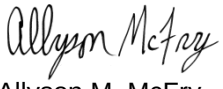
| FIELD SAMPLING TEST REPORT | |
|---|---|
| **Customer Information** | LST.FAI.HBDCResults@ul.com<br>UL Verification Services, Inc.<br>3251 Old Lee Highway, Suite 100<br>Fairfax, VA 22030<br>USA |
| **HB Project Number** | 2009049NY |
| **Date Received** | October 2, 2020 |
| **Testing Laboratory Location** | UL Environment - Marietta, 2211 Newmarket Parkway, Marietta, GA 30067-9399 USA |
| **Method** | USEPA Compendium Method TO-17 ; ASTM 6196 |
| **Authorized by** |  <br>Allyson M. McFry<br>Chemistry Laboratory Director |

Sampling: Reported data were obtained from samples and sampling information as provided by the on-site investigator. These data and general information are provided to assist the investigator in an overall IAQ assessment. Interpretation of data is left to the client or persons who conducted the field work.

This test is accredited and meets the requirements of ISO/IEC 17025 as verified by ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1297.



Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

| UL ID: | SV1TFD |
|---|---|
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.2 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| **Sample Location/Description** | Ex1_BR4_Pre |
|---|---|
| **Total Volatile Organic Compounds** | 34.7 µg/m³ |

| **CAS Number** | **Compound** | **Concentration** | |
|---|---|---|---|
| | | **µg/m³** | **ppb** |
| 77-68-9 | Propanoic acid, 2-methyl-, 3-hydroxy-2,2,4-trimethylpentyl ester (component of Texanol) | 12.7 | 1.4 |
| 64-19-7 | Acetic acid | 6.4 | 2.6 |
| 541-02-6 | Cyclopentasiloxane, decamethyl | 6.0 | 0.4 |
| 25265-77-4 | 2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate | 5.9 | 0.7 |
| 6846-50-0 | TXIB (2,2,4-Trimethyl-1,3-pentanediol diisobutyrate) | 4.8 | 0.4 |
| 66-25-1 | Hexanal | 2.8 | 0.7 |
| 124-19-6 | Nonyl aldehyde (Nonanal)† | 4.3 | 0.7 |

| | |
|---|---|
| UL ID: | SV1TFDF |
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.0 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| | |
|---|---|
| **Sample Location/Description** | Field Blank |
| **Total Volatile Organic Compounds** | BQL |

| CAS Number | Compound | Concentration | |
|---|---|---|---|
| | | µg/m³ | ppb |
| --- | none | --- | --- |

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

| | |
|---|---|
| UL ID: | SV2TFD |
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.0 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| | |
|---|---|
| **Sample Location/Description** | Ex1_BR4_Post |
| **Total Volatile Organic Compounds** | 31.7 µg/m³ |

| CAS Number | Compound | Concentration | |
|---|---|---|---|
| | | µg/m³ | ppb |
| 100-42-5 | Styrene† | 12.5 | 2.9 |
| 71-43-2 | Benzene† | 7.0 | 2.2 |
| 64-19-7 | Acetic acid | 5.7 | 2.3 |
| 91-20-3 | Naphthalene† | 5.0 | 0.9 |
| 98-01-1 | Furfural (2-Furaldehyde) | 3.5 | 0.9 |
| 19549-87-2 | 1-Heptene, 2,4-dimethyl* | 2.3 | 0.4 |
| 108-88-3 | Toluene (Methylbenzene) | 2.1 | 0.6 |
| 100-41-4 | Benzene, ethyl† | 2.0 | 0.5 |

| | |
|---|---|
| UL ID: | SV3TFD |
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.0 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| | |
|---|---|
| **Sample Location/Description** | Blank |
| **Total Volatile Organic Compounds** | BQL |

| **CAS Number** | **Compound** | **Concentration** | |
|---|---|---|---|
| | | **µg/m³** | **ppb** |
| --- | none | --- | --- |

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

| | |
|---|---|
| UL ID: | SV4TFD |
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.1 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| | |
|---|---|
| **Sample Location/Description** | EX2_LR_Hall_Pre |
| **Total Volatile Organic Compounds** | 40.4 µg/m³ |

| CAS Number | Compound | Concentration | |
|---|---|---|---|
| | | µg/m³ | ppb |
| 541-02-6 | Cyclopentasiloxane, decamethyl | 19.1 | 1.3 |
| 64-19-7 | Acetic acid | 6.3 | 2.6 |
| 77-68-9 | Propanoic acid, 2-methyl-, 3-hydroxy-2,2,4-trimethylpentyl ester (component of Texanol) | 6.1 | 0.7 |
| 66-25-1 | Hexanal | 5.2 | 1.3 |
| 108-88-3 | Toluene (Methylbenzene) | 4.3 | 1.1 |
| 25265-77-4 | 2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate | 3.2 | 0.4 |
| 124-19-6 | Nonyl aldehyde (Nonanal) † | 4.4 | 0.8 |

| UL ID: | SV5TFD |
|---|---|
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.1 |

## CONCENTRATIONS OF TOTAL AND INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

| **Sample Location/Description** | Ex2_LR_Hall_Post |
|---|---|
| **Total Volatile Organic Compounds** | 1,050 µg/m³ |

| **CAS Number** | **Compound** | **Concentration** | |
|---|---|---|---|
| | | **µg/m³** | **ppb** |
| 71-43-2 | Benzene† | 89.4 | 28.0 |
| 100-42-5 | Styrene† | 61.6 | 14.5 |
| 64-19-7 | Acetic acid | 54.7 | 22.3 |
| 98-01-1 | Furfural (2-Furaldehyde) | 50.9 | 12.9 |
| 534-22-5 | Furan, 2-methyl-* | 45.7 | 13.6 |
| 108-95-2 | Phenol† | 42.7 | 11.1 |
| 90-05-1 | Phenol, 2-methoxy* | 33.3 | 6.6 |
| 91-20-3 | Naphthalene† | 30.7 | 5.9 |
| 108-88-3 | Toluene (Methylbenzene) | 26.8 | 7.1 |
| 116-09-6 | 2-Propanone, 1-hydroxy | 24.4 | 8.1 |
| 80-62-6 | Methyl methacrylate (2-Propenoic acid, 2-methyl-, methyl ester) | 24.4 | 5.9 |
| 78-93-3 | 2-Butanone (Methyl ethyl ketone, MEK) | 24.2 | 8.2 |
| 66-25-1 | Hexanal | 23.5 | 5.7 |
| 431-03-8 | 2,3-Butanedione | 22.7 | 6.5 |
| 123-91-1 | 1,4-Dioxane† | 21.2 | 5.9 |
| 80-56-8 | Pinene, alpha (2,6,6-Trimethyl-bicyclo[3.1.1]hept-2-ene) | 18.1 | 3.2 |
| 93-51-6 | Phenol, 2-methoxy-4-methyl* | 17.9 | 3.2 |
| 1192-62-7 | Ethanone, 1-(2-furanyl)* | 17.3 | 3.8 |
| 110-86-1 | Pyridine | 15.3 | 4.7 |
| 98-00-0 | 2-Furanmethanol* | 14.4 | 3.6 |
| 104-76-7 | 1-Hexanol, 2-ethyl | 14.1 | 2.6 |
| 1330-20-7 | Xylenes (Total) † | 13.1 | 3.0 |
| 106-44-5 | Phenol, 4-methyl (p-Cresol)* | 12.8 | 2.9 |
| 2998-23-4 | 2-Propenoic acid, pentyl ester* | 12.7 | 2.2 |
| 100-52-7 | Benzaldehyde | 12.7 | 2.9 |
| 565-69-5 | 3-Pentanone, 2-methyl* | 11.8 | 2.9 |
| 10031-87-5 | Acetic acid, 2-ethylbutyl ester* | 11.1 | 1.9 |
| 53957-33-8 | Benzenemethanol, 2,5-dimethyl-* | 11.1 | 2.0 |
| 5077-67-8 | 1-Hydroxy-2-butanone* | 10.5 | 2.9 |
| 95-13-6 | Indene* | 10.1 | 2.1 |
| 96-54-8 | 1H-Pyrrole, 1-methyl-* | 9.6 | 2.9 |
| 620-02-0 | 2-Furancarboxaldehyde, 5-methyl* | 9.4 | 2.1 |
| 141-32-2 | Butyl acrylate (2-Propenoic Acid, butyl ester) | 9.4 | 1.8 |
| 100-41-4 | Benzene, ethyl† | 9.1 | 2.1 |
| 592-20-1 | 2-Propanone, 1-(acetyloxy)-* | 9.0 | 1.9 |

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

| UL ID: | SV5TFD |
|---|---|
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.1 |

| CAS Number | Compound | Concentration | |
|---|---|---|---|
| | | µg/m³ | ppb |
| 100-47-0 | Benzonitrile | 9.0 | 2.1 |
| 91-10-1 | Phenol, 2,6-dimethoxy* | 8.9 | 1.4 |
| 111-71-7 | Heptanal (Heptaldehyde) | 8.2 | 1.8 |
| 91-57-6 | Naphthalene, 2-methyl | 8.1 | 1.4 |
| 71-41-0 | 1-Pentanol (N-Pentyl alcohol) | 8.1 | 2.3 |
| 1004-29-1 | Furan, 2-butyltetrahydro | 8.1 | 1.5 |
| 98-86-2 | Acetophenone (Ethanone, 1-phenyl)* | 8.1 | 1.6 |
| 2785-89-9 | Phenol, 4-ethyl-2-methoxy* | 7.9 | 1.3 |
| 105-67-9 | Phenol, 2,4-dimethyl | 7.9 | 1.6 |
| 95-48-7 | Phenol, 2-methyl* | 7.8 | 1.8 |
| 19549-87-2 | 1-Heptene, 2,4-dimethyl* | 7.7 | 1.5 |
| 628-61-5 | Octane, 2-chloro* | 7.6 | 1.3 |
| 95-87-4 | Phenol, 2,5-dimethyl-* | 7.1 | 1.4 |
| 5989-27-5 | D-Limonene* | 7.1 | 1.3 |
| 541-05-9 | Cyclotrisiloxane, hexamethyl | 7.1 | 0.8 |
| 80-71-7 | 2-Cyclopenten-1-one, 2-hydroxy-3-methyl-* | 7.0 | 1.5 |
| 77-68-9 | Propanoic acid, 2-methyl-, 3-hydroxy-2,2,4-trimethylpentyl ester (component of Texanol) | 6.7 | 0.8 |
| 120-92-3 | Cyclopentanone | 6.2 | 1.8 |
| 814-78-8 | 3-Buten-2-one, 3-methyl* | 6.1 | 1.8 |
| 102-76-1 | 1,2,3-Propanetriol, triacetate (Triacetin)* | 5.6 | 0.6 |
| 1000309-57-2 | Oxalic acid, dodecyl 2-isopropylphenyl ester* | 5.6 | 0.4 |
| 1000293-37-8 | 5-Chloropentanoic acid, 2-ethylcyclohexyl ester* | 5.5 | 0.5 |
| 1120-73-6 | 2-Cyclopenten-1-one, 2-methyl* | 5.2 | 1.3 |
| 109-67-1 | 1-Pentene | 5.2 | 1.8 |
| 142-62-1 | Hexanoic acid | 4.9 | 1.0 |
| 130876-99-2 | 5,8-Decadien-2-one, 5,9-dimethyl-, (E)-* | 4.8 | 0.7 |
| 25265-77-4 | 2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate | 4.8 | 0.5 |
| 22148-75-0 | N-Formylamphetamine* | 4.6 | 0.7 |
| 42781-12-4 | 2-Propanone, 1-(1-methylethoxy)-* | 4.6 | 1.0 |
| 127-19-5 | Acetamide, N,N-dimethyl-* | 4.6 | 1.3 |
| 4170-30-3 | 2-Butenal | 4.5 | 1.6 |
| 1121-05-7 | 2-Cyclopenten-1-one, 2,3-dimethyl-* | 4.5 | 1.0 |
| 1000369-65-4 | Diethylmalonic acid, pentyl 3-phenylpropyl ester* | 4.3 | 0.3 |
| 21852-80-2 | Falcarinol* | 4.3 | 0.4 |
| 92-52-4 | 1,1'-Biphenyl* | 4.3 | 0.7 |
| 575-41-7 | Naphthalene, 1,3-dimethyl-* | 4.1 | 0.6 |
| 294-62-2 | Cyclododecane | 4.0 | 0.6 |
| 10574-37-5 | 2-Pentene, 2,3-dimethyl | 4.0 | 1.0 |
| 767-60-2 | 1H-Indene, 3-methyl* | 3.9 | 0.7 |
| 1000293-68-2 | Octanoic acid, 3,5-difluorophenyl ester* | 3.9 | 0.4 |
| 40771-26-4 | 1,5-Dihydroxy-1,2,3,4-tetrahydronaphthalene* | 3.8 | 0.6 |
| 90-00-6 | Phenol, 2-ethyl* | 3.8 | 0.8 |
| 57-55-6 | 1,2-Propanediol (Propylene glycol) | 3.7 | 1.2 |
| 4265-25-2 | Benzofuran, 2-methyl* | 3.7 | 0.7 |
| 61208-94-4 | Cyclohexane, (1-methylbutyl)-* | 3.5 | 0.6 |

| UL ID: | SV5TFD |
|---|---|
| Sample Date: | September 29, 2020 |
| Volume (L): | 18.1 |

| CAS Number | Compound | Concentration | |
|---|---|---|---|
| | | µg/m³ | ppb |
| 32850-08-1 | 4-(p-Tolylcarbamoyl-methyl)-piperazine-1-carboxylic acid ethyl ester* | 3.4 | 0.3 |
| 1185-33-7 | 1-Butanol, 2,2-dimethyl* | 3.4 | 0.8 |
| 109-69-3 | Butane, 1-chloro | 3.3 | 0.9 |
| 621-59-0 | Benzaldehyde, 3-hydroxy-4-methoxy-* | 3.3 | 0.5 |
| 621-58-9 | Phenol, 5-ethenyl-2-methoxy-* | 3.3 | 0.5 |
| 67-64-1 | Acetone | 3.2 | 1.3 |
| 626-68-6 | 1,3-Dioxane, 2-methyl-* | 3.1 | 0.7 |
| 79-20-9 | Acetate, methyl (Acetic acid, methyl ester) | 3.1 | 1.0 |
| 629-50-5 | Tridecane | 3.0 | 0.4 |
| 614-97-1 | 5-Methylbenzimidazole* | 3.0 | 0.6 |
| 135-77-3 | 1.2.4-Trimethoxybenzene* | 3.0 | 0.4 |
| 107-92-6 | Butanoic acid | 3.0 | 0.8 |
| 259-79-0 | Biphenylene* | 2.9 | 0.5 |
| 769-78-8 | Vinyl benzoate* | 2.8 | 0.5 |
| 3777-69-3 | Furan, 2-pentyl | 2.8 | 0.5 |
| 930-27-8 | Furan, 3-methyl* | 2.7 | 0.8 |
| 110-13-4 | 2,5-Hexanedione* | 2.7 | 0.6 |
| 1002-69-3 | Decane, 1-chloro* | 2.6 | 0.4 |
| 109-08-0 | Pyrazine, methyl* | 2.5 | 0.6 |
| 4505-38-8 | 2-Cyclohexene-1,4-dione* | 2.4 | 0.5 |
| 708-53-2 | Gallacetophenone-4'-methylether* | 2.3 | 0.3 |
| 54460-99-0 | 4-Heptanol, 4-ethyl-2,6-dimethyl-* | 2.3 | 0.3 |
| 290-37-9 | Pyrazine | 2.3 | 0.7 |
| 3208-16-0 | Furan, 2-ethyl | 2.1 | 0.5 |
| 3008-40-0 | 1,2-Cyclopentanedione* | 2.0 | 0.5 |
| 109-06-8 | Pyridine,2-methyl (2-Picoline)* | 2.0 | 0.5 |
| 98-82-8 | Benzene, 1-methylethyl (Cumene) | 2.0 | 0.4 |

TVOC (total volatile organic compounds) are calibrated relative to toluene.

Field Blanks: Reported concentrations based on 18.0 L of volume sampled for VOCs. Actual field blanks are not intended to have a measurable amount of air sampled.

†Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

Values below 2.0 µg/m³ are for information purposes only. Chemical was detected, but below the quantifiable level of 0.04 µg based on a standard of 18 L air collection volume.

UL Environment's quality assurance program monitors blank sorbent media to ensure that the residual background does not exceed UL Environment's quality objective of ≤ 36 ng of total VOC.

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

Project #_2009049NY

1001053392 - 3363197

1 of 4

## ACTIVE CHEMICAL SAMPLING CHAIN OF CUSTODY

| | | |
|---|---|---|
| Company: ULVS (Healthy Buildings) | Contact: CARESULTS@UL.COM | Project/P.O./Job Number: 2009049NY ~~-Exp 1~~ SN |
| Address: 3251 Old Lee Highway #100 Fairfax, VA 22030 | Phone: 571.655.7919<br>Fax: 703.323.4440 | Sample Date: 29SEP2020<br>Investigator: SAM.HORNER |

Please check the appropriate fields; Use separate COC for each sample method.

**VOLATILE ORGANICS: IVOC SCAN: _____ TOP 20 IVOC _____ TVOC ONLY _____ OTHER B.T.E.X.**

**ALDEHYDE SCAN: _____ FORMALDEHYDE ONLY _____** | **ANALYSIS: LEED V4 ___ LEED V4.1 ___ OTHER B.T.E.X.**

**TAT: Standard __X__ Next Day Rush*_____ * Rush charges apply; please call in advance to confirm availability**

Comments:

| UL ID | SAMPLE ID/ TUBE ID | SAMPLE LOCATION/ DESCRIPTION | START TIME | STOP TIME | TIME SAMPLED (MIN) | PUMP ID # | FLOW RATE (L/MIN) | VOLUME (L) |
|---|---|---|---|---|---|---|---|---|
| F01V | 2009049NY-01A/ s/n B26560 | Ex1_BR4_Pre | 12:19 | 13:19 | 60 | 2018 | 0.303 L | 18.19 L |
| F02V | 2009049NY-01B/ s/n B26593 | Ex1_BR4_Post | 12:19 | 13:19 | 60 | 2018 | 0.300 L | 18.00 L |
| F03V | 2009049NY-01C/ s/n B27049 | Field Blank | 12:19 | 13:19 | 60 | 2018 | | n/a |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| | | |
|---|---|---|
| Released By: SAM.HORNER (Print/Sign) | Date/Time: 01OCT2020 | Method of Shipment: UPS NEXT D<br>1Z F82 417 25 9340 9128 |
| Received By: Dan Benton | Date/Time: 10/2/20 10: AM | Sample Condition: Acceptable |

3363197

3363197

Description: VOC Tubes and DNPH Cartridges

Customer: UL Environment Inc.

Received Date: 2020-OCT-02 12:31:03 PM

Aurora Project No.: 1001053392
Order No.:
Oracle Project No.:

3 of 6

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**

Project # 2009049NY

1001053392-3363197

2 of 4

## ACTIVE CHEMICAL SAMPLING CHAIN OF CUSTODY

| | | |
|---|---|---|
| Company: ULVS (Healthy Buildings) | Contact: CARESULTS@UL.COM | Project/P.O./Job Number: 2009049NY |
| Address: 3251 Old Lee Highway #100 Fairfax, VA 22030 | Phone: 571.655.7919 Fax: 703.323.4440 | Sample Date: 30SEP2020 |
| | | Investigator: SAM.HORNER |

Please check the appropriate fields; Use separate COC for each sample method.

**VOLATILE ORGANICS: IVOC SCAN: _____ TOP 20 IVOC _____ TVOC ONLY _____ OTHER ___B.T.E.X.**

**ALDEHYDE SCAN: _____ FORMALDEHYDE ONLY _____** | **ANALYSIS: LEED V4 ___ LEED V4.1 ___ OTHER _B.T.E.X.**

**TAT: Standard __X__ Next Day Rush*_____ * Rush charges apply; please call in advance to confirm availability**

Comments:

| UL ID | SAMPLE ID/ TUBE ID | SAMPLE LOCATION/ DESCRIPTION | START TIME | STOP TIME | TIME SAMPLED (MIN) | PUMP ID # | FLOW RATE (L/MIN) | VOLUME (L) |
|---|---|---|---|---|---|---|---|---|
| FotV | 2009049NY-02A/ s/n B26473 | Ex2_LR_Hall_Pre | 08:25 | 09:25 | 60 | 2018 | 0.302 L | 18.14 L |
| FoSV | 2009049NY-02B/ s/n B26422 | Ex2_LR_Hall_Post | 12:52 | 13:52 | 60 | 2018 | 0.302 L | 18.09 L |
| FoIFV | 2009049NY-02C/ s/n B26882 | Field Blank | | | | | | n/a 18 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| | | |
|---|---|---|
| Released By: SAM.HORNER (Print/Sign) | Date/Time: 01OCT2020 | Method of Shipment: UPS 1Z F82 417 25 9340 9128 |
| Received By: Dan Boxton | Date/Time: 10/2/20 10:30 AM | Sample Condition: Acceptable |

3363197

3363197

Description: VOC Tubes and DNPH Cartridges

Customer: UL Environment Inc.

Received Date: 2020-OCT-02 12:31:03 PM

Aurora Project No.: 1001053392
Order No.:
Oracle Project No.:

2 of 6

Date Prepared: November 13, 2020
Product #: 1001053392-3363197
Report #: 1001053392-3363197R1

**Supersedes Report #: 1001053392-3363197**