

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Brandon Alger, Geologist, RRD

FROM: Shane Morrison, Toxicologist, RRD

DATE: October 30, 2018

SUBJECT: Ford Livonia Transmission Plant (ReSub 12-hr) Site-Specific Criteria Evaluation

The following site-specific volatilization to indoor air criteria (VIAC) are the DEQ's determination of values that reflect best available information regarding the toxicity and exposure risks posed by the hazardous substances present at the facility. These values are based upon the information provided with the request to develop site-specific VIAC for this facility. Provided that the conditions used to develop the site-specific criteria are met, these values may be used without further documentation, or other values may be developed by a person consistent with the statutory provisions for development of site-specific criteria and provided for DEQ review and approval.

Correspondence transmitting these values to the submitter/consultant as part of a report, review, or other request must incorporate the appropriate sections of the VIAP model document language. As indicated in this document, when GVIIC and SVIIC are not applicable, the correspondence must include language indicating the requirement to satisfy the site-specific VIAC for all three media i.e., groundwater, soil, and soil gas. In addition, all of the following site-specific VIAC tables must be copied into the correspondence or letter as part of your response to the submitter/consultant.

Residential site-specific criteria were included in the evaluation based on information provided and the DEQ's residential conceptual site model. Exceedance of the site-specific unrestricted residential criteria will require restrictions or institutional controls for closure or aid in the determination of off-site migration.

Nonresidential site-specific criteria were generated for a 24-hour workday exposure (Tables 1-4) and when appropriate adjustments were made for a 12-hour workday exposure (Tables 5-8).

The site-specific criteria were generated using the USDA soil type of sand. Other site-specific criteria can be generated using a different soil types by providing soil characterization results from department approved methods on soils collected at the site.

Please contact me at MorrisonS5@michigan.gov or 517-284-5063 if you require any clarification of these comments and criterion or have additional questions.

cc: Mitch Adelman, Field Operations Section Manager, RRD
Christine Flaga, Toxicology Unit Supervisor, RRD
Matt Williams, Vapor Intrusion Specialist, RRD
Paul Owens, District Supervisor, RRD
Beth Vens, Assistant District Supervisor, RRD

Table 1. Nonresidential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (< 50,000 ft²) with a **slab-on-grade** or **crawlspace**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	Groundwater Not In Contact (GWNIC)	Soil	Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	2,900 nc	220 nc	10,000 nc
156592	cis-1,2-Dichloroethylene	810 nc	37 (M) nc	410 nc
156605	trans-1,2-Dichloroethylene	3,400 nc	210 nc	4,100 nc
123911	1,4-Dioxane	4.1E+05 ca	10,000 ca	400 ca
127184	Tetrachloroethylene	1,100 (SE) st	74 (SE) st	1,400 (SE) st
79016	Trichloroethylene	70 (SE) dev	4.0 (M) (SE) dev	67 (SE) dev
75014	Vinyl chloride	92 ca	8.2 (M) ca	450 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 2. Nonresidential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (< 50,000 ft²) with an **occupied basement**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	Groundwater In Contact (GWIC)	Soil	Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	170 nc	140 nc	10,000 nc
156592	cis-1,2-Dichloroethylene	11 nc	25 (M) nc	410 nc
156605	trans-1,2-Dichloroethylene	20 nc	140 nc	4,100 nc
123911	1,4-Dioxane	4,500 ca	6,800 ca	400 ca
127184	Tetrachloroethylene	23 (SE) st	49 (M) (SE) st	1,400 (SE) st
79016	Trichloroethylene	1.1 (SE) dev	2.7 (M) (SE) dev	67 (SE) dev
75014	Vinyl chloride	7.2 ca	5.4 (M) ca	450 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 3. Nonresidential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (> 50,000 ft²) with a **slab-on-grade** or **crawlspace**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	Groundwater Not In Contact (GWNIC)	Soil	Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	4,300 nc	330 nc	10,000 nc
156592	cis-1,2-Dichloroethylene	1,200 nc	55 nc	410 nc
156605	trans-1,2-Dichloroethylene	5,100 nc	320 nc	4,100 nc
123911	1,4-Dioxane	6.1E+05 ca	15,000 ca	400 ca
127184	Tetrachloroethylene	1,600 (SE) st	110 (SE) st	1,400 (SE) st
79016	Trichloroethylene	110 (SE) dev	6.0 (M) (SE) dev	67 (SE) dev
75014	Vinyl chloride	140 ca	12 (M) ca	450 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 4. Nonresidential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (> 50,000 ft²) with an **occupied basement**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	Groundwater In Contact (GWIC)	Soil	Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	250 nc	220 nc	10,000 nc
156592	cis-1,2-Dichloroethylene	14 nc	37 (M) nc	410 nc
156605	trans-1,2-Dichloroethylene	20 nc	210 nc	4,100 nc
123911	1,4-Dioxane	4,600 ca	10,000 ca	400 ca
127184	Tetrachloroethylene	35 (SE) st	74 (SE) st	1,400 (SE) st
79016	Trichloroethylene	1.6 (SE) dev	4.0 (M) (SE) dev	67 (SE) dev
75014	Vinyl chloride	10 ca	8.1 (M) ca	450 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 5. Nonresidential Volatilization to Indoor Air Criteria (VIAC) adjusted for **12 hour work-day exposure**. The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (< 50,000 ft²) with a **slab-on-grade** or **crawlspace**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	12 hr Groundwater In Contact (GWIC)	12 hr Soil	12 hr Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	5,700 nc	430 nc	20,000 nc
156592	cis-1,2-Dichloroethylene	1,600 nc	74 nc	820 nc
156605	trans-1,2-Dichloroethylene	6,800 nc	420 nc	8,200 nc
123911	1,4-Dioxane	8.1E+05 ca	21,000 ca	800 ca
127184	Tetrachloroethylene	2,200 (SE) st	150 (SE) st	2,700 (SE) st
79016	Trichloroethylene	140 (SE) dev	8.0 (M) (SE) dev	130 (SE) dev
75014	Vinyl chloride	180 ca	16 (M) ca	910 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: (ca) = Carcinogenic; (nc) = Non-Carcinogenic; (dev) = Developmental; (mut) = Mutagenic cancer; (st) = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote M: Site-specific criterion may be below target detection limits (TDL). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote SE: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote S: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 6. Nonresidential Volatilization to Indoor Air Criteria (VIAC) adjusted for **12 hour work-day exposure**. The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (< 50,000 ft²) with an **occupied basement**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	12 hr Groundwater In Contact (GWIC)	12 hr Soil	12 hr Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	350 nc	290 nc	20,000 nc
156592	cis-1,2-Dichloroethylene	22 nc	49 (M) nc	820 nc
156605	trans-1,2-Dichloroethylene	39 nc	280 nc	8,200 nc
123911	1,4-Dioxane	9,000 ca	14,000 ca	800 ca
127184	Tetrachloroethylene	47 (SE) st	99 (SE) st	2,700 (SE) st
79016	Trichloroethylene	2.2 (SE) dev	5.3 (M) (SE) dev	130 (SE) dev
75014	Vinyl chloride	14 ca	11 (M) ca	910 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: (ca) = Carcinogenic; (nc) = Non-Carcinogenic; (dev) = Developmental; (mut) = Mutagenic cancer; (st) = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote M: Site-specific criterion may be below target detection limits (TDL). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote SE: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote S: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 7. Nonresidential Volatilization to Indoor Air Criteria (VIAC) adjusted for **12 hour work-day exposure**. The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (> 50,000 ft²) with a **slab-on-grade** or **crawlspace**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	12 hr Groundwater In Contact (GWIC)	12 hr Soil	12 hr Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	8,600 nc	650 nc	20,000 nc
156592	cis-1,2-Dichloroethylene	2,400 nc	110 nc	820 nc
156605	trans-1,2-Dichloroethylene	10,000 nc	630 nc	8,200 nc
123911	1,4-Dioxane	1.2E+06 ca	31,000 ca	800 ca
127184	Tetrachloroethylene	3,300 (SE) st	220 (SE) st	2,700 (SE) st
79016	Trichloroethylene	210 (SE) dev	12 (M) (SE) dev	130 (SE) dev
75014	Vinyl chloride	280 ca	24 (M) ca	910 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 8. Nonresidential Volatilization to Indoor Air Criteria (VIAC) adjusted for **12 hour work-day exposure**. The following are **restricted** site-specific criteria that apply to a nonresidential **structure** (> 50,000 ft²) with an **occupied basement**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	12 hr Groundwater In Contact (GWIC)	12 hr Soil	12 hr Soil Gas**
		(µg/L)	(µg/kg)	(µg/m ³)
75354	1,1-Dichloroethylene	500 nc	430 nc	20,000 nc
156592	cis-1,2-Dichloroethylene	28 nc	74 nc	820 nc
156605	trans-1,2-Dichloroethylene	40 nc	420 nc	8,200 nc
123911	1,4-Dioxane	9,100 ca	21,000 ca	800 ca
127184	Tetrachloroethylene	70 (SE) st	150 (SE) st	2,700 (SE) st
79016	Trichloroethylene	3.3 (SE) dev	8.0 (M) (SE) dev	130 (SE) dev
75014	Vinyl chloride	21 ca	16 (M) ca	910 ca

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.

Table 9. Residential Volatilization to Indoor Air Criteria (VIAC). The following are **unrestricted** site-specific criteria that apply to a residential **house** with a **basement**, the depth to groundwater submitted for this site (i.e. 5 ft), and USDA soil type of **sand**.

CAS#	Hazardous Substance	Groundwater In Contact (GWIC) (µg/L)	Soil (µg/kg)	Soil Gas** (µg/m ³)
75354	1,1-Dichloroethylene	18 nc	12 (M) nc	7,000 nc
156592	cis-1,2-Dichloroethylene	3.4 nc	2.1 (M) nc	280 nc
156605	trans-1,2-Dichloroethylene	13 nc	12 (M) nc	2,800 nc
123911	1,4-Dioxane	1,900 ca	360 (M) ca	170 ca
127184	Tetrachloroethylene	1.5 (SE) st	6.2 (M) (SE) st	1,400 (SE) st
79016	Trichloroethylene	7.3E-02 (M) (SE) dev	0.33 (M) (DD) dev	67 (SE) dev
75014	Vinyl chloride	0.12 (M) mut	8.2E-02 (M) mut	54 mut

**Soil gas site-specific criteria are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for site-specific criterion: **(ca)** = Carcinogenic; **(nc)** = Non-Carcinogenic; **(dev)** = Developmental; **(mut)** = Mutagenic cancer; **(st)** = Short-term (i.e., less than chronic exposure); Agency for Toxic Substances and Disease Registry Inhalation Minimum Risk Level for Acute Inhalation or Intermediate Inhalation exposure durations; U.S. Environmental Protection Agency Integrated Risk Information System Reference Concentration for short-term exposure; or Air Quality Division Acute Initial Threshold Screening Level.
- Footnote **M**: Site-specific criterion may be below target detection limits (**TDL**). In accordance with Sec. 20120a(10) when the TDL for a hazardous substance is greater than the developed cleanup criterion, the criterion is the TDL.
- Footnote **SE**: Site-specific criteria based on single event exposure; therefore, sampling methods should reflect shorter exposure scenarios.
- Footnote **S**: Calculated health-based value exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is the criterion.