



STATE OF MICHIGAN
DEPARTMENT OF HEALTH AND HUMAN SERVICES
LANSING

RICK SNYDER
GOVERNOR

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June 2, 2015

Linda Martin, Remedial Project Manager
U.S. Environmental Protection Agency
77 West Jackson (SR-6J)
Chicago, Illinois 60604

Dear Ms. Martin:

Per your request, I have reviewed the soil gas and crawlspace air data for samples taken at the Harbor West Condominiums property near the Grand Traverse Overall Supply Superfund (GTOS) site in Greilickville, Michigan. Trichloroethylene (TCE), tetrachloroethylene (PCE), and related chemicals¹ are contaminants at the GTOS site and have entered the groundwater, which flows under the condominiums and out to Grand Traverse Bay in Lake Michigan. Although the chemicals are in the groundwater, they can volatilize into the soil gas, accumulate under structures, and enter the indoor air via a process called vapor intrusion. Indoor air levels of these chemicals can reach levels of public health concern.

I have determined that the levels of 1,1-dichloroethylene (1,1-DCE), cis-1,2-dichloroethylene (cis-1,2-DCE), trans-1,2-dichloroethylene (trans-1,2-DCE), PCE, and vinyl chloride (VC), as detected, are not expected to cause harm to people. This is based on the concentrations of these chemicals being lower than U.S. Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) vapor intrusion screening levels. Therefore, these chemicals are not expected to enter indoor air at levels that could harm building occupants. **I cannot determine whether the levels of TCE in the soil gas or crawlspace air may cause harm to people breathing indoor air containing this chemical.** This is based on the fact that, while the level of TCE in some of the soil gas and crawlspace air samples exceeded

¹ Some documents refer to "trichloroethylene" as "*trichloroethene*" (italics added), and so on with the other chemicals listed above, except for vinyl chloride. This reflects only a naming preference – the chemical itself is the same.

screening levels, there are no indoor air data available to assess actual exposure to people occupying the condominiums.

For next steps, I recommend that indoor air be sampled, concurrent with crawlspace and soil gas sampling, preferably when groundwater elevations are high (so that the source of potential subsurface vapors is closer to the condominiums) or when there is snow cover and people are heating their homes (so any vapors are likely to be drawn into the structure via the “chimney effect”). If indoor air levels of the contaminants are below screening levels in these worst-case scenarios, then they are likely not to be of concern during other times of the year.

The remainder of this letters details the supporting information for the conclusions above.

Evaluation of Data

The soil gas and/or crawlspace air at the condominiums have been tested by EPA several times: first, during an investigation in 2007 and 2008 (only one of the condos currently in question was sampled); then, quarterly soil gas sampling since 2009, as part of the ongoing monitoring at the GTOS site; and most recently, soil gas and crawlspace air in October 2014 and January 2015. For purposes of this evaluation, I am considering only the data in the October 2014 and January 2015 sampling events, since they represent the most recent conditions and include crawlspace air. The attached map shows the soil gas sampling locations, but not the locations of the crawlspace samples, to protect those property owners’ privacy.

I used the most current state (Michigan) and federal guidance to evaluate the data from these sampling events: the 2013 MDEQ vapor intrusion screening values and the on-line EPA vapor intrusion screening level calculator (last updated June 2014). These screening levels represent the best available science and are protective of public health, including sensitive populations such as children, the elderly, and pregnant women.

The soil gas screening levels assume that the samples were collected underneath the building. The samples for this investigation were not collected under the building but next to it. However, the use of shallow soil gas screening levels allows the evaluation to be conservative (i.e., health-protective).

The crawlspace air samples were compared to screening levels for indoor air, since there are no screening levels for crawlspace air. It is possible that vapors in the crawlspace would not enter the indoor air or would do so at lower levels. Therefore, this comparison is also conservative.

The chemicals of interest that were analyzed for in the samples were 1,1-DCE; cis-1,2-DCE; trans-1,2-DCE; PCE; TCE; and VC. 1,1-DCE and VC were not detected in any soil gas or crawlspace samples and will not be discussed further. Neither cis- nor trans-1,2-DCE was detected in soil gas but both were detected in at least one of the crawlspace samples, so they will be evaluated further. TCE and PCE were detected in both soil gas and crawlspace air and will be evaluated further. The attached tables show the screening levels and the maximum detected concentration of the chemicals detected in the soil gas and crawlspace samples.

The levels of cis- and trans-1,2-DCE, when detected, were well below their respective screening levels and do not pose a health concern.

The levels of PCE in soil gas decreased from the 2014 to the 2015 sampling event. PCE in Condo A's crawlspace also decreased between sampling events, but increased in Condo B's crawlspace. Although the crawlspace air concentrations were below screening levels in both condos and do not pose a health concern, it is not clear why one unit showed a decrease while the other unit showed an increase. Additional sampling is necessary, including indoor air, to ensure that occupants of the condos are not exposed to potentially harmful levels of PCE.

The levels of TCE detected in the soil gas decreased from the 2014 to the 2015 sampling event. TCE in Condo A's crawlspace also decreased between sampling events, exceeding only the EPA screening level for the 2014 sample and neither screening level in 2015. The TCE in Condo B's crawlspace increased between sampling events, exceeding EPA's screening level on both occasions and MDEQ's screening level as well in 2015. TCE is commonly found at former industrial sites. It was used as a solvent and a dry-cleaning agent, among other applications. The EPA screening level for TCE is protective of a one-in-one-million cancer risk (primarily kidney, non-Hodgkin's lymphoma, and liver and biliary tract cancers) and heart malformations in the developing fetus. The MDEQ screening level is protective of the fetal heart malformations and a one-in-100,000 cancer risk. There are no indoor air data for either condo to assess whether and to what extent exposure might be occurring. Additional sampling is necessary, including indoor air, to ensure that occupants of the condos are not exposed to potentially harmful levels of TCE.

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If I can be of further assistance in this matter, please do not hesitate to contact me.

Sincerely,

Christina Rose Bush

Christina Bush, Toxicologist
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CC: Cindy Fairbanks, MDEQ
Benzie-Leelanau District Health Department

Map of Harbor West Condominiums, Greilickville, Michigan, and soil gas sampling locations.



1/10/2015 9:00:18 AM 10/10/2015 9:00:18 AM 10/10/2015 9:00:18 AM 10/10/2015 9:00:18 AM

Soil gas results at Harbor West Condominiums for October 2014 and January 2015 sampling events Greilickville, Michigan.¹ Units are parts per billion by volume.

| | Screening Levels ² | | Sampling Location | | | | | |
|---------------|-------------------------------|--------------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | | HWC-3 | | HWC-4 | | HWC-17 | |
| Chemical | <i>EPA</i> ³ | <i>MDEQ</i> ⁴ | <i>2014</i> | <i>2015</i> | <i>2014</i> | <i>2015</i> | <i>2014</i> | <i>2015</i> |
| cis-1,2-DCE | NSL ⁵ | 58 | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ |
| trans-1,2-DCE | NSL ⁵ | 580 | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ | ND ⁶ |
| PCE | 16 | 170 | 95 | 15 | 98 | 17 | 1 | 0.1 |
| TCE | 0.9 | 12 | 17 ⁷ | 2 | 18 ⁷ | 2.2 | ND ⁶ | ND ⁶ |

Crawlspace air results at Harbor West Condominiums for October 2014 and January 2015 sampling events, Greilickville, Michigan.⁸ Units are parts per billion by volume.

| | Screening Levels ² | | Sampling Locations | | | |
|---------------|-------------------------------|---------------------------|--------------------|--------------------|-----------------|--------------------|
| | | | Condo "A" | | Condo "B" | |
| Chemical | <i>EPA</i> ⁹ | <i>MDEQ</i> ¹⁰ | <i>2014</i> | <i>2015</i> | <i>2014</i> | <i>2015</i> |
| cis-1,2-DCE | NSL ⁵ | 1.7 | 0.027 | 0.019 ⁷ | 0.021 | 0.14 ⁷ |
| trans-1,2-DCE | NSL ⁵ | 17 | ND ⁶ | ND ⁶ | ND ⁶ | 0.026 ⁷ |
| PCE | 1.6 | 5 | 0.37 | 0.16 | 0.53 | 0.83 |
| TCE | 0.09 | 0.37 | 0.18 | 0.064 | 0.32 | 0.49 |

1. One sample taken per location each event.
2. Although each agency may have its own unique protocol to determine screening levels, resulting in different values, if the screening levels are within about an order of magnitude (ten times) from each other, they are considered similar.
3. Soil gas screening level, from EPA Vapor Intrusion Screening Level (VISL) Calculator (see <http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6>).
4. 2013 MDEQ Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels (see http://www.michigan.gov/documents/deq/deq-rrd-VIGuidanceDoc-May2013_422550_7.pdf?20150522143610).
5. No screening level available (EPA does not have screening levels for cis- or trans-1,2-DCE).
6. Not detected above the laboratory's reporting limit.
7. The laboratory estimated the concentrations because, while the chemicals were positively identified, the concentrations were so low that they were outside of the calibration range of the analytical instrument for that chemical.
8. Two samples taken for Condo A, three samples for Condo B, each event. Only the highest concentration detected shown.
9. Indoor air screening level, from EPA Vapor Intrusion Screening Level (VISL) Calculator (see <http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6>).
10. 2013 MDEQ Vapor Intrusion Indoor Air Screening Levels (see http://www.michigan.gov/documents/deq/deq-rrd-VIGuidanceDoc-May2013_422550_7.pdf?20150522143610).