

Tony Evers  
Governor



DIVISION OF PUBLIC HEALTH

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Karen E. Timberlake  
Secretary

**State of Wisconsin**  
Department of Health Services

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December 23, 2022

Celeste Hemphill-Welter  
Douglas County Department of Health and Human Services  
1316 North 14th Street, Suite #324  
Superior, WI 54880

Re: Letsos Property (BRRTS# 02-16-560359) Indoor Air Quality Assessment

Dear Ms. Hemphill-Welter:

This letter summarizes our findings from the investigation of trichloroethylene (TCE) in indoor air at an office and two Airbnb units related to an ongoing vapor intrusion concern at the property referenced above. **DHS recommends that periodic TCE in indoor air sampling continue at this property and that efforts be taken to keep TCE in indoor air concentrations below the Wisconsin Department of Natural Resources (DNR) Vapor Action Level (VAL).**

**Background:** An investigation of indoor air quality was initiated based upon previous results indicating the presence of TCE in indoor air above the WI DNR VAL at this property. In consultation with our office, it was decided that passive organic vapor monitor (OVM) air samples should be collected in both cold and warm weather scenarios to determine if TCE exists in the residence at levels that would constitute an elevated acute or chronic health risk to building occupants.

**Investigation:** The investigation consisted of deployment of passive OVMs during cold weather (February 2022, temperature range<sup>1</sup> = 8° to 26° F) and warm weather (September 2022, temperature range<sup>1</sup> = 65° to 80° F) periods, and subsequent laboratory analysis of the OVMs at the Wisconsin State Laboratory of Hygiene (WSLH). Assay Technology TraceAir<sup>®</sup> II 525 (AT 525) OVM's were used to assess for indoor air VOCs. One OVM was deployed inside the building in the main level office area and one OVM was deployed in each of the upstairs Airbnb units. An additional OVM was deployed outdoors to assess the ambient air background TCE concentration. For both the February and September events, OVMs were picked up after four days of sampling and submitted to the WSLH for analysis. The laboratory analyzed the air samples using an OSHA method to evaluate for TCE.

**Results and Discussion:** Results from the AT 525 OVM laboratory analysis are summarized in Table 1 below. The February 2022 cold weather TCE results were all below the DNR residential VAL<sup>2</sup>. The September 2022 warm weather samples, however, did report that TCE concentrations were present above the TCE residential VAL in both the Airbnb Unit A and Outdoor ambient

background samples. The fact that the outdoor ambient background and Airbnb Unit A samples were both above the residential TCE VAL and showing a similar concentration along with the fact that the main floor office area was not above the TCE VAL raises a concern that vapor mitigation system exhaust may have the potential to cause re-entrainment of TCE into the upper Airbnb unit.

**Table 1:** Summary of Results

| Sample Location    | TCE Concentration in $\mu\text{g}/\text{m}^3$<br>(DNR VAL = $2.1 \mu\text{g}/\text{m}^3$ ) |                              |
|--------------------|--|------------------------------|
|                    | Sampling Date<br>= 2/14/2022   | Sampling Date<br>= 9/12/2022 |
| Main Floor Office  | < 0.7  | 1.7                          |
| Airbnb Unit A      | 1.5  | <b>3.7</b>                   |
| Airbnb Unit B      | 0.9  | 1.8                          |
| Outdoor Background | < 0.7  | <b>3.4</b>                   |

Abbreviations: TCE = trichloroethylene;  $\mu\text{g}/\text{m}^3$  = microgram per cubic meter; DNR = Department of Natural Resources; VAL = Vapor Action Limit. Values in bold font exceed the residential DNR VAL for TCE.

**Site Visit Limitations:** The results from this investigation represent only the conditions during the time sampled. OVMs require some air flow for effective sample collection, so there is a small possibility that they could under report VOC concentrations when deployed in a very still area.

**Human Health Concerns:** The primary target for TCE toxicity is the central nervous system, and exposure to moderate amounts may cause headaches, dizziness, and sleepiness<sup>3</sup>. Exposure to higher levels of TCE can also cause heart rhythm changes and damage to the liver and kidney. Human epidemiology and animal toxicology studies show that TCE may cause developmental effects such as spontaneous abortion, congenital heart defects, central nervous system defects, and lowered birth weight. There is also strong evidence that TCE exposure over long periods can cause kidney cancer and some evidence for TCE to increase risk for liver cancer and malignant lymphoma.

**Conclusions:** TCE was reported above the WI DNR residential VAL in one indoor air location, which indicates the potential for periodic incursions of TCE above levels that indicate the elevated risk of health effects – namely acute developmental risks for persons who are or may become pregnant.

**Recommendations:** DHS recommends that periodic TCE in indoor air sampling continue at this property and that efforts be taken to keep TCE in indoor air concentrations below the DNR residential VAL. Efforts may include, but are not limited to, the following potential actions:

- Use of a portable carbon air purifying unit (APU)
- Use of carbon impregnated HVAC filters
- Maintaining indoor spaces under positive air pressure using HVAC controls.

DHS also recommends inspecting the exhaust for the vapor mitigation system (VMS) to ensure it does not have the potential to cause re-entrainment of VMS exhaust back into the building.

Please contact me at (608) 266-6677, or [curtis.hedman@dhs.wisconsin.gov](mailto:curtis.hedman@dhs.wisconsin.gov) if you have any questions about the health recommendations made in this letter.

Sincerely,



Curtis Hedman  
Toxicologist – Hazard Assessment Section

Cc: Grant Neitzel, Hydrogeologist – Senior, Wisconsin DNR  
James Walden, Hydrogeologist, P.G. – Vapor Intrusion Expert, Wisconsin DNR

Enclosed: WSLH Lab Results Reports

*Note: This publication was made possible by a cooperative agreement [Agency for Toxic Substances and Disease Registry's (ATSDR's) Program to Promote Localized Efforts to Reduce Environmental Exposure (APPLETREE) Program in Wisconsin #TS20-2001]. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the ATSDR, or the U.S. Department of Health and Human Services.*

**References:**

<sup>1</sup> Weather underground historical data for Superior, Wisconsin. Accessed online at: <https://www.wunderground.com/history/daily/us/wi/superior/KSUW/date/>.

<sup>2</sup> WI DNR Vapor Intrusion Vapor Action Levels (VALs), Wisconsin Vapor Quick Look up Table, Based on May 2022 EPA Regional Screening Levels. Accessed online at: <https://dnr.wi.gov/DocLink/RR/RR0136.pdf>.

<sup>3</sup> Agency for Toxic Substances and Disease Registry (ATSDR). 2019. Toxicological Profile for Trichloroethylene. Accessed online at: <https://www.atsdr.cdc.gov/toxprofiles/tp19.pdf>.



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CURTIS HEDMAN  
WI DEPT OF HEALTH SERVICES DPH-BEOH  
1 W. WILSON ST  
RM 150  
MADISON, WI 53701

**Lab Workorder ID** 606868  
**Visit/Project ID** LETSOS TCE  
**PO** DH 060  
**Received** February 23, 2022  
**Reported** March 3, 2022  
**Report ID** 9480890  
**Previous Report IDs**

Dear CURTIS HEDMAN:

Enclosed are the analytical results for sample(s) received by the laboratory on February 23, 2022. All samples/specimens received by the laboratory were acceptable for testing. Sample results were not blank corrected, and all quality control met laboratory standards unless otherwise noted in the report narrative. All results apply to the samples as received and reported concentrations were calculated with information supplied by the sample submitter.

Please contact the lab if you have any questions concerning this report.

Sincerely,

Steve Strelbel, Laboratory Director

Analyst - SARAH OEMIG

**Final Report**

|                          |                                |   |
|--------------------------|--------------------------------|---|
| Lab ID: <b>606868001</b> | Sample ID: <b>UNIT A-20317</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date:           | Matrix: <b>Air</b>             | Sampled Time: <b>5774 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |         | TWA          |             |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|---------|--------------|-------------|
|                 |                             |               |            |                 | Front  | Rear | Total   |              |             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 2/27/2022     | 421 L      | 0.29 ug         |        |      | 0.65 ug | 0.0015 mg/m3 | 0.00029 ppm |

|                          |                                |   |
|--------------------------|--------------------------------|---|
| Lab ID: <b>606868002</b> | Sample ID: <b>UNIT B-21897</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date:           | Matrix: <b>Air</b>             | Sampled Time: <b>5774 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |         | TWA           |             |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|---------|---------------|-------------|
|                 |                             |               |            |                 | Front  | Rear | Total   |               |             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 2/27/2022     | 421 L      | 0.29 ug         |        |      | 0.39 ug | 0.00093 mg/m3 | 0.00017 ppm |

|                          |                                |   |
|--------------------------|--------------------------------|---|
| Lab ID: <b>606868003</b> | Sample ID: <b>OFFICE-22330</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date:           | Matrix: <b>Air</b>             | Sampled Time: <b>5765 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |          | TWA            |              |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|----------|----------------|--------------|
|                 |                             |               |            |                 | Front  | Rear | Total    |                |              |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 2/27/2022     | 420 L      | 0.29 ug         |        |      | <0.29 ug | <0.00069 mg/m3 | <0.00013 ppm |

**Final Report**

|                          |                                 |   |
|--------------------------|---------------------------------|---|
| Lab ID: <b>606868004</b> | Sample ID: <b>OUTDOOR-19617</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date:           | Matrix: <b>Air</b>              | Sampled Time: <b>5769 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |          | TWA            |              |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|----------|----------------|--------------|
|                 |                             |               |            |                 | Front  | Rear | Total    |                |              |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 2/27/2022     | 421 L      | 0.29 ug         |        |      | <0.29 ug | <0.00069 mg/m3 | <0.00013 ppm |

Abbreviations:  
 mg = milligrams                      ppm or ppmv = parts per million                      /m3 = per cubic meter  
 ug = micrograms                      ppb or pptv = parts per billion                      ng = nanograms  
 < Less Than. The analyte, if present, is at a level too low to be accurately quantitated by the method used

Displayed values on report have been rounded to 2 significant figures. Please contact the laboratory if you have any questions regarding our result calculation or rounding. All samples were received by the laboratory in acceptable condition unless otherwise noted.

The results in this report apply only to the samples, specifically listed above, and tested at the Wisconsin Occupational Health Laboratory

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**End of Analytical Report**



**Wisconsin Occupational  
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1 W. WILSON ST  
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MADISON, WI 53701

Lab Workorder ID 643499  
Visit/Project ID LETSOS TCE  
PO DH 060  
Received September 20, 2022  
Reported October 6, 2022  
Report ID 10195231  
Previous Report IDs

Dear CURTIS HEDMAN:

Enclosed are the analytical results for sample(s) received by the laboratory on September 20, 2022. All samples/specimens received by the laboratory were acceptable for testing. Sample results were not blank corrected, and all quality control met laboratory standards unless otherwise noted in the report narrative. All results apply to the samples as received and reported concentrations were calculated with information supplied by the sample submitter.

Please contact the lab if you have any questions concerning this report.

Sincerely,

Steve Strebel, Laboratory Director

Analyst - SARAH OEMIG

**Final Report**

|                                 |                                   |   |
|---------------------------------|-----------------------------------|---|
| Lab ID: <b>643499001</b>        | Sample ID: <b>OUTDOOR - 02244</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date: <b>9/12/2022</b> | Matrix: <b>Air</b>                | Sampled Time: <b>5977 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |        | TWA                         |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|--------|-----------------------------|
|                 |                             |               |            |                 | Front  | Rear | Total  |                             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 10/4/2022     | 436 L      | 0.29 ug         |        |      | 1.5 ug | 0.0034 mg/m3<br>0.00064 ppm |

|                                 |                                  |   |
|---------------------------------|----------------------------------|---|
| Lab ID: <b>643499002</b>        | Sample ID: <b>OFFICE - 03149</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date: <b>9/12/2022</b> | Matrix: <b>Air</b>               | Sampled Time: <b>5975 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |         | TWA                         |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|---------|-----------------------------|
|                 |                             |               |            |                 | Front  | Rear | Total   |                             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 10/4/2022     | 436 L      | 0.29 ug         |        |      | 0.74 ug | 0.0017 mg/m3<br>0.00032 ppm |

|                                 |                                  |   |
|---------------------------------|----------------------------------|---|
| Lab ID: <b>643499003</b>        | Sample ID: <b>UNIT A - 02129</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date: <b>9/12/2022</b> | Matrix: <b>Air</b>               | Sampled Time: <b>5869 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |        | TWA                         |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|--------|-----------------------------|
|                 |                             |               |            |                 | Front  | Rear | Total  |                             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 10/4/2022     | 428 L      | 0.29 ug         |        |      | 1.6 ug | 0.0037 mg/m3<br>0.00070 ppm |

**Final Report**

|                                 |                                  |   |
|---------------------------------|----------------------------------|---|
| Lab ID: <b>643499004</b>        | Sample ID: <b>UNIT B - 02137</b> | Media: <b>3M 3501+ or Assay 525 OVM</b> |
| Sampling Date: <b>9/12/2022</b> | Matrix: <b>Air</b>               | Sampled Time: <b>5868 M</b>             |

| Analyte         | Method                      | Analysis Date | Air Volume | Reporting Limit | RESULT |      |         | TWA                         |
|-----------------|-----------------------------|---------------|------------|-----------------|--------|------|---------|-----------------------------|
|                 |                             |               |            |                 | Front  | Rear | Total   |                             |
| Trichloroethene | OSHA 1001, 1002, 1004, 1005 | 10/4/2022     | 428 L      | 0.29 ug         |        |      | 0.79 ug | 0.0018 mg/m3<br>0.00034 ppm |

Abbreviations:  
 mg = milligrams      ppm or ppmv = parts per million      /m3 = per cubic meter  
 ug = micrograms      ppb or ppbv = parts per billion      ng = nanograms  
 < Less Than. The analyte, if present, is at a level too low to be accurately quantitated by the method used

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**End of Analytical Report**