

## **Appendix C**

### **EGL E Response to Site-Specific Volatilization to Indoor Air Criteria Request**

## DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

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### INTEROFFICE COMMUNICATION

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TO: Ronda Blayer, Environmental Engineering Specialist, MMD

FROM: Shane Morrison, Senior Toxicologist, RRD

DATE: July 31, 2020

SUBJECT: Chemours Montague Works Site-Specific Criteria Evaluation

The following site-specific volatilization to indoor air criteria (SSVIAC) are the Michigan Department of Environment, Great Lakes, and Energy's (EGLE'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 SSVIAC for this facility. These values may be used provided it is documented that the conditions used to develop the site-specific criteria are met at the facility. Other values may be developed by a person consistent with the statutory provisions for development of site-specific criteria and provided for EGLE 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 volatilization to indoor air pathway (VIAP) model document language. As indicated in this document, when groundwater volatilization to indoor air inhalation criteria (GVIIC) and soil volatilization to indoor air inhalation criteria (SVIIC) are not applicable, the correspondence must include language indicating the requirement to evaluate all potentially affected three media i.e., groundwater, soil, and soil gas. In addition, all of the following SSVIAC tables must be copied into the correspondence or letter as part of your response to the submitter/consultant. If representative groundwater and soil sampling indicate that site concentrations are below unrestricted residential SSVIAC, there is not a vapor source and there is not a requirement to evaluate the migration of vapors with soil gas sampling. Exceedance of unrestricted residential SSVIAC for any media necessitates a representative soil gas investigation to evaluate the VIAP.

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

Nonresidential SSVIAC may be adjusted for some hazardous substances to reflect a reasonable maximum worker exposure of 12-hour per day; however, if a person does not exceed the provided nonresidential site-specific criteria, no adjustment is necessary.

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

Additional hazardous substances were included in the site-specific evaluation that were not explicitly requested. These hazardous substances may be components of recent petroleum releases and the primary breakdown products of tetrachloroethylene. The preemptive site-specific evaluation of these substances was provided to limit the potential need for future resubmittal for this facility.

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

cc: Eric Wildfang, Toxicology Unit Supervisor, RRD  
Rich Conforti, Management and Tracking Unit Supervisor, MMD  
Dale Bridgford, Geologist Specialist, MMD  
Joe Rogers, Geologist Specialist, MMD  
Al Taylor, Hazardous Waste Section Manager, MMD  
Kimberly Tyson, Permit and Corrective Action Unit Manager, MMD

**Table 1.** Nonresidential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a nonresidential structure that has areas **< 50,000 ft<sup>2</sup> of continuously open space**, a **basement** foundation, the depth to groundwater submitted for this site (i.e. 25 ft), and USDA soil type of **sand**.

| CAS#    | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)                   | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------|----------------------------------------------|-----------------------------------|------------------------------------|
| 83329   | Acenaphthene               | 3,900 (S)<br>sol                             | 2.4E+06<br>nc                     | 11,000<br>nc                       |
| 208968  | Acenaphthylene             | 490 (CC)<br>nc                               | DATA                              | 11,000<br>nc                       |
| 75070   | Acetaldehyde               | 27,000<br>nc                                 | 400 (M)<br>nc                     | 460<br>nc                          |
| 67641   | Acetone                    | 1.4E+08 (EE)<br>st                           | 2.1E+06 (EE)<br>st                | 1.0E+06 (EE)<br>st                 |
| 98862   | Acetophenone               | 6.1E+06 (S) (DD)<br>sol                      | 4.9E+06 (C) (DD) dev<br>(8.4E+05) | 1.1E+05 (DD)<br>dev                |
| 107028  | Acrolein                   | 40<br>nc                                     | 0.54 (M)<br>nc                    | 1.0<br>nc                          |
| 107131  | Acrylonitrile              | 1,200<br>ca                                  | 22 (M)<br>ca                      | 29<br>ca                           |
| 7664417 | Ammonia                    | 5.6E+06 (EE)<br>st                           | DATA                              | 40,000 (EE)<br>st                  |
| 994058  | t-Amyl methyl ether (TAME) | 20,000<br>nc                                 | 400<br>nc                         | 3,200<br>nc                        |
| 120127  | Anthracene                 | 43 (S)<br>sol                                | 1.5E+08<br>nc                     | 51,000<br>nc                       |
| 71432   | Benzene                    | 310<br>ca                                    | 31 (M)<br>ca                      | 260<br>ca                          |
| 56553   | Benzo(a)anthracene         | 9.4 (S)<br>sol                               | 7.4E+06<br>ca                     | 33<br>ca                           |
| 205992  | Benzo(b)fluoranthene       | NA                                           | NA                                | NA                                 |
| 207089  | Benzo(k)fluoranthene       | NA                                           | NA                                | NA                                 |
| 191242  | Benzo(g,h,i)perylene       | NA                                           | NA                                | NA                                 |
| 50328   | Benzo(a)pyrene             | NA                                           | NA                                | NA                                 |
| 111444  | bis-2-Chloroethylether     | 2,200<br>ca                                  | 64 (M)<br>ca                      | 6.0<br>ca                          |
| 75274   | Bromodichloromethane       | 470<br>nc                                    | 10 (M)<br>nc                      | 100<br>nc                          |
| 75252   | Bromoform                  | 53,000<br>ca                                 | 840<br>ca                         | 1,800<br>ca                        |
| 74839   | Bromomethane               | 340<br>nc                                    | 11 (M)<br>nc                      | 510<br>nc                          |
| 75650   | t-Butyl alcohol            | 2.5E+06<br>nc                                | 38,000<br>nc                      | 3,700<br>nc                        |
| 104518  | n-Butylbenzene             | 11,000<br>nc                                 | 6,500<br>nc                       | 10,000<br>nc                       |
| 135988  | sec-Butylbenzene           | 18,000 (S)<br>sol                            | 44,000<br>nc                      | 20<br>nc                           |
| 98066   | t-Butylbenzene             | 18<br>nc                                     | 7.5 (M)<br>nc                     | 20<br>nc                           |
| 56235   | Carbon tetrachloride       | 120<br>ca                                    | 5.8 (M)<br>ca                     | 360<br>ca                          |

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| CAS#   | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)    | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|--------|----------------------------|----------------------------------------------|--------------------|------------------------------------|
| 108907 | Chlorobenzene              | 7,400<br>nc                                  | 960<br>nc          | 2,600<br>nc                        |
| 75003  | Chloroethane               | 90,000<br>nc                                 | 3,900<br>nc        | 2.0E+05<br>nc                      |
| 110758 | 2-Chloroethyl vinyl ether  | TX                                           | TX                 | TX                                 |
| 67663  | Chloroform                 | 170<br>ca                                    | 4.9 (M)<br>ca      | 87<br>ca                           |
| 74873  | Chloromethane              | 2,100<br>nc                                  | 81 (M)<br>nc       | 4,600<br>nc                        |
| 91587  | beta-Chloronaphthalene     | TX                                           | TX                 | TX                                 |
| 95578  | 2-Chlorophenol             | 4.3E+05 (DD)<br>dev                          | 94,000 (DD)<br>dev | 600 (DD)<br>dev                    |
| 218019 | Chrysene                   | NA                                           | NA                 | NA                                 |
| 74908  | Cyanide, Hydrogen          | 1,100<br>nc                                  | 21 (M)<br>nc       | 41<br>nc                           |
| 110827 | Cyclohexane                | 15,000<br>nc                                 | 3,700<br>nc        | 3.1E+05<br>nc                      |
| 53703  | Dibenzo(a,h)anthracene     | NA                                           | NA                 | NA                                 |
| 132649 | Dibenzofuran               | 3,100 (S)<br>sol                             | 8.4E+07<br>nc      | 200<br>nc                          |
| 124481 | Dibromochloromethane       | 1,200<br>ca                                  | 18 (M)<br>ca       | 83<br>ca                           |
| 95501  | 1,2-Dichlorobenzene        | 1.0E+05<br>nc                                | 17,000<br>nc       | 15,000<br>nc                       |
| 541731 | 1,3-Dichlorobenzene        | 720<br>nc                                    | 120<br>nc          | 150<br>nc                          |
| 106467 | 1,4-Dichlorobenzene        | 2,600<br>ca                                  | 440<br>ca          | 510<br>ca                          |
| 75718  | Dichlorodifluoromethane    | 390<br>nc                                    | 150 (M)<br>nc      | 17,000<br>nc                       |
| 75343  | 1,1-Dichloroethane         | 1,500<br>ca                                  | 49 (M)<br>ca       | 1,200<br>ca                        |
| 107062 | 1,2-Dichloroethane         | 450<br>ca                                    | 15 (M)<br>ca       | 77<br>ca                           |
| 75354  | 1,1-Dichloroethylene       | 2,300<br>nc                                  | 140<br>nc          | 10,000<br>nc                       |
| 156592 | cis-1,2-Dichloroethylene   | 650<br>nc                                    | 25 (M)<br>nc       | 410<br>nc                          |
| 156605 | trans-1,2-Dichloroethylene | 2,700<br>nc                                  | 140<br>nc          | 4,100<br>nc                        |
| 78875  | 1,2-Dichloropropane        | 580<br>nc                                    | 25 (M)<br>nc       | 200<br>nc                          |
| 542756 | 1,3-Dichloropropene        | 1,100 (J)<br>ca                              | 58 (M) (J)<br>ca   | 500 (J)<br>ca                      |
| 60297  | Diethyl ether              | 2.5E+05<br>nc                                | 4,100<br>nc        | 51,000<br>nc                       |

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| CAS#    | Hazardous Substance              | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)    | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------------|----------------------------------------------|--------------------|------------------------------------|
| 108203  | Diisopropyl ether                | 74,000 (DD)<br>dev                           | 1,600 (DD)<br>dev  | 23,000 (DD)<br>dev                 |
| 64175   | Ethanol                          | 6.2E+08 (EE)<br>st                           | 1.1E+07 (EE)<br>st | 6.3E+05 (EE)<br>st                 |
| 637923  | Ethyl-tert-butyl ether (ETBE)    | 390 (CC)<br>nc                               | DATA               | 19,000<br>nc                       |
| 100414  | Ethylbenzene                     | 980<br>ca                                    | 230<br>ca          | 800<br>ca                          |
| 106934  | Ethylene dibromide               | 67<br>ca                                     | 1.4 (M)<br>ca      | 3.3<br>ca                          |
| 206440  | Fluoranthene                     | NA                                           | NA                 | NA                                 |
| 86737   | Fluorene                         | 1,700 (S)<br>sol                             | 5.5E+06<br>nc      | 7,200<br>nc                        |
| 142825  | n-Heptane                        | 3,400 (S) (GW)<br>sol                        | 1,500<br>nc        | 1.8E+05<br>nc                      |
| 118741  | Hexachlorobenzene (C-66)         | 6.2 (S)<br>sol                               | 79 (M)<br>nc       | 1.8<br>nc                          |
| 87683   | Hexachlorobutadiene (C-46)       | 230<br>ca                                    | 46 (M)<br>ca       | 91<br>ca                           |
| 77474   | Hexachlorocyclopentadiene (C-56) | 11 (M)<br>nc                                 | 3.8 (M)<br>nc      | 10<br>nc                           |
| 67721   | Hexachloroethane                 | 1,000<br>ca                                  | 61 (M)<br>ca       | 200<br>ca                          |
| 110543  | n-Hexane                         | 670 (GW)<br>nc                               | 290<br>nc          | 36,000<br>nc                       |
| 193395  | Indeno(1,2,3-cd)pyrene           | NA                                           | NA                 | NA                                 |
| 67630   | Isopropyl alcohol                | 7.3E+06<br>nc                                | 1.2E+05<br>nc      | 10,000<br>nc                       |
| 98828   | Isopropyl benzene                | 220<br>ca                                    | 71 (M)<br>ca       | 190<br>ca                          |
| Varies  | Mercury (Total)                  | 20<br>nc                                     | 260<br>nc          | 15<br>nc                           |
| 74828   | Methane                          | 10,000 (AA)                                  | DATA               | 8.4E+06 (GG)                       |
| 1634044 | Methyl-tert-butyl ether (MTBE)   | 89,000<br>ca                                 | 1,400<br>ca        | 7,700<br>ca                        |
| 96377   | Methylcyclopentane               | 700<br>nc                                    | 340 (M)<br>nc      | 36,000<br>nc                       |
| 75092   | Methylene chloride               | 53,000<br>nc                                 | 1,500<br>nc        | 31,000<br>nc                       |
| 91576   | 2-Methylnaphthalene              | 19,000<br>nc                                 | 20,000<br>nc       | 510<br>nc                          |
| 91203   | Naphthalene                      | 1,700<br>ca                                  | 1,300<br>ca        | 59<br>ca                           |
| 98953   | Nitrobenzene                     | 20,000<br>ca                                 | 3,200<br>ca        | 50<br>ca                           |
| 109660  | Pentane                          | 910 (GW)<br>nc                               | 420 (M)<br>nc      | 51,000<br>nc                       |

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| CAS#    | Hazardous Substance                   | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|---------------------------------------|----------------------------------------------|---------------------|------------------------------------|
| 85018   | Phenanthrene                          | 1,200 (S)<br>sol                             | 19,000<br>nc        | 5.1<br>nc                          |
| 7723140 | Phosphorus, White                     | NA                                           | NA                  | NA                                 |
| 1336363 | Polychlorinated biphenyls (PCBs)      | 0.66 (CC) (J)<br>ca                          | DATA                | 20 (J)<br>ca                       |
| 103651  | n-Propylbenzene                       | 38,000 (DD)<br>dev                           | 14,000 (DD)<br>dev  | 33,000 (DD)<br>dev                 |
| 129000  | Pyrene                                | 140 (S)<br>sol                               | 2.9E+08<br>nc       | 5,100<br>nc                        |
| 100425  | Styrene                               | 12,000<br>ca                                 | 2,900<br>ca         | 3,500<br>ca                        |
| 630206  | 1,1,1,2-Tetrachloroethane             | 1,500<br>ca                                  | 61 (M)<br>ca        | 270<br>ca                          |
| 79345   | 1,1,2,2-Tetrachloroethane             | 1,100<br>ca                                  | 51<br>ca            | 34<br>ca                           |
| 127184  | Tetrachloroethylene                   | 900 (EE)<br>st                               | 49 (M) (EE)<br>st   | 1,400 (EE)<br>st                   |
| 109999  | Tetrahydrofuran                       | 7.7E+06<br>nc                                | 1.5E+05<br>nc       | 1.0E+05<br>nc                      |
| 108883  | Toluene                               | 3.0E+05 (EE)<br>st                           | 43,000 (EE)<br>st   | 2.5E+05 (EE)<br>st                 |
| 87616   | 1,2,3-Trichlorobenzene                | 18,000 (S)<br>sol                            | 9,800<br>nc         | 1,400<br>nc                        |
| 120821  | 1,2,4-Trichlorobenzene                | 1,400<br>nc                                  | 620<br>nc           | 100<br>nc                          |
| 71556   | 1,1,1-Trichloroethane                 | 1.1E+05 (EE)<br>st                           | 5,000 (EE)<br>st    | 2.3E+05 (EE)<br>st                 |
| 79005   | 1,1,2-Trichloroethane                 | 110<br>nc                                    | 4.4 (M)<br>nc       | 10<br>nc                           |
| 79016   | Trichloroethylene                     | 57 (DD)<br>dev                               | 2.7 (M) (DD)<br>dev | 67 (DD)<br>dev                     |
| 75694   | Trichlorofluoromethane                | 1,600<br>nc                                  | 220<br>nc           | 22,000<br>nc                       |
| 76131   | 1,1,2-Trichloro-1,2,2-trifluoroethane | 37,000<br>nc                                 | 10,000<br>nc        | 9.7E+05<br>nc                      |
| 540841  | 2,2,4-Trimethyl pentane               | 2,400 (S) (GW)<br>sol                        | 1,500 (M)<br>nc     | 1.8E+05<br>nc                      |
| 526738  | 1,2,3-Trimethylbenzene                | 11,000 (JT)<br>nc                            | 3,200 (JT)<br>nc    | 3,100 (JT)<br>nc                   |
| 95636   | 1,2,4-Trimethylbenzene                | 6,100 (JT)<br>nc                             | 1,700 (JT)<br>nc    | 3,100 (JT)<br>nc                   |
| 108678  | 1,3,5-Trimethylbenzene                | 4,300 (JT)<br>nc                             | 1,200 (JT)<br>nc    | 3,100 (JT)<br>nc                   |
| 75014   | Vinyl chloride                        | 73<br>ca                                     | 5.4 (M)<br>ca       | 450<br>ca                          |
| 1330207 | Xylenes                               | 16,000 (J)<br>nc                             | 3,300 (J)<br>nc     | 11,000 (J)<br>nc                   |

**Table 2.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a residential house with a **slab-on-grade** foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of **sand**.

| CAS#    | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------|----------------------------------------------|---------------------|------------------------------------|
| 83329   | Acenaphthene               | 3,900 (S)<br>sol                             | 2.1E+05<br>nc       | 7,300<br>nc                        |
| 208968  | Acenaphthylene             | 65 (CC)<br>nc                                | DATA                | 7,300<br>nc                        |
| 75070   | Acetaldehyde               | 3,600<br>nc                                  | 34 (M)<br>nc        | 310<br>nc                          |
| 67641   | Acetone                    | 2.6E+07 (EE)<br>st                           | 2.6E+05 (EE)<br>st  | 1.0E+06 (EE)<br>st                 |
| 98862   | Acetophenone               | 6.1E+06 (S) (DD)<br>sol                      | 6.2E+05 (DD)<br>dev | 1.1E+05 (DD)<br>dev                |
| 107028  | Acrolein                   | 5.6 (M)<br>nc                                | 4.6E-02 (M)<br>nc   | 0.70<br>nc                         |
| 107131  | Acrylonitrile              | 100<br>ca                                    | 1.2 (M)<br>ca       | 12<br>ca                           |
| 7664417 | Ammonia                    | 3.9E+05<br>nc                                | DATA                | 17,000<br>nc                       |
| 994058  | t-Amyl methyl ether (TAME) | 3,100<br>nc                                  | 34 (M)<br>nc        | 2,200<br>nc                        |
| 120127  | Anthracene                 | 43 (S)<br>sol                                | 1.3E+07<br>nc       | 35,000<br>nc                       |
| 71432   | Benzene                    | 29<br>ca                                     | 1.7 (M)<br>ca       | 110<br>ca                          |
| 56553   | Benzo(a)anthracene         | 9.4 (S) (MM)<br>sol                          | 1.6E+05 (MM)<br>mut | 5.8 (MM)<br>mut                    |
| 205992  | Benzo(b)fluoranthene       | NA                                           | NA                  | NA                                 |
| 207089  | Benzo(k)fluoranthene       | NA                                           | NA                  | NA                                 |
| 191242  | Benzo(g,h,i)perylene       | NA                                           | NA                  | NA                                 |
| 50328   | Benzo(a)pyrene             | NA                                           | NA                  | NA                                 |
| 111444  | bis-2-Chloroethylether     | 190<br>ca                                    | 3.4 (M)<br>ca       | 2.6<br>ca                          |
| 75274   | Bromodichloromethane       | 51<br>ca                                     | 0.61 (M)<br>ca      | 48<br>ca                           |
| 75252   | Bromoform                  | 5,300<br>ca                                  | 45 (M)<br>ca        | 770<br>ca                          |
| 74839   | Bromomethane               | 51<br>nc                                     | 0.90 (M)<br>nc      | 350<br>nc                          |
| 75650   | t-Butyl alcohol            | 3.1E+05<br>nc                                | 3,200<br>nc         | 2,500<br>nc                        |
| 104518  | n-Butylbenzene             | 1,700<br>nc                                  | 560<br>nc           | 7,000<br>nc                        |
| 135988  | sec-Butylbenzene           | 6,900<br>nc                                  | 3,800<br>nc         | 14<br>nc                           |
| 98066   | t-Butylbenzene             | 2.9<br>nc                                    | 0.64 (M)<br>nc      | 14<br>nc                           |
| 56235   | Carbon tetrachloride       | 12<br>ca                                     | 0.31 (M)<br>ca      | 150<br>ca                          |



**Table 2.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a residential house with a **slab-on-grade** foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of **sand**.

| CAS#   | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)      | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|--------|----------------------------|----------------------------------------------|----------------------|------------------------------------|
| 108907 | Chlorobenzene              | 1,100<br>nc                                  | 82<br>nc             | 1,700<br>nc                        |
| 75003  | Chloroethane               | 13,000<br>nc                                 | 330<br>nc            | 1.4E+05<br>nc                      |
| 110758 | 2-Chloroethyl vinyl ether  | TX                                           | TX                   | TX                                 |
| 67663  | Chloroform                 | 16<br>ca                                     | 0.26 (M)<br>ca       | 37<br>ca                           |
| 74873  | Chloromethane              | 300<br>nc                                    | 6.9 (M)<br>nc        | 3,100<br>nc                        |
| 91587  | beta-Chloronaphthalene     | TX                                           | TX                   | TX                                 |
| 95578  | 2-Chlorophenol             | 80,000 (DD)<br>dev                           | 12,000 (DD)<br>dev   | 600 (DD)<br>dev                    |
| 218019 | Chrysene                   | NA                                           | NA                   | NA                                 |
| 74908  | Cyanide, Hydrogen          | 140<br>nc                                    | 1.8 (M)<br>nc        | 28<br>nc                           |
| 110827 | Cyclohexane                | 2,200<br>nc                                  | 320 (M)<br>nc        | 2.1E+05<br>nc                      |
| 53703  | Dibenzo(a,h)anthracene     | NA                                           | NA                   | NA                                 |
| 132649 | Dibenzofuran               | 3,100 (S)<br>sol                             | 7.1E+06<br>nc        | 140<br>nc                          |
| 124481 | Dibromochloromethane       | 48 (MM)<br>mut                               | 0.40 (MM) (M)<br>mut | 14 (MM)<br>mut                     |
| 95501  | 1,2-Dichlorobenzene        | 16,000<br>nc                                 | 1,500<br>nc          | 10,000<br>nc                       |
| 541731 | 1,3-Dichlorobenzene        | 110<br>nc                                    | 10 (M)<br>nc         | 100<br>nc                          |
| 106467 | 1,4-Dichlorobenzene        | 260<br>ca                                    | 23 (M)<br>ca         | 220<br>ca                          |
| 75718  | Dichlorodifluoromethane    | 60<br>nc                                     | 12 (M)<br>nc         | 11,000<br>nc                       |
| 75343  | 1,1-Dichloroethane         | 140<br>ca                                    | 2.6 (M)<br>ca        | 530<br>ca                          |
| 107062 | 1,2-Dichloroethane         | 43<br>ca                                     | 0.82 (M)<br>ca       | 33<br>ca                           |
| 75354  | 1,1-Dichloroethylene       | 350<br>nc                                    | 12 (M)<br>nc         | 7,000<br>nc                        |
| 156592 | cis-1,2-Dichloroethylene   | 98<br>nc                                     | 2.1 (M)<br>nc        | 280<br>nc                          |
| 156605 | trans-1,2-Dichloroethylene | 410<br>nc                                    | 12 (M)<br>nc         | 2,800<br>nc                        |
| 78875  | 1,2-Dichloropropane        | 89<br>nc                                     | 2.1 (M)<br>nc        | 140<br>nc                          |
| 542756 | 1,3-Dichloropropene        | 110 (J)<br>ca                                | 3.1 (M) (J)<br>ca    | 210 (J)<br>ca                      |
| 60297  | Diethyl ether              | 38,000<br>nc                                 | 350<br>nc            | 35,000<br>nc                       |

**Table 2.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a residential house with a **slab-on-grade** foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of **sand**.

| CAS#    | Hazardous Substance              | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------------|----------------------------------------------|---------------------|------------------------------------|
| 108203  | Diisopropyl ether                | 17,000 (DD)<br>dev                           | 200 (M) (DD)<br>dev | 23,000 (DD)<br>dev                 |
| 64175   | Ethanol                          | 1.1E+08 (EE)<br>st                           | 1.3E+06 (EE)<br>st  | 6.3E+05 (EE)<br>st                 |
| 637923  | Ethyl-tert-butyl ether (ETBE)    | 22 (CC)<br>nc                                | DATA                | 13,000<br>nc                       |
| 100414  | Ethylbenzene                     | 96<br>ca                                     | 12 (M)<br>ca        | 340<br>ca                          |
| 106934  | Ethylene dibromide               | 6.7<br>ca                                    | 7.4E-02 (M)<br>ca   | 1.4<br>ca                          |
| 206440  | Fluoranthene                     | NA                                           | NA                  | NA                                 |
| 86737   | Fluorene                         | 1,700 (S)<br>sol                             | 4.7E+05<br>nc       | 4,900<br>nc                        |
| 142825  | n-Heptane                        | 150 (GW)<br>nc                               | 130<br>nc           | 1.2E+05<br>nc                      |
| 118741  | Hexachlorobenzene (C-66)         | 6.2 (S)<br>sol                               | 6.8 (M)<br>nc       | 1.2<br>nc                          |
| 87683   | Hexachlorobutadiene (C-46)       | 25<br>ca                                     | 2.5 (M)<br>ca       | 39<br>ca                           |
| 77474   | Hexachlorocyclopentadiene (C-56) | 1.9 (M)<br>nc                                | 0.32 (M)<br>nc      | 7.0<br>nc                          |
| 67721   | Hexachloroethane                 | 110<br>ca                                    | 3.3 (M)<br>ca       | 85<br>ca                           |
| 110543  | n-Hexane                         | 29 (GW)<br>nc                                | 25<br>nc            | 24,000<br>nc                       |
| 193395  | Indeno(1,2,3-cd)pyrene           | NA                                           | NA                  | NA                                 |
| 67630   | Isopropyl alcohol                | 8.8E+05<br>nc                                | 9,900<br>nc         | 7,000<br>nc                        |
| 98828   | Isopropyl benzene                | 22<br>ca                                     | 3.8 (M)<br>ca       | 81<br>ca                           |
| Varies  | Mercury (Total)                  | 3.1<br>nc                                    | 22 (M)<br>nc        | 10<br>nc                           |
| 74828   | Methane                          | 10,000 (AA)                                  | DATA                | 8.4E+06 (GG)                       |
| 1634044 | Methyl-tert-butyl ether (MTBE)   | 8,500<br>ca                                  | 74 (M)<br>ca        | 3,300<br>ca                        |
| 96377   | Methylcyclopentane               | 110<br>nc                                    | 29 (M)<br>nc        | 24,000<br>nc                       |
| 75092   | Methylene chloride               | 7,800<br>nc                                  | 130<br>nc           | 21,000<br>nc                       |
| 91576   | 2-Methylnaphthalene              | 2,900<br>nc                                  | 1,700<br>nc         | 350<br>nc                          |
| 91203   | Naphthalene                      | 160<br>ca                                    | 67 (M)<br>ca        | 25<br>ca                           |
| 98953   | Nitrobenzene                     | 1,600<br>ca                                  | 170 (M)<br>ca       | 21<br>ca                           |
| 109660  | Pentane                          | 40 (M) (GW)<br>nc                            | 36 (M)<br>nc        | 35,000<br>nc                       |

**Table 2.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are **restricted** site-specific criteria that apply to a residential house with a **slab-on-grade** foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of **sand**.

| CAS#    | Hazardous Substance                   | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)         | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|---------------------------------------|----------------------------------------------|-------------------------|------------------------------------|
| 85018   | Phenanthrene                          | 360<br>nc                                    | 1,700<br>nc             | 3.5<br>nc                          |
| 7723140 | Phosphorus, White                     | NA                                           | NA                      | NA                                 |
| 1336363 | Polychlorinated biphenyls (PCBs)      | 3.1E-02 (M) (CC) (J)<br>ca                   | DATA                    | 8.5 (J)<br>ca                      |
| 103651  | n-Propylbenzene                       | 8,800 (DD)<br>dev                            | 1,800 (DD)<br>dev       | 33,000 (DD)<br>dev                 |
| 129000  | Pyrene                                | 140 (S)<br>sol                               | 2.5E+07<br>nc           | 3,500<br>nc                        |
| 100425  | Styrene                               | 1,200<br>ca                                  | 150<br>ca               | 1,500<br>ca                        |
| 630206  | 1,1,1,2-Tetrachloroethane             | 150<br>ca                                    | 3.2 (M)<br>ca           | 110<br>ca                          |
| 79345   | 1,1,1,2-Tetrachloroethane             | 110<br>ca                                    | 2.7 (M)<br>ca           | 15<br>ca                           |
| 127184  | Tetrachloroethylene                   | 210 (EE)<br>st                               | 6.2 (M) (EE)<br>st      | 1,400 (EE)<br>st                   |
| 109999  | Tetrahydrofuran                       | 1.1E+06<br>nc                                | 13,000<br>nc            | 70,000<br>nc                       |
| 108883  | Toluene                               | 48,000<br>nc                                 | 3,700<br>nc             | 1.7E+05<br>nc                      |
| 87616   | 1,2,3-Trichlorobenzene                | 3,400<br>nc                                  | 840<br>nc               | 940<br>nc                          |
| 120821  | 1,2,4-Trichlorobenzene                | 220<br>nc                                    | 53 (M)<br>nc            | 70<br>nc                           |
| 71556   | 1,1,1-Trichloroethane                 | 19,000 (EE)<br>st                            | 450 (EE)<br>st          | 1.7E+05 (EE)<br>st                 |
| 79005   | 1,1,2-Trichloroethane                 | 17<br>nc                                     | 0.37 (M)<br>nc          | 7.0<br>nc                          |
| 79016   | Trichloroethylene                     | 13 (DD)<br>dev                               | 0.33 (M) (DD)<br>dev    | 67 (DD)<br>dev                     |
| 75694   | Trichlorofluoromethane                | 260<br>nc                                    | 19 (M)<br>nc            | 15,000<br>nc                       |
| 76131   | 1,1,2-Trichloro-1,2,2-trifluoroethane | 6,000<br>nc                                  | 860<br>nc               | 6.6E+05<br>nc                      |
| 540841  | 2,2,4-Trimethyl pentane               | 160 (GW)<br>nc                               | 130 (M)<br>nc           | 1.2E+05<br>nc                      |
| 526738  | 1,2,3-Trimethylbenzene                | 1,700 (JT)<br>nc                             | 270 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 95636   | 1,2,4-Trimethylbenzene                | 960 (JT)<br>nc                               | 150 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 108678  | 1,3,5-Trimethylbenzene                | 680 (JT)<br>nc                               | 100 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 75014   | Vinyl chloride                        | 1.9 (MM)<br>mut                              | 8.2E-02 (MM) (M)<br>mut | 54 (MM)<br>mut                     |
| 1330207 | Xylenes                               | 2,600 (J)<br>nc                              | 280 (J)<br>nc           | 7,600 (J)<br>nc                    |

**Table 3.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 25 ft), and USDA soil type of sand.

| CAS#    | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------|----------------------------------------------|---------------------|------------------------------------|
| 83329   | Acenaphthene               | 3,900 (S)<br>sol                             | 2.0E+05<br>nc       | 7,300<br>nc                        |
| 208968  | Acenaphthylene             | 65 (CC)<br>nc                                | DATA                | 7,300<br>nc                        |
| 75070   | Acetaldehyde               | 3,000<br>nc                                  | 34 (M)<br>nc        | 310<br>nc                          |
| 67641   | Acetone                    | 2.3E+07 (EE)<br>st                           | 2.6E+05 (EE)<br>st  | 1.0E+06 (EE)<br>st                 |
| 98862   | Acetophenone               | 6.1E+06 (S) (DD)<br>sol                      | 6.2E+05 (DD)<br>dev | 1.1E+05 (DD)<br>dev                |
| 107028  | Acrolein                   | 4.6 (M)<br>nc                                | 4.6E-02 (M)<br>nc   | 0.70<br>nc                         |
| 107131  | Acrylonitrile              | 83<br>ca                                     | 1.2 (M)<br>ca       | 12<br>ca                           |
| 7664417 | Ammonia                    | 3.6E+05<br>nc                                | DATA                | 17,000<br>nc                       |
| 994058  | t-Amyl methyl ether (TAME) | 2,400<br>nc                                  | 34 (M)<br>nc        | 2,200<br>nc                        |
| 120127  | Anthracene                 | 43 (S)<br>sol                                | 1.3E+07<br>nc       | 35,000<br>nc                       |
| 71432   | Benzene                    | 23<br>ca                                     | 1.7 (M)<br>ca       | 110<br>ca                          |
| 56553   | Benzo(a)anthracene         | 9.4 (S) (MM)<br>sol                          | 1.6E+05 (MM)<br>mut | 5.8 (MM)<br>mut                    |
| 205992  | Benzo(b)fluoranthene       | NA                                           | NA                  | NA                                 |
| 207089  | Benzo(k)fluoranthene       | NA                                           | NA                  | NA                                 |
| 191242  | Benzo(g,h,i)perylene       | NA                                           | NA                  | NA                                 |
| 50328   | Benzo(a)pyrene             | NA                                           | NA                  | NA                                 |
| 111444  | bis-2-Chloroethylether     | 160<br>ca                                    | 3.4 (M)<br>ca       | 2.6<br>ca                          |
| 75274   | Bromodichloromethane       | 40<br>ca                                     | 0.61 (M)<br>ca      | 48<br>ca                           |
| 75252   | Bromoform                  | 4,200<br>ca                                  | 45 (M)<br>ca        | 770<br>ca                          |
| 74839   | Bromomethane               | 40<br>nc                                     | 0.90 (M)<br>nc      | 350<br>nc                          |
| 75650   | t-Butyl alcohol            | 2.8E+05<br>nc                                | 3,200<br>nc         | 2,500<br>nc                        |
| 104518  | n-Butylbenzene             | 1,300<br>nc                                  | 550<br>nc           | 7,000<br>nc                        |
| 135988  | sec-Butylbenzene           | 6,400<br>nc                                  | 3,800<br>nc         | 14<br>nc                           |
| 98066   | t-Butylbenzene             | 2.2<br>nc                                    | 0.64 (M)<br>nc      | 14<br>nc                           |
| 56235   | Carbon tetrachloride       | 9.0<br>ca                                    | 0.31 (M)<br>ca      | 150<br>ca                          |

**Table 3.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 25 ft), and USDA soil type of sand.

| CAS#   | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)      | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|--------|----------------------------|----------------------------------------------|----------------------|------------------------------------|
| 108907 | Chlorobenzene              | 890<br>nc                                    | 82<br>nc             | 1,700<br>nc                        |
| 75003  | Chloroethane               | 11,000<br>nc                                 | 330<br>nc            | 1.4E+05<br>nc                      |
| 110758 | 2-Chloroethyl vinyl ether  | TX                                           | TX                   | TX                                 |
| 67663  | Chloroform                 | 12<br>ca                                     | 0.26 (M)<br>ca       | 37<br>ca                           |
| 74873  | Chloromethane              | 240<br>nc                                    | 6.9 (M)<br>nc        | 3,100<br>nc                        |
| 91587  | beta-Chloronaphthalene     | TX                                           | TX                   | TX                                 |
| 95578  | 2-Chlorophenol             | 73,000 (DD)<br>dev                           | 12,000 (DD)<br>dev   | 600 (DD)<br>dev                    |
| 218019 | Chrysene                   | NA                                           | NA                   | NA                                 |
| 74908  | Cyanide, Hydrogen          | 120<br>nc                                    | 1.8 (M)<br>nc        | 28<br>nc                           |
| 110827 | Cyclohexane                | 1,700<br>nc                                  | 320 (M)<br>nc        | 2.1E+05<br>nc                      |
| 53703  | Dibenzo(a,h)anthracene     | NA                                           | NA                   | NA                                 |
| 132649 | Dibenzofuran               | 3,100 (S)<br>sol                             | 7.1E+06<br>nc        | 140<br>nc                          |
| 124481 | Dibromochloromethane       | 37 (MM)<br>mut                               | 0.40 (MM) (M)<br>mut | 14 (MM)<br>mut                     |
| 95501  | 1,2-Dichlorobenzene        | 12,000<br>nc                                 | 1,500<br>nc          | 10,000<br>nc                       |
| 541731 | 1,3-Dichlorobenzene        | 88<br>nc                                     | 10 (M)<br>nc         | 100<br>nc                          |
| 106467 | 1,4-Dichlorobenzene        | 200<br>ca                                    | 23 (M)<br>ca         | 220<br>ca                          |
| 75718  | Dichlorodifluoromethane    | 47<br>nc                                     | 12 (M)<br>nc         | 11,000<br>nc                       |
| 75343  | 1,1-Dichloroethane         | 110<br>ca                                    | 2.6 (M)<br>ca        | 530<br>ca                          |
| 107062 | 1,2-Dichloroethane         | 34<br>ca                                     | 0.82 (M)<br>ca       | 33<br>ca                           |
| 75354  | 1,1-Dichloroethylene       | 270<br>nc                                    | 12 (M)<br>nc         | 7,000<br>nc                        |
| 156592 | cis-1,2-Dichloroethylene   | 77<br>nc                                     | 2.1 (M)<br>nc        | 280<br>nc                          |
| 156605 | trans-1,2-Dichloroethylene | 320<br>nc                                    | 12 (M)<br>nc         | 2,800<br>nc                        |
| 78875  | 1,2-Dichloropropane        | 70<br>nc                                     | 2.1 (M)<br>nc        | 140<br>nc                          |
| 542756 | 1,3-Dichloropropene        | 86 (J)<br>ca                                 | 3.1 (M) (J)<br>ca    | 210 (J)<br>ca                      |
| 60297  | Diethyl ether              | 30,000<br>nc                                 | 350<br>nc            | 35,000<br>nc                       |

**Table 3.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 25 ft), and USDA soil type of sand.

| CAS#    | Hazardous Substance              | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------------|----------------------------------------------|---------------------|------------------------------------|
| 108203  | Diisopropyl ether                | 13,000 (DD)<br>dev                           | 190 (M) (DD)<br>dev | 23,000 (DD)<br>dev                 |
| 64175   | Ethanol                          | 9.9E+07 (EE)<br>st                           | 1.3E+06 (EE)<br>st  | 6.3E+05 (EE)<br>st                 |
| 637923  | Ethyl-tert-butyl ether (ETBE)    | 22 (CC)<br>nc                                | DATA                | 13,000<br>nc                       |
| 100414  | Ethylbenzene                     | 74<br>ca                                     | 12 (M)<br>ca        | 340<br>ca                          |
| 106934  | Ethylene dibromide               | 5.2<br>ca                                    | 7.4E-02 (M)<br>ca   | 1.4<br>ca                          |
| 206440  | Fluoranthene                     | NA                                           | NA                  | NA                                 |
| 86737   | Fluorene                         | 1,700 (S)<br>sol                             | 4.7E+05<br>nc       | 4,900<br>nc                        |
| 142825  | n-Heptane                        | 150 (GW)<br>nc                               | 130<br>nc           | 1.2E+05<br>nc                      |
| 118741  | Hexachlorobenzene (C-66)         | 6.1<br>nc                                    | 6.7 (M)<br>nc       | 1.2<br>nc                          |
| 87683   | Hexachlorobutadiene (C-46)       | 19<br>ca                                     | 2.5 (M)<br>ca       | 39<br>ca                           |
| 77474   | Hexachlorocyclopentadiene (C-56) | 1.4 (M)<br>nc                                | 0.32 (M)<br>nc      | 7.0<br>nc                          |
| 67721   | Hexachloroethane                 | 82<br>ca                                     | 3.2 (M)<br>ca       | 85<br>ca                           |
| 110543  | n-Hexane                         | 29 (GW)<br>nc                                | 25<br>nc            | 24,000<br>nc                       |
| 193395  | Indeno(1,2,3-cd)pyrene           | NA                                           | NA                  | NA                                 |
| 67630   | Isopropyl alcohol                | 8.1E+05<br>nc                                | 9,800<br>nc         | 7,000<br>nc                        |
| 98828   | Isopropyl benzene                | 17<br>ca                                     | 3.8 (M)<br>ca       | 81<br>ca                           |
| Varies  | Mercury (Total)                  | 2.4<br>nc                                    | 22 (M)<br>nc        | 10<br>nc                           |
| 74828   | Methane                          | 10,000 (AA)                                  | DATA                | 8.4E+06 (GG)                       |
| 1634044 | Methyl-tert-butyl ether (MTBE)   | 6,600<br>ca                                  | 74 (M)<br>ca        | 3,300<br>ca                        |
| 96377   | Methylcyclopentane               | 83<br>nc                                     | 29 (M)<br>nc        | 24,000<br>nc                       |
| 75092   | Methylene chloride               | 6,200<br>nc                                  | 130<br>nc           | 21,000<br>nc                       |
| 91576   | 2-Methylnaphthalene              | 2,300<br>nc                                  | 1,700<br>nc         | 350<br>nc                          |
| 91203   | Naphthalene                      | 130<br>ca                                    | 67 (M)<br>ca        | 25<br>ca                           |
| 98953   | Nitrobenzene                     | 1,400<br>ca                                  | 170 (M)<br>ca       | 21<br>ca                           |
| 109660  | Pentane                          | 40 (M) (GW)<br>nc                            | 36 (M)<br>nc        | 35,000<br>nc                       |

**Table 3.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 25 ft), and USDA soil type of sand.

| CAS#    | Hazardous Substance                   | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)         | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|---------------------------------------|----------------------------------------------|-------------------------|------------------------------------|
| 85018   | Phenanthrene                          | 320<br>nc                                    | 1,700<br>nc             | 3.5<br>nc                          |
| 7723140 | Phosphorus, White                     | NA                                           | NA                      | NA                                 |
| 1336363 | Polychlorinated biphenyls (PCBs)      | 3.1E-02 (M) (CC) (J)<br>ca                   | DATA                    | 8.5 (J)<br>ca                      |
| 103651  | n-Propylbenzene                       | 6,800 (DD)<br>dev                            | 1,800 (DD)<br>dev       | 33,000 (DD)<br>dev                 |
| 129000  | Pyrene                                | 140 (S)<br>sol                               | 2.5E+07<br>nc           | 3,500<br>nc                        |
| 100425  | Styrene                               | 920<br>ca                                    | 150<br>ca               | 1,500<br>ca                        |
| 630206  | 1,1,1,2-Tetrachloroethane             | 120<br>ca                                    | 3.2 (M)<br>ca           | 110<br>ca                          |
| 79345   | 1,1,2,2-Tetrachloroethane             | 85<br>ca                                     | 2.7 (M)<br>ca           | 15<br>ca                           |
| 127184  | Tetrachloroethylene                   | 160 (EE)<br>st                               | 6.2 (M) (EE)<br>st      | 1,400 (EE)<br>st                   |
| 109999  | Tetrahydrofuran                       | 8.9E+05<br>nc                                | 13,000<br>nc            | 70,000<br>nc                       |
| 108883  | Toluene                               | 37,000<br>nc                                 | 3,700<br>nc             | 1.7E+05<br>nc                      |
| 87616   | 1,2,3-Trichlorobenzene                | 2,600<br>nc                                  | 830<br>nc               | 940<br>nc                          |
| 120821  | 1,2,4-Trichlorobenzene                | 170<br>nc                                    | 53 (M)<br>nc            | 70<br>nc                           |
| 71556   | 1,1,1-Trichloroethane                 | 14,000 (EE)<br>st                            | 450 (EE)<br>st          | 1.7E+05 (EE)<br>st                 |
| 79005   | 1,1,2-Trichloroethane                 | 14<br>nc                                     | 0.37 (M)<br>nc          | 7.0<br>nc                          |
| 79016   | Trichloroethylene                     | 10 (DD)<br>dev                               | 0.33 (M) (DD)<br>dev    | 67 (DD)<br>dev                     |
| 75694   | Trichlorofluoromethane                | 200<br>nc                                    | 19 (M)<br>nc            | 15,000<br>nc                       |
| 76131   | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4,600<br>nc                                  | 860<br>nc               | 6.6E+05<br>nc                      |
| 540841  | 2,2,4-Trimethyl pentane               | 160 (GW)<br>nc                               | 130 (M)<br>nc           | 1.2E+05<br>nc                      |
| 526738  | 1,2,3-Trimethylbenzene                | 1,300 (JT)<br>nc                             | 270 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 95636   | 1,2,4-Trimethylbenzene                | 740 (JT)<br>nc                               | 150 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 108678  | 1,3,5-Trimethylbenzene                | 520 (JT)<br>nc                               | 100 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 75014   | Vinyl chloride                        | 1.5 (MM)<br>mut                              | 8.2E-02 (MM) (M)<br>mut | 54 (MM)<br>mut                     |
| 1330207 | Xylenes                               | 2,000 (J)<br>nc                              | 280 (J)<br>nc           | 7,600 (J)<br>nc                    |

**Table 4.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of sand.

| CAS#    | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------|----------------------------------------------|---------------------|------------------------------------|
| 83329   | Acenaphthene               | 3,900 (S)<br>sol                             | 2.0E+05<br>nc       | 7,300<br>nc                        |
| 208968  | Acenaphthylene             | 65 (CC)<br>nc                                | DATA                | 7,300<br>nc                        |
| 75070   | Acetaldehyde               | 2,000<br>nc                                  | 34 (M)<br>nc        | 310<br>nc                          |
| 67641   | Acetone                    | 1.4E+07 (EE)<br>st                           | 2.6E+05 (EE)<br>st  | 1.0E+06 (EE)<br>st                 |
| 98862   | Acetophenone               | 6.1E+06 (S) (DD)<br>sol                      | 6.2E+05 (DD)<br>dev | 1.1E+05 (DD)<br>dev                |
| 107028  | Acrolein                   | 3.1 (M)<br>nc                                | 4.6E-02 (M)<br>nc   | 0.70<br>nc                         |
| 107131  | Acrylonitrile              | 56<br>ca                                     | 1.2 (M)<br>ca       | 12<br>ca                           |
| 7664417 | Ammonia                    | 2.7E+05<br>nc                                | DATA                | 17,000<br>nc                       |
| 994058  | t-Amyl methyl ether (TAME) | 1,600<br>nc                                  | 34 (M)<br>nc        | 2,200<br>nc                        |
| 120127  | Anthracene                 | 43 (S)<br>sol                                | 1.3E+07<br>nc       | 35,000<br>nc                       |
| 71432   | Benzene                    | 16<br>ca                                     | 1.7 (M)<br>ca       | 110<br>ca                          |
| 56553   | Benzo(a)anthracene         | 9.4 (S) (MM)<br>sol                          | 1.6E+05 (MM)<br>mut | 5.8 (MM)<br>mut                    |
| 205992  | Benzo(b)fluoranthene       | NA                                           | NA                  | NA                                 |
| 207089  | Benzo(k)fluoranthene       | NA                                           | NA                  | NA                                 |
| 191242  | Benzo(g,h,i)perylene       | NA                                           | NA                  | NA                                 |
| 50328   | Benzo(a)pyrene             | NA                                           | NA                  | NA                                 |
| 111444  | bis-2-Chloroethylether     | 85<br>ca                                     | 3.4 (M)<br>ca       | 2.6<br>ca                          |
| 75274   | Bromodichloromethane       | 26<br>ca                                     | 0.61 (M)<br>ca      | 48<br>ca                           |
| 75252   | Bromoform                  | 2,500<br>ca                                  | 45 (M)<br>ca        | 770<br>ca                          |
| 74839   | Bromomethane               | 28<br>nc                                     | 0.90 (M)<br>nc      | 350<br>nc                          |
| 75650   | t-Butyl alcohol            | 1.6E+05<br>nc                                | 3,200<br>nc         | 2,500<br>nc                        |
| 104518  | n-Butylbenzene             | 880<br>nc                                    | 550<br>nc           | 7,000<br>nc                        |
| 135988  | sec-Butylbenzene           | 3,000<br>nc                                  | 3,800<br>nc         | 14<br>nc                           |
| 98066   | t-Butylbenzene             | 1.5<br>nc                                    | 0.64 (M)<br>nc      | 14<br>nc                           |
| 56235   | Carbon tetrachloride       | 6.0<br>ca                                    | 0.31 (M)<br>ca      | 150<br>ca                          |



**Table 4.** Residential Volatilization to Indoor Air Criteria (VIAC). The following are unrestricted site-specific criteria that apply to a residential house with a basement foundation, the depth to groundwater submitted for this site (i.e. 12.46 ft), and USDA soil type of sand.

| CAS#   | Hazardous Substance        | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)      | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|--------|----------------------------|----------------------------------------------|----------------------|------------------------------------|
| 108907 | Chlorobenzene              | 600<br>nc                                    | 82<br>nc             | 1,700<br>nc                        |
| 75003  | Chloroethane               | 7,400<br>nc                                  | 330<br>nc            | 1.4E+05<br>nc                      |
| 110758 | 2-Chloroethyl vinyl ether  | TX                                           | TX                   | TX                                 |
| 67663  | Chloroform                 | 8.4<br>ca                                    | 0.26 (M)<br>ca       | 37<br>ca                           |
| 74873  | Chloromethane              | 170<br>nc                                    | 6.9 (M)<br>nc        | 3,100<br>nc                        |
| 91587  | beta-Chloronaphthalene     | TX                                           | TX                   | TX                                 |
| 95578  | 2-Chlorophenol             | 37,000 (DD)<br>dev                           | 12,000 (DD)<br>dev   | 600 (DD)<br>dev                    |
| 218019 | Chrysene                   | NA                                           | NA                   | NA                                 |
| 74908  | Cyanide, Hydrogen          | 84<br>nc                                     | 1.8 (M)<br>nc        | 28<br>nc                           |
| 110827 | Cyclohexane                | 1,200<br>nc                                  | 320 (M)<br>nc        | 2.1E+05<br>nc                      |
| 53703  | Dibenzo(a,h)anthracene     | NA                                           | NA                   | NA                                 |
| 132649 | Dibenzofuran               | 3,100 (S)<br>sol                             | 7.1E+06<br>nc        | 140<br>nc                          |
| 124481 | Dibromochloromethane       | 23 (MM)<br>mut                               | 0.40 (MM) (M)<br>mut | 14 (MM)<br>mut                     |
| 95501  | 1,2-Dichlorobenzene        | 8,200<br>nc                                  | 1,500<br>nc          | 10,000<br>nc                       |
| 541731 | 1,3-Dichlorobenzene        | 58<br>nc                                     | 10 (M)<br>nc         | 100<br>nc                          |
| 106467 | 1,4-Dichlorobenzene        | 130<br>ca                                    | 23 (M)<br>ca         | 220<br>ca                          |
| 75718  | Dichlorodifluoromethane    | 32<br>nc                                     | 12 (M)<br>nc         | 11,000<br>nc                       |
| 75343  | 1,1-Dichloroethane         | 74<br>ca                                     | 2.6 (M)<br>ca        | 530<br>ca                          |
| 107062 | 1,2-Dichloroethane         | 23<br>ca                                     | 0.82 (M)<br>ca       | 33<br>ca                           |
| 75354  | 1,1-Dichloroethylene       | 190<br>nc                                    | 12 (M)<br>nc         | 7,000<br>nc                        |
| 156592 | cis-1,2-Dichloroethylene   | 53<br>nc                                     | 2.1 (M)<br>nc        | 280<br>nc                          |
| 156605 | trans-1,2-Dichloroethylene | 220<br>nc                                    | 12 (M)<br>nc         | 2,800<br>nc                        |
| 78875  | 1,2-Dichloropropane        | 47<br>nc                                     | 2.1 (M)<br>nc        | 140<br>nc                          |
| 542756 | 1,3-Dichloropropene        | 58 (J)<br>ca                                 | 3.1 (M) (J)<br>ca    | 210 (J)<br>ca                      |
| 60297  | Diethyl ether              | 20,000<br>nc                                 | 350<br>nc            | 35,000<br>nc                       |

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| CAS#    | Hazardous Substance              | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)     | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|----------------------------------|----------------------------------------------|---------------------|------------------------------------|
| 108203  | Diisopropyl ether                | 8,800 (DD)<br>dev                            | 190 (M) (DD)<br>dev | 23,000 (DD)<br>dev                 |
| 64175   | Ethanol                          | 5.9E+07 (EE)<br>st                           | 1.3E+06 (EE)<br>st  | 6.3E+05 (EE)<br>st                 |
| 637923  | Ethyl-tert-butyl ether (ETBE)    | 22 (CC)<br>nc                                | DATA                | 13,000<br>nc                       |
| 100414  | Ethylbenzene                     | 50<br>ca                                     | 12 (M)<br>ca        | 340<br>ca                          |
| 106934  | Ethylene dibromide               | 3.2<br>ca                                    | 7.4E-02 (M)<br>ca   | 1.4<br>ca                          |
| 206440  | Fluoranthene                     | NA                                           | NA                  | NA                                 |
| 86737   | Fluorene                         | 1,700 (S)<br>sol                             | 4.7E+05<br>nc       | 4,900<br>nc                        |
| 142825  | n-Heptane                        | 150 (GW)<br>nc                               | 130<br>nc           | 1.2E+05<br>nc                      |
| 118741  | Hexachlorobenzene (C-66)         | 3.7<br>nc                                    | 6.7 (M)<br>nc       | 1.2<br>nc                          |
| 87683   | Hexachlorobutadiene (C-46)       | 12<br>ca                                     | 2.5 (M)<br>ca       | 39<br>ca                           |
| 77474   | Hexachlorocyclopentadiene (C-56) | 0.92 (M)<br>nc                               | 0.32 (M)<br>nc      | 7.0<br>nc                          |
| 67721   | Hexachloroethane                 | 52<br>ca                                     | 3.2 (M)<br>ca       | 85<br>ca                           |
| 110543  | n-Hexane                         | 29 (GW)<br>nc                                | 25<br>nc            | 24,000<br>nc                       |
| 193395  | Indeno(1,2,3-cd)pyrene           | NA                                           | NA                  | NA                                 |
| 67630   | Isopropyl alcohol                | 4.6E+05<br>nc                                | 9,800<br>nc         | 7,000<br>nc                        |
| 98828   | Isopropyl benzene                | 11<br>ca                                     | 3.8 (M)<br>ca       | 81<br>ca                           |
| Varies  | Mercury (Total)                  | 1.6<br>nc                                    | 22 (M)<br>nc        | 10<br>nc                           |
| 74828   | Methane                          | 10,000 (AA)                                  | DATA                | 8.4E+06 (GG)                       |
| 1634044 | Methyl-tert-butyl ether (MTBE)   | 4,500<br>ca                                  | 74 (M)<br>ca        | 3,300<br>ca                        |
| 96377   | Methylcyclopentane               | 57<br>nc                                     | 29 (M)<br>nc        | 24,000<br>nc                       |
| 75092   | Methylene chloride               | 4,300<br>nc                                  | 130<br>nc           | 21,000<br>nc                       |
| 91576   | 2-Methylnaphthalene              | 1,400<br>nc                                  | 1,700<br>nc         | 350<br>nc                          |
| 91203   | Naphthalene                      | 82<br>ca                                     | 67 (M)<br>ca        | 25<br>ca                           |
| 98953   | Nitrobenzene                     | 750<br>ca                                    | 170 (M)<br>ca       | 21<br>ca                           |
| 109660  | Pentane                          | 40 (M) (GW)<br>nc                            | 36 (M)<br>nc        | 35,000<br>nc                       |

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| CAS#    | Hazardous Substance                   | Groundwater Not In Contact (GWNIC)<br>(µg/L) | Soil<br>(µg/kg)         | Soil Gas**<br>(µg/m <sup>3</sup> ) |
|---------|---------------------------------------|----------------------------------------------|-------------------------|------------------------------------|
| 85018   | Phenanthrene                          | 150<br>nc                                    | 1,700<br>nc             | 3.5<br>nc                          |
| 7723140 | Phosphorus, White                     | NA                                           | NA                      | NA                                 |
| 1336363 | Polychlorinated biphenyls (PCBs)      | 3.1E-02 (M) (CC) (J)<br>ca                   | DATA                    | 8.5 (J)<br>ca                      |
| 103651  | n-Propylbenzene                       | 4,500 (DD)<br>dev                            | 1,800 (DD)<br>dev       | 33,000 (DD)<br>dev                 |
| 129000  | Pyrene                                | 140 (S)<br>sol                               | 2.5E+07<br>nc           | 3,500<br>nc                        |
| 100425  | Styrene                               | 620<br>ca                                    | 150<br>ca               | 1,500<br>ca                        |
| 630206  | 1,1,1,2-Tetrachloroethane             | 76<br>ca                                     | 3.2 (M)<br>ca           | 110<br>ca                          |
| 79345   | 1,1,1,2-Tetrachloroethane             | 53<br>ca                                     | 2.7 (M)<br>ca           | 15<br>ca                           |
| 127184  | Tetrachloroethylene                   | 110 (EE)<br>st                               | 6.2 (M) (EE)<br>st      | 1,400 (EE)<br>st                   |
| 109999  | Tetrahydrofuran                       | 5.6E+05<br>nc                                | 13,000<br>nc            | 70,000<br>nc                       |
| 108883  | Toluene                               | 25,000<br>nc                                 | 3,700<br>nc             | 1.7E+05<br>nc                      |
| 87616   | 1,2,3-Trichlorobenzene                | 1,700<br>nc                                  | 830<br>nc               | 940<br>nc                          |
| 120821  | 1,2,4-Trichlorobenzene                | 110<br>nc                                    | 53 (M)<br>nc            | 70<br>nc                           |
| 71556   | 1,1,1-Trichloroethane                 | 9,600 (EE)<br>st                             | 450 (EE)<br>st          | 1.7E+05 (EE)<br>st                 |
| 79005   | 1,1,2-Trichloroethane                 | 9.0<br>nc                                    | 0.37 (M)<br>nc          | 7.0<br>nc                          |
| 79016   | Trichloroethylene                     | 6.8 (DD)<br>dev                              | 0.33 (M) (DD)<br>dev    | 67 (DD)<br>dev                     |
| 75694   | Trichlorofluoromethane                | 130<br>nc                                    | 19 (M)<br>nc            | 15,000<br>nc                       |
| 76131   | 1,1,2-Trichloro-1,2,2-trifluoroethane | 3,000<br>nc                                  | 860<br>nc               | 6.6E+05<br>nc                      |
| 540841  | 2,2,4-Trimethyl pentane               | 160 (GW)<br>nc                               | 130 (M)<br>nc           | 1.2E+05<br>nc                      |
| 526738  | 1,2,3-Trimethylbenzene                | 890 (JT)<br>nc                               | 270 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 95636   | 1,2,4-Trimethylbenzene                | 490 (JT)<br>nc                               | 150 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 108678  | 1,3,5-Trimethylbenzene                | 350 (JT)<br>nc                               | 100 (JT)<br>nc          | 2,100 (JT)<br>nc                   |
| 75014   | Vinyl chloride                        | 1.0 (MM) (M)<br>mut                          | 8.2E-02 (MM) (M)<br>mut | 54 (MM)<br>mut                     |
| 1330207 | Xylenes                               | 1,300 (J)<br>nc                              | 280 (J)<br>nc           | 7,600 (J)<br>nc                    |

**FOOTNOTES**

\*\*Soil gas site-specific volatilization to indoor air (SSVIAC) are applicable for all depths.

- Acceptable Air Values (AAV) endpoint basis used for SSVIAC: (**ca**) = Carcinogenic; (**nc**) = Non-Carcinogenic; (**dev**) = Developmental; (**mut**) = Mutagenic cancer; (**st**) = Short-term (i.e., less than chronic exposure).
- Footnote **(#)**: Acceptable air concentrations (AAC) cannot be adjusted to a 12-hour exposure time for hazardous substance.
- Footnote **AA**: Health-based groundwater SSVIAC are not available due to insufficient toxicological data. Dissolved-phase methane in groundwater is not explosive; however, if liberated and allowed to accumulate in an enclosed structure the principle health and safety concerns are explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable groundwater concentration is the flammability and explosivity screening level (**FESL**) of 10,000 µg/L.
- Footnote **C**: The health-based SSVIAC exceeds the chemical-specific soil saturation screening level. The person proposing or implementing response activity must document whether additional response activity is required to control non aqueous phase liquid (**NAPL**) to protect against risks associated with NAPL by using methods appropriate for the NAPL present.
- Footnote **CC**: Insufficient chemical-physical input parameters have been identified to allow the development of a health-based SSVIAC using standard methods. The health based SSVIAC for groundwater is developed based solely on the approach that the department uses for shallow groundwater. If groundwater detections are present, soil vapor may be the most appropriate media to evaluate risk posed from the VIAP.
- Footnote **DATA**: Insufficient physical chemical parameters to calculate a health based SSVIAC for specified media. If detections are present in specified media, health-based soil vapor SSVIAC should be used to evaluate risk.
- Footnote **DD**: Hazardous substance causes developmental effects. Residential SSVIAC are protective of both prenatal exposure using a pregnant female receptor and postnatal exposure using a child receptor. Nonresidential SSVIAC are protective of prenatal exposure using a pregnant female receptor. Prenatal developmental effects may occur after an acute (i.e. short-term) or full-term exposure.
- Footnote **EE**: The acceptable air concentration (**AAC**) for the volatile hazardous substances is not derived using standard methods. The hazardous substance may cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The AAC for these hazardous substances is the acute or intermediate minimum risk level (MRL) developed by the Agency for Toxic Substances and Disease Registry (ATSDR), a United States Environmental Protection Agency Integrated Risk Information System (IRIS) acute reference concentration, or EGLE's Air Quality Division acute initial threshold screening level (ITSL).
- Footnote **FF**: The AAC for the volatile hazardous substances are based on toxicity values that have been identified to have the potential to cause adverse human health effects for less than chronic exposures (i.e. short-term or acute). The short-term exposure for shallow groundwater health based SSVIAC are based on modification of the standard methods by the department to develop applicable shallow groundwater values.
- Footnote **GG**: Health-based SSVIAC for soil vapor are not available due to insufficient toxicological data. The soil vapor value addresses the health and safety concerns of explosive, flammable, and asphyxiant properties of gas phase methane. The acceptable soil vapor concentration is derived based on 25% of the lower explosive level (**LEL**) for methane.
- Footnote **GW**: The calculated health based SSVIAC for a hazardous substance based upon shallow groundwater is considered protective when it is greater than the calculated value for groundwater.
- Footnote **ID**: Requires further evaluation to determine the appropriate media to sample.
- Footnote **J**: Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to criteria.
- Footnote **JT**: Hazardous substance may be present in several isomer forms. The health-based SSVIAC may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive health-based SSVIAC of the detected isomers.
- Footnote **M**: The health based SSVIAC 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 health-based SSVIAC, the TDL is used to evaluate the risk posed from the pathway.
- Footnote **MM**: Hazardous substance is a carcinogen with a mutagenic mode of action. The cancer potency values used in calculating health-based SSVIAC are modified using age-dependent adjustment factors for those carcinogenic chemicals identified as mutagenic.
- Footnote **NA**: The hazardous substance does not meet the department's definition of a volatile; therefore, no health based SSVIAC were developed.
- Footnote **NR**: The hazardous substance has not been previously evaluated by the Remediation and Redevelopment Division Toxicology Unit. The identification, collection, and evaluation of toxicological literature and chemical-physical data cannot be completed within the timeframe requested.
- Footnote **S**: Calculated health-based SSVIAC exceeds the hazardous substance-specific water solubility limit; therefore, the water solubility limit is used to evaluate the risk posed from the pathway.
- Footnote **TX**: The Remediation and Redevelopment Division Toxicology Unit has not identified an inhalation toxicity value for the hazardous substance.