**From:** Richard Werner <rwerner@eciconsulting.net>
**Sent:** Monday, April 09, 2018 10:22 AM
**To:** McIlheran, Adam S - DNR
**Subject:** [WARNING: ATTACHMENT(S) MAY CONTAIN MALWARE]Re: BRRTS#02-41-20016_733 East Capitol Drive
**Attachments:** BRRTS#02-41-20016_733EastCapitolDrive.pdf

Good morning Adam

I have attached the Site-Specific VISL Results output tables for a "Commercial Property" for the compounds that are not listed in the WI Vapor Quick Look-up Table (November, 2017). We originally used the May, 2016 USEPA Regional Screening Level Tables but I could not find the backup in our file. Therefore, we re-ran the site-specific analysis using the November, 2017 screening levels.

Below in italics is the soil gas sampling methodology:

*On June 27, 2016, Environmental Consulting, Inc. collected three (3) soil gas samples denoted as SG1, SG2 and SG3 on the subject property. The soil gas samples were collected from temporary sampling points advanced through the asphalt pavement on the subject property. Figure 3-1 illustrates the approximate locations of the three (3) soil gas samples collected on the subject property. The soil gas sampling points were advanced using a track-mounted direct push drilling machine. A six-inch long stainless steel soil gas implant was installed at the invert of each of the three (3) soil borings. One-quarter inch inner diameter poly tubing was attached to the implant and extended up to grade, protruding several feet out of the borehole. A sandpack consisting of #1 size sand was then installed around the soil gas implant within the borehole to a depth of 1 foot bgs. An 8-inch thick bentonite seal was then installed in the remaining annular space to grade and properly hydrated. Once the bentonite had been adequately hydrated, each soil gas sample was collected in laboratory-supplied summa canisters with a one-hour regulator attached to the one-quarter inch inner-diameter poly tubing protruding from each borehole. The three (3) soil gas samples denoted as SG1, SG2 and SG3 were submitted to EMSL in Cinnaminson, New Jersey for analysis of VOCs by the United States Environmental Protection Agency ("USEPA") method TO-15.*

Let me know if you need anything else.

Thanks,
Rich
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# Site-specific VISL Results
# Commercial Equation Inputs

*** Inputted values different from Commercial defaults are highlighted.**
**Output generated 09APR2018:10:26:32**

| Variable | Commercial Air Default Value | Value |
|---|---|---|
| $AF_{gw}$ (Attenuation Factor Groundwater) unitless | 0.001 | 0.001 |
| $AF_{ss}$ (Attenuation Factor Sub-Slab) unitless | 0.03 | 0.03 |
| $AT_{w}$ (averaging time - composite worker) | 365 | 365 |
| $ED_{w}$ (exposure duration - composite worker) yr | 25 | 25 |
| $EF_{w}$ (exposure frequency - composite worker) day/yr | 250 | 250 |
| $ET_{w}$ (exposure time - composite worker) hr | 8 | 8 |
| THQ (target hazard quotient) unitless | 0.1 | 0.1 |
| LT (lifetime) yr | 70 | 70 |
| TR (target risk) unitless | 1.0E-06 | 1.0E-06 |

## Commercial Vapor Intrusion Screening Levels (VISL)
## <a href= \/guide.html#Table1 ⍈ User's Guide Variable References</a>

**Output generated 09APR2018:10:26:32**

| Chemical | CAS Number | Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) | Does the chemical have inhalation toxicity data? (IUR and/or RfC) | Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp}$ > $C_{i,a}$,Target?) | Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc}$ > $C_{i,a}$,Target?) | Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m³) | Toxicity Basis |
|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | Yes | Yes | Yes | Yes | 1.35E+04 | NC |
| Butadiene, 1,3- | 106-99-0 | Yes | Yes | Yes | Yes | 4.09E-01 | CA |
| Cyclohexane | 110-82-7 | Yes | Yes | Yes | Yes | 2.63E+03 | NC |
| Dichloroethylene, 1,2-cis- | 156-59-2 | Yes | No | No Inhal. Tox. Info | No Inhal. Tox. Info | | |
| Dichloropropane, 1,2- | 78-87-5 | Yes | Yes | Yes | Yes | 1.75E+00 | NC |
| Ethanol | 64-17-5 | Yes | No | No Inhal. Tox. Info | No Inhal. Tox. Info | | |
| Ethyl Acetate | 141-78-6 | Yes | Yes | Yes | Yes | 3.07E+01 | NC |
| Heptane, N- | 142-82-5 | Yes | Yes | Yes | Yes | 1.75E+02 | NC |
| Hexane, N- | 110-54-3 | Yes | Yes | Yes | Yes | 3.07E+02 | NC |
| Isopropanol | 67-63-0 | Yes | Yes | Yes | Yes | 8.76E+01 | NC |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | Yes | Yes | Yes | Yes | 2.19E+03 | NC |
| Propylene | 115-07-1 | Yes | Yes | Yes | Yes | 1.31E+03 | NC |
| Tetrahydrofuran | 109-99-9 | Yes | Yes | Yes | Yes | 8.76E+02 | NC |
| Trimethylpentene, 2,4,4- | 25167-70-8 | Yes | No | No Inhal. Tox. Info | No Inhal. Tox. Info | | |

## Commercial Vapor Intrusion Screening Levels (VISL)
## <a href= \/guide.html#Table1 ⍈ User's Guide Variable References</a>

**Output generated 09APR2018:10:26:32**

| Chemical | Target Sub-Slab and Exterior Soil Gas Concentration (TCR=1E-06 or THQ=0.1) $C_{sg}$,Target (µg/m³) | Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) $C_{gw}$,Target (µg/L) | Is Target Groundwater Concentration < MCL? ($C_{gw}$ < MCL?) | Pure Phase Vapor Concentration $C_{vp}$ (25 ° C) (\µg/m³) | Maximum Groundwater Vapor Concentration $C_{hc}$ (\µg/m³) | Temperature for Maximum Groundwater Vapor Concentration (° C) |
|---|---|---|---|---|---|---|
| Acetone | 4.51E+05 | 9.46E+06 | -- | 7.25E+08 | 1.43E+09 | 25 |
| Butadiene, 1,3- | 1.36E+01 | 1.36E-01 | -- | 6.14E+09 | 2.21E+09 | 25 |
| Cyclohexane | 8.76E+04 | 4.29E+02 | -- | 4.39E+08 | 3.37E+08 | 25 |
| Dichloroethylene, 1,2-cis- | | | | 1.04E+09 | 1.07E+09 | 25 |
| Dichloropropane, 1,2- | 5.84E+01 | 1.52E+01 | No (5) | 3.24E+08 | 3.23E+08 | 25 |
| Ethanol | | | | 1.47E+08 | 2.04E+08 | 25 |
| Ethyl Acetate | 1.02E+03 | 5.60E+03 | -- | 4.42E+08 | 4.38E+08 | 25 |
| Heptane, N- | 5.84E+03 | 2.14E+00 | -- | 2.48E+08 | 2.78E+08 | 25 |
| Hexane, N- | 1.02E+04 | 4.17E+00 | -- | 7.00E+08 | 6.99E+08 | 25 |
| Isopropanol | 2.92E+03 | 2.65E+05 | -- | 1.47E+08 | 3.31E+08 | 25 |
| Methyl Ethyl Ketone (2-Butanone) | 7.30E+04 | 9.42E+05 | -- | 3.51E+08 | 5.19E+08 | 25 |
| Propylene | 4.38E+04 | 1.64E+02 | -- | 1.97E+10 | 1.60E+09 | 25 |
| Tetrahydrofuran | 2.92E+04 | 3.04E+05 | -- | 6.28E+08 | 2.88E+09 | 25 |
| Trimethylpentene, 2,4,4- | | | | 4.29E+08 | | 25 |

## Commercial Vapor Intrusion Screening Levels (VISL)
## <a href= \/guide.html#Table1 ⍈ User's Guide Variable References</a>

**Output generated 09APR2018:10:26:32**

| Chemical | Lower Explosive Limit LEL (% by volume) | LEL Ref | Inhalation Unit Risk $(ug/m^3)^{-1}$ | IUR Ref | Chronic RfC $(mg/m^3)$ | RfC Ref | Mutagenic Indicator | Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ (µg/m³) | Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ (µg/m³) |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | 2.50 | U | | | 3.09E+01 | U | | | 1.35E+04 |
| Butadiene, 1,3- | 2.00 | U | 3.00E-05 | U | 2.00E-03 | U | | 4.09E-01 | 8.76E-01 |
| Cyclohexane | 1.30 | U | | | 6.00E+00 | U | | | 2.63E+03 |
| Dichloroethylene, 1,2-cis- | 3.00 | U | | | | | | | |
| Dichloropropane, 1,2- | 3.40 | U | 3.70E-06 | U | 4.00E-03 | U | | 3.31E+00 | 1.75E+00 |
| Ethanol | 3.30 | U | | | | | | | |
| Ethyl Acetate | 2.00 | U | | | 7.00E-02 | U | | | 3.07E+01 |
| Heptane, N- | 1.05 | U | | | 4.00E-01 | U | | | 1.75E+02 |
| Hexane, N- | 1.10 | U | | | 7.00E-01 | U | | | 3.07E+02 |
| Isopropanol | 2.00 | U | | | 2.00E-01 | U | | | 8.76E+01 |
| Methyl Ethyl Ketone (2-Butanone) | 1.40 | U | | | 5.00E+00 | U | | | 2.19E+03 |
| Propylene | 2.00 | U | | | 3.00E+00 | U | | | 1.31E+03 |
| Tetrahydrofuran | 2.00 | U | | | 2.00E+00 | U | | | 8.76E+02 |
| Trimethylpentene, 2,4,4- | | | | | | | | | |

| Chemical | CAS Number | Site Sub-Slab and Exterior Soil Gas Concentration $C_{sg}$ (µg/m³) | Site Indoor Air Concentration $C_{i,a}$ (µg/m³) | VI Carcinogenic Risk CR | VI Hazard HQ |
|---|---|---|---|---|---|
| Acetone | 67-64-1 | 13000 | 3.90E+02 | | 2.88E-03 |
| Butadiene, 1,3- | 106-99-0 | 22 | 6.60E-01 | 1.61E-06 | 7.53E-02 |
| Cyclohexane | 110-82-7 | 60 | 1.80E+00 | | 6.85E-05 |
| Dichloroethylene, 1,2-cis- | 156-59-2 | 60 | | | |
| Dichloropropane, 1,2- | 78-87-5 | 320 | 9.60E+00 | 2.90E-06 | 5.48E-01 |
| Ethanol | 64-17-5 | 260 | | | |
| Ethyl Acetate | 141-78-6 | 31 | 9.30E-01 | | 3.03E-03 |
| Heptane, N- | 142-82-5 | 94 | 2.82E+00 | | 1.61E-03 |
| Hexane, N- | 110-54-3 | 46 | 1.38E+00 | | 4.50E-04 |
| Isopropanol | 67-63-0 | 86 | 2.58E+00 | | 2.95E-03 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 1000 | 3.00E+01 | | 1.37E-03 |
| Propylene | 115-07-1 | 2000 | 6.00E+01 | | 4.57E-03 |
| Tetrahydrofuran | 109-99-9 | 870 | 2.61E+01 | | 2.98E-03 |
| Trimethylpentene, 2,4,4- | 25167-70-8 | 25 | | | |
| **Sum* | | | | *4.51E-06* | *6.43E-01* |

| Chemical | Inhalation Unit Risk $(ug/m^3)^{-1}$ | IUR Ref | Chronic RfC $(mg/m^3)$ | RfC Ref | Temperature (°C) for Groundwater Vapor Concentration | Mutagen? |
|---|---|---|---|---|---|---|
| Acetone | | | 3.09E+01 | U | 25 | |
| Butadiene, 1,3- | 3.00E-05 | U | 2.00E-03 | U | 25 | |
| Cyclohexane | | | 6.00E+00 | U | 25 | |
| Dichloroethylene, 1,2-cis- | | | | | 25 | |
| Dichloropropane, 1,2- | 3.70E-06 | U | 4.00E-03 | U | 25 | |
| Ethanol | | | | | 25 | |
| Ethyl Acetate | | | 7.00E-02 | U | 25 | |
| Heptane, N- | | | 4.00E-01 | U | 25 | |
| Hexane, N- | | | 7.00E-01 | U | 25 | |
| Isopropanol | | | 2.00E-01 | U | 25 | |
| Methyl Ethyl Ketone (2-Butanone) | | | 5.00E+00 | U | 25 | |
| Propylene | | | 3.00E+00 | U | 25 | |
| Tetrahydrofuran | | | 2.00E+00 | U | 25 | |
| Trimethylpentene, 2,4,4- | | | | | 25 | |
| **Sum* | | | | | | |

| Chemical | CAS Number | Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) | Does the chemical have inhalation toxicity data? (IUR and/or RfC) | MW | MW Ref | Vapor Pressure VP (mm Hg) | VP Ref | Pure Component Water Solubility S (mg/L) | S Ref | MCL (ug/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 67-64-1 | Yes | Yes | 58.08 | U | 2.32E+02 | U | 1.00E+06 | U | |
| Butadiene, 1,3- | 106-99-0 | Yes | Yes | 54.09 | U | 2.11E+03 | U | 7.35E+02 | U | |
| Cyclohexane | 110-82-7 | Yes | Yes | 84.16 | U | 9.69E+01 | U | 5.50E+01 | U | |
| Dichloroethylene, 1,2-cis- | 156-59-2 | Yes | No | 96.94 | U | 2.00E+02 | U | 6.41E+03 | U | 70 |
| Dichloropropane, 1,2- | 78-87-5 | Yes | Yes | 112.99 | U | 5.33E+01 | U | 2.80E+03 | U | 5 |
| Ethanol | 64-17-5 | Yes | No | 46.07 | U | 5.93E+01 | U | 1.00E+06 | U | |
| Ethyl Acetate | 141-78-6 | Yes | Yes | 88.11 | U | 9.32E+01 | U | 8.00E+04 | U | |
| Heptane, N- | 142-82-5 | Yes | Yes | 100.21 | U | 4.60E+01 | U | 3.40E+00 | U | |
| Hexane, N- | 110-54-3 | Yes | Yes | 86.18 | U | 1.51E+02 | U | 9.50E+00 | U | |
| Isopropanol | 67-63-0 | Yes | Yes | 60.10 | U | 4.54E+01 | U | 1.00E+06 | U | |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | Yes | Yes | 72.11 | U | 9.06E+01 | U | 2.23E+05 | U | |
| Propylene | 115-07-1 | Yes | Yes | 42.08 | U | 8.69E+03 | U | 2.00E+02 | U | |
| Tetrahydrofuran | 109-99-9 | Yes | Yes | 72.11 | U | 1.62E+02 | U | 1.00E+06 | U | |
| Trimethylpentene, 2,4,4- | 25167-70-8 | Yes | No | 112.22 | U | 7.10E+01 | U | 4.04E+00 | U | |

| Chemical | Henry's Law Constant @25°C (atm-m$^3$/mole) | Henry's Law Constant (unitless) | H`& HLC Ref | Henry's Law Constant Used in Calcs (unitless) | Air Diffusivity $D_{ia}$ cm$^2$/s) | $D_{ia}$ Ref | Water Diffusivity $D_{iw}$ cm$^2$/s) | $D_{iw}$ Ref | Normal Boiling Point $T_{boil}$ (K) | BP Ref | Critical Temperature $T_{crit}$ (K) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 3.50E-05 | 1.43E-03 | U | 1.43E-03 | 1.06E-01 | U | 1.15E-05 | U | 329.15 | U | 5.08E+02 |
| Butadiene, 1,3- | 7.36E-02 | 3.01E+00 | U | 3.01E+00 | 1.00E-01 | U | 1.03E-05 | U | 268.75 | U | 4.25E+02 |
| Cyclohexane | 1.50E-01 | 6.13E+00 | U | 6.13E+00 | 8.00E-02 | U | 9.11E-06 | U | 353.85 | U | 5.53E+02 |
| Dichloroethylene, 1,2-cis- | 4.08E-03 | 1.67E-01 | U | 1.67E-01 | 8.84E-02 | U | 1.13E-05 | U | 333.25 | U | 5.36E+02 |
| Dichloropropane, 1,2- | 2.82E-03 | 1.15E-01 | U | 1.15E-01 | 7.33E-02 | U | 9.73E-06 | U | 368.65 | U | 5.72E+02 |
| Ethanol | 5.00E-06 | 2.04E-04 | U | 2.04E-04 | 1.24E-01 | U | 1.32E-05 | U | 351.35 | U | 5.15E+02 |
| Ethyl Acetate | 1.34E-04 | 5.48E-03 | U | 5.48E-03 | 8.23E-02 | U | 9.70E-06 | U | 350.25 | U | 5.23E+02 |
| Heptane, N- | 2.00E+00 | 8.18E+01 | U | 8.18E+01 | 6.49E-02 | U | 7.59E-06 | U | 371.65 | U | 5.40E+02 |
| Hexane, N- | 1.80E+00 | 7.36E+01 | U | 7.36E+01 | 7.31E-02 | U | 8.17E-06 | U | 341.85 | U | 5.08E+02 |
| Isopropanol | 8.10E-06 | 3.31E-04 | U | 3.31E-04 | 1.03E-01 | U | 1.12E-05 | U | 355.45 | U | 5.08E+02 |
| Methyl Ethyl Ketone (2-Butanone) | 5.69E-05 | 2.33E-03 | U | 2.33E-03 | 9.14E-02 | U | 1.02E-05 | U | 352.65 | U | 5.37E+02 |
| Propylene | 1.96E-01 | 8.01E+00 | U | 8.01E+00 | 1.10E-01 | U | 1.07E-05 | U | 225.15 | U | 3.65E+02 |
| Tetrahydrofuran | 7.05E-05 | 2.88E-03 | U | 2.88E-03 | 9.94E-02 | U | 1.08E-05 | U | 338.15 | U | 5.40E+02 |
| Trimethylpentene, 2,4,4- | 7.46E-01 | | U | | 5.95E-02 | U | 7.31E-06 | U | 374.15 | U | 5.65E+02 |

| Chemical | $T_{crit}$ Ref | Enthalpy of vaporization at the normal boiling point Δ$H_{v,b}$ (cal/mol) | Δ$H_{v,b}$ Ref | Organic Carbon Partition Coefficient $K_{oc}$ ($cm^3/g$) | $K_{oc}$ Ref | Lower Explosive Limit LEL (% by volume) | LEL Ref |
|---|---|---|---|---|---|---|---|
| Acetone | U | 6960.00 | U | 2.36 | U | 2.50 | U |
| Butadiene, 1,3- | U | 5370.00 | U | 39.6 | U | 2.00 | U |
| Cyclohexane | U | 7160.00 | U | 146 | U | 1.30 | U |
| Dichloroethylene, 1,2-cis- | U | 7220.00 | U | 39.6 | U | 3.00 | U |
| Dichloropropane, 1,2- | U | 7590.00 | U | 60.7 | U | 3.40 | U |
| Ethanol | U | 9220.00 | U | 1.04 | U | 3.30 | U |
| Ethyl Acetate | U | 7630.00 | U | 5.58 | U | 2.00 | U |
| Heptane, N- | U | 7590.00 | U | 240 | U | 1.05 | U |
| Hexane, N- | U | 6900.00 | U | 132 | U | 1.10 | U |
| Isopropanol | U | 10800.00 | U | 1.53 | U | 2.00 | U |
| Methyl Ethyl Ketone (2-Butanone) | U | 7480.00 | U | 4.51 | U | 1.40 | U |
| Propylene | U | 4400.00 | U | 21.7 | U | 2.00 | U |
| Tetrahydrofuran | U | 7070.00 | U | 10.8 | U | 2.00 | U |
| Trimethylpentene, 2,4,4- | U | | | 240 | U | | |