02	2.58E-02	1.46E-06	1.05E-06
SVOC	Atrazine	1912-24-9	2.24E-01	5.76E-05	1.25E-07	5.42E+00	5.42E+00	5.91E-05	7.38E-09
SVOC	Benzaldehyde	100-52-7	6.23E-01	7.84E-05	3.58E-04	5.76E-02	5.76E-02	1.61E-06	5.77E-07
SVOC	Benzo(a)anthracene	56-55-3	4.41E-01	7.78E-05	2.63E-05	7.35E-02	7.35E-02	1.73E-06	4.56E-08
SVOC	Benzo(a)pyrene	50-32-8	3.72E-01	7.78E-05	5.87E-06	1.88E-01	1.88E-01	2.84E-06	1.67E-08
SVOC	Benzo(b)fluoranthene	205-99-2	1.95E-01	4.80E-05	7.20E-04	1.80E-02	1.80E-02	1.45E-06	1.04E-06
SVOC	Benzo(g,h,i)perylene	191-24-2	1.88E-01	4.54E-05	2.88E-06	2.01E-01	2.01E-01	2.98E-06	8.58E-09
SVOC	Benzo(k)fluoranthene	207-08-9	1.95E-01	4.80E-05	4.74E-06	1.36E-01	1.36E-01	2.31E-06	1.09E-08
SVOC	Benzoic Acid	65-85-0	4.63E-01	6.89E-05	4.37E-06	2.25E-01	2.25E-01	3.23E-06	1.41E-08
SVOC	Benzyl Alcohol	100-51-6	6.12E-01	7.75E-05	7.95E-06	1.68E-01	1.68E-01	2.64E-06	2.10E-08
SVOC	Biphenyl	92-52-4	3.49E-01	7.04E-05	6.13E-03	3.10E-02	3.10E-02	1.47E-06	9.03E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.77E-01	7.31E-05	3.47E-06	2.80E-01	2.80E-01	3.80E-06	1.32E-08
SVOC	bis(2-Chloroethyl) ether	111-44-4	5.98E-01	6.51E-05	2.83E-04	5.55E-02	5.55E-02	1.60E-06	4.51E-07
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	3.03E-01	3.16E-05	6.06E-07	6.38E-01	6.38E-01	7.62E-06	4.62E-09
SVOC	4-Bromophenyl-phenyl ether	101-55-3	2.26E-01	5.88E-05	2.39E-03	2.02E-02	2.02E-02	1.45E-06	3.47E-06
SVOC	Butylbenzylphthalate	85-68-7	1.50E-01	4.17E-05	1.04E-05	6.01E-02	6.01E-02	1.63E-06	1.70E-08
SVOC	Caprolactam	105-60-2	5.98E-01	7.77E-05	1.03E-07	8.88E+00	8.88E+00	9.63E-05	9.92E-09
SVOC	Carbazole	86-74-8	3.37E-01	6.07E-05	1.56E-07	4.58E+00	4.58E+00	5.01E-05	7.82E-09
SVOC	4-Chloro-3-methylphenol	59-50-7	5.24E-01	8.22E-05	8.15E-06	1.64E-01	1.64E-01	2.60E-06	2.12E-08
SVOC	4-Chloroaniline	106-47-8	4.17E-01	8.73E-05	4.75E-06	2.52E-01	2.52E-01	3.50E-06	1.67E-08
SVOC	2-Chloronaphthalene	91-58-7	4.25E-01	7.59E-05	6.42E-03	3.77E-02	3.77E-02	1.50E-06	9.60E-06
SVOC	2-Chlorophenol	95-57-8	4.33E-01	8.17E-05	7.03E-03	3.84E-02	3.84E-02	1.50E-06	1.05E-05
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	2.45E-01	6.61E-05	4.50E-03	2.18E-02	2.18E-02	1.45E-06	6.54E-06
SVOC	Chrysene	218-01-9	2.14E-01	5.37E-05	6.67E-04	1.99E-02	1.99E-02	1.45E-06	9.69E-07
SVOC	Dibenz(a,h)anthracene	53-70-3	1.75E-01	4.48E-05	2.09E-08	2.51E+01	2.51E+01	2.70E-04	5.66E-09
SVOC	Dibenzofuran	132-64-9	2.06E-01	5.18E-05	2.57E-04	2.05E-02	2.05E-02	1.45E-06	3.74E-07
SVOC	3,3'-Dichlorobenzidine	91-94-1	1.68E-01	5.82E-05	2.05E-08	3.32E+01	3.32E+01	3.58E-04	7.35E-09
SVOC	2,4-Dichlorophenol	120-83-2	2.99E-01	7.58E-05	3.31E-05	5.32E-02	5.32E-02	1.58E-06	5.23E-08
SVOC	Diethylphthalate	84-66-2	2.21E-01	5.49E-05	4.43E-06	1.65E-01	1.65E-01	2.60E-06	1.15E-08
SVOC	2,4-Dimethylphenol	105-67-9	5.05E-01	7.51E-05	2.93E-05	7.46E-02	7.46E-02	1.74E-06	5.10E-08
SVOC	Dimethylphthalate	131-11-3	4.91E-01	5.43E-05	2.15E-06	3.40E-01	3.40E-01	4.44E-06	9.52E-09
SVOC	Di-n-butylphthalate	84-74-2	3.78E-01	6.79E-05	7.69E-09	1.03E+02	1.03E+02	1.11E-03	8.56E-09
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	2.38E-01	5.97E-05	8.73E-06	1.01E-01	1.01E-01	1.98E-06	1.72E-08
SVOC	2,4-Dinitrophenol	51-28-5	2.36E-01	7.83E-05	1.33E-06	7.10E-01	7.10E-01	8.40E-06	1.12E-08
SVOC	2,4-Dinitrotoluene	121-14-2	1.75E+00	6.10E-05	9.64E-07	8.95E-01	8.95E-01	1.04E-05	1.00E-08
SVOC	2,6-Dinitrotoluene	606-20-2	2.83E-01	6.27E-05	8.36E-06	1.13E-01	1.13E-01	2.09E-06	1.74E-08

**Attachment B6: Normalized Indoor Air Concentration in a Residential Building with Basement
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 _{bldg} (L-water/m ³)
SVOC	Di-n-octylphthalate	117-84-0	1.30E-01	3.09E-05	4.93E-04	1.23E-02	1.23E-02	1.44E-06	7.12E-07
SVOC	Fluoranthene	206-44-0	2.61E-01	5.49E-05	1.56E-04	2.72E-02	2.72E-02	1.46E-06	2.29E-07
SVOC	Fluorene	86-73-7	3.14E-01	6.81E-05	8.23E-04	2.87E-02	2.87E-02	1.47E-06	1.21E-06
SVOC	Hexachlorobenzene	118-74-1	4.68E-01	5.11E-05	1.29E-02	4.14E-02	4.14E-02	1.51E-06	1.95E-05
SVOC	Hexachlorobutadiene	87-68-3	4.85E-01	5.32E-05	1.37E-01	4.28E-02	4.28E-02	1.52E-06	2.08E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	1.39E-01	6.23E-05	4.04E-01	1.23E-02	1.23E-02	1.44E-06	5.83E-04
SVOC	Hexachloroethane	67-72-1	2.16E-02	5.88E-05	7.02E-02	1.92E-03	1.92E-03	1.35E-06	9.46E-05
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	1.64E-01	4.89E-05	7.70E-06	8.88E-02	8.88E-02	1.86E-06	1.43E-08
SVOC	Isophorone	78-59-1	5.38E-01	5.84E-05	1.07E-04	5.39E-02	5.39E-02	1.59E-06	1.70E-07
SVOC	2-Methylnaphthalene	91-57-6	4.51E-01	6.70E-05	1.06E-02	3.99E-02	3.99E-02	1.51E-06	1.59E-05
SVOC	Methylphenol (total)	1319-77-3	6.39E-01	8.64E-05	1.77E-05	1.14E-01	1.14E-01	2.09E-06	3.70E-08
SVOC	Naphthalene	91-20-3	5.10E-01	6.48E-05	7.98E-03	4.51E-02	4.51E-02	1.53E-06	1.22E-05
SVOC	2-Nitroaniline	88-74-4	6.31E-01	6.91E-05	3.27E-06	3.03E-01	3.03E-01	4.05E-06	1.32E-08
SVOC	3-Nitroaniline	99-09-2			2.94E-06				
SVOC	4-Nitroaniline	100-01-6	5.00E-01	7.41E-05	4.23E-08	2.06E+01	2.06E+01	2.22E-04	9.39E-09
SVOC	Nitrobenzene	98-95-3	6.57E-01	7.43E-05	3.83E-04	6.03E-02	6.03E-02	1.63E-06	6.24E-07
SVOC	2-Nitrophenol	88-75-5	4.66E-01	6.78E-05	1.94E-04	4.52E-02	4.52E-02	1.53E-06	2.97E-07
SVOC	4-Nitrophenol	100-02-7	5.40E-01	8.30E-05	8.48E-09	1.15E+02	1.15E+02	1.23E-03	1.05E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	2.70E-01	5.49E-05	9.96E-05	3.03E-02	3.03E-02	1.47E-06	1.47E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	4.71E-01	7.06E-05	5.38E-05	5.70E-02	5.70E-02	1.61E-06	8.63E-08
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	5.20E-01	5.54E-05	2.39E-03	4.62E-02	4.62E-02	1.54E-06	3.68E-06
SVOC	Pentachlorophenol	87-86-5	4.84E-01	5.27E-05	1.97E-07	3.18E+00	3.18E+00	3.50E-05	6.88E-09
SVOC	Phenanthrene	85-01-8	3.24E-01	6.45E-05	4.76E-04	3.02E-02	3.02E-02	1.47E-06	7.00E-07
SVOC	Phenol	108-95-2	7.08E-01	7.86E-05	6.37E-06	2.07E-01	2.07E-01	3.04E-06	1.93E-08
SVOC	Pyrene	129-00-0	2.35E-01	6.26E-05	1.02E-04	2.79E-02	2.79E-02	1.46E-06	1.50E-07
SVOC	2,4,5-Trichlorophenol	95-95-4	2.51E-01	6.07E-05	6.33E-05	3.34E-02	3.34E-02	1.48E-06	9.37E-08
SVOC	2,4,6-Trichlorophenol	88-06-2	2.75E-01	5.40E-05	1.03E-04	3.04E-02	3.04E-02	1.47E-06	1.52E-07
PCB	PCBs (total)	1336-36-3	1.75E-01	4.32E-05	4.09E-02	1.54E-02	1.54E-02	1.45E-06	5.91E-05
INORG	Antimony	7440-36-0							
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	Lead	7439-92-1							
INORG	Manganese	7439-96-5							
INORG	Mercury	7439-97-6	2.65E-01	5.44E-05	1.45E-01	2.34E-02	2.34E-02	1.46E-06	2.11E-04
INORG	Nickel	7440-02-0							
INORG	Selenium	7782-49-2							
INORG	Silver	7440-22-4							
INORG	Thallium	7440-28-0							

**Attachment B6: Normalized Indoor Air Concentration in a Residential Building with Basement
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 _{bldg} (L-water/m ³)
INORG	Vanadium	7440-62-2							
INORG	Zinc	7440-66-6							
Notes: Crack Soil and Building Characteristics									
	SCS Soil texture class			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					
	Residual saturation	L/L-soil	θ _r	0.111					
	Hydraulic conductivity	cm/s	K	1.1E-04					
	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	1.5E-09					
	Relative saturation	unitless	S _e	0.159					
	van Genuchten N	unitless	N	1.321					
	van Genuchten M	unitless	M	0.243					
	Relative air permeability	unitless	k _{rg}	0.917					
	Permeability to vapor	cm ²	k _v	1.36E-09					
	Distance from building foundation to source	m	L _T	1.66					
	Bldg foundation thickness	m	L _{crack}	0.15					
	Bldg foundation length	m		10.56					
	Bldg foundation width	m		10.56					
	Bldg occupied height	m		4.88					
	Bldg occupied volume	m ³		544.19					
	Occupied depth below ground	m		2.0					
	Bldg area for vapor intrusion	m ²	A _B	196.0					
	Ratio of A _{crack} to A _B		η	1E-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}	1.31E+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}	42.24					
	Crack depth below ground	m	Z _{crack}	2.15					
	Crack radius	m	r _{crack}	5E-04					
	Soil gas flow rate into bldg	m ³ /day	Q _{soil}	1.91E-02					

**Attachment B6: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Residential Exposure to Groundwater via Vapor Intrusion
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
Off-Site	Off-Site East	S1	VOC	cis-1,2-Dichloroethene	156-59-2	2.10E-01		9E-04
Off-Site	Off-Site East	S1	VOC	trans-1,2-Dichloroethene	156-60-5	4.30E-02		3E-04
Off-Site	Off-Site East	S1	VOC	Trichloroethene	79-01-6	3.86E+00	1E-06	
Off-Site	Off-Site East	S1	VOC	Vinyl Chloride	75-01-4	1.90E-03	1E-08	3E-05
Off-Site	Off-Site West	S1	VOC	1,1-Dichloroethene	75-35-4	2.10E-03		1E-05
Off-Site	Off-Site West	S1	VOC	cis-1,2-Dichloroethene	156-59-2	8.80E-01		4E-03
Off-Site	Off-Site West	S1	VOC	trans-1,2-Dichloroethene	156-60-5	5.40E-02		3E-04
Off-Site	Off-Site West	S1	VOC	Trichloroethene	79-01-6	5.70E-03	2E-09	
Off-Site	Off-Site West	S1	VOC	Vinyl Chloride	75-01-4	3.70E-03	2E-08	5E-05
Notes:								
Only detected constituents are shown in each area.								
Only concentrations in saturated units P1 and S1 are shown.								
Cancer and non-cancer risk estimates are calculated using the maximum groundwater concentrations detected in each AOI.								

**Attachment B6: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/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	2.77E-07	4.68E-06
VOC	Acrolein	107-02-8	2.49E-03	9.50E-01	1.04E-04	8.40E-02	1.21E-06	8.44E-02	6.39E-07	1.08E-05
VOC	Acrylonitrile	107-13-1	2.10E-03	1.04E+00	1.12E-04	9.16E-02	1.31E-06	9.22E-02	5.90E-07	9.97E-06
VOC	Benzene	71-43-2	1.31E-01	7.60E-01	8.47E-05	6.72E-02	9.91E-07	6.72E-02	2.67E-05	4.51E-04
VOC	Bromobenzene	108-86-1	4.26E-02							
VOC	Bromochloromethane	74-97-5	2.94E-02	5.94E-01	8.64E-05	5.25E-02	1.01E-06	5.25E-02	4.70E-06	7.94E-05
VOC	Bromodichloromethane	75-27-4	3.62E-02	2.57E-01	9.16E-05	2.27E-02	1.07E-06	2.28E-02	2.50E-06	4.23E-05
VOC	Bromoform	75-25-2	1.03E-02	1.29E-01	8.90E-05	1.14E-02	1.04E-06	1.15E-02	3.58E-07	6.04E-06
VOC	Bromomethane	74-83-9	1.76E-01	6.29E-01	1.05E-04	5.56E-02	1.22E-06	5.56E-02	2.98E-05	5.03E-04
VOC	2-Butanone	78-93-3	1.14E-03	6.98E-01	8.47E-05	6.17E-02	9.91E-07	6.25E-02	2.17E-07	3.67E-06
VOC	n-Butylbenzene	104-51-8	2.23E-01							
VOC	sec-Butylbenzene	135-98-8	1.69E-04							
VOC	tert-Butylbenzene	98-06-6	2.48E-01							
VOC	Carbon Disulfide	75-15-0	7.91E-01	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	1.91E-04	3.22E-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	1.32E-04	2.24E-03
VOC	Chlorobenzene	108-90-7	7.71E-02	6.31E-01	7.52E-05	5.57E-02	8.80E-07	5.57E-02	1.30E-05	2.20E-04
VOC	Chloroethane	75-00-3	1.80E-01	2.34E+00	9.94E-05	2.07E-01	1.16E-06	2.07E-01	1.13E-04	1.91E-03
VOC	2-Chloroethylvinyl ether	110-75-8								
VOC	Chloroform	67-66-3	8.98E-02	8.99E-01	8.64E-05	7.94E-02	1.01E-06	7.94E-02	2.17E-05	3.66E-04
VOC	Chloromethane	74-87-3	1.80E-01	1.09E+00	5.62E-05	9.62E-02	6.57E-07	9.62E-02	5.27E-05	8.90E-04
VOC	2-Chlorotoluene	95-49-8	7.30E-02	5.43E-01	7.52E-05	4.79E-02	8.80E-07	4.79E-02	1.06E-05	1.80E-04
VOC	4-Chlorotoluene	106-43-4								
VOC	Cumene	98-82-8	2.19E-01	5.62E-01	6.13E-05	4.96E-02	7.18E-07	4.96E-02	3.30E-05	5.57E-04
VOC	Cyclohexane	110-82-7	3.98E+00	7.25E-01	7.86E-05	6.40E-02	9.20E-07	6.40E-02	7.75E-04	1.31E-02
VOC	p-Cymene	99-87-6								
VOC	1,2-Dibromo-3-chloropropane	96-12-8	3.00E-03	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.13E-02	5.60E-07	9.46E-06
VOC	Dibromochloromethane	124-48-1	2.03E-02	1.69E-01	9.07E-05	1.50E-02	1.06E-06	1.50E-02	9.27E-07	1.57E-05
VOC	1,2-Dibromoethane	106-93-4	1.52E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	2.82E-06	4.76E-05
VOC	Dibromomethane	74-95-3	1.76E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	3.27E-06	5.52E-05
VOC	trans-1,4-Dichloro-2-butene	110-57-6	1.79E-03	5.73E-01	8.00E-05	5.06E-02	9.36E-07	5.11E-02	2.78E-07	4.70E-06
VOC	1,2-Dichlorobenzene	95-50-1	3.44E-02	5.96E-01	6.83E-05	5.27E-02	7.99E-07	5.27E-02	5.50E-06	9.30E-05
VOC	1,3-Dichlorobenzene	541-73-1	6.33E-02	5.98E-01	6.79E-05	5.28E-02	7.95E-07	5.28E-02	1.02E-05	1.72E-04
VOC	1,4-Dichlorobenzene	106-46-7	4.54E-02	5.96E-01	6.83E-05	5.27E-02	7.99E-07	5.27E-02	7.27E-06	1.23E-04
VOC	Dichlorodifluoromethane	75-71-8	7.01E+00	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	1.30E-03	2.20E-02
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	2.39E-05	4.04E-04
VOC	1,2-Dichloroethane	107-06-2	2.23E-02	8.99E-01	8.55E-05	7.94E-02	1.00E-06	7.94E-02	5.39E-06	9.11E-05
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	1.46E-04	2.46E-03
VOC	1,2-Dichloroethene (total)	540-59-0	1.92E-01							
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	1.68E-05	2.85E-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	3.90E-05	6.59E-04
VOC	1,2-Dichloropropane	78-87-5	6.36E-02	6.76E-01	7.54E-05	5.97E-02	8.83E-07	5.97E-02	1.15E-05	1.95E-04
VOC	1,3-Dichloropropane	142-28-9	2.03E-05	6.40E-01	8.53E-05	5.66E-02	9.98E-07	1.06E-01	6.51E-09	1.10E-07
VOC	2,2-Dichloropropane	594-20-7	9.36E-02	6.22E-01	8.19E-05	5.49E-02	9.59E-07	5.50E-02	1.56E-05	2.64E-04
VOC	1,1-Dichloropropene	563-58-6	1.02E+00							
VOC	1,3-Dichloropropene (total)	542-75-6	3.88E-01	5.41E-01	8.64E-05	4.78E-02	1.01E-06	4.78E-02	5.63E-05	9.51E-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	2.78E-05	4.69E-04
VOC	Ethyl Methacrylate	97-63-2	1.72E-02	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.11E-02	3.19E-06	5.40E-05
VOC	2-Hexanone	591-78-6	3.58E-02	6.47E-01	7.10E-05	5.72E-02	8.31E-07	5.72E-02	6.21E-06	1.05E-04
VOC	Iodomethane	74-88-4	1.12E-01	4.53E-01	6.70E-05	4.00E-02	7.85E-07	4.00E-02	1.36E-05	2.30E-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	4.83E-07	8.17E-06
VOC	Methyl tert-butyl ether	1634-04-4	1.46E-02	7.42E-01	8.73E-05	6.56E-02	1.02E-06	6.56E-02	2.92E-06	4.94E-05
VOC	4-Methyl-2-pentanone	108-10-1	2.82E-03	6.48E-01	6.74E-05	5.72E-02	7.89E-07	5.75E-02	4.93E-07	8.33E-06
VOC	Methylcyclohexane	108-87-2	9.74E+00	6.35E-01	7.36E-05	5.61E-02	8.62E-07	5.61E-02	1.66E-03	2.81E-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	1.31E-05	2.21E-04
VOC	n-Propylbenzene	103-65-1	1.89E-01							
VOC	Styrene	100-42-5	5.46E-02	6.13E-01	6.91E-05	5.42E-02	8.09E-07	5.42E-02	8.99E-06	1.52E-04
VOC	1,1,1,2-Tetrachloroethane	630-20-6	4.95E-02	6.13E-01	6.83E-05	5.42E-02	7.99E-07	5.42E-02	8.14E-06	1.38E-04
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	1.12E-06	1.89E-05
VOC	Tetrachloroethene	127-18-4	3.89E-01	6.22E-01	7.08E-05	5.49E-02	8.29E-07	5.50E-02	6.50E-05	1.10E-03
VOC	Toluene	108-88-3	1.45E-01	7.52E-01	7.43E-05	6.64E-02	8.70E-07	6.64E-02	2.92E-05	4.93E-04
VOC	1,2,3-Trichlorobenzene	87-61-6	1.82E-01							
VOC	1,2,4-Trichlorobenzene	120-82-1	2.29E-02	2.59E-01	7.11E-05	2.29E-02	8.32E-07	2.29E-02	1.60E-06	2.70E-05
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	7.45E-05	1.26E-03
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	3.49E-06	5.90E-05
VOC	Trichloroethene	79-01-6	2.35E-01	6.83E-01	7.86E-05	6.03E-02	9.20E-07	6.03E-02	4.30E-05	7.27E-04
VOC	Trichlorofluoromethane	75-69-4	1.98E+00	7.52E-01	8.38E-05	6.64E-02	9.81E-07	6.64E-02	4.00E-04	6.76E-03
VOC	1,2,3-Trichloropropane	96-18-4	8.35E-03	6.13E-01	6.83E-05	5.42E-02	7.99E-07	5.43E-02	1.38E-06	2.33E-05
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	9.83E+00	6.74E-01	7.08E-05	5.95E-02	8.29E-07	5.95E-02	1.78E-03	3.00E-02

**Attachment B6: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/m ³)
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	1.56E-05	2.64E-04
VOC	1,3,5-Trimethylbenzene	108-67-8	1.06E-01	5.20E-01	7.49E-05	4.59E-02	8.77E-07	4.60E-02	1.48E-05	2.51E-04
VOC	Vinyl Acetate	108-05-4	1.15E-02	7.34E-01	7.95E-05	6.49E-02	9.30E-07	6.50E-02	2.27E-06	3.84E-05
VOC	Vinyl Chloride	75-01-4	8.02E-01	9.16E-01	1.06E-04	8.09E-02	1.24E-06	8.09E-02	1.97E-04	3.33E-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	2.44E-05	4.12E-04
SVOC	Acenaphthene	83-32-9	2.02E-03	3.64E-01	6.64E-05	3.21E-02	7.78E-07	3.25E-02	2.00E-07	3.38E-06
SVOC	Acenaphthylene	208-96-8	2.31E-03	3.88E-01	6.03E-05	3.43E-02	7.06E-07	3.46E-02	2.43E-07	4.10E-06
SVOC	Acetophenone	98-86-2	2.19E-04	6.91E-01	6.91E-05	6.11E-02	8.09E-07	6.48E-02	4.30E-08	7.27E-07
SVOC	Anthracene	120-12-7	7.20E-04	2.80E-01	6.69E-05	2.47E-02	7.83E-07	2.58E-02	5.65E-08	9.55E-07
SVOC	Atrazine	1912-24-9	1.25E-07	2.24E-01	5.76E-05	1.98E-02	6.74E-07	5.42E+00	2.06E-09	3.48E-08
SVOC	Benzaldehyde	100-52-7	3.58E-04	6.23E-01	7.84E-05	5.50E-02	9.17E-07	5.76E-02	6.27E-08	1.06E-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	5.88E-09	9.94E-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	3.35E-09	5.66E-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	3.94E-08	6.67E-07
SVOC	Benzo(g,h,i)perylene	191-24-2	2.88E-06	1.88E-01	4.54E-05	1.66E-02	5.32E-07	2.01E-01	1.76E-09	2.98E-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	1.96E-09	3.31E-08
SVOC	Benzoic Acid	65-85-0	4.37E-06	4.63E-01	6.89E-05	4.09E-02	8.06E-07	2.25E-01	2.99E-09	5.06E-08
SVOC	Benzyl Alcohol	100-51-6	7.95E-06	6.12E-01	7.75E-05	5.40E-02	9.07E-07	1.68E-01	4.06E-09	6.86E-08
SVOC	Biphenyl	92-52-4	6.13E-03	3.49E-01	7.04E-05	3.08E-02	8.24E-07	3.10E-02	5.77E-07	9.75E-06
SVOC	bis(2-Chloroethoxy)methane	111-91-1	3.47E-06	3.77E-01	7.31E-05	3.33E-02	8.55E-07	2.80E-01	2.95E-09	4.99E-08
SVOC	bis(2-Chloroethyl) ether	111-44-4	2.83E-04	5.98E-01	6.51E-05	5.28E-02	7.61E-07	5.55E-02	4.77E-08	8.06E-07
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	1.17E-09	1.98E-08
SVOC	4-Bromophenyl-phenyl ether	101-55-3	2.39E-03	2.26E-01	5.88E-05	1.99E-02	6.88E-07	2.02E-02	1.47E-07	2.48E-06
SVOC	Butylbenzylphthalate	85-68-7	1.04E-05	1.50E-01	4.17E-05	1.33E-02	4.88E-07	6.01E-02	1.90E-09	3.22E-08
SVOC	Caprolactam	105-60-2	1.03E-07	5.98E-01	7.77E-05	5.28E-02	9.09E-07	8.88E+00	2.78E-09	4.70E-08
SVOC	Carbazole	86-74-8	1.56E-07	3.37E-01	6.07E-05	2.98E-02	7.11E-07	4.58E+00	2.17E-09	3.67E-08
SVOC	4-Chloro-3-methylphenol	59-50-7	8.15E-06	5.24E-01	8.22E-05	4.62E-02	9.62E-07	1.64E-01	4.07E-09	6.87E-08
SVOC	4-Chloroaniline	106-47-8	4.75E-06	4.17E-01	8.73E-05	3.69E-02	1.02E-06	2.52E-01	3.63E-09	6.14E-08
SVOC	2-Chloronaphthalene	91-58-7	6.42E-03	4.25E-01	7.59E-05	3.75E-02	8.89E-07	3.77E-02	7.35E-07	1.24E-05
SVOC	2-Chlorophenol	95-57-8	7.03E-03	4.33E-01	8.17E-05	3.82E-02	9.57E-07	3.84E-02	8.20E-07	1.39E-05
SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	4.50E-03	2.45E-01	6.61E-05	2.16E-02	7.74E-07	2.18E-02	2.98E-07	5.04E-06
SVOC	Chrysene	218-01-9	6.67E-04	2.14E-01	5.37E-05	1.89E-02	6.28E-07	1.99E-02	4.03E-08	6.81E-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	1.59E-09	2.69E-08
SVOC	Dibenzofuran	132-64-9	2.57E-04	2.06E-01	5.18E-05	1.82E-02	6.07E-07	2.05E-02	1.61E-08	2.71E-07
SVOC	3,3'-Dichlorobenzidine	91-94-1	2.05E-08	1.68E-01	5.82E-05	1.48E-02	6.82E-07	3.32E+01	2.07E-09	3.50E-08
SVOC	2,4-Dichlorophenol	120-83-2	3.31E-05	2.99E-01	7.58E-05	2.64E-02	8.87E-07	5.32E-02	5.35E-09	9.04E-08
SVOC	Diethylphthalate	84-66-2	4.43E-06	2.21E-01	5.49E-05	1.95E-02	6.42E-07	1.65E-01	2.21E-09	3.74E-08
SVOC	2,4-Dimethylphenol	105-67-9	2.93E-05	5.05E-01	7.51E-05	4.46E-02	8.79E-07	7.46E-02	6.64E-09	1.12E-07
SVOC	Dimethylphthalate	131-11-3	2.15E-06	4.91E-01	5.43E-05	4.33E-02	6.36E-07	3.40E-01	2.21E-09	3.74E-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	2.42E-09	4.08E-08
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	8.73E-06	2.38E-01	5.97E-05	2.11E-02	6.99E-07	1.01E-01	2.68E-09	4.53E-08
SVOC	2,4-Dinitrophenol	51-28-5	1.33E-06	2.36E-01	7.83E-05	2.08E-02	9.16E-07	7.10E-01	2.87E-09	4.85E-08
SVOC	2,4-Dinitrotoluene	121-14-2	9.64E-07	1.75E+00	6.10E-05	1.55E-01	7.14E-07	8.95E-01	2.62E-09	4.43E-08
SVOC	2,6-Dinitrotoluene	606-20-2	8.36E-06	2.83E-01	6.27E-05	2.50E-02	7.34E-07	1.13E-01	2.86E-09	4.84E-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	1.84E-08	3.11E-07
SVOC	Fluoranthene	206-44-0	1.56E-04	2.61E-01	5.49E-05	2.30E-02	6.42E-07	2.72E-02	1.29E-08	2.18E-07
SVOC	Fluorene	86-73-7	8.23E-04	3.14E-01	6.81E-05	2.77E-02	7.97E-07	2.87E-02	7.17E-08	1.21E-06
SVOC	Hexachlorobenzene	118-74-1	1.29E-02	4.68E-01	5.11E-05	4.14E-02	5.98E-07	4.14E-02	1.62E-06	2.74E-05
SVOC	Hexachlorobutadiene	87-68-3	1.37E-01	4.85E-01	5.32E-05	4.28E-02	6.23E-07	4.28E-02	1.78E-05	3.00E-04
SVOC	Hexachlorocyclopentadiene	77-47-4	4.04E-01	1.39E-01	6.23E-05	1.23E-02	7.29E-07	1.23E-02	1.51E-05	2.55E-04
SVOC	Hexachloroethane	67-72-1	7.02E-02	2.16E-02	5.88E-05	1.91E-03	6.88E-07	1.92E-03	4.09E-07	6.91E-06
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	2.08E-09	3.51E-08
SVOC	Isophorone	78-59-1	1.07E-04	5.38E-01	5.84E-05	4.75E-02	6.84E-07	5.39E-02	1.76E-08	2.97E-07
SVOC	2-Methylnaphthalene	91-57-6	1.06E-02	4.51E-01	6.70E-05	3.98E-02	7.84E-07	3.99E-02	1.28E-06	2.17E-05
SVOC	Methylphenol (total)	1319-77-3	1.77E-05	6.39E-01	8.64E-05	5.65E-02	1.01E-06	1.14E-01	6.10E-09	1.03E-07
SVOC	Naphthalene	91-20-3	7.98E-03	5.10E-01	6.48E-05	4.50E-02	7.58E-07	4.51E-02	1.09E-06	1.85E-05
SVOC	2-Nitroaniline	88-74-4	3.27E-06	6.31E-01	6.91E-05	5.57E-02	8.09E-07	3.03E-01	3.01E-09	5.09E-08
SVOC	3-Nitroaniline	99-09-2	2.94E-06							
SVOC	4-Nitroaniline	100-01-6	4.23E-08	5.00E-01	7.41E-05	4.42E-02	8.68E-07	2.06E+01	2.64E-09	4.46E-08
SVOC	Nitrobenzene	98-95-3	3.83E-04	6.57E-01	7.43E-05	5.80E-02	8.70E-07	6.03E-02	7.02E-08	1.19E-06
SVOC	2-Nitrophenol	88-75-5	1.94E-04	4.66E-01	6.78E-05	4.11E-02	7.94E-07	4.52E-02	2.66E-08	4.50E-07
SVOC	4-Nitrophenol	100-02-7	8.48E-09	5.40E-01	8.30E-05	4.77E-02	9.72E-07	1.15E+02	2.95E-09	4.99E-08
SVOC	N-Nitrosodiphenylamine	86-30-6	9.96E-05	2.70E-01	5.49E-05	2.38E-02	6.42E-07	3.03E-02	9.16E-09	1.55E-07
SVOC	N-Nitroso-di-n-propylamine	621-64-7	5.38E-05	4.71E-01	7.06E-05	4.16E-02	8.26E-07	5.70E-02	9.30E-09	1.57E-07
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	2.39E-03	5.20E-01	5.54E-05	4.59E-02	6.48E-07	4.62E-02	3.36E-07	5.67E-06
SVOC	Pentachlorophenol	87-86-5	1.97E-07	4.84E-01	5.27E-05	4.27E-02	6.17E-07	3.18E+00	1.90E-09	3.21E-08
SVOC	Phenanthrene	85-01-8	4.76E-04	3.24E-01	6.45E-05	2.86E-02	7.55E-07	3.02E-02	4.37E-08	7.39E-07
SVOC	Phenol	108-95-2	6.37E-06	7.08E-01	7.86E-05	6.26E-02	9.20E-07	2.07E-01	4.01E-09	6.77E-08

**Attachment B6: Vapor Flux to Outdoor Air 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 _v (m ² /day)	D _w (m ² /day)	D _e (m ² /day)	J (L/m ² -s)	C _{air} (L/m ³)
SVOC	Pyrene	129-00-0	1.02E-04	2.35E-01	6.26E-05	2.08E-02	7.32E-07	2.79E-02	8.67E-09	1.47E-07
SVOC	2,4,5-Trichlorophenol	95-95-4	6.33E-05	2.51E-01	6.07E-05	2.22E-02	7.11E-07	3.34E-02	6.43E-09	1.09E-07
SVOC	2,4,6-Trichlorophenol	88-06-2	1.03E-04	2.75E-01	5.40E-05	2.43E-02	6.32E-07	3.04E-02	9.53E-09	1.61E-07
PCB	PCBs (total)	1336-36-3	4.09E-02	1.75E-01	4.32E-05	1.54E-02	5.06E-07	1.54E-02	1.92E-06	3.24E-05
INORG	Antimony	7440-36-0								
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	Lead	7439-92-1								
INORG	Manganese	7439-96-5								
INORG	Mercury	7439-97-6	1.45E-01	2.65E-01	5.44E-05	2.34E-02	6.37E-07	2.34E-02	1.03E-05	1.75E-04
INORG	Nickel	7440-02-0								
INORG	Selenium	7782-49-2								
INORG	Silver	7440-22-4								
INORG	Thallium	7440-28-0								
INORG	Vanadium	7440-62-2								
INORG	Zinc	7440-66-6								
Soil Parameters										
	Soil type			Silty Clay						
	Total porosity	L/L-soil	θ _T	0.481	Silty-Clay					
	Water-filled porosity	L/L-soil	θ _w	0.170	Silty Clay					
	Air-filled porosity	L/L-soil	θ _a	0.311	Silty Clay					
	Depth to groundwater	m	DTW	3.81	porosity-water content					
	Bulk density	kg/L	ρ _b	1.38						
	Dispersion coefficient	(kg/m ³) / (kg/m ² /s)	C/Q	16.9	from correlation equation in USEPA SSSG (2002)					

**Attachment B6: Upper-Bound Estimates of Incremental Cancer Risk and Hazard Quotient for
Residential Exposure to Groundwater via Volatilization to Outdoor Air
Former Delco Plant 5, Kokomo, Indiana**

On/Off-site	Area	Saturated Unit	Chem Group	Chemical	CASRN	Max GW Conc (mg/L)	Cancer Risk	HQ
Off-Site	Off-Site East	S1	VOC	cis-1,2-Dichloroethene	156-59-2	2.10E-01		2E-03
Off-Site	Off-Site East	S1	VOC	trans-1,2-Dichloroethene	156-60-5	4.30E-02		4E-04
Off-Site	Off-Site East	S1	VOC	Trichloroethene	79-01-6	3.86E+00	2E-07	
Off-Site	Off-Site East	S1	VOC	Vinyl Chloride	75-01-4	1.90E-03	2E-09	6E-05
Off-Site	Off-Site West	S1	VOC	1,1-Dichloroethene	75-35-4	2.10E-03		2E-05
Off-Site	Off-Site West	S1	VOC	cis-1,2-Dichloroethene	156-59-2	8.80E-01		7E-03
Off-Site	Off-Site West	S1	VOC	trans-1,2-Dichloroethene	156-60-5	5.40E-02		5E-04
Off-Site	Off-Site West	S1	VOC	Trichloroethene	79-01-6	5.70E-03	3E-10	
Off-Site	Off-Site West	S1	VOC	Vinyl Chloride	75-01-4	3.70E-03	4E-09	1E-04
Notes:								
Only detected constituents are shown in each area.								
Only concentrations in saturated units P1 and S1 are shown.								
Cancer and non-cancer risk estimates are calculated using the maximum groundwater concentrations detected in each AOI.								

APPENDIX C

BACKGROUND SOIL DATA AND RISK ESTIMATES

BACKGROUND SOIL DATA AND RISK ESTIMATES

Background soil samples were collected during the RFI to characterize the naturally-occurring levels of metals in soil at the Facility so that background risks and site-related risks for certain potential exposures can be distinguished in the RFI baseline risk assessment. Consistent with the RFI Work Plan (ARCADIS 2005), background soil samples were collected from eight locations where no manufacturing or management of production materials or wastes is known to have occurred. These locations and the metal concentrations found in the samples from these locations are shown on Figure 17 of the May 2006 RFI Data Report (ARCADIS 2006). At each location, one sample was collected from 0 to 2 ft below ground surface (bgs), one from 2 to 4 ft bgs, and one or more from deeper intervals in the vadose zone. The boring logs for these locations and the analytical data for the background samples are provided in the May 2006 RFI Data Report.

During review of the background data, the surface samples at locations SB-0503, SB-0504, SB-0505, and SB-0506 were identified as having several metal concentrations high enough to be considered statistical outliers. The boring logs for these locations indicate these samples may have contained asphalt and surficial fill materials not representative of the native soil at the Facility. Therefore, these samples were removed from the background data set prior to any use of the background data. In addition, the lead concentrations in two background samples (120 mg/kg at 7.5-8 ft bgs from SB-0501 and 118 mg/kg at 2-4 ft bgs from SB-0505), although not identified as statistical outliers, were removed from the background data set because they appear to be outside the reasonable range of natural background concentrations, based on professional judgment and comparison to background levels for Indiana that have been reported in the literature (Dragun and Chekiri 2005).

The metal concentrations that have been used in the calculation of soil background levels are summarized in Table C1. This table includes background data from all sampled intervals above the saturated zone, except for the concentrations removed as discussed above. The data from the surficial and deeper samples were combined because the soil type (silty-clay) from the sampled depths is similar.

The upper confidence limits (UCLs) presented on these tables are nonparametric BCa bootstrap confidence limits on the mean (Efron and Tibshirani 1998) calculated from 4,000 bootstrap replications and at a 0.05 level of significance. Nonparametric bootstrap statistical limits are more reliable than parametric statistical limits because, unlike parametric limits, they do not rely

on assumptions about distribution shapes that are often difficult to justify. Concentrations of metals in soil at or below these UCLs are considered to be within background levels and not site-related; for concentrations higher than these UCLs, the differences between the concentrations and background UCLs are considered site-related in baseline risk assessment calculations of site-related cumulative cancer and noncancer risks for exposure to soil.

Table C1 summarizes the UCL calculations for site-specific background metals. As shown on this table, no UCLs were calculated for antimony, cadmium, mercury, selenium, silver, and beryllium because these metals were infrequently detected or not detected in the site-specific background samples. The concentrations of these metals in natural soils are considered to be below the detection limits, and no background values are subtracted from concentrations when comparing to screening criteria or calculating risks.

Table C2 presents the estimates of cancer risk and hazard quotient that are associated with these background levels, based on the exposure and toxicity assumptions for routine worker exposure to soil discussed in Appendix B. These background levels of risks are not included in the site-related risk estimates that are discussed in Section 2.4 of the EI CA725 Report.

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- Dragun, J. and Chekiri, K. 2005. Elements in North American Soils - Second Edition. Amherst Scientific Publishers.
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**Table C1: Concentrations Used in Calculation of Site-Specific Background
Former Delco Plant 5, Kokomo, Indiana**

Location ID	Top Depth	Bottom Depth	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Cu mg/kg	Pb mg/kg	Mn mg/kg	Hg mg/kg	Ni mg/kg	Se mg/kg	Ag mg/kg	Tl mg/kg	V mg/kg	Zn mg/kg
MW-0501-P1		1	1 U	1 U	15	0.250 U	1 U	5.65	2.03	15.2	22.7	193	0.525 U	7.7	1 U	1 U	1 U	15.7	27.9
MW-0501-P1	2	4	1.19 U	2.63	168	0.298 U	1.19 U	15.5	7.02	41.5	45.2	638	0.625 U	19.7	1.19 U	1.19 U	3.19	22	100
MW-0501-P1	8.5	9	1.18 U	11	89.6	0.295 U	1.18 U	13.6	11.4	19.9	14.3	481	0.625 U	16	1.18 U	1.18 U	3.62	23.6	62.1
MW-0516-3U		2	1.20 UJ	8.68	89.7	0.299 U	1.20 U	12.6	7.01	53.3	69.1	625	0.60 U	12.5	1.20 U	1.20 U	1.20 U	24.3	129
MW-0516-3U	2	4	1.15 UJ	7.79	98.9	0.287 U	1.15 U	14.5	4.87	32.8	10.7	204	0.620 U	15.8	1.15 U	1.15 U	1.15 U	23.3	66.7
MW-0516-3U	8	10	1.07 UJ	6.4	78.5	0.268 U	1.07 U	10.7	5.46	15.3	5.71	369	0.575 U	15.7	1.07 U	1.07 U	1.07 U	18.3	37.8
SB-0501		2	1.10 U	6.07	79.9	0.274 U	1.10 U	14.6	8.33	18.8	19.4	306	0.61 U	17.4	1.10 U	1.10 U	3.26	26.6	62.2
SB-0501	2	4	1.19 U	5.11	96.1	0.298 U	1.19 U	11.3	9.03	14.2	43.8	283	0.64 U	10.7	1.19 U	1.19 U	1.19 U	21.7	66.9
SB-0501	7.5	8	0.98 U	4.68	32.1	0.246 U	0.98 U	6.12	3.78	9.19	--	456	0.54 U	9.85	0.98 U	0.98 U	2.22	13.4	42.9
SB-0501	8	10	0.98 U	5.81	21	0.243 U	0.98 U	9.95	4.34	12.6	5.9	203	0.55 U	12.6	0.98 U	0.98 U	2.18	17	32.6
SB-0502		2	1.18 U	4.88	98.1	0.295 U	1.18 U	11.9	6.84	30.6	55.1	610	0.605 U	9.97	1.18 U	1.18 U	2.48	22.4	107
SB-0502	4	6	1.12 U	15.1	88.3	0.671	1.12 U	18.5	5.14	27.1	13.3	156	0.63 U	18.8	1.12 U	1.12 U	4.63	38.4	67.7
SB-0503	2	4	1.18 U	3.41	92.8	0.439	1.18 U	14.3	4.25	15.9	13.7	220	0.633 U	12.8	1.18 U	1.18 U	2.82	22.9	57
SB-0503	6	8	1.03 U	8.36	76.9	0.257 U	1.03 U	15.2	7.5	17.6	7.05	383	0.575 U	21.5	1.03 U	1.03 U	3.17	22.6	59.2
SB-0504	2	4	1.23 U	3.98	103	0.661	1.23 U	17.7	3.04	23.7	12.3	113	0.645 U	14	1.23 U	1.23 U	1.23 U	25.8	60.6
SB-0504	6	8	1.18 U	9.57	92.7	0.294 U	1.18 U	15.7	15.2	14.8	14.1	313	0.615 U	15.3	1.18 U	1.18 U	2.98	30.3	53.1
SB-0504	8	10	1.15 U	1.15 U	41.3	0.286 U	1.15 U	9.1	3.36	10.8	6.58	185	0.595 U	11.2	1.15 U	1.15 U	2.38	14.2	28.4
SB-0505	2	4	1.22 U	4.79	118	0.304 U	1.22 U	13.3	5.39	14.9	--	322	0.64 U	14.1	1.22 U	1.22 U	2.61	23.8	56
SB-0505	8	10	1.12 U	14.6	74	0.280 U	1.12 U	10.5	5.82	16.5	9.6	196	0.585 U	17.3	1.12 U	1.12 U	2.91	20	40.3
SB-0506	2	4	1.23 U	7.63	113	0.308 U	1.23 U	15.9	5.2	14.9	12.4	221	0.63 U	12.6	1.23 U	1.23 U	3.34	26.5	53.6
SB-0506	6	8	1.13 U	12.6	78.5	0.282 U	1.13 U	11.4	5.99	15.6	6.51	354	0.585 U	17.1	1.13 U	1.13 U	2.84	20.1	41.3
		Result Count	21	21	21	21	21	21	21	21	19	21	21	21	21	21	21	21	21
		Detected		19	21	3		21	21	21	19	21		21			15	21	21
		Minimum Concentration	1.0	1.0	15	0.24	1.0	5.7	2.0	9.2	5.7	113	0.53	7.7	1.0	1.0	1.00	13.4	28
		Mean Concentration	1.1	6.9	83	0.33	1.1	12.8	6.2	20.7	20.4	325	0.60	14.4	1.1	1.1	2.45	22.5	60
		Maximum Concentration	1.2	15.1	168	0.67	1.2	18.5	15.2	53.3	69.1	638	0.65	21.5	1.2	1.2	4.63	38.4	129
		95% Bootstrap UCL	NA	12.5	132	NA	NA	16.7	10.9	36.6	46.4	545	NA	19.1	NA	NA	3.58	31.3	97
Notes:																			
1. Duplicate samples were collected at MW-0516-3U (2-4 ft) and SB-0503 (2-4ft). Averaged results are shown and were used in the UCL calculations.																			
2. Concentrations for nondetects (U-qualified data) are one half of the sample quantitation limits.																			
3. NA (Not applicable) indicates that no UCL was calculated, and no background value was used, because the metal was not detected in a sufficient number of background samples.																			
4. "--" indicates lead results which were removed from the data set (118 mg/kg in SB-0505(2-4 ft) and 120 mg/kg in SB-0501(7.5-8 ft)). Surface samples at SB-0503, SB-0504, SB-0505, and SB-0506 were also removed.																			
5. All statistics are based on the data set after removal of results.																			

**Table C2: Cumulative Cancer Risk and Hazard Index Estimates for Background Soil
Former Delco Plant 5, Kokomo, Indiana**

Chem Group	Chemical	CASRN	Background Conc (mg/kg)	Routine Worker Contact Criterion - Cancer (mg/kg)	Routine Worker Contact Criterion - Noncancer (mg/kg)	Routine Worker Risk	Routine Worker HQ	Maintenance Worker Contact Criterion - Cancer (mg/kg)	Maintenance Worker Contact Criterion - Noncancer (mg/kg)	Maintenance Worker Risk	Maintenance Worker HQ
INORG	Antimony	7440-36-0			8.2E+02				1.0E+04		
INORG	Arsenic	7440-38-2	1.25E+01	2.7E+00	4.4E+02	5E-06	3E-02	9.5E+01	7.0E+03	1E-07	2E-03
INORG	Barium	7440-39-3	1.32E+02		4.1E+05		3E-04		5.1E+06		3E-05
INORG	Beryllium	7440-41-7		4.3E+03	3.9E+03			1.4E+03	8.2E+03		
INORG	Cadmium	7440-43-9		5.7E+03	1.3E+03			1.9E+03	1.8E+04		
INORG	Chromium (total)	7440-47-3	1.67E+01	8.6E+02	6.0E+03	2E-08	3E-03	2.8E+02	3.0E+04	6E-08	6E-04
INORG	Cobalt	7440-48-4	1.09E+01	3.7E+03	2.6E+04	3E-09	4E-04	1.2E+03	9.6E+03	9E-09	1E-03
INORG	Copper	7440-50-8	3.66E+01		8.2E+04		4E-04		1.0E+06		4E-05
INORG	Lead	7439-92-1	4.64E+01		1.0E+03						
INORG	Manganese	7439-96-5	5.45E+02		1.1E+05		5E-03		2.4E+04		2E-02
INORG	Mercury	7439-97-6			1.1E+02				3.2E+03		
INORG	Nickel	7440-02-0	1.91E+01	4.3E+04	3.6E+04	4E-10	5E-04	1.4E+04	4.0E+04	1E-09	5E-04
INORG	Selenium	7782-49-2			1.0E+04				1.3E+05		
INORG	Silver	7440-22-4			8.0E+03				4.7E+03		
INORG	Thallium	7440-28-0	3.58E+00		1.4E+02		3E-02		1.8E+03		2E-03
INORG	Vanadium	7440-62-2	3.13E+01		2.0E+03		2E-02		2.5E+04		1E-03
INORG	Zinc	7440-66-6	9.72E+01		6.1E+05		2E-04		7.6E+06		1E-05
					Sum:	5E-06	8E-02		Sum:	2E-07	3E-02
Notes:											
Cancer criteria are calculated at a target risk of 1E-06.											
Noncancer criteria are calculated at a target hazard quotient of 1.											

APPENDIX D

SOIL GAS DATA EVALUATION SUPPORTING INFORMATION AND CALCULATIONS

C O N T E N T S

D1	Introduction	1
D2	Hypothetical Indoor Air Concentration.....	1
D3	Cancer Risk	2
D4	Sensitivity Analysis.....	2
D5	References	3

D1 Introduction

This appendix explains how the trichloroethene (TCE) soil gas data that were collected off-site near monitoring well MW-0612-S1 were used to verify the findings from comparison of the TCE groundwater data from this location to vapor intrusion criteria developed to guide the RFI field investigation. The following sections describe how the TCE soil gas data were used to estimate a hypothetical upper-bound TCE indoor air concentration and the cancer risk associated with residential inhalation of the hypothetical concentration.

D2 Hypothetical Indoor Air Concentration

The hypothetical upper-bound TCE indoor air concentration was estimated by using the TCE soil gas data to derive an upper-bound estimate of the rate at which TCE mass can diffuse from the soil per unit area (or mass flux). This estimate of TCE mass flux was then assumed to enter a residence without any attenuation, and mix with the indoor air.

Three soil gas samples from soil gas sampling ports SGP-0704 and SGP-0708 had detected concentrations of TCE. Concentrations in the duplicate pairs were averaged to obtain a representative concentration for the sample and the maximum concentration from the three samples was used to estimate the hypothetical upper-bound TCE mass flux from the soil. This average TCE soil gas concentration (C_{sg}) is approximately 0.064 mg/m³ (or 12 ppbv).

The upper-bound TCE mass flux (J) was calculated using Fick's law of diffusion and an upper-bound concentration gradient, as follows:

$$J = D_e \left(\frac{C_{sg} - 0}{L} \right)$$

where L is the depth at which C_{sg} was measured (approximately 1.6 m) and D_e is the effective diffusion coefficient of TCE in soil (8.29×10^{-2} m²/day). The calculated TCE mass flux is 3.31×10^{-3} mg/m²-day. The D_e was calculated by:

$$D_e = D_a \cdot \frac{\theta_a^{10/3}}{\theta_t^2} + \frac{D_w}{H} \cdot \frac{\theta_w^{10/3}}{\theta_t^2}$$

where D_a is the diffusion coefficient in air ($6.83 \times 10^{-1} \text{ m}^2/\text{day}$), D_w is the diffusion coefficient in water ($7.86 \times 10^{-5} \text{ m}^2/\text{day}$), H is the Henry's law constant at 12.5°C (0.235), θ_t is the total porosity of silty clay soil (0.48), θ_a is the air-filled porosity of soil (0.342), and θ_w is the water filled porosity of soil (0.138) (USEPA 1996). The soil type and water-filled porosity are based on those observed at soil gas sampling ports SGP-0704 and SGP-0708.

All the TCE emitted from the soil is assumed to enter a residence without any attenuation. Under this hypothetical worst-case assumption, the indoor air concentration (C_{bldg}) is calculated by conservation of mass as follows:

$$C_{bldg} = \frac{J}{H_b \cdot Ach}$$

where H_b is the building's occupied height (2.44 m based on a single story building) and A_{ch} is the building's long-term air exchange rate (assumed to be 1/hr). The calculated indoor air concentration is $5.7 \times 10^{-5} \text{ mg/m}^3$.

D3 Cancer Risk

The cancer risk associated with residential inhalation of the hypothetical TCE indoor air concentration C_{bldg} is calculated using the standard risk equation for inhalation:

$$Risk = C_{bldg} \cdot URF \cdot \frac{EF \cdot ED}{AT}$$

where URF is the unit risk factor ($1.7 \times 10^{-3} (\text{mg/m}^3)^{-1}$ from NCEA 1995), EF is the exposure frequency (350 day/yr), ED is the exposure duration (30 yr), and AT is the averaging time (365 day/yr x 70 yr) (USEPA 1991). The calculated cancer risk is 4×10^{-8} . Since TCE was the only USEPA-designated human carcinogen detected in the soil gas, the calculated risk estimate also represents a cumulative cancer risk estimate, which is well below USEPA's cumulative cancer risk limit of 1×10^{-4} .

D4 Sensitivity Analysis

Additional calculations were performed to assess the robustness of the above result to changes in two input parameters: the air exchange rate and the URF . The additional calculations were

performed with an air exchange rate of 0.25/hr (USEPA 2004) and a *URF* of 1.5×10^{-2} (mg/m³)⁻¹ (IDEM 2005). The cancer risk calculated using the combination of a lower air exchange rate and a higher *URF* is 1×10^{-6} , which is still well below the limit of 10^{-4} .

D5 References

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