SITE-SPECIFIC TARGET LEVELS FOR SUBSURFACE SOIL AND GROUNDWATER

Prepared For

GENERAL MOTORS
POWERTRAIN GROUP (GMPTG)
WILLOW RUN TRANSMISSION PLANT
YPSILANTI, MICHIGAN

Prepared For

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1. INTRODUCTION

The following report documents Harding ESE, a MACTEC Company's (Harding ESE's) development of site-specific, risk-based target levels (SSTLs) for chemical constituents that are detected in subsurface soil and groundwater at the General Motors Powertrain Group (GMPTG) Willow Run Transmission Plant in Ypsilanti, Michigan. Currently, the Michigan Department of Environmental Quality (MDEQ) publishes generic risk-based cleanup criteria for different land uses and exposure scenarios under Public Act 451, Part 201. In reviewing the assumptions used to develop these criteria, it was determined that some of these generic Part 201 criteria provide a reasonable value for initial comparison of analytical data. Other generic Part 201 criteria, specifically groundwater-surface water interface (GSI) criteria and volatilization to indoor air (VIA) criteria, were overly conservative for application at the GMPTG site. Considering this, SSTLs were developed for the site.

The SSTLs were developed by first identifying potentially applicable migration pathways and exposure routes, and then assessing whether generic Part 201 cleanup criteria provided a reasonable value for initial comparison of analytical data. Site-specific criteria were developed when the generic criteria appeared to be overly conservative based upon differing constituent migration distances or migration rates. The chemical-specific physical and chemical properties used by MDEQ in development of generic Part 201 criteria were used during development of the site-specific criteria. Moreover, the exposure frequencies and durations used by MDEQ during development of the generic Part 201 criteria were used during development of the site-specific criteria. Criteria selected for each migration pathway/exposure route for each constituent were then compared to each other, and the lowest criteria selected as the SSTL for that chemical.

The resulting SSTLs provide GMPTG with a tool to evaluate soil and groundwater analytical results at existing areas of concern, as well as future areas of concern using more appropriate criteria. The SSTLs should not be considered cleanup goals for the site. They provide a reasonable set of criteria that can be used to evaluate whether further action is warranted in a particular area of concern.

This document provides a brief discussion of the site setting followed by sections that describe potential migration pathways and receptors, site constituents of concern, and the approach to development of the SSTLs. The report concludes with the documentation of SSTLs for the GMPTG site.

1.1 SITE SETTING

The property and surrounding area of the GMPTG plant is zoned industrial. The main manufacturing building covers most of the property. The majority of the property outside of the building is covered with asphalt or concrete. Surface water runoff is controlled by the plants stormwater system. The building is located approximately 700 feet northeast of the Willow Run Creek (see Figure 1). No other surface water bodies are located in the vicinity of the site.

Where present, surface soils consist of fill sands and compacted gravel. Subsurface soils consist of sand fill which transitions to natural sands. The natural sands extend to a depth of up to 18 feet. Below these sands, low permeability clays are encountered, which extend to at least 70 feet below ground surface.

Groundwater is typically encountered in the sand at 7 to 9 feet below ground surface. The groundwater flow direction is generally to the south, although the flow direction beneath the manufacturing building varies significantly due to subsurface structures (i.e., utility tunnel, building footings, storm drains, and machine pits)

2. EXPOSURE PATHWAYS AND RECEPTORS

Table 1 summarizes potential exposure pathways and receptors at the GMPTG site by media and migration. Each of these pathways was evaluated during the development of SSTLs for the site. Surface soil impacts are limited to only a few historical study areas since most areas of the plant are covered with asphalt or concrete. Potential receptors for impacted surface soil are plant workers with potential exposure pathways being ingestion and dermal contact. Since surface soil areas are limited at the site and future impacts are only likely to be a result of a spill event that would require an immediate response action, fugitive dust and volatilization to ambient air are unlikely pathways and have not been evaluated.

Most areas with impacted subsurface soils are covered with either asphalt or concrete pavement. Potential pathways for subsurface soils are limited to direct contact or inhalation of volatile organic vapors by construction workers during excavation activities, or direct contact or inhalation of volatile organic vapors by plant workers, if the pavement was removed. Additionally, volatilization of organic vapors to indoor building air could occur through joints and cracks in the pavement.

Subsurface soils can also leach substances to shallow groundwater. Due to the shallow nature of the groundwater, construction workers could possibly contact the groundwater or inhale volatile organic vapors emanating from groundwater during excavation activities. Also, given the shallow nature of the groundwater, organic vapors could volatilize from the groundwater to indoor air through joints and cracks in the building floor.

Water in the area is currently provided by a municipal water system. A review of area water well records indicates that two drinking water wells are or may have been located within one mile of the GMPTG Plant. One well is located 0.6 miles south-southeast of the plant, and another is located approximately 0.9 miles south of the plant. Both wells are located on the opposite side of Willow Run Creek. It is not known whether these wells are currently in use. These wells were set in a sand and gravel aquifer that is separated from the shallow groundwater by at least 50 feet of low permeability clay in the area of the GMPTG Plant. Tell me more

Shallow groundwater in the upper sand is unusable as a drinking water or irrigation source. The Michigan Department of Public Health requires that a drinking water well must be at least 25 feet deep. Boring logs indicate that the maximum depth to the base of the perched zone is 18 feet; therefore, the installation of a drinking water well in the perched zone would not be allowed. Results of aquifer pumping tests at several study areas indicated that the average sustainable yield of water from the perched zone is 0.5 gallon per minute. Considering this yield, it is unlikely that extracted water would be used for drinking water or irrigation purposes

The Willow Run Creek could be a potential receptor for impacted groundwater. Collected hydrogeologic data suggest that the perched groundwater flows south and could discharge to Willow Run Creek located a minimum distance of 700 feet southwest of the main manufacturing building. The facility structures, including building footings and steam tunnels, inhibit the direct migration of groundwater from beneath the facility. Test data collected to date indicate that impacted groundwater has not migrated from the property nor discharged to Willow Creek. Good!

3. SITE CONSTITUENTS OF CONCERN

To develop a list of site constituents of concern, Harding ESE utilized the historical chemical database for the site. The database of consists of analytical results for soil and groundwater samples collected

from over 22 investigation areas across the GMPTG site. A query of the data was performed to obtain a list of compounds detected at the site, the minimum and maximum concentrations, and frequency of detection. The report generated from this query is provided in Appendix A. This data was then evaluated to determine which compounds exceeded generic MDEQ criteria and which were most frequently detected. From this evaluation a list of organic compounds was compiled for development of SSTLs. This list of compounds with their physical and chemical properties is presented on Table 2.

4. APPROACH TO DEVELOPING SSTLs

As previously discussed, the relevant migration pathways and exposure routes for the GMPTG site are the following:

- Discharge of impacted groundwater to the surface water in Willow Run Creek;
- Volatilization of volatile organic compounds from subsurface soil or groundwater to indoor air; and
- Direct contact with soil and/or groundwater by plant workers or utility/construction workers.

In reviewing the assumptions used to develop the generic Part 201 criteria for these pathways (see Table 1), it was determined that the generic Part 201 groundwater-surface water interface (GSI) criteria and volatilization to indoor air (VIA) criteria were overly conservative for application at the GMPTG site. Considering this, SSTLs for GSI and VIA were calculated based on site-specific conditions. Routinely applied analytical models were used to provide conservative estimates of the effects of migration of constituents to the GSI and volatilization to indoor air. The approach to developing GSI and VIA SSTLs for both soil and groundwater is discussed below.

4.1 GSI CRITERIA

SSTLs for the GSI were calculated using modifications of the analytical models presented in ASTM E1739-95. Site-specific soil and groundwater physical properties were assumed along with more probable points of exposure and compliance to back calculate risk-based screening levels at source areas that will meet the generic criteria established by MDEQ at the point where groundwater vents to Willow Run Creek..

The analytical models that were used to develop the SSTLs are presented in Appendix B. Equation 1 in Appendix B is the analytical model for steady-state attenuation of chemicals in groundwater. As presented, this equation accounts for biodegradation. The result of a natural attenuation study performed as part of this SSTL study were not conclusive and, therefore (per MDEQ guidance), degradation was not considered in the SSTL development. The steady-state attenuation equation presented in ASTM E1739-95 includes vertical dispersion; however, at the GMPTG Plant, vertical dispersion in groundwater is assumed to be negligible because the plume extends to the base of the shallow aquifer at most source areas. Considering this, vertical dispersion was not considered in the model.

The velocity used in Equation 1 is the chemical velocity in groundwater. The chemical velocity is determined using the Retardation Equation (see Appendix B).

The solution of Equation 1 represents the ratio of the dissolved chemical concentration along the centerline of the plume to the dissolved chemical concentration at the source area. As indicated by Equation 2 in Appendix B, the SSTL for groundwater at the source is calculated by dividing this ratio into the generic GSI criteria established by MDEQ.

For subsurface soils, Equation 3 in Appendix B is used to calculate a leaching factor. The leaching factor presented is a mathematical description for the leaching of chemicals to groundwater considering sorption to soils, volatilization into soil pore spaces, and the subsequent mixing of the leachate with groundwater as a result of infiltration.

The SSTL for subsurface soil at the source is calculated by dividing the SSTL for groundwater at the source (i.e., the results of Equation 2) by the leaching factor. This relationship is presented as Equation 4 in Appendix B. Table C-1 in Appendix C presents the parameters and values used in the models. Where possible, these characteristics are based upon site-specific data. Literature values were used when site-specific data was not available. Silty sand was assumed when selecting literature values for soil physical characteristics.

There is natural variability in the parameters at the site and, therefore, uncertainty in the selection of parameters input to the models. To account for this, conservative input parameters were selected to result in a conservative estimate of the SSTLs. Also, the GSI criteria do not consider mixing of the

groundwater with surface water upon discharge to the surface water body. This mixing will further dilute constituent concentrations.

4.2 VOLATILIZATION TO INDOOR AIR CRITERIA

Historical analytical results were compared to the MDEQ Generic Groundwater and Soil Industrial and Commercial II VIA Criteria. The results of this comparison were reviewed and it was determined that several of the concentrations of constituents in the groundwater were *above* the chemical-specific solubility and were influenced by the presence of free product. The groundwater samples from areas containing free product were discounted from the evaluation. A site-specific VIA criteria was calculated for constituents that historically exceeded generic criteria established by MDEQ or when the generic VIA criteria was the lowest criteria for the constituent and the value was less than the soil saturation (C_{sat}) or solubility for groundwater. In cases where the generic criteria defaulted to the C_{sat} or the solubility for groundwater, no calculation was necessary.

The VIA was calculated using the Johnson and Ettinger models specified in the MDEQ guidance document, "Part 201 Generic Groundwater and Soil Volatilization to Indoor Air Inhalation Criteria: Technical Support Document", August 31, 1998. This model was coupled with the Environmental Protection Agency (EPA) Integrated Risk Information Systems (IRIS) VIA spreadsheets to complete the calculations accurately and consistently. The input parameters for this model are presented in Table C-2, Appendix C. The IRIS VIA spreadsheets are presented in Appendix D.

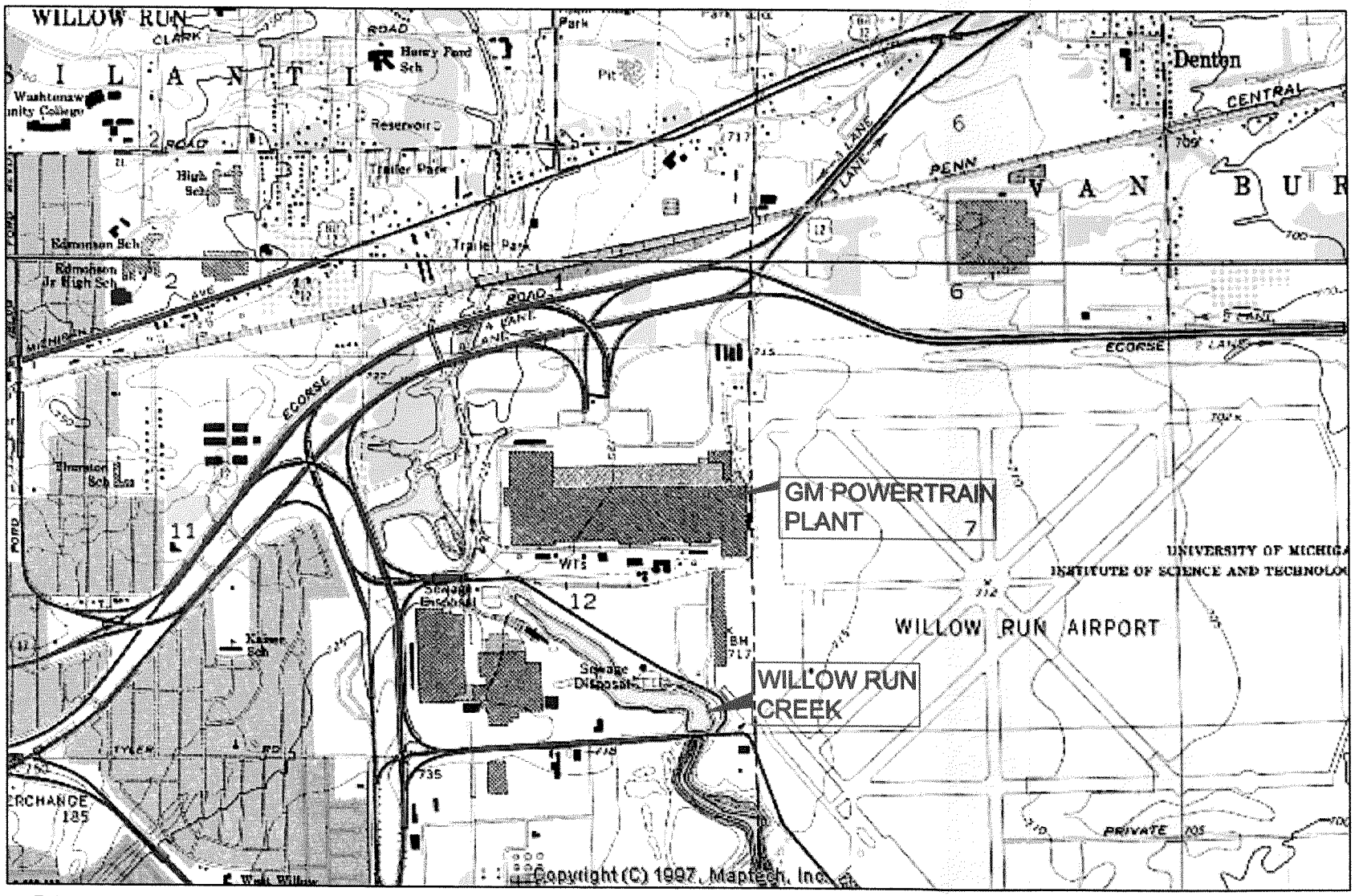
5. SSTL RESULTS

The results of SSTL development for the GMPTG site are presented on Tables E-1 (Soil SSTLs) and E-2 (Groundwater SSTLs) found in Appendix E. The Site SSTLs were determined by comparing the three MDEQ criteria for each media (soil and groundwater), generic direct contact, VIA (generic or site-specific), GSI (site-specific). For each chemical, the calculated GSI SSTLs for soil and groundwater are shown with respective distances ranging from 200 to 2000 feet. For groundwater, the calculated SSTLs and the generic Part 201 criteria for groundwater were also compared to chemical-specific water solubility values. The solubility value was used as the default SSTL when the lower of the calculated SSTL value or generic Part 201 criteria exceeded the solubility. For groundwater, the calculated SSTLs and the generic Part 201 criteria were also compared to C_{sat} value developed by MDEQ. The C_{sat} value

was used as the default SSTL when the lower of the calculated SSTL value or generic Part 201 criteria exceeded the $C_{sat.}$ The most protective of all criteria for each chemical was established as the Site SSTL.

These SSTLs provide a reasonable value for initial comparison of analytical data for soil and groundwater. The SSTLs should not be considered cleanup goals for the site. They provide a reasonable set of criteria that can be used to evaluate whether further action is warranted in a particular area of concern. Further action could include:

- statistical analysis of the chemical distribution;
- possible elimination of exposure routes based upon study area-specific conditions;
- modification of the risk assessment exposure assumptions or receptors based upon study area-specific conditions;
- detailed numerical modeling to establish study area-specific cleanup goals; and/or
- resampling of soil and/or groundwater to verify that the conditions have not changed.



Taken from the Ypsilanti, Michigan, 7.5 Series U.S.G.S. Topographic Quadrangle Maps

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0.5 miles

QUADRANGLE LOCATION

FIGURE 1
SITE LOCATION MAP
GMPT WILLOW RUN TRANSMISSION PLANT
YPSILANTI, MICHIGAN

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TABLE 1
POTENTIAL EXPOSURE PATHWAYS/RECEPTORS
GM POWERTRAIN WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Media	Potential Migration	Potential Exposure Pathway(s)/Receptor(s)	Published Cleanup Criteria[1]
Surface Soil	Direct exposure	Ingestion and dermal contact by plant worker	Generic Industrial & Commercial II Direct Contact Criteria
Subsurface Soil	Direct exposure	Ingestion or dermal contact by construction worker	Generic Industrial & Commercial II Direct Contact Criteria
		Inhalation by plant worker	Generic Soil Volatilization to Indoor Air Criteria or Site-specific being developed by Harding ESE
	Soils leaching to groundwater	Groundwater discharging to surface water	Generic GSI Criteria or Site-specific being developed by Harding ESE
Groundwater	Direct exposure	Direct contact by construction worker	Generic Groundwater Contact Criteria
		Inhalation by Plant worker	Generic Groundwater Volatilization to Indoor Air Criteria or Site-specific being developed by Harding ESE
	Groundwater discharging to surface water	Discharge of groundwater to Willow Run Creek	Generic GSI Criteria or Site-specific being developed by Harding ESE

[1] MDEQ cleanup criteria are constantly being developed and updated. The most current published cleanup criteria will be used for comparison purposes.

TABLE 2
PHYSICAL/CHEMICAL PARAMETERS FOR DETECTED COMPOUNDS
GM POWERTRAIN WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Chemical	CAS No.	Solubility in Water (S) (mg/L)	Henry's Law Constant (H) (dimensionless)	Organic Compound Partition Coefficient (Koc) (ml/g)
Acenaphthene	83-32-9	4.24E+00	6.36E-03	7.14E+03
Acetone	67641	1.00E+09	1.59E-03	5.81E-01
Anthracene	120-12-7	4.34E-02	2.67E-03	2.97E+04
Benzene	71-43-2	1.75E+03	2.28E-01	5.82E+01
Benzo(a)anthracene	56-55-3	9.40E-03	1.37E-04	4.01E+05
Benzo(b)fluoranthene	205-99-2	1.50E-03	4.51E-03	1.24E+06
Benzo(k)fluoranthene	207-08-9	8.00E-04	3.40E-05	1.24E+06
Benzo(a)pyrene	50-32-8	1.62E-03	4.63E-05	1.01E+06
Benzo(g,h,i)perylene	191-24-2	2.60E-04	2.19E-06	3.86E+06
Chlorobenzene	108-90-7	4.72E+02	1.52E-01	2.20E+02
Chrysene	218-01-9	1.60E-03	3.88E-03	4.01E+05
1,1-Dichloroethane	75-34-3	5.06E+03	2.30E-01	3.13E+01
1,1-Dichloroethylene	75-35-4	2.25E+03	1.07E+00	5.82E+01
cis-1,2-Dichloroethylene	540-59-0	3.50E+03	1.67E-01	3.56E+01
trans-1,2-Dichloroethylene	540-59-0	6.30E+03	3.85E-01	5.22E+01
Ethylbenzene	100-41-4	1.69E+02	3.23E-01	3.67E+02
Fluoranthene	206-44-0	2.06E-01	6.60E-04	1.08E+05
Fluorene	86-73-7	1.98E+00	2.61E-03	1.38E+04
Indeno(1,2,3-c,d)pyrene	193-99-5	2.20E-05	6.56E-05	3.45E+06
Methyl tert-butyl ether	1634-04-4	4.68E+04	2.62E-02	9.41E+00
Naphthalene	91-20-3	3.10E+01	1.98E-02	2.01E+03
Phenanthrene	85-01-8	1.00E+00	2.71E-01	3.30E+04
Polychlorinated biphenyls	1336-36-3	4.47E-02	1.72E-02	3.06E+05
Pyrene	129-00-0	1.35E-01	4.51E-04	1.06E+05
Tetrachloroethylene	127-18-4	2.00E+02	7.54E-01	1.56E+02
Toluene	108-88-3	5.26E+02	2.72E-01	1.80E+02
1,1,1-Trichloroethane	71-55-6	1.33E+03	7.05E-01	5.03E+01
Trichloroethylene	79-01-6	1.10E+03	4.22E-01	1.68E+02
Vinyl Chloride	75-01-4	2.76E+03	1.11E+00	1.85E+01
Xylenes (total)	1330-20-7	1.86E+02	2.48E-01	3.48E+02

Notes: S, H, and K_{oc} data obtained from:
MDEQ Op Memo #18 Attachment B Toxilogical and
Chemical-Physical Data for Part 201 Cleanup Criteria
November 1, 2000

APPENDIX A

DETECTED CHEMICALS

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Minimum and Maximum Detected Values and Frequency of Detection 09-Jan-0

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Volatile Organics	SOIL	Acetone	80	280	4/ 13	31%
		Benzene	0.8	6800	46/ 398	12%
		Benzyl Chloride			0/ 39	0%
		Bromobenzene			0/ 39	0%
		Bromodichloromethane			0/ 67	0%
		Bromoform			0/ 67	0%
		Bromomethane			0/ 67	0%
		2- Butanone	37	37	1/ 13	8%
		Carbon Disulfide	1	2	3/ 13	23%
		Carbon Tetrachloride			0/ 67	0%
		Chlorobenzene	0.5	1800	9/ 250	4%
		Chlorodibromomethane			0/ 39	0%
		Chloroethane	35	35	1/ 67	1%
		2- Chloroethylvinylether			0/ 67	0%
		Chloroform	1	3	5/ 67	7%
		Chloromethane			0/ 67	0%
		cis-1,2-Dichloroethene			0/ 31	0%
		cis-1,3-Dichloropropene			0/ 30	0%
		Dibromochloromethane			0/ 28	0%
		Dibromomethane			0/ 39	0%
		1,2- Dichlorobenzene	1	13	7/ 826	1%
		Dichlorodifluoromethane			0/ 39	0%
		1,1- Dichloroethane	25	38	2/ 165	1%
		1,1- Dichloroethene			0/ 67	0%
		1,2- Dichloroethene (total)	2	2	1/ 6	17%
		1,2- Dichloropropane			0/ 67	0%
		Ethanolamine			0/ 2	0%
		Ethylbenzene	1	29000	75/ 398	19%
		Ethylene Dibromide			0/ 31	0%
		2- Hexanone			0/ 13	0%
		Methyl tert-butyl ether (MTBE	1	480	30/ 31	97%
		4- Methyl-2-Pentanone	50	50	1/ 13	8%
		Methylene Chloride	7	88	9/ 66	14%
		Percent Solids	56.2	94.6	40/ 40	100%
		Styrene			0/ 30	0%
		1,1,2,2- Tetrachloroethane			0/ 106	0%
		Tetrachloroethene	1	150	16/ 67	24%
		Toluene	1	40000	135/ 398	34%
		Total Xylenes	1	10000	80/ 308	26%
		trans-1,2-Dichloroethene	1	3	3/ 61	5%
		trans-1,3-Dichloropropene			0/ 67	0%
		1,1,1- Trichloroethane	12	25	5/ 134	4%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Volatile Organics	**SOIL**	Trichloroethene	1	630	14/ 67	21%
		Trichlorofluoromethane			0/ 54	0%
		1,2,3- Trichloropropane			0/ 39	0%
		Vinyl Acetate			0/ 13	0%
		Vinyl Chloride	6	18	2/ 67	3%
		1,2- Xylene	-2	28000	78/ 218	36%
	WATER	Acetone	2.9	27	10/ 96	10%
		Benzene	1	3200	36/ 346	10%
		Benzyl Chloride			0/ 2	0%
		Bromobenzene			0/ 4	0%
		Bromodichloromethane	1	2	2/ 188	1%
		Bromoform			0/ 188	0%
		Bromomethane			0/ 188	0%
		2- Butanone	1.2	7.9	9/ 96	9%
		Carbon Disulfide	5	5	1/ 96	1%
		Carbon Tetrachloride			0/ 188	0%
		Chlorobenzene	4	4800	3/ 256	1%
		Chlorodibromomethane			0/ 32	0%
		Chloroethane	2	31	6/ 188	3%
		2- Chloroethylvinylether			0/ 145	0%
		Chloroform	1	5	11/ 188	6%
		Chloromethane			0/ 145	0%
		cis-1,2-Dichloroethene	12	20	6/ 72	8%
		cis-1,3-Dichloropropene			0/ 105	0%
		Dibromochloromethane			0/ 156	0%
		Dibromomethane			0/ 5	0%
		1,2- Dichlorobenzene			0/ 372	0%
		Dichlorodifluoromethane			0/ 41	0%
		1,1- Dichloroethane	19	19	1/ 376	0%
		1,1- Dichloroethene	9	9	1/ 188	1%
		1,2- Dichloroethene (total)	7	28	8/ 86	9%
		1,2- Dichloropropane	16	16	1/ 188	1%
		1,2- Dichloropropene			0/ 9	0%
		Ethanolamine			0/ 4	0%
		Ethylbenzene	2	13000	19/ 346	5%
		2- Hexanone			0/ 96	0%
		Methyl tert-butyl ether (MTBE			0/ 35	0%
		4- Methyl-2-Pentanone	20	32	3/ 96	3%
		Methylene Chloride	1.2	1000	11/ 188	6%
		Percent Solids	90.9	93.3	2/ 2	100%
		Styrene			0/ 102	0%
		1,1,2,2- Tetrachloroethane			0/ 192	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Volatile Organics	**WATER**	Tetrachloroethene	5	61	3/ 207	1%
		Toluene	1	11000	26/ 346	8%
		Total Xylenes	1.1	59000	21/ 280	7%
		trans-1,2-Dichloroethene	1	60	22/ 129	17%
		trans-1,3-Dichloropropene			0/ 179	0%
		1,1,1- Trichloroethane	2	2	1/ 385	0%
		Trichloroethene	1	520	29/ 216	13%
		Trichlorofluoromethane			0/ 92	0%
		1,2,3- Trichloropropane			0/ 4	0%
		Vinyl Acetate			0/ 52	0%
		Vinyl Chloride	1.8	2000	14/ 188	7%
		1,2- Xylene	-2	30	70/ 196	36%
Semivolatile Organics	**SOIL**	Acenaphthene	360	2200	7/ 243	3%
		Acenaphthylene	190	190	1/ 243	0%
		Aniline			0/ 5	0%
		Anthracene	260	62000	7/ 243	3%
		Benzidine			0/ 20	0%
		Benzo(a)Anthracene	330	23000	12/ 243	5%
		Benzo(a)Pyrene	340	16000	6/ 243	2%
		Benzo(b)Fluoranthene	290	1700	5/ 212	2%
		Benzo(b+k)Fluoranthene	360	3400	2/ 32	6%
		Benzo(g,h,i)perylene	190	670	3/ 243	1%
		Benzo(j)Fluoranthene			0/ 40	0%
		Benzo(k)Fluoranthene	700	700	1/ 211	0%
		Benzoic Acid			0/ 24	0%
		Benzyl Alcohol			0/ 24	0%
		bis(2-Chloroethoxy)methane			0/ 24	0%
		bis(2-Chloroethyl)ether			0/ 24	0%
		bis(2-Chloroisopropyl)ether			0/ 24	0%
		bis(2-Ethylhexyl)phthalate			0/ 24	0%
		4- Bromophenyl-phenylether			0/ 24	0%
		Butylbenzylphthalate			0/ 24	0%
		4- Chloro-3-Methylphenol			0/ 24	0%
		4- Chloroaniline			0/ 24	0%
		2- Chloronaphthalene			0/ 24	0%
		2- Chlorophenol			0/ 24	0%
		4- Chlorophenyl-phenylether			0/ 24	0%
		Chrysene	230	27000	15/ 243	6%
		Di-n-butylphthalate			0/ 24	0%
		Di-n-octylphthalate			0/ 24	0%
		Dibenzo(a,e)Pyrene			0/ 10	0%
		Dibenzo(a,h)Acridine			0/ 40	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Semivolatile Organics	**SOIL**	Dibenzo(a,h)Anthracene			0/ 243	0%
		Dibenzo(a,h)Pyrene			0/ 40	0%
		Dibenzo(a,i)Pyrene			0/ 40	0%
		Dibenzo(a,j)Acridine			0/ 40	0%
		7H- Dibenzo(c,g)Carbazole			0/ 40	0%
		Dibenzofuran			0/ 24	0%
		1,2- Dichlorobenzene			0/ 72	0%
		3,3'- Dichlorobenzidine			0/ 24	0%
		2,4- Dichlorophenol			0/ 36	0%
		Diethylphthalate			0/ 24	0%
		2,4- Dimethylphenol			0/ 24	0%
		Dimethylphthalate			0/ 24	0%
		4,6- Dinitro-2-methylphenol			0/ 24	0%
		2,4- Dinitrophenol			0/ 24	0%
		2,4- Dinitrotoluene			0/ 48	0%
		1,2- Diphenylhydrazine			0/ 5	0%
		Fluoranthene	210	36000	36/ 243	15%
		Fluorene	453	44000	10/ 243	4%
		Hexachlorobenzene			0/ 24	0%
		Hexachlorobutadiene			0/ 24	0%
		Hexachlorocyclopentadiene			0/ 24	0%
		Hexachloroethane			0/ 24	0%
		Indeno(1,2,3-c,d)Pyrene	220	390	3/ 243	1%
		Isophorone			0/ 24	0%
		3- Methylcholanthrene			0/ 40	0%
		2- Methylnaphthalene	590	1200	3/ 24	13%
		2- Methylphenol			0/ 61	0%
		N-nitroso-di-n-butylamine			0/ 5	0%
		N-Nitroso-di-n-propylamine			0/ 24	0%
		N-nitrosodimethylamine			0/ 5	0%
		N-Nitrosodiphenylamine			0/ 24	0%
		Naphthalene	440	20000	7/ 243	3%
		2- Nitroaniline			0/ 72	0%
		Nitrobenzene			0/ 24	0%
		2- Nitrophenol			0/ 48	0%
		Pentachlorophenol			0/ 24	0%
		Phenanthrene	246	64000	45/ 243	19%
		Phenol			0/ 24	0%
		2- Picoline			0/ 5	0%
		Pyrene	122	39000	42/ 243	17%
		Pyridine			0/ 5	0%
		1,2,4,5- Tetrachlorobenzene			0/ 5	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Semivolatile Organics	**SOIL**	1,2,4- Trichlorobenzene			0/ 24	0%
		2,4,5- Trichlorophenol			0/ 48	0%
	WATER	Acenaphthene			0/ 105	0%
		Acenaphthylene			0/ 105	0%
		Aniline			0/ 19	0%
		Anthracene	20	52000	3/ 105	3%
		Benzidine			0/ 33	0%
		Benzo(a)Anthracene	7.1	22000	5/ 105	5%
		Benzo(a)Pyrene	8.8	9200	2/ 105	2%
		Benzo(b)Fluoranthene	10	73000	2/ 103	2%
		Benzo(b+k)Fluoranthene			0/ 2	0%
		Benzo(g,h,i)perylene			0/ 105	0%
		Benzo(j)Fluoranthene			0/ 1	0%
		Benzo(k)Fluoranthene	31000	31000	1/ 103	1%
		Benzoic Acid			0/ 33	0%
		Benzyl Alcohol			0/ 33	0%
		bis(2-Chloroethoxy)methane			0/ 33	0%
		bis(2-Chloroethyl)ether			0/ 33	0%
		bis(2-Chloroisopropyl)ether			0/ 33	0%
		bis(2-Ethylhexyl)phthalate	10	10	1/ 33	3%
		4- Bromophenyl-phenylether			0/ 33	0%
		Butylbenzylphthalate			0/ 33	0%
		4- Chloro-3-Methylphenol			0/ 33	0%
		4- Chloroaniline			0/ 33	0%
		2- Chloronaphthalene			0/ 33	0%
		2- Chlorophenol			0/ 33	0%
		4- Chlorophenyl-phenylether			0/ 33	0%
		Chrysene	11.3	53000	5/ 105	5%
		Di-n-butylphthalate	35	44	2/ 33	6%
		Di-n-octylphthalate			0/ 33	0%
		Dibenzo(a,e)Pyrene			0/ 1	0%
		Dibenzo(a,h)Acridine			0/ 1	0%
		Dibenzo(a,h)Anthracene			0/ 105	0%
		Dibenzo(a,h)Pyrene			0/ 1	0%
		Dibenzo(a,i)Pyrene			0/ 1	0%
		Dibenzo(a,j)Acridine			0/ 1	0%
		7H- Dibenzo(c,g)Carbazole			0/ 1	0%
		Dibenzofuran			0/ 33	0%
		1,2- Dichlorobenzene			0/ 99	0%
		3,3'- Dichlorobenzidine			0/ 33	0%
		2,4- Dichlorophenol			0/ 56	0%
		Diethylphthalate			0/ 33	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Semivolatile Organics	**WATER**	2,4- Dimethylphenol			0/ 33	0%
		Dimethylphthalate			0/ 33	0%
		4,6- Dinitro-2-methylphenol			0/ 33	0%
		2,4- Dinitrophenol			0/ 33	0%
		2,4- Dinitrotoluene			0/ 66	0%
		1,2- Diphenylhydrazine			0/ 19	0%
		Fluoranthene	50	1400000	6/ 104	6%
		Fluorene	5.6	24000	4/ 105	4%
		Hexachlorobenzene			0/ 33	0%
		Hexachlorobutadiene			0/ 34	0%
		Hexachlorocyclopentadiene			0/ 33	0%
		Hexachloroethane			0/ 33	0%
		Indeno(1,2,3-c,d)Pyrene			0/ 105	0%
		Isophorone			0/ 33	0%
		3- Methylcholanthrene			0/ 1	0%
		2- Methylnaphthalene			0/ 33	0%
		2- Methylphenol			0/ 90	0%
		N-nitroso-di-n-butylamine			0/ 19	0%
		N-Nitroso-di-n-propylamine			0/ 33	0%
		N-nitrosodimethylamine			0/ 19	0%
		N-Nitrosodiphenylamine			0/ 33	0%
		Naphthalene			0/ 105	0%
		2- Nitroaniline			0/ 99	0%
		Nitrobenzene			0/ 33	0%
		2- Nitrophenol			0/ 66	0%
		Pentachlorophenol			0/ 33	0%
		Phenanthrene	22	100000	9/ 105	9%
		Phenol			0/ 33	0%
		2- Picoline			0/ 19	0%
		Pyrene	27	700000	6/ 105	6%
		Pyridine			0/ 19	0%
		1,2,4,5- Tetrachlorobenzene			0/ 19	0%
		1,2,4- Trichlorobenzene			0/ 33	0%
		2,4,5- Trichlorophenol			0/ 66	0%
Pesticides/PCBs	**SOIL**	Aldrin			0/ 12	0%
		alpha-BHC			0/ 12	0%
		Aroclor-1016			0/ 20	0%
		Aroclor-1221			0/ 20	0%
		Aroclor-1232			0/ 20	0%
		Aroclor-1242			0/ 20	0%
		Aroclor-1248			0/ 20	0%
		Aroclor-1254			0/ 20	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Pesticides/PCBs	SOIL	Aroclor-1260	3100	3700	2/ 20	10%
		beta-BHC			0/ 12	0%
		Chlordane			0/ 12	0%
		4,4'- DDD			0/ 12	0%
		4,4'- DDE			0/ 12	0%
		4,4'- DDT			0/ 12	0%
		delta-BHC			0/ 8	0%
		Dieldrin			0/ 12	0%
		Endosulfan I			0/ 12	0%
		Endosulfan II			0/ 12	0%
		Endosulfan Sulfate			0/ 12	0%
		Endrin			0/ 12	0%
		Endrin Aldehyde			0/ 12	0%
		gamma-BHC (Lindane)			0/ 12	0%
		Heptachlor			0/ 12	0%
		Heptachlor Epoxide			0/ 12	0%
		Methoxychlor			0/ 4	0%
		Percent Solids	87.4	87.4	1/ 1	100%
		Total PCBs			0/ 1	0%
		Toxaphene			0/ 12	0%
	WATER	Aldrin			0/ 10	0%
		alpha-BHC			0/ 10	0%
		Aroclor-1016			0/ 35	0%
		Aroclor-1221			0/ 35	0%
		Aroclor-1232			0/ 35	0%
		Aroclor-1242			0/ 35	0%
		Aroclor-1248	0.77	6	3/ 35	9%
		Aroclor-1254			0/ 35	0%
		Aroclor-1260			0/ 35	0%
		Aroclor-1268 — this was a hit			0/ 5	0%
		beta-BHC			0/ 10	0%
		Chlordane			0/ 10	0%
		4,4'- DDD			0/ 10	0%
		4,4'- DDE			0/ 10	0%
		4,4'- DDT			0/ 10	0%
		delta-BHC			0/ 10	0%
		Dieldrin			0/ 10	0%
		Endosulfan I			0/ 10	0%
		Endosulfan II			0/ 10	0%
		Endosulfan Sulfate			0/ 10	0%
		Endrin			0/ 10	0%
		Endrin Aldehyde			0/ 5	0%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Pesticides/PCBs	**WATER**	Endrin Ketone			0/ 5	0%
		gamma-BHC (Lindane)			0/ 10	0%
		Heptachlor			0/ 10	0%
		Heptachlor Epoxide			0/ 10	0%
		Methoxychlor			0/ 5	0%
		Toxaphene			0/ 10	0%
Inorganics	**SOIL**	Arsenic	880	4900	8/ 8	100%
		Barium	12000	40000	8/ 8	100%
		Cadmium	0.3	330	37/ 52	71%
		Chromium	1500	82000	102/ 116	88%
		Copper	3000	42000	69/ 72	96%
		Cyanide			0/ 8	0%
		Hexavalent Chromium			0/ 3	0%
		Lead	530	276000	128/ 164	78%
		Mercury	20	60	6/ 8	75%
		Nickel	2900	14000	8/ 8	100%
		Percent Solids	81.3	98.2	39/ 39	100%
		Zinc	14000	69000	67/ 72	93%
	WATER	Arsenic	2.9	11	6/ 10	60%
		Barium	50	584	7/ 10	70%
		Cadmium	0.25	2.8	3/ 64	5%
		Chromium	2	5	6/ 80	7%
		Copper	20	510	8/ 56	14%
		Cyanide			0/ 5	0%
		Iron	30	13000	40/ 52	77%
		Lead	1.2	30	16/ 97	16%
		Mercury			0/ 10	0%
		Nickel	17	24	3/ 57	5%
		Selenium			0/ 5	0%
		Silver	1	1	1/ 5	20%
		Zinc	20	320	19/ 73	26%
Miscellaneous	**SOIL**	8334 Transmission Oil	300000	350000000	16/ 18	89%
		8335 Transmission Oil	100000	140000000	11/ 11	100%
		8336 Transmission Oil	50000	490000000	32/ 33	97%
		Fuel Oil #2	25000	560000	9/ 28	32%
		Fuel Oil #6	200	250000	6/ 8	75%
		Fuel Oil Range Organics	70000	10300000	3/ 8	38%
		Gasoline Range Organics			0/ 8	0%
		Kerosene	290000	290000	1/ 1	100%
		Lube Oil Range Organics			0/ 8	0%
		NP-12 Oil	30000	39000000	6/ 6	100%
		Oil/Grease	40000	57000000	4/ 7	57%

Minimum and Maximum Detected Values and Frequency of Detection *09-Jan-0*

Category	Matrix	Parameter	Minimum Detected Value	Maximum Detected Value	Frequency of Detection	
Miscellaneous	**SOIL**	Percent Solids	77	97.1	110/ 110	100%
		Total Petroleum Hydrocarbon	23	130000000	97/ 135	72%
	WATER	8334 Transmission Oil	1300	1800000	6/ 6	100%
		8335 Transmission Oil	600	1300000000	18/ 20	90%
		Fuel Oil #2	150	4300	5/ 12	42%
		Fuel Oil #6	700000	2000000	3/ 3	100%
		Fuel Oil Range Organics			0/ 2	0%
		Gasoline Range Organics			0/ 2	0%
		Lube Oil Range Organics	43000	1600000	2/ 2	100%
		Percent Solids	83.2	99	10/ 10	100%
		Specific Gravity	0.86	0.88	3/ 3	100%
		Total Petroleum Hydrocarbon	13	1500000000	41/ 96	43%

APPENDIX B

MODELING EQUATIONS

SITE SPECIFIC CLEANUP CRITERIA
GM POWERTRAIN WILLOW RUN PLANT

Equation 1 - Groundwater Transport

The following equation for steady state attenuation of chemical concentrations in groundwater will be used, as modified from ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites:

$$\frac{C_{(x)}}{C_{source}} = \exp\left\{\frac{x}{2\alpha_x}\left(1-\sqrt{\left(1+\frac{4\lambda\,\alpha_x}{U_c}\right)}\right)\right\} \quad erf\left[\frac{S_w}{4\sqrt{\alpha y X}}\right]$$

Where:

$C(x)$ = dissolved chemical concentration along centerline of dissolved plume [mg/L - H_2O]

C_{source} = dissolved chemical concentration in dissolved plume source area [mg/L - H_2O]

S_w = source width (perpendicular to flow in the horizontal plane) [ft]

α_x = longitudinal dispersivity [ft] = 0.10 (x)

α_y = transverse dispersivity [ft] = $\alpha_x/3$

U_c = chemical velocity [ft/d] = $\dfrac{K_s i}{n_e R_c}$

where Rc = retardation factor = $1+\dfrac{K_d P_s}{\theta_s}$ *where* $K_d = (K_{oc})(f_{oc})$

n_e = effective porosity [unitless]

K_s = saturated hydraulic conductivity [ft/d]

i = groundwater gradient [ft/ft]

θ_s = volumetric water content or porosity of saturated zone [ft^3 - H_2O/ft^3 - soil]

P_s = soil bulk density [g - soil/ml - soil]

K_{oc} = distribution coefficient for organic carbon [ml/g]

f_{oc} = fraction of the soil that consists of organic carbon [%]

λ = first order of degradation constant [d^{-1}]

$erf_{(\tilde{n})}$ = error function evaluated for the value of ñ

x = distance along centerline from edge of dissolved plume source zone [ft]

SITE SPECIFIC CLEANUP CRITERIA
GM POWERTRAIN WILLOW RUN PLANT

Equation 2 - SSTL for Groundwater at the Source

The SSTL for groundwater at the source will be calculated as follows:

$$GW_{source} = \frac{GW_{comp}}{[C(x)/C_{source}]}$$

Where:

GW_{source} = SSTL for groundwater at the source

GW_{comp} = groundwater cleanup criteria at the compliance point (i.e., GSI at the downgradient property boundary)

$C(x)/C_{source}$ = ratio of the dissolved chemical concentration along the centerline of the plume and the dissolved chemical concentration in the source area (calculated in Equation 1)

SITE SPECIFIC CLEANUP CRITERIA
GM POWERTRAIN WILLOW RUN PLANT

Equation 3 - Leaching Factor

The following equation for leaching to and mixing with groundwater will be used, as referenced in ASTM E1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, May 1994:

$$LF_{sw}\ \frac{(mg/L-water)}{(mg/kg-soil)} = \frac{P_s}{(\theta_{ws}+K_dP_s+H\theta_{as})\left(\frac{1+U_{gw}\delta_{gw}}{IW}\right)}\ x\ 10^{o}\ \frac{cm^3-K_g}{L-g}$$

Where:

LF_{sw} = soil-water leaching factor $\left[\frac{mg/L}{mg/kg}\right]$

K_d = distribution coefficient of the chemical [ml/g] = (k_{oc}) (f_{oc})

K_{oc} = distribution coefficient for organic carbon [ml/g]

f_{oc} = fraction of the soil that consists of organic carbon [%]

U_{gw} = groundwater seepage velocity $[ft/d]=\frac{K_si}{n_e}$

K_s = saturated hydraulic conductivity [ft/d]

i = groundwater gradient [ft/ft]

n_e = effective porosity [unitless]

δ_{gw} = groundwater mixing zone thickness [ft]

P_s = soil bulk density [g-soil/mL-soil]

θ_{as} = volumetric air content in vadose zone soils [ft^3-air/ft^3-soil]

θ_{ws} = volumetric water content in vadose zone soils [ft^3-H_2O/ft^3 total volume]

H = Henry's Law Constant [ft^3-H_2O/ft^3-air]

I = infiltration rate of water through soil [ft/d]

W = length of source in direction of groundwater flow [ft]

SITE SPECIFIC CLEANUP CRITERIA
GM POWERTRAIN WILLOW RUN PLANT

Equation 4 - SSTL for Subsurface Soil at the Source (Protective of Groundwater)

The SSTL for subsurface soil will be calculated as follows:

$$Soil_{source} = \frac{GW_{source}}{LF_{sw}}$$

Where:

$Soil_{source}$ = SSTL for subsurface soil at the source protective of GSI at the property line

GW_{source} = SSTL for groundwater at the source as calculated from Equation 2

LF_{sw} = soil-water leaching factor as calculated from Equation 3

APPENDIX C

PARAMETERS FOR MODELING

TABLE C-1
PARAMETERS FOR USE IN GSI MODELING
GM POWERTRAIN WILLOW RUN PLANT

Parameter	Proposed Value	Source
b - aquifer thickness	4.0 ft	Average of measurements from borings at the plant
X - distance along centerline of plume from edge of dissolved plume source area	vary in 200 foot increments from 200 ft to 2,000 ft	Estimated distances from Areas of Concern (AOCs) to the downgradient property boundary.
K_{oc} - distribution coefficient	Chemical Specific; See Attachment 1	Not applicable
n_e - effective porosity	0.33	Literature value obtained from Ref. 1 and consistent with Ref. 2
i - groundwater gradient	0.0040 ft/ft	Average of 19 gradient measurements from 15 different AOCs.
H - Henry's Law Constant	Chemical Specific; See Attachment 1	Not applicable
K_s - hydraulic conductivity (saturated)	4.2 ft/day	Geometric mean of 17 slug or pumping tests conducted at 7 AOCs.
I - infiltration rate of water through soil	0.001 ft/day	Typical infiltration rate for a low-permeability setting
δ - mixing zone thickness	4 ft	Depth to which chemicals extend into the water table (i.e., plume thickness at the source). At all AOCs, plume thickness equals aquifer thickness.
f_{oc} - organic carbon content	0.002	Literature value obtained from Ref. 3 and consistent with Ref. 2
P_s - soil bulk density	1.6 g/cm^3	Calculated from $P_s = 2.65\ (1-N)$, where N (total porosity) is a literature value of 0.40 obtained from Ref. 1
S_d - source depth	4.0 ft	Depth to which chemicals extend into the water table; i.e., plume thickness. At all AOCs, plume thickness equals aquifer thickness.
S_w - source width	20 ft	Variable from AOC to AOC; therefore, selected values consistent with Ref. 2
θ_{as} – volumetric air content in vadose zone soils (air filled soil porosity)	0.31 ft^3-air/ft^3-soil	Calculated from $\theta_{as} = N - \theta_{ws}$, where N (total porosity) is typical literature value of 0.40 obtained from Ref. 1.
θ_{ws} – volumetric water content in vadose zone soils (water-filled soil porosity)	0.090 ft^3-H_2O/ft^3-soil	Calculated from θ_{ws} = (%moisture x P_s), where %moisture is 0.056 (the average of five unsaturated soil samples from various AOCs).
θ_s – volumetric water content of saturated zone	0.33 ft^3-H_2O/ft^3-soil	Assumed equal to the effective porosity.
W – width of source parallel to groundwater flow	50 ft	Variable from AOC to AOC; therefore, selected value consistent with Ref. 2 and Ref. 4 (see below)

References:

(1) Handbook: Groundwater and Wellhead Protection, EPA/625/R-94/001, United States Environmental Protection Agency, September 1994, pg. 49.

(2) Risk-based Corrective Action (RBCA) Procedure for Cleanup Objectives, written by Doug Clay, Illinois Environmental Protection Agency, Bureau of Land, Division of Remediation Management, September 1995.

(3) Applied Contaminant Transport Modeling, Theory and Practice, Chunmiao Zheng and Gordon D. Bennett, Van Nostand Reinhold, New York, 1995, pg. 251.

(4) ASTM E-1739, Standard for Risk-Based Corrective Action Applied at Petroleum Release Sites, American Society for Testing and Materials, approved May 1994.

TABLE C-2
PARAMETERS FOR USE IN VIA MODELING
GM POWERTRAIN WILLOW RUN PLANT
YPSILANTI, MICHIGAN

Parameter	Symbol	Value
Average Soil/Groundwater Temp	T_S	10 °C
Depth Below Grade to Bottom of Enclosed Space Floor	L_F	25 cm
Depth Below Grade to Water Table	L_{WT}	240 cm
Thickness of Soil Stratum A	h_A	240 cm
Depth below grade to bottom of contamination	L_b	340 cm
Soil Type Directly Above Water Table - Stratum A		Loamy Sand
Stratum A Soil Dry Bulk Density	$\rho_b^{\$}$	1.6 g/cm^3
Stratum A Soil Total Porosity	n^A	0.4
Stratum A Soil Water-filled Porosity	$\theta_w^{\$}$	0.3
Enclosed Space Floor Thickness	L_{crack}	23 cm
Soil-Bldg. Pressure Differential	ΔP	40 g/cm-s^2
Enclosed Floor Space Length	L_B	36576 cm
Enclosed Floor Space Width	W_B	12192 cm
Enclosed Space Height	H_B	610 cm
Floor-wall Seam Crack Width	w	0.1 cm
Indoor Air Exchange Rate	ER	2/hour
Averaging Time for Carcinogens	AT_C	70 years
Averaging Time for Noncarcinogens	AT_{NC}	21 years
Exposure Duration	ED	21 years
Exposure Frequency	EF	245 days/yr.
Target Risk for Carcinogens	TR	1.00E-06
Target Hazard Quotient for Noncarcinogens	THQ	1
Vinyl Chloride - Unit Risk Factor	URF	4.40E-06
Vinyl Chloride - Reference Concentration	RfC	1.00E-01

APPENDIX D

VIA MODELING

General Explanation

TABLE 1
Risk-Based VIA Results
GM Powertrain Plant
Ypsilanti, Michigan

Chemical	Maximum Groundwater Concentration	Product Present	MDEQ Generic Groundwater Industrial VIA Criteria	Calculated Groundwater Risk-Based VIA Criteria	Maximum Soil Concentration	MDEQ Generic Soil Industrial VIA Criteria	Calculated Soil Risk-Based VIA Criteria
Acenaphthene	ND	NA	4,200 {S}	NC	2,200	190,000,000	NA
Anthracene	52,000	Yes	43 {S}	1,600,000,000	62,000	1,000,000,000	NA
Benzene	3,200	NA	36,000 {S}	NC	6,800	1,600	NA
Benzo(a)anthracene	NA	NA	NLV	NA	23,000	NLV	12,800
Benzo(b)fluoranthene	NA	NA	NLV	NA	1,700	NLV	NA
Benzo(k)fluoranthene	NA	NA	NLV	NA	700	NLV	NA
Benzo(a)pyrene	NA	NA	NLV	NA	16,000	NLV	NA
Benzo(g,h,i)perylene	NA	NA	NLV	NA	670	NLV	NA
Chlorobenzene	4,800	NA	470,000 {S}	NC	1,800	120,000	NA
Chrysene	NA	NA	ID	NA	27,000	ID	NA
1,1 Dichloroethane	41	NA	2,300,000 {S}	NC	38	230,000	1,300,000
1,1-Dichloroethylene	ND (10)	NA	1,300	NC	2	62	1,390
cis-1,2-Dichloroethylene	20	NA	220,000	NC	ND	23,000	131,000
trans-1,2-Dichloroethylene	99	NA	200,000	NC	3	23,000	145,000
Ethybenzene	13,000	NA	170,000 {S}	NC	29,000	140,000	NA
Fluoranthene	1,400,000*	Yes	210 {S}	1,000,000,000	36,000	1,000,000,000	NA
Fluorene	24,000*	Yes	2,000 {S}	191,000,000	44,000	580,000,000	NA
Indeno(1,2,3-c,d)pyrene	ND	NA	NLV	NA	390	NLV	NA
Methyl tert-butyl ether (MTBE)	ND	NA	47,000,000 {S}	NC	480	5,900,000	NA
Naphthalene	ND	NA	31,000 {S}	NC	20,000	250,000	NA
Phenanthrene	100,000*	Yes	1,000 {S}	3,170	64,000	1,800,000	NA
Polychlorinated biphenyls	6	NA	45 {S}	NC	3,700	3,000,000	NA
Pyrene	700,000*	Yes	140 {S}	1,100,000,000	39,000	1,000,000,000	NA
Tetrachloroethylene	61	NA	170,000	NC	150	11,000	100,000
Toluene	11,000	NA	530,000 {S}	NC	40,000	250,000	NA
1,1,1-Trichloroethane	2	NA	1,300,000 {S}	NC	25	250,000	NA
Trichloroethylene	520	NA	97,000	NC	630	7,100	63,000
Vinyl Chloride	2,000	NA	690	1190**	18	28	825
Xylenes (total)	59,000	NA	190,000 {S}	NC	10,000	150,000	NA

Notes:
All results reported in parts per billion (ppb).
NC - Not calculated
VIA - Volatilization to Indoor Air.
NLV - Chemical is not likely to volatilize under most conditions ([per MDEQ ERD Op Memo #18 and STD Part 213).
NA - Not applicable.
{S} - RBSL is based on chemical-specific water solubility limit (per MDEQ ERD Op Memo #18 and STD Part 213)
* Concentrations above solubility in groundwater are not valid with the Ettinger Model and are considered free product, which is consided to be sorbed to the soil.
** Using new data from the EPA IRIS per toxicologist Jeff Crum of MDEQ ERD.

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
75014		Vinyl chloride (chloroethene)

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	240	0	0	A	LS	LS		

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
1.6	0.4	0.3	0	0	0	0	0	0

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm·s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-06	1

Used to calculate risk-based groundwater concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-05	2.70E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	4.4E-06	1.0E-01

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
6.62E+08	215	0.100	0.000	0.000	0.708	5.41E-08	0.225	1.22E-08	18.75	0.4	0.104	0.296	97,536

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+08	4.48E+08	2.18E-05	25	5,000	1.73E-02	7.43E-01	1.75E-04	3.12E-04	0.00E+00	0.00E+00	3.52E-04	3.15E-04	215

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
25	7.43E+02	0.10	2.74E+02	3.12E-04	9.75E+03	#NUM!	1.28E-06	9.51E-04	4.4E-06	1.0E-01

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.19E+03	1.57E+05	1.19E+03	2.76E+06	1.19E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

VERSION 1.2
September, 1998

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

YES: X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES:

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
71432		Benzene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm \cdot s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	8.3E-06	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm \cdot m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm·s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	8,122	2.69E-03	1.16E-01	1.75E-04	2.67E-04	0.00E+00	0.00E+00	2.67E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.18E-01	3.70E+02	0.10	3.15E+02	2.67E-04	9.75E+03	#NUM!	NA	NA	2.77E+00	1.34E-09	1.04E+09	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m³)	Finite source bldg. conc., $C_{building}$ (µg/m³)	Final finite source bldg. conc., $C_{building}$ (µg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.26E-06	NA	4.67E-04	4.67E-04	8.3E-06	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
1.28E+04	NA	1.28E+04	5.47E+05	1.28E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
75343		1,1-Dichloroethane

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm \cdot s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1
				Used to calculate risk-based soil concentration.	

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	0.0E+00	5.0E-01

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm \cdot m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	7,450	2.88E-03	1.24E-01	1.75E-04	2.27E-04	0.00E+00	0.00E+00	2.27E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
6.32E-02	4.80E+02	0.10	3.15E+02	2.27E-04	9.75E+03	#NUM!	NA	NA	2.50E+00	1.47E-09	8.65E+08	NO

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m³)	Finite source bldg. conc., $C_{building}$ (µg/m³)	Final finite source bldg. conc., $C_{building}$ (µg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.17E-06	NA	5.59E-04	5.59E-04	NA	5.0E-01

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	1.33E+06	1.33E+06	1.31E+06	1.31E+06

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
75354		1,1-Dichloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm·s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	5.0E-05	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm \cdot m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm·s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	6,392	1.47E-02	6.34E-01	1.75E-04	2.65E-04	0.00E+00	0.00E+00	2.65E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.18E-01	1.84E+03	0.10	3.15E+02	2.65E-04	9.75E+03	#NUM!	NA	NA	2.76E+00	6.59E-09	2.11E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m³)	Finite source bldg. conc., $C_{building}$ (µg/m³)	Final finite source bldg. conc., $C_{building}$ (µg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.17E-04	NA	7.17E-04	5.0E-05	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
1.39E+03	NA	1.39E+03	7.76E+05	1.39E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
156592		cis-1,2-Dichloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm \cdot s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	0.0E+00	3.5E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm·m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm·s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	7,734	2.04E-03	8.77E-02	1.75E-04	2.30E-04	0.00E+00	0.00E+00	2.30E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
7.10E-02	3.32E+02	0.10	3.15E+02	2.30E-04	9.75E+03	#NUM!	NA	NA	2.52E+00	1.03E-09	1.24E+09	NO

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.20E-06	NA	3.97E-04	3.97E-04	NA	3.5E-02

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	1.31E+05	1.31E+05	9.24E+05	1.31E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES: X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES:

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
156605		trans-1,2-Dichloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm·s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.07E-02	1.19E-05	9.39E-03	25	6,717	320.85	516.50	5.25E+01	6.30E+03	0.0E+00	7.0E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	7,136	4.96E-03	2.14E-01	1.75E-04	2.13E-04	0.00E+00	0.00E+00	2.13E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
1.05E-01	6.98E+02	0.10	3.15E+02	2.13E-04	9.75E+03	#NUM!	NA	NA	2.41E+00	2.01E-09	6.12E+08	YES

Finite source indoor attenuation coefficient, <α> (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(µg/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.17E-04	NA	7.17E-04	NA	7.0E-02

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
NA	1.45E+05	1.45E+05	1.93E+06	1.45E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES	X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES	

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
127184		Tetrachloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm·s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1
				Used to calculate risk-based soil concentration.	

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.8E-07	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm \cdot m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm·s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	9,553	7.83E-03	3.37E-01	1.75E-04	2.13E-04	0.00E+00	0.00E+00	2.13E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.10E-01	6.50E+02	0.10	3.15E+02	2.13E-04	9.75E+03	#NUM!	NA	NA	2.41E+00	1.87E-09	6.56E+08	YES

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.17E-04	NA	7.17E-04	5.8E-07	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
1.19E+05	NA	1.19E+05	1.04E+05	1.04E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES: X

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES:

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
79016		Trichloroethylene

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm \cdot s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm \cdot m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.7E-06	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	8,557	4.79E-03	2.06E-01	1.75E-04	2.36E-04	0.00E+00	0.00E+00	2.36E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m^3)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.32E-01	3.87E+02	0.10	3.15E+02	2.36E-04	9.75E+03	#NUM!	NA	NA	2.56E+00	1.24E-09	1.05E+09	NO

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m^3)	Finite source bldg. conc., $C_{building}$ (µg/m^3)	Final finite source bldg. conc., $C_{building}$ (µg/m^3)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.20E-06	NA	4.65E-04	4.65E-04	1.7E-06	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
6.28E+04	NA	6.28E+04	5.86E+05	6.28E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

DATA ENTRY SHEET

CALCULATE RISK-BASED SOIL CONCENTRATION (enter "X" in "YES" box)

VERSION 1.2
September, 1998

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL SOIL CONCENTRATION (enter "X" in "YES" box and initial soil conc. below)

YES [ ]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial soil conc., C_R (µg/kg)	Chemical
75014		Vinyl chloride (chloroethene)

ENTER Average soil temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to top of contamination, L_t (cm)	ENTER Depth below grade to bottom of contamination, (enter value of 0 if value is unknown) L_b (cm)	ENTER Totals must add up to value of L_t (cell D28) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
10	25	240	340	240	0	0			1.40E-08

ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum A soil organic carbon fraction, f_{oc}^A (unitless)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum B soil organic carbon fraction, f_{oc}^B (unitless)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)	ENTER Stratum C soil organic carbon fraction, f_{oc}^C (unitless)
1.6	0.4	0.3	0.002								

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)
23	40	36576	12192	610	0.1	2

ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	21	21	245	1.0E-05	1

Used to calculate risk-based soil concentration.

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.23E-06	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.4E-05	0.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Initial soil concentration used, C_R (µg/kg)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
6.62E+08	215	0.100	ERROR	ERROR	#N/A	#N/A	#N/A	1.40E-08	97,536	1	1.51E+08

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm \cdot m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)
4.48E+08	2.18E-05	25	5,000	1.73E-02	7.46E-01	1.75E-04	3.10E-04	0.00E+00	0.00E+00	3.10E-04	215	25

Soil-water partition coefficient, K_d (cm^3/g)	Source vapor conc., C_{source} (µg/m³)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (µg/m³)	Finite source β term (unitless)	Finite source ψ term $(sec)^{-1}$	Time for source depletion, τ_D (sec)	Exposure duration > time for source depletion (YES/NO)
3.72E-02	2.75E+03	0.10	3.15E+02	3.10E-04	9.75E+03	#NUM!	NA	NA	3.05E+00	1.15E-08	1.33E+08	YES

Finite source indoor attenuation coefficient, $<\alpha>$ (unitless)	Mass limit bldg. conc., $C_{building}$ (µg/m³)	Finite source bldg. conc., $C_{building}$ (µg/m³)	Final finite source bldg. conc., $C_{building}$ (µg/m³)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.17E-04	NA	7.17E-04	8.4E-05	NA

RESULTS SHEET

RISK-BASED SOIL CONCENTRATION CALCULATIONS:

Indoor exposure soil conc., carcinogen (µg/kg)	Indoor exposure soil conc., noncarcinogen (µg/kg)	Risk-based indoor exposure soil conc., (µg/kg)	Soil saturation conc., C_{sat} (µg/kg)	Final indoor exposure soil conc., (µg/kg)
8.25E+02	NA	8.25E+02	7.49E+05	8.25E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

APPENDIX E

SSTL RESULTS

Table E-1
Site Specific Target Level Calculation For Soil
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Soil GSI SSTL (ppb)	MDEQ Generic Volatilization to Indoor Air Value for Soil (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Industrial and Commercial II Direct Contact Value for Soil (ppb)	MDEQ Soil Saturation Concentration Screening Values	Site SSTL Value (ppb)
Acetone	200	3.4E+04	**1.1E+08**	NC	**1.1E+08**	1.1E+08	34,000
Acetone	400	6.7E+04	**1.1E+08**	NC	**1.1E+08**	1.1E+08	67,000
Acetone	600	1.0E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	100,000
Acetone	800	1.4E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	140,000
Acetone	1000	1.9E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	190,000
Acetone	1200	2.3E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	230,000
Acetone	1400	2.6E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	260,000
Acetone	1600	3.0E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	300,000
Acetone	1800	3.4E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	340,000
Acetone	2000	3.8E+05	**1.1E+08**	NC	**1.1E+08**	1.1E+08	380,000
Acenaphthene	200	2.9E+04	3.5E+08	NC	2.0E+08	NA	29,000
Acenaphthene	400	5.7E+04	3.5E+08	NC	2.0E+08	NA	57,000
Acenaphthene	600	8.9E+04	3.5E+08	NC	2.0E+08	NA	89,000
Acenaphthene	800	1.2E+05	3.5E+08	NC	2.0E+08	NA	120,000
Acenaphthene	1000	1.6E+05	3.5E+08	NC	2.0E+08	NA	160,000
Acenaphthene	1200	1.9E+05	3.5E+08	NC	2.0E+08	NA	190,000
Acenaphthene	1400	2.3E+05	3.5E+08	NC	2.0E+08	NA	230,000
Acenaphthene	1600	2.6E+05	3.5E+08	NC	2.0E+08	NA	260,000
Acenaphthene	1800	2.9E+05	3.5E+08	NC	2.0E+08	NA	290,000
Acenaphthene	2000	3.1E+05	3.5E+08	NC	2.0E+08	NA	310,000
Anthracene	200	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	400	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	600	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	800	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	1000	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	1200	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	1400	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	1600	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	1800	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Anthracene	2000	ID	1.0E+09	NC	1.0E+09	NA	1,000,000,000
Benzene	200	1.8E+04	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	400	3.6E+04	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	600	5.6E+04	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	800	7.9E+04	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	1000	1.0E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	1200	1.2E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	1400	1.4E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	1600	1.6E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	1800	1.8E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzene	2000	2.0E+05	8.4E+03	1.3E+04	**4.0E+05**	4.0E+05	12,800
Benzo(a)anthracene	200	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	400	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	600	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	800	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	1000	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	1200	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	1400	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	1600	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	1800	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(a)anthracene	2000	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	200	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	400	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	600	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	800	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	1000	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	1200	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	1400	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	1600	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	1800	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(b)fluoranthene	2000	NLL	NLV	NC	1.0E+05	NA	100,000
Benzo(k)fluoranthene	200	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	400	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	600	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	800	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	1000	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	1200	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	1400	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	1600	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	1800	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(k)fluoranthene	2000	NLL	NLV	NC	1.0E+06	NA	1,000,000
Benzo(a)pyrene	200	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	400	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	600	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	800	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	1000	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	1200	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	1400	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	1600	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	1800	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(a)pyrene	2000	NLL	NLV	NC	1.0E+04	NA	10,000
Benzo(g,h,i)perylene	200	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	400	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	600	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	800	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	1000	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	1200	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	1400	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	1600	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	1800	NLL	NLV	NC	9.1E+06	NA	9,100,000
Benzo(g,h,i)perylene	2000	NLL	NLV	NC	9.1E+06	NA	9,100,000

Table E-1
Site Specific Target Level Calculation For Soil
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Soil GSI SSTL (ppb)	MDEQ Generic Volatilization to Indoor Air Value for Soil (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Industrial and Commercial II Direct Contact Value for Soil (ppb)	MDEQ Soil Saturation Concentration Screening Values	Site SSTL Value (ppb)
Chlorobenzene	200	5.0E+03	2.2E+05	NC	**2.6E+05**	2.6E+05	5,000
Chlorobenzene	400	9.9E+03	2.2E+05	NC	**2.6E+05**	2.6E+05	9,900
Chlorobenzene	600	1.5E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	15,000
Chlorobenzene	800	2.1E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	21,000
Chlorobenzene	1000	2.8E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	28,000
Chlorobenzene	1200	3.3E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	33,000
Chlorobenzene	1400	3.9E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	39,000
Chlorobenzene	1600	4.4E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	44,000
Chlorobenzene	1800	5.0E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	50,000
Chlorobenzene	2000	5.6E+04	2.2E+05	NC	**2.6E+05**	2.6E+05	56,000
Chrysene	200	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	400	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	600	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	800	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	1000	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	1200	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	1400	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	1600	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	1800	NLL	ID	NC	1.0E+07	NA	10,000,000
Chrysene	2000	NLL	ID	NC	1.0E+07	NA	10,000,000
1,1 Dichloroethane	200	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	400	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	600	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	800	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	1000	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	1200	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	1400	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	1600	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	1800	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1 Dichloroethane	2000	ID	4.3E+05	1.3E+06	**8.9E+05**	8.9E+05	**890,000**
1,1-Dichloroethylene	200	2.0E+04	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	400	4.0E+04	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	600	6.2E+04	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	800	8.7E+04	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	1000	1.1E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	1200	1.4E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	1400	1.6E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	1600	1.8E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	1800	2.0E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
1,1-Dichloroethylene	2000	2.3E+05	3.3E+02	1.4E+03	**5.7E+05**	5.7E+05	1,390
cis-1,2-Dichloroethylene	200	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	400	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	600	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	800	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	1000	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	1200	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	1400	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	1600	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	1800	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
cis-1,2-Dichloroethylene	2000	ID	4.2E+04	1.3E+05	**6.4E+05**	6.4E+05	131,000
trans-1,2-Dichloroethylene	200	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	400	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	600	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	800	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	1000	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	1200	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	1400	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	1600	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	1800	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
trans-1,2-Dichloroethylene	2000	ID	4.3E+04	1.5E+05	**1.4E+06**	1.4E+06	145,000
Ethylbenzene	200	3.3E+03	**1.4E+05**	NC	**1.4E+05**	1.4E+05	3,300
Ethylbenzene	400	6.5E+03	**1.4E+05**	NC	**1.4E+05**	1.4E+05	6,500
Ethylbenzene	600	1.0E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	10,000
Ethylbenzene	800	1.4E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	14,000
Ethylbenzene	1000	1.8E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	18,000
Ethylbenzene	1200	2.2E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	22,000
Ethylbenzene	1400	2.6E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	26,000
Ethylbenzene	1600	2.9E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	29,000
Ethylbenzene	1800	3.3E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	33,000
Ethylbenzene	2000	3.7E+04	**1.4E+05**	NC	**1.4E+05**	1.4E+05	37,000
Fluoranthene	200	3.6E+04	1.0E+09	NC	1.8E+08	NA	36,000
Fluoranthene	400	7.2E+04	1.0E+09	NC	1.8E+08	NA	72,000
Fluoranthene	600	1.1E+05	1.0E+09	NC	1.8E+08	NA	110,000
Fluoranthene	800	1.6E+05	1.0E+09	NC	1.8E+08	NA	160,000
Fluoranthene	1000	2.0E+05	1.0E+09	NC	1.8E+08	NA	200,000
Fluoranthene	1200	**2.3E+05**	1.0E+09	NC	1.8E+08	NA	**230,000**
Fluoranthene	1400	**2.3E+05**	1.0E+09	NC	1.8E+08	NA	**230,000**
Fluoranthene	1600	**2.3E+05**	1.0E+09	NC	1.8E+08	NA	**230,000**
Fluoranthene	1800	**2.3E+05**	1.0E+09	NC	1.8E+08	NA	**230,000**
Fluoranthene	2000	**2.3E+05**	1.0E+09	NC	1.8E+08	NA	**230,000**
Fluorene	200	3.5E+04	1.0E+09	NC	1.3E+08	NA	35,000
Fluorene	400	7.0E+04	1.0E+09	NC	1.3E+08	NA	70,000
Fluorene	600	1.1E+05	1.0E+09	NC	1.3E+08	NA	110,000
Fluorene	800	1.5E+05	1.0E+09	NC	1.3E+08	NA	150,000
Fluorene	1000	2.0E+05	1.0E+09	NC	1.3E+08	NA	200,000
Fluorene	1200	2.3E+05	1.0E+09	NC	1.3E+08	NA	230,000
Fluorene	1400	2.7E+05	1.0E+09	NC	1.3E+08	NA	270,000
Fluorene	1600	**2.8E+05**	1.0E+09	NC	1.3E+08	NA	**280,000**
Fluorene	1800	**2.8E+05**	1.0E+09	NC	1.3E+08	NA	**280,000**
Fluorene	2000	**2.8E+05**	1.0E+09	NC	1.3E+08	NA	**280,000**

Table E-1
Site Specific Target Level Calculation For Soil
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Soil GSI SSTL (ppb)	MDEQ Generic Volatilization to Indoor Air Value for Soil (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Industrial and Commercial II Direct Contact Value for Soil (ppb)	MDEQ Soil Saturation Concentration Screening Values	Site SSTL Value (ppb)
Indeno(1,2,3-c,d)pyrene	200	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	400	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	600	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	800	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	1000	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	1200	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	1400	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	1600	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	1800	NLL	NLV	NC	1.0E+05	NA	100,000
Indeno(1,2,3-c,d)pyrene	2000	NLL	NLV	NC	1.0E+05	NA	100,000
Methyl tert-butyl ether (MTBE)	200	2.2E+05	**5.9E+06**	NC	**5.9E+06**	5.9E+06	220,000
Methyl tert-butyl ether (MTBE)	400	4.4E+05	**5.9E+06**	NC	**5.9E+06**	5.9E+06	440,000
Methyl tert-butyl ether (MTBE)	600	6.8E+05	**5.9E+06**	NC	**5.9E+06**	5.9E+06	680,000
Methyl tert-butyl ether (MTBE)	800	9.5E+05	**5.9E+06**	NC	**5.9E+06**	5.9E+06	950,000
Methyl tert-butyl ether (MTBE)	1000	1.2E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	1,200,000
Methyl tert-butyl ether (MTBE)	1200	1.5E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	1,500,000
Methyl tert-butyl ether (MTBE)	1400	1.7E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	1,700,000
Methyl tert-butyl ether (MTBE)	1600	2.0E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	2,000,000
Methyl tert-butyl ether (MTBE)	1800	2.2E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	2,200,000
Methyl tert-butyl ether (MTBE)	2000	2.5E+06	**5.9E+06**	NC	**5.9E+06**	5.9E+06	2,500,000
Naphthalene	200	6.7E+05	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	400	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	600	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	800	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	1000	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	1200	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	1400	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	1600	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	1800	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Naphthalene	2000	**6.7E+05**	4.7E+05	NC	8.0E+07	NA	470,000
Phenanthrene	200	3.5E+04	3.3E+06	NC	8.0E+06	NA	35,330
Phenanthrene	400	7.0E+04	3.3E+06	NC	8.0E+06	NA	70,320
Phenanthrene	600	1.1E+05	3.3E+06	NC	8.0E+06	NA	108,485
Phenanthrene	800	1.5E+05	3.3E+06	NC	8.0E+06	NA	151,870
Phenanthrene	1000	2.0E+05	3.3E+06	NC	8.0E+06	NA	197,871
Phenanthrene	1200	2.4E+05	3.3E+06	NC	8.0E+06	NA	237,445
Phenanthrene	1400	2.8E+05	3.3E+06	NC	8.0E+06	NA	277,019
Phenanthrene	1600	3.2E+05	3.3E+06	NC	8.0E+06	NA	316,593
Phenanthrene	1800	**3.4E+05**	3.3E+06	NC	8.0E+06	NA	3,300,000
Phenanthrene	2000	**3.4E+05**	3.3E+06	NC	8.0E+06	NA	3,300,000
Polychlorinated Biphenyl's (PCBs)	200	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	400	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	600	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	800	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	1000	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	1200	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	1400	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	1600	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	1800	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Polychlorinated Biphenyl's (PCBs)	2000	NA	1.6E+07	NC	2.0E+04*	NA	20,000*
Pyrene	200	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	400	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	600	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	800	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	1000	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	1200	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	1400	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	1600	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	1800	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Pyrene	2000	ID	1.0E+09	NC	1.1E+08	NA	110,000,000
Tetrachloroethylene	200	1.1E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	11,000
Tetrachloroethylene	400	2.2E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	22,000
Tetrachloroethylene	600	3.5E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	35,000
Tetrachloroethylene	800	4.8E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	48,000
Tetrachloroethylene	1000	6.3E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	60,000
Tetrachloroethylene	1200	7.6E+04	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	76,000
Tetrachloroethylene	1400	**8.8E+04**	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	**88,000**
Tetrachloroethylene	1600	**8.8E+04**	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	**88,000**
Tetrachloroethylene	1800	**8.8E+04**	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	**88,000**
Tetrachloroethylene	2000	**8.8E+04**	6.0E+04	1.0E+05	**8.8E+04**	8.8E+04	**88,000**
Toluene	200	1.8E+04	**2.5E+05**	NC	**2.5E+05**	2.5E+05	18,000
Toluene	400	3.6E+04	**2.5E+05**	NC	**2.5E+05**	2.5E+05	36,000
Toluene	600	5.5E+04	**2.5E+05**	NC	**2.5E+05**	2.5E+05	55,000
Toluene	800	7.7E+04	**2.5E+05**	NC	**2.5E+05**	2.5E+05	77,000
Toluene	1000	1.0E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	100,000
Toluene	1200	1.2E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	120,000
Toluene	1400	1.4E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	140,000
Toluene	1600	1.6E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	160,000
Toluene	1800	1.8E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	180,000
Toluene	2000	2.0E+05	**2.5E+05**	NC	**2.5E+05**	2.5E+05	200,000
1,1,1-Trichloroethane	200	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	400	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	600	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	800	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	1000	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	1200	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	1400	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	1600	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	1800	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**
1,1,1-Trichloroethane	2000	**4.6E+05**	**4.6E+05**	NC	**4.6E+05**	4.6E+05	**460,000**

Table E-1
Site Specific Target Level Calculation For Soil
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Soil GSI SSTL (ppb)	MDEQ Generic Volatilization to Indoor Air Value for Soil (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Industrial and Commercial II Direct Contact Value for Soil (ppb)	MDEQ Soil Saturation Concentration Screening Values	Site SSTL Value (ppb)
Trichloroethylene	200	3.3E+04	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	33,000
Trichloroethylene	400	6.6E+04	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	600	1.0E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	800	1.4E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	1000	1.9E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	1200	2.2E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	1400	2.6E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	1600	3.0E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	1800	3.3E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Trichloroethylene	2000	3.7E+05	3.7E+04	6.3E+04	**5.0E+05**	5.0E+05	62,800
Vinyl Chloride	200	4.7E+03	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	400	9.4E+03	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	600	1.4E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	800	2.0E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	1000	2.6E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	1200	3.2E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	1400	3.7E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	1600	4.2E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	1800	4.7E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Vinyl Chloride	2000	5.3E+04	1.5E+02	8.3E+02	2.9E+04	4.9E+05	825
Xylenes (Total)	200	5.5E+03	**1.5E+05**	NC	**1.5E+05**	1.5E+05	5,500
Xylenes (Total)	400	1.1E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	11,000
Xylenes (Total)	600	1.7E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	17,000
Xylenes (Total)	800	2.4E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	24,000
Xylenes (Total)	1000	3.1E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	31,000
Xylenes (Total)	1200	3.7E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	37,000
Xylenes (Total)	1400	4.3E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	43,000
Xylenes (Total)	1600	4.9E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	49,000
Xylenes (Total)	1800	5.6E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	56,000
Xylenes (Total)	2000	6.2E+04	**1.5E+05**	NC	**1.5E+05**	1.5E+05	62,000

Notes:
ppb - parts per billion
SSTL - Site-Specific Target Level
NLL - Chemical is not likely to leach under most soil conditions.
NLV - Not Likely to Volatilize per MDEQ ERD Op Memo #18.
ID - Insufficient Data per MDEQ ERD Op Memo #18.
NA - Not available per MDEQ ERD Op Memo #18.
NC - Not Calculated
Bolded values exceed or are limited by the MDEQ ERD Op Memo #18 Water Solubility Value or Soil Saturation and default this value.
*Per Part 201, refer to the Toxic Substances Control Act (TSCA), 40 CFR 761, subparts D and G, as amended, to determine the applicability of TSCA
Changes in MDEQ criteria may change Site SSTL value.

2 5

1) Workers don't care about distance to SW

Table E-2
Site Specific Target Level Calculation For Groundwater
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Groundwater GSI SSTL (ppb)	MDEQ Generic Comm. & Industrial II, III, IV Groundwater Volatilization to Indoor Air Criteria (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Groundwater Contact Criteria (ppb)	Groundwater Solubility	Site SSTL Value (ppb)
Acetone	200	3.5E+04	**1.0E+09**	NC	3.1E+07	1.00E+09	35,000
Acetone	400	7.0E+04	**1.0E+09**	NC	3.1E+07	1.00E+09	70,000
Acetone	600	1.1E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	110,000
Acetone	800	1.5E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	150,000
Acetone	1000	2.0E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	200,000
Acetone	1200	2.4E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	240,000
Acetone	1400	2.7E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	270,000
Acetone	1600	3.1E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	310,000
Acetone	1800	3.5E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	350,000
Acetone	2000	3.9E+05	**1.0E+09**	NC	3.1E+07	1.00E+09	390,000
Acenaphthene	200	3.9E+02	**4.2E+03**	NC	**4.2E+03**	4.24E+03	390
Acenaphthene	400	7.8E+02	**4.2E+03**	NC	**4.2E+03**	4.24E+03	780
Acenaphthene	600	1.2E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	1,200
Acenaphthene	800	1.7E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	1,700
Acenaphthene	1000	2.2E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	2,200
Acenaphthene	1200	2.6E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	2,600
Acenaphthene	1400	3.1E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	3,100
Acenaphthene	1600	3.5E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	3,500
Acenaphthene	1800	3.9E+03	**4.2E+03**	NC	**4.2E+03**	4.24E+03	3,900
Acenaphthene	2000	**4.2E+03**	**4.2E+03**	NC	**4.2E+03**	4.24E+03	4,200
Anthracene	200	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	400	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	600	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	800	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	1000	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	1200	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	1400	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	1600	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	1800	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Anthracene	2000	ID	**4.3E+01**	NC	**4.3E+01**	4.30E+01	43
Benzene	200	4.1E+03	3.6E+04	NC	1.1E+04	1.75E+06	4,100
Benzene	400	8.2E+03	3.6E+04	NC	1.1E+04	1.75E+06	8,200
Benzene	600	1.3E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	800	1.8E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	1000	2.3E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	1200	2.8E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	1400	3.2E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	1600	3.7E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	1800	4.2E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzene	2000	4.6E+04	3.6E+04	NC	1.1E+04	1.75E+06	11,000
Benzo(a)anthracene	200	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	400	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	600	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	800	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	1000	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	1200	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	1400	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	1600	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	1800	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(a)anthracene	2000	ID	NLV	NC	**9.4E+00**	9.40E+00	9.4
Benzo(b)fluoranthene	200	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	400	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	600	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	800	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	1000	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	1200	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	1400	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	1600	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	1800	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(b)fluoranthene	2000	ID	NLV	NC	**2.0E+00**	2.00E+00	2.0
Benzo(k)fluoranthene	200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	1000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	1200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	1400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	1600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	1800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(k)fluoranthene	2000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	1000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	1200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	1400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	1600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	1800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(a)pyrene	2000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0

Table E-2
Site Specific Target Level Calculation For Groundwater
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Groundwater GSI SSTL (ppb)	MDEQ Generic Comm. & Industrial II, III, IV Groundwater Volatilization to Indoor Air Criteria (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Groundwater Contact Criteria (ppb)	Groundwater Solubility	Site SSTL Value (ppb)
Benzo(g,h,i)perylene	200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	1000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	1200	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	1400	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	1600	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	1800	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Benzo(g,h,i)perylene	2000	ID	NLV	NC	**5.0E+00**	5.00E+00	5.0
Chlorobenzene	200	9.7E+02	**4.7E+05**	NC	8.6E+04	4.70E+05	970
Chlorobenzene	400	1.9E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	1,900
Chlorobenzene	600	3.0E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	3,000
Chlorobenzene	800	4.2E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	4,200
Chlorobenzene	1000	5.4E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	5,400
Chlorobenzene	1200	6.5E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	6,500
Chlorobenzene	1400	7.6E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	7,600
Chlorobenzene	1600	8.7E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	8,700
Chlorobenzene	1800	9.8E+03	**4.7E+05**	NC	8.6E+04	4.70E+05	9,800
Chlorobenzene	2000	1.1E+04	**4.7E+05**	NC	8.6E+04	4.70E+05	11,000
Chrysene	200	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	400	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	600	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	800	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	1000	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	1200	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	1400	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	1600	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	1800	ID	ID	NC	5.0E+00	1.60E+00	5.0
Chrysene	2000	ID	ID	NC	5.0E+00	1.60E+00	5.0
1,1 Dichloroethane	200	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	400	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	600	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	800	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	1000	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	1200	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	1400	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	1600	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	1800	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1 Dichloroethane	2000	ID	2.3E+06	NC	2.4E+06	5.06E+06	2,300,000
1,1-Dichloroethylene	200	1.3E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	400	2.7E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	600	4.1E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	800	5.8E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	1000	7.5E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	1200	9.0E+03	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	1400	1.1E+04	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	1600	1.2E+04	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	1800	1.4E+04	1.3E+03	NC	1.1E+04	2.25E+06	1,300
1,1-Dichloroethylene	2000	1.5E+04	1.3E+03	NC	1.1E+04	2.25E+06	1,300
cis-1,2-Dichloroethylene	200	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	400	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	600	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	800	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	1000	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	1200	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	1400	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	1600	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	1800	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
cis-1,2-Dichloroethylene	2000	ID	2.2E+05	NC	2.0E+05	3.50E+06	200,000
trans-1,2-Dichloroethylene	200	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	400	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	600	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	800	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	1000	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	1200	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	1400	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	1600	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	1800	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
trans-1,2-Dichloroethylene	2000	ID	2.0E+05	NC	2.2E+05	6.30E+06	200,000
Ethylbenzene	200	3.7E+02	**1.7E+05**	NC	**1.7E+05**	1.69E+05	370
Ethylbenzene	400	7.4E+02	**1.7E+05**	NC	**1.7E+05**	1.69E+05	740
Ethylbenzene	600	1.1E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	1,100
Ethylbenzene	800	1.6E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	1,600
Ethylbenzene	1000	2.1E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	2,100
Ethylbenzene	1200	2.5E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	2,500
Ethylbenzene	1400	2.9E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	2,900
Ethylbenzene	1600	3.3E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	3,300
Ethylbenzene	1800	3.7E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	3,700
Ethylbenzene	2000	4.2E+03	**1.7E+05**	NC	**1.7E+05**	1.69E+05	4,200

Table E-2
Site Specific Target Level Calculation For Groundwater
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Groundwater GSI SSTL (ppb)	MDEQ Generic Comm. & Industrial II, III, IV Groundwater Volatilization to Indoor Air Criteria (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Groundwater Contact Criteria (ppb)	Groundwater Solubility	Site SSTL Value (ppb)
Fluoranthene	200	3.3E+01	**2.1E+02**	NC	**2.1E+02**	2.06E+02	33
Fluoranthene	400	6.6E+01	**2.1E+02**	NC	**2.1E+02**	2.06E+02	67
Fluoranthene	600	1.0E+02	**2.1E+02**	NC	**2.1E+02**	2.06E+02	100
Fluoranthene	800	1.4E+02	**2.1E+02**	NC	**2.1E+02**	2.06E+02	140
Fluoranthene	1000	1.8E+02	**2.1E+02**	NC	**2.1E+02**	2.06E+02	190
Fluoranthene	1200	**2.1E+02**	**2.1E+02**	NC	**2.1E+02**	2.06E+02	210
Fluoranthene	1400	**2.1E+02**	**2.1E+02**	NC	**2.1E+02**	2.06E+02	210
Fluoranthene	1600	**2.1E+02**	**2.1E+02**	NC	**2.1E+02**	2.06E+02	210
Fluoranthene	1800	**2.1E+02**	**2.1E+02**	NC	**2.1E+02**	2.06E+02	210
Fluoranthene	2000	**2.1E+02**	**2.1E+02**	NC	**2.1E+02**	2.06E+02	210
Fluorene	200	2.5E+02	**2.0E+03**	NC	**2.0E+03**	1.98E+03	250
Fluorene	400	4.9E+02	**2.0E+03**	NC	**2.0E+03**	1.98E+03	490
Fluorene	600	7.6E+02	**2.0E+03**	NC	**2.0E+03**	1.98E+03	760
Fluorene	800	1.1E+03	**2.0E+03**	NC	**2.0E+03**	1.98E+03	1,100
Fluorene	1000	1.4E+03	**2.0E+03**	NC	**2.0E+03**	1.98E+03	1,400
Fluorene	1200	1.7E+03	**2.0E+03**	NC	**2.0E+03**	1.98E+03	1,700
Fluorene	1400	1.9E+03	**2.0E+03**	NC	**2.0E+03**	1.98E+03	1,900
Fluorene	1600	**2.0E+03**	**2.0E+03**	NC	**2.0E+03**	1.98E+03	**2,000**
Fluorene	1800	**2.0E+03**	**2.0E+03**	NC	**2.0E+03**	1.98E+03	**2,000**
Fluorene	2000	**2.0E+03**	**2.0E+03**	NC	**2.0E+03**	1.98E+03	**2,000**
Indeno(1,2,3-c,d)pyrene	200	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	400	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	600	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	800	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	1000	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	1200	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	1400	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	1600	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	1800	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Indeno(1,2,3-c,d)pyrene	2000	ID	NLV	NC	5.0E+00	2.20E-02	5.0
Methyl tert-butyl ether (MTBE)	200	1.5E+04	**4.7E+07**	NC	6.9E+05	4.70E+07	15,000
Methyl tert-butyl ether (MTBE)	400	3.0E+04	**4.7E+07**	NC	6.9E+05	4.70E+07	30,000
Methyl tert-butyl ether (MTBE)	600	4.6E+04	**4.7E+07**	NC	6.9E+05	4.70E+07	46,000
Methyl tert-butyl ether (MTBE)	800	6.5E+04	**4.7E+07**	NC	6.9E+05	4.70E+07	65,000
Methyl tert-butyl ether (MTBE)	1000	8.4E+04	**4.7E+07**	NC	6.9E+05	4.70E+07	84,000
Methyl tert-butyl ether (MTBE)	1200	1.0E+05	**4.7E+07**	NC	6.9E+05	4.70E+07	100,000
Methyl tert-butyl ether (MTBE)	1400	1.2E+05	**4.7E+07**	NC	6.9E+05	4.70E+07	120,000
Methyl tert-butyl ether (MTBE)	1600	1.3E+05	**4.7E+07**	NC	6.9E+05	4.70E+07	130,000
Methyl tert-butyl ether (MTBE)	1800	1.5E+05	**4.7E+07**	NC	6.9E+05	4.70E+07	150,000
Methyl tert-butyl ether (MTBE)	2000	1.7E+05	**4.7E+07**	NC	6.9E+05	4.70E+07	170,000
Naphthalene	200	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	400	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	600	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	800	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	1000	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	1200	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	1400	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	1600	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	1800	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Naphthalene	2000	**3.1E+04**	**3.1E+04**	NC	**3.1E+04**	3.10E+04	**31,000**
Phenanthrene	200	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	400	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	600	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	800	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	1000	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	1200	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	1400	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	1600	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	1800	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Phenanthrene	2000	**1.0E+03**	**1.0E+03**	NC	**1.0E+03**	1.00E+03	**1,000**
Polychlorinated Biphenyl's (PCBs)	200	4.1	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	400	8.2	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	600	12.7	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	800	17.7	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	1000	23.1	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	1200	27.7	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	1400	32.3	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	1600	37.0	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	1800	41.6	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Polychlorinated Biphenyl's (PCBs)	2000	**44.7**	**4.5E+01**	NC	3.3E+00	4.47E+01	3.3
Pyrene	200	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	400	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	600	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	800	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	1000	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	1200	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	1400	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	1600	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	1800	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**
Pyrene	2000	ID	**1.4E+02**	NC	**1.4E+02**	1.35E+02	**140**

Table E-2
Site Specific Target Level Calculation For Groundwater
GM Powertrain Willow Run Plant
Ypsilanti, Michigan

Compound	Distance to surface water (feet)	Calculated Groundwater GSI SSTL (ppb)	MDEQ Generic Comm. & Industrial II, III, IV Groundwater Volatilization to Indoor Air Criteria (ppb)	Calculated Risk-Based Volitilization to Indoor Air Value	MDEQ Generic Groundwater Contact Criteria (ppb)	Groundwater Solubility	Site SSTL Value (ppb)
Tetrachloroethylene	200	9.3E+02	1.7E+05	NC	1.2E+04	2.00E+05	930
Tetrachloroethylene	400	1.8E+03	1.7E+05	NC	1.2E+04	2.00E+05	1,800
Tetrachloroethylene	600	2.8E+03	1.7E+05	NC	1.2E+04	2.00E+05	2,800
Tetrachloroethylene	800	4.0E+03	1.7E+05	NC	1.2E+04	2.00E+05	4,000
Tetrachloroethylene	1000	5.2E+03	1.7E+05	NC	1.2E+04	2.00E+05	5,200
Tetrachloroethylene	1200	6.2E+03	1.7E+05	NC	1.2E+04	2.00E+05	6,200
Tetrachloroethylene	1400	7.3E+03	1.7E+05	NC	1.2E+04	2.00E+05	7,300
Tetrachloroethylene	1600	8.3E+03	1.7E+05	NC	1.2E+04	2.00E+05	8,300
Tetrachloroethylene	1800	9.4E+03	1.7E+05	NC	1.2E+04	2.00E+05	9,400
Tetrachloroethylene	2000	1.0E+04	1.7E+05	NC	1.2E+04	2.00E+05	10,000
Toluene	200	2.9E+03	**5.3E+05**	NC	**5.3E+05**	5.30E+05	2,900
Toluene	400	5.7E+03	**5.3E+05**	NC	**5.3E+05**	5.30E+05	5,700
Toluene	600	8.9E+03	**5.3E+05**	NC	**5.3E+05**	5.30E+05	8,900
Toluene	800	1.2E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	12,000
Toluene	1000	1.6E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	16,000
Toluene	1200	1.9E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	19,000
Toluene	1400	2.3E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	23,000
Toluene	1600	2.6E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	26,000
Toluene	1800	2.9E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	29,000
Toluene	2000	3.2E+04	**5.3E+05**	NC	**5.3E+05**	5.30E+05	32,000
1,1,1-Trichloroethane	200	6.8E+03	**1.3E+06**	NC	**1.3E+06**	1.33E+06	6,800
1,1,1-Trichloroethane	400	1.4E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	14,000
1,1,1-Trichloroethane	600	2.1E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	21,000
1,1,1-Trichloroethane	800	2.9E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	29,000
1,1,1-Trichloroethane	1000	3.8E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	38,000
1,1,1-Trichloroethane	1200	4.6E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	46,000
1,1,1-Trichloroethane	1400	5.3E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	53,000
1,1,1-Trichloroethane	1600	6.1E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	61,000
1,1,1-Trichloroethane	1800	6.9E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	69,000
1,1,1-Trichloroethane	2000	7.6E+04	**1.3E+06**	NC	**1.3E+06**	1.33E+06	76,000
Trichloroethylene	200	4.1E+03	9.7E+04	NC	3.7E+04	1.10E+06	4,100
Trichloroethylene	400	8.2E+03	9.7E+04	NC	3.7E+04	1.10E+06	8,200
Trichloroethylene	600	1.3E+04	9.7E+04	NC	3.7E+04	1.10E+06	13,000
Trichloroethylene	800	1.8E+04	9.7E+04	NC	3.7E+04	1.10E+06	18,000
Trichloroethylene	1000	2.3E+04	9.7E+04	NC	3.7E+04	1.10E+06	23,000
Trichloroethylene	1200	2.8E+04	9.7E+04	NC	3.7E+04	1.10E+06	28,000
Trichloroethylene	1400	3.2E+04	9.7E+04	NC	3.7E+04	1.10E+06	32,000
Trichloroethylene	1600	3.7E+04	9.7E+04	NC	3.7E+04	1.10E+06	37,000
Trichloroethylene	1800	4.2E+04	9.7E+04	NC	3.7E+04	1.10E+06	42,000
Trichloroethylene	2000	4.6E+04	9.7E+04	NC	3.7E+04	1.10E+06	46,000
Vinyl Chloride	200	3.1E+02	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	400	6.2E+02	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	600	9.5E+02	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	800	1.3E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	1000	1.7E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	1200	2.1E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	1400	2.4E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	1600	2.8E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	1800	3.1E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Vinyl Chloride	2000	3.5E+03	6.9E+02	1.2E+03	5.7E+02	2.76E+06	570
Xylenes (Total)	200	7.2E+02	**1.9E+05**	NC	1.9E+05	**1.86E+05**	720
Xylenes (Total)	400	1.4E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	1,400
Xylenes (Total)	600	2.2E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	2,200
Xylenes (Total)	800	3.1E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	3,100
Xylenes (Total)	1000	4.0E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	4,000
Xylenes (Total)	1200	4.8E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	4,900
Xylenes (Total)	1400	5.7E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	5,700
Xylenes (Total)	1600	6.5E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	6,500
Xylenes (Total)	1800	7.3E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	7,300
Xylenes (Total)	2000	8.1E+03	**1.9E+05**	NC	1.9E+05	**1.86E+05**	8,100

Notes:
ppb - parts per billion
SSTL - Site-Specific Target Level
NLL - Chemical is not likely to leach under most soil conditions.
NLV - Not Likely to Volatilize per MDEQ ERD Op Memo #18.
ID - Insufficient Data per MDEQ ERD Op Memo #18.
NA - Not available per MDEQ ERD Op Memo #18.
NC - Not Calculated
Bolded values exceed or are limited by the MDEQ ERD Op Memo #18 Water Solubility Value or Soil Saturation and default this value.
*Per Part 201, refer to the Toxic Substances Control Act (TSCA), 40 CFR 761, subparts D and G, as amended, to determine the applicability of TSCA
Changes in MDEQ criteria may change Site SSTL value.