Appendix A. Chemicals tested for at the Mill Street Plant Brownfield, sampled May 25, 2004, City of Ecorse, Wayne County, Michigan. (Detected chemicals are underlined. Exceedances of Michigan criteria are shaded.)

VOCs	SVOCs	Metals	Pesticides and PCBs
1,1,1,2-Tetrachloroethane	1,2,4-Trichlorobenzene	Aluminum	4,4'-DDD
1,1,1-Trichloroethane	2,4,5-Trichlorophenol	Antimony	4,4'-DDE
1,1,2,2-Tetrachloroethane	2,4,6-Trichlorophenol	Arsenic	4,4'-DDT
1,1,2-Trichloroethane	2,4-Dichlorophenol	Barium	Aldrin
1,1-Dichloroethane	2,4-Dimethylphenol	Beryllium	alpha-Chlordane
1,1-Dichloroethene	2,4-Dinitrophenol	Cadmium	alpha-Hexachlorocyclohexane
1,2,3-Trichlorobenzene	2,4-Dinitrotoluene	Calcium	Aroclor 1016
1,2,3-Trichloropropane	2,6-Dinitrotoluene	Chromium	Aroclor 1221
1,2,4-Trimethylbenzene	2-Chloronaphthalene	Cobalt	Aroclor 1232
1,2-Dibromo-3-chloropropane	2-Chlorophenol	Copper	Aroclor 1242
1,2-Dibromoethane	2-Methylnaphthalene	Cyanide	Aroclor 1248
1,2-Dichlorobenzene	2-Methylphenol	Iron	Aroclor 1254
1,2-Dichloroethane	2-Nitroaniline	Lead	Aroclor 1260
1,2-Dichloropropane	2-Nitrophenol	Magnesium	Aroclor 1262
1,3,5-Trimethylbenzene	3-Nitroaniline	Manganese	Aroclor 1268
1,3-Dichlorobenzene	4,6-Dinitro-2-methylphenol	Mercury	beta-Hexachlorocyclohexane
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether	Nickel	delta-Hexachlorocyclohexane
2-Butanone	4-Chloro-3-methylphenol	Potassium	Dieldrin
2-Hexanone	4-Chlorophenyl phenyl ether	Selenium	Endosulfan I
4-Isopropyltoluene	4-Methylphenol & 3-Methylphenol	Silver	Endosulfan II
4-Methyl-2-pentanone	4-Nitroaniline	Sodium	Endosulfan sulfate
Acetone	4-Nitrophenol	Thallium	Endrin
Acrylonitrile	Acenaphthene	Vanadium	Endrin aldehyde
Benzene	Acenaphthylene	Zinc	Endrin ketone
Bromobenzene	Anthracene		gamma-Chlordane
Bromochloromethane	Azobenzene		Heptachlor
Bromodichlormethane	Benzo (g,h,i)perylene		Heptachlor epoxide
Bromoform	Benzo(a)anthracene		Lindane
Bromomethane	Benzo(a)pyrene		Methoxychlor
Carbon disulfide	Benzo(b)fluoranthene		Toxaphene
Carbon tetrachloride	Benzo(k)fluoranthene		
Chlorobenzene	Bis(2-chloroethoxy)methane		
Chloroethane	Bis(2-chloroethyl)ether		
Chloroform	Bis(2-chloroisopropyl)ether		
Chloromethane	Bis(2-ethylhexyl)phthalate		
cis-1,2-Dichloroethene	Butyl benzyl phthalate		
cis-1,3-Dichloropropene	Carbazole		
Dibromochloromethane	Chrysene		
Dibromomethane	Dibenzo(a,h)anthracene		
Dichlorodifluoromethane	Dibenzofuran		
Diethyl ether	Diethyl phthalate		
Ethylbenzene	Dimethyl phthalate		
Hexachloroethane	Di-n-butyl phthalate		
Iodomethane	di-n-octyl phthalate		
Isopropylbenzene	Fluoranthene		
m,p-Xylene	Fluorene		
Methy tert-butyl ether	Hexachlorobenzene		
Methylene chloride	Hexachlorobutadiene		
n-Butylbenzene	Hexachlorocyclopentadiene		
n-Propylbenzene	Hexachloroethane		
o-Xylene	Indeno(1,2,3-cd)pyrene		
sec-Butylbenzene	Isophorone		
Styrene	Naphthalene		
tert-Butylbenzene	Nitrobenzene		
Tetrachloroethene	N-Nitrosodimethylamine		
Toluene	N-Nitrosodi-n-propylamine		
trans-1,2-Dichloroethene	N-Nitrosodiphenylamine		
trans-1,3-Dichloropropene	Pentachlorophenol		
trans-1,4-Dichloro-2-butene	Phenanthrene		
Trichloroethene	Phenol		
Trichlorofluoromethane	Pyrene		
Vinyl chloride			

Appendix B. MDEQ Part 201 Generic Clean-up Criteria Terminology

Industrial and Commercial Land-Use Definitions

The primary activity in an **Industrial** land-use setting is industrial in nature. Access to the general public is and will continue to be reliably restricted consistent with use of the property. Exposure assumptions include: a soil ingestion rate of 50 mg/day, up to 245 days/year ingestion frequency, up to 160 days/year dermal exposure to soil, and up to 21 years exposure duration.

A **Commercial I** property is used to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations. Examples of Commercial I properties are schools, nursing homes, and daycare facilities. Exposure assumptions include: a soil ingestion rate of 200 mg/day (child) or 100 mg/day (adult), up to 350 days/year ingestion frequency; up to 245 days/year dermal exposure to soil, and up to 6 years (child) or 24 years (adult) exposure duration. (These are the same exposure assumptions as for a Residential scenario.)

A **Commercial II** property has activities similar to the Industrial category. Access to the public is reliably restricted, consistent with property use, by means of fencing, security systems, or both. Exposure assumptions are the same as for the Industrial category.

The public has unrestricted access at a **Commercial III** property. However, public access is less in frequency and duration than workers at the facility. The worker population is engaged in activities that are of a low soil-intensive nature. Examples of Commercial III properties are gas stations, auto dealerships, auto service stations, and retail warehouses. Exposure assumptions are the same as for the Industrial category.

The **Commercial IV** property similar to the Commercial III property except the worker population is engaged in activities that are of a high soil-intensive nature, such as grounds maintenance. Examples of Commercial IV properties are professional offices, medical/dental offices and clinics, and banks. Exposure assumptions are the same as for the Industrial category.

MDEQ Groundwater Criteria

The **Residential and Commercial I Drinking Water Criteria (DWC)** identify drinking water concentrations that are safe for long-term, daily residential or light commercial-setting consumption. The criteria are *not* applicable if drinking water use is prohibited by land use restrictions, such as a restrictive covenant, or by an approved institutional control that is part of the Remedial Action Plan. Adverse aesthetic impacts are considered for select chemicals. The **Industrial and Commercial II, III, IV DWC** identify drinking water concentrations that are safe for long-term, daily workplace consumption. Residential/Commercial I DWC are applicable at the site boundary unless off-property use of the aquifer is appropriately controlled. Applicability of the criteria and consideration of aesthetic impacts are the same as for the Residential/Commercial I DWC.

The **Groundwater Surface Water Interface (GSI) Criteria** identify groundwater concentrations that are protective of a receiving surface water. The criteria are based on the most protective value for aquatic life, terrestrial life, or human health.

The **Residential and Commercial I Groundwater Volatilization to Indoor Air Inhalation Criteria (GVIIC)** address the migration of chemical vapors from groundwater through soil into buildings. The criteria identify groundwater concentrations that protect occupants from the inhalation of contaminant concentrations in indoor air that may cause adverse health effects. Therefore, the pathway is relevant only for volatile compounds. The criteria are *not* applicable if a current or future structure does not contain materials, at or below grade, that limit vapor intrusion (poured cement walls versus soil or basements), there is an open sump, or depth to groundwater is less than 3 meters below grade. (These properties require a site-specific assessment.) The **Industrial and Commercial II, III, IV Groundwater Volatilization to Indoor Air Inhalation Criteria** identify groundwater concentrations that protect workers from the inhalation of contaminant concentrations in workplace indoor air that may cause adverse health effects. As for the Residential/Commercial I GVIIC, the criteria are *not* applicable if a current or future structure does not contain materials that limit vapor intrusion (poured cement walls versus soil basements), there is an open sump, or depth to groundwater is less than 3 meters below grade.

The **Groundwater Contact Criteria (GCC)** identify groundwater concentrations that are protective against adverse health effects that may result from dermal exposure to chemicals in groundwater, such as could be experienced by workers in subsurface excavations. The criteria are only protective of chronic systemic human health effects and do not address flammability/explosivity or acute inhalation and dermal toxicity.

Water Solubility Criteria identify theoretical threshold water concentrations above which free phase liquid contaminant may exist. Water solubility is defined as the maximum amount of solute that will dissolve in a given amount of water to produce a saturated solution. Solubilities can be greater than 100 percent.

Flammability and Explosivity Criteria identify concentrations in groundwater that are protective against physical hazards of flammability and explosivity. Criteria are available for those chemicals with a published flash point of less than 140º F and a published lower explosive limit (LEL). The screening level is set using 10 percent of the LEL, then converted to a groundwater value using the chemical-specific Henry's Law Constant.

Acute Inhalation Toxicity Screening Levels (AISLs) identify groundwater concentrations protective against unacceptable air concentrations within enclosed spaces that would cause acute inhalation toxicity. The screening levels are developed using National Institute of Occupational Safety and Health (NIOSH) short-term exposure limits (STELs, defined as 15-minute time-weighted average exposures that should not be exceeded at any time during a workday), then converted to a groundwater value using the chemical-specific Henry's Law Constant.

MDEQ Soil Criteria

The **Residential and Commercial I Drinking Water Protection Criteria (DWPC)** identify soil concentrations not expected to leach and contaminate groundwater at levels greater than the Residential/Commercial I DWC. The criteria are *not* applicable if drinking water use is prohibited by land use restrictions, such as a restrictive covenant, or by an approved institutional control. The **Industrial and Commercial II, III, IV DWPC** identify soil concentrations that are not expected to leach and contaminate groundwater at levels greater than the corresponding DWC on-property and the Residential/Commercial I DWC, or other applicable criteria, at the property boundary.

The **GSI Protection Criteria (GSIPC)** identify soil concentrations of chemicals that are not expected to leach and contaminated groundwater at levels greater than the corresponding GSI criteria.

The **Residential and Commercial I Soil Volatilization to Indoor Air Inhalation Criteria (SVIIC)** address the migration of contaminant vapors from soil into residential and some commercial buildings. These criteria identify soil concentrations that protect occupants from exposure to indoor air concentrations that may cause adverse health effects. The pathway is relevant only for volatile compounds. The criteria are *not* applicable if a current or future structure does not contain materials, at or below grade, that limit vapor intrusion (poured cement walls versus soil basements) or there is an open sump. The criteria may not be protective of odors, physical hazards, or ecological impacts. The **Industrial and Commercial II, III, IV SVIICs** address the migration of contaminants vapors from soil into workplace buildings. These criteria identify soil concentrations that protect workers from exposure to indoor air concentrations that may cause adverse health effects. Workplace exposures are not expected to be more than eight hours per day. Applicability of workplace criteria is the same as for Residential/-Commercial I applications.

The **Groundwater Contact Protection Criteria** identify soil concentrations that are not expected to contaminated groundwater at levels greater than the GCC.

The **Residential and Commercial I Direct Contact Criteria (DCC)** identify soil concentrations that are protective against adverse health effects due to long-term ingestion of and dermal exposure to contaminated soil. The criteria do *not* address risks posed by inhalation and physical hazards. The **Industrial and Commercial II DCC, Commercial III DCC, and Commercial IV DCC** are similar to the Residential/-Commercial I DCC, except that each applies to the appropriate workplace setting.

Soil Saturation (Csat) Screening Levels identify theoretical threshold soil concentrations above which free phase liquid contaminant may exist. Csat values serve as an upper limit to the applicability of other soil-based criteria. Csat screening levels are applicable to all soil depths.

The **Residential and Commercial I Infinite Volatile Soil Inhalation Criteria (VSIC) for Ambient Air** identify soil concentrations not expected to yield ambient air

concentrations that would cause adverse human health effects via inhalation. The **Residential and Commercial I Finite VSIC for 5 Meter Source Thickness - Ambient Air** applies to situations where the source thickness is 5 meters or less, regardless of the depth at which contamination is found. Similarly, the **Residential and Commercial I Finite VSIC for 2 Meter Source Thickness - Ambient Air** applies to situations where the source thickness is 2 meters or less. All three of these criteria only address long-term, systemic health effects and do not address acute health effects or physical hazards. The **Industrial and Commercial II, III, IV Infinite VSIC, VSIC for 5 Meter Source Thickness, and VSIC for 2 Meter Source Thickness – Ambient Air** are similar to their respective Residential/Commercial I counterparts, except that they apply to workplace settings.

The **Residential Particulate Soil Inhalation Criteria (PSICs) for Ambient Air** identify concentrations of chemicals in soil that are not expected to yield ambient air concentrations of contaminated particulates that would cause adverse human health effects via inhalation. If subsurface soils are not disturbed, the criteria are applicable to the top 6 inches of soil. Otherwise, the criteria apply to the entire soil column. It is assumed that there is 50 percent vegetative cover for each half-acre of an evaluated property. The criteria only address long-term, systemic health effects. The **Industrial/-Commercial PSICs for Ambient Air** are similar to the Residential/Commercial I criteria, except that they apply to workplace settings.

Certification

This **Mill Street Plant Brownfield Redevelopment Assessment** Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures.

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.