Air Testing Associates llc
Indoor Air Quality & Environmental Testing Services

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January 18, 2019

Scott Morrison
Slidell Refrigeration and Metal Fabricators, Inc.
1543 Gause Blvd W
Slidell, Louisiana 70460-5774

Email: scott@slidellrefrigeration.com

Project No.: 18-0056.01
Location: Christwood Cognitive Care Unit
Subject: Indoor Air Quality (IAQ) Screening Assessment

Dear Mr. Morrison:

On the dates of 11/1/2018 and 11/2/18, Air Testing Associates, LLC performed a follow-up limited Indoor Air Quality (IAQ) Screening Assessment at Christwood Cognitive Care Unit located at 100 Christwood Blvd., Covington, LA 70433. The primary focus of this effort was to qualify and quantify defined contaminates within the indoor air environment for Carbon Dioxide and Volatile Organic Compounds (VOCs) as well as determine the absence or presence of Acetic Acid (Acetate) and Formic Acid (Formate) within air-condition condensate.

Mr. William Feaheny served as Senior Environmental Scientist for this project. His duties included field data collection, data interpretation, and project documentation. Mr. Feaheny is a degreed Microbiologist, has an M.S. degree in Environmental Science and has over 25 years of experience in the safety and environmental fields. He has completed both residential and commercial IAQ assessments.

Sampling Activities and Analyses:

- Humidity readings obtained within the building on 11/1/18 indicated a relative humidity between 42% and 53% within the building. EPA suggests that indoor

humidity should be maintained below 60% relative humidity, and if possible, ideally 30-50%.

- Humidity readings obtained within the building on 11/2/18 indicated a relative humidity between 39% and 52% within the building. EPA suggests that indoor humidity should be maintained below 60% relative humidity, and if possible, ideally 30-50%.

- Analytics Corporation performed applicable laboratory analyses for Acetic Acid (Acetate) and Formic Acid (Formate) in air-condition condensate, which were determined by via Modified NIOSH Method 2011.

- Volatile Organic Compounds (VOCs) and Carbon Dioxide (CO2) were collected and determined via EPA TO-15 “whole-air” sampling methodology. Two (2), TO-15 whole air samples were obtained. Samples were initiated within Room 802 but not analyzed due to equipment failure (i.e. broken/non-functioning regulator). Samples were successfully obtained and analyzed from Room 833 and Hall B (common Kitchen Area). The laboratory analysis also included a Library Compound search for tentatively identified compounds not included within the EPA target list. EMSL Analytical, Inc. (EMLAP # 100194; NJDEP Cert # 04653) of Cinnaminson, NJ performed applicable VOC and Carbon Dioxide laboratory analyses.

Temperature and Relative Humidity Measurements:

Relative humidity in excess of 60% can promote or facilitate mold growth. In an effort to access the general efficiency of the facility’s HVAC system, humidity measurements were obtained within those representative areas sampled. The five performance requirements the HVAC system does to controls moisture are:

Control temperature
Control humidity
Ventilate occupied areas
Pressurize the building
Filter / clean the air

The American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) have published guidelines describing thermal environmental conditions, (ASHRAE Standard 55-1981, Thermal Environmental Conditions for Human Occupancy). These guidelines are intended to achieve thermal conditions in a given environment that at least 80% of the persons who occupy that environment will find acceptable or "comfortable." ASHRAE recommendations suggest when a building environment is occupied by sedentary or slightly active persons, and when the relative humidity is at 50%: The operating temperature to achieve thermal acceptability (comfort zone) should be 68° to 74° F in winter and 73° to 79° F in summer. If the operating temperature is outside this range, (at either end-point), then more than 20% of healthy people occupying the area are likely to experience some degree of discomfort.

ASHRAE recommendations suggest that relative humidity ranges from 20-60% present a comfort zone considered to be both comfortable and healthful. ASHRAE's recommended design conditions are an effective temperature and dry bulb temperature of 76° F (24.5° C), a relative humidity of 40 percent, and an air circulation rate of less than 45 feet per minute. Relative humidity levels below 20 percent are associated with increased discomfort and drying of the mucous membranes, which brings about coughing, itching, and sore throats. High humidity may possibly provide a growth medium for bacteria and fungi.

Relative humidity readings, which were obtained on 11/1/18, from those interior locations sampled, ranged between 42% and 53%. Though the readings varied between specific locations sampled, overall relative humidity was within recommended ASHRAE and EPA parameters (30 to 60% relative humidity) within those interior areas sampled.

Relative humidity readings, which were obtained on 11/2/18, from those interior locations sampled, ranged between 39% and 52%. Though the readings varied between specific locations sampled, overall relative humidity was within recommended ASHRAE and EPA parameters (30 to 60% relative humidity) within those interior areas sampled.

Acetic Acid /Formic Acid Modified NIOSH Method 2011 Condensate Sampling:

Acetic Acid (Acetate) and Formic Acid (Formate) in condensate were determined by via Modified NIOSH Method. Samples were gathered from representative HVAC equipment by sterile syringes (Table 1).

Table 1:

Location	**Date**	**Description**	**Acetic Acid (Acetate)** **ug/ml**	**Formic Acid (Formate)** **ug/ml**
Room 802	11/1/2018	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with sterile syringe)	170	25.3
Room 833	11/1/2018	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with sterile syringe)	98.1	7.13
Hall B (common	11/1/2018	AC Unit/Acetic Acid and Formic Acid Condensate	90.4	13.8

Kitchen Area)		Sample (Gathered with sterile syringe)		
Field Blank	11/1/2018	Field Blank	< 5	< 5

Carbon Dioxide (CO2) Monitoring:

CO2 is a colorless, odorless, and tasteless gas. It is a product of completed carbon combustion and the by-product of biological respiration. Adverse health effects from CO2 may occur since it is an asphyxiant gas. The most widely recognized exposure limits for CO2 reference an 8-hour Time-Weighted Average (TWA) of 5,000 ppm, with a 15-minute Short-Term Exposure Limit (STEL) of either 15,000 ppm or 30,000 ppm. According to NIOSH, concentrations of 40,000 ppm or higher should be regarded as immediately dangerous to life and health. The OSHA Permissible Exposure Limit (PEL) is 5,000 ppm as an 8-hour TWA (Time Weighted Average). The CO2 levels can be used as a rough indicator of the effectiveness of ventilation, and excessive population density in a structure. CO2 increases in buildings with higher occupant densities and is diluted and removed from buildings based on outdoor air ventilation rates. Therefore, examining levels of CO2 in indoor air can reveal information regarding occupant densities and outdoor air ventilation rates. High CO2 levels may indicate a problem with overcrowding or inadequate outdoor air ventilation rates.

ASHRAE Standard 62-1989 had recommended that CO2 “comfort level” concentration in an occupied building should not exceed 1000 ppm. The 1989 ASHRAE had also stated that CO2 concentrations in acceptable outdoor air typically range from 300-500 ppm. A later standard, ASRAEASHRAE 62-2001 recommended that CO2 levels be less than 700 ppm above the outdoor air concentration. The most recent ASHRAE Standard 62.1-2013 does not prescribe a specific comfort level for CO2. The following was cited in a published ASHRAE Technical FAQ response that referred to ASHRAE Standard 62.1-2013: *CO2 at very high concentrations (e.g. greater than 5000 ppm) can pose a health risk. Refer to Appendix B, Summary of Selected Air Quality Guidelines in* ASHRAE Standard 62.1-2013, *"Ventilation for Acceptable Indoor Air Quality". However, in most buildings, concentrations almost never rise to these levels. CO2 at the concentrations commonly found in buildings is not a direct health risk, but CO2 concentrations can be used as an indicator of occupant odors (odorous bioeffluents) and occupant acceptance of these odors. At the activity levels found in typical office buildings, steady-state CO2 concentrations of about 700 ppm above outdoor air levels indicate an outdoor air ventilation rate of about 7.5 L/s/person (15 cfm/person). Laboratory and field studies have shown that this rate of ventilation will dilute odors from human bioeffluents to levels that will satisfy a substantial majority (about 80%) of unadapted persons (visitors) in a space. CO2 concentrations in outdoor air typically range from 300 to 500 ppm. Thus, indoor CO2 concentrations of 1000 to 1200 ppm in spaces housing sedentary people is an indicator that a substantial majority of visitors entering the space will be satisfied with respect to human bioeffluents (body odor). Note however that CO2 concentration is not a good indicator of the concentration and occupant acceptance of other indoor contaminants, such as volatile organic compounds off-gassing from furnishings*

and building materials. Thus, CO2 concentration is not a reliable indicator of overall building air quality.

Elevated carbon dioxide levels in significant concentrations above background outdoor levels (i.e. > 700 ppm above outdoors) may be a possible indication of an inadequate amount of outside air being brought into a building. Though the most recent 2013 ASHRAE Standard did not prescribe a specific comfort level for CO2, it has been reported by other sources and literature that when carbon dioxide levels of greater than a 1,000 ppm "comfort level" * may correlate with occupant complaints. Though carbon dioxide itself may not be responsible for the complaints, a high level of carbon dioxide may indicate that a ventilation issue which could be allowing other contaminants in the building to be present at elevated levels and could be responsible for those occupant complaints.

**Note: The "comfort levels" cited should only be used as a guideline to determine the amount of fresh outside air entering a building. Therefore, 1,000 ppm or other suggested CO2 levels should be used as a guideline for improving ventilation. If a building exceeds this guideline, it should not be interpreted as a hazardous or life-threatening situation but as a "comfort level".*

CO2 levels within those interior areas, which were determined by TO-15 methodology, ranged between 630 ppm and 640 ppm. CO2 levels within those indoor areas sampled were less than the OSHA PEL (5,000 ppm) 8-hour, TWA exposure limit. Based upon current regulatory standards and industry guidelines, the CO2 levels within those locations sampled are not considered to be hazardous or life-threatening situation. The CO2 indoor levels within were not considered in excess of "comfort levels" for a typical indoor environment (>1000 ppm).

A log of those areas sampled for CO2 on 11/1/18 is included in Appendix 3.

TO-15 VOCs Analyses:

The term TVOC encompasses a very large and diverse group of carbon-containing compounds, including aliphatic, aromatic and halogenated hydrocarbons, aldehydes, ethers, esters, acids, alcohols and ketones. Volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

EPA's Total Exposure Assessment Methodology (TEAM) studies found levels of about a

dozen common organic pollutants to be 2 to 5 times higher inside homes than outside, regardless of whether the homes were located in rural or highly industrial areas. Additional TEAM studies indicate that while people are using products containing organic chemicals, they can expose themselves and others to very high pollutant levels, and elevated concentrations can persist in the air long after the activity is completed.

At present there are few standards governing exposures to specific VOC contaminants in non-industrial buildings. No standards have been set for VOCs in non-industrial settings. The NHMRC recommends that total VOCs have a maximum permissible level of 500 micrograms/m^3 with the recommended limit for acceptable indoor air quality of a single compound should not contribute more than 250 micrograms/m^3.OSHA regulates formaldehyde, a specific VOC, as a carcinogen. OSHA has adopted a Permissible Exposure Level (PEL) of .75 ppm, and an action level of 0.5 ppm. HUD has established a level of .4 ppm for mobile homes. Based upon current information, it is advisable to mitigate formaldehyde that is present at levels higher than 0.1 ppm. Global consensus has resulted in the emergence of preliminary guidelines for tVOC standards for IAQ (Australian NHMRC, 1993; Finnish Society of IAQ, 1995; Seifert, 1999; Hong Kong EPA, 1999; Japan MoH, 2000). Depending on location (home, school, etc.), recommended levels range from 200 to 1300 ug/m3 or about 50 to 325 ppb (Toluene units) or approximately 100 to 650 ppb isobutylene units. By all accounts, the IAQ tVOC threshold for normal environments should not exceed 500 ppb (0.5 ppm) toluene units, which is equivalent to 1000 ppb (1 ppm) isobutylene units.

Two (2) “whole air” TO-15 samples were obtained within Rooms 802, 833 and the Hall B (common Kitchen Area) in the building. The Sample from Room 802 was not analyzed due to a nonfunctioning regulator. The samples obtained within Room 833 and Hall B (common Kitchen Area) in the building were analyzed according to EPA Compendium TO-15 for VOCs. In addition, a “Library Search” for other target chemical compounds was also performed. Identified chemical compounds are included within the Sample Summaries of Appendix 4.

Room 802 Sample:

The Sample from Room 802 was not analyzed due to a nonfunctioning regulator.

Room 833 Sample:

The total value of calculated VOCs (1100 ug/m3) within Room 833 was above the considered threshold for normal 500 ppb (0.5 ppm) toluene units within normal indoor environments.

A number of different EPA Target List Compounds were identified within Room 833 area sampled and accounted for 740 ug/m3 of the total value of calculated VOCs or 67% of the VOCs identified. The predominant (>100 ug/m3) EPA Target List Compounds included Ethanol (670 ug/m3) and Acetone (120 ug/m3). These specific compounds accounted for 690 ug/m3 (3.23 ppm) or 62% of the VOCs identified within Room 833.

A number of other tentatively identified organic compounds (TICs) identified within Room 833 area sampled and accounted for 350 ug/m3 of the total value of calculated VOCs or 32% of the VOCs identified. The predominant (>100 ug/m3) tentatively identified organic compounds included .alpha.-Pinene (120 ug/mg), These specific compounds accounted for 120 ug/m3 (1/9 ppm) or 12% of the VOCs identified within Room 833.

Hall B Sample:

The total value of calculated VOCs (1100 ug/m3) within Hall B Living Area was in excess of the considered threshold for normal 500 ppb (0.5 ppm) toluene units within normal indoor environments.

A number of different EPA Target List Compounds were identified within Hall B area sampled and accounted for 740 ug/m3 of the total value of calculated VOCs or 67% of the VOCs identified. The predominant (>100 ug/m3) EPA Target List Compounds included Ethanol (530 ug/m3) and Acetone (110 ug/m3). These specific compounds accounted for 1950 ug/m3 (1.95 ppm) or 58% of the VOCs identified within the Hall B.

A number of other tentatively identified organic compounds (TICs) identified within Hall B accounted for 330 ug/m3 of the total value of calculated VOCs or 30% of the VOCs identified. The predominant (>100 ug/m3) tentatively identified organic compounds included.alpha.-Pinene (410 ug/mg). These specific compounds accounted for 110 ug/m3) or 10% of the VOCs identified within Hall B.

See the attached EMSL Analytical, Inc.'s report (Appendix 4) for specific details pertaining to those chemical compounds identified by the TO-15 analysis. Additional information pertaining to possible background sources of those contaminants identified are also attached to the laboratory data.

Conclusions/ Recommendations

Acetic Acid (Acetate) and Formic Acid (Formate) in condensate were determined by via Modified NIOSH Method. Samples were gathered using sterile syringes from representative HVAC equipment that services Room 802, Room 833 and he Hall B Common Area. Acetate was identified in concentrations between 90.4 to 170 ppm. Formate was identified in concentrations between 7.13 to 25.3 ppm. These concentrations were comparable or in excess to concentrations where formicary corrosion was identified by an industry research report published in 2011 by Carrier to address indoor coil corrosion (Appendix 5). Carrier recognized that environmental factors, such as elevated VOC's related to common household products, contributed to formicary corrosion that was responsible for increased evaporator coil failures. Carrier also acknowledged that the coil material used within their older equipment was more susceptible to environmental conditions that promoted formicary corrosion. As a result

of this research published in 2011, Carrier not only offered a new line aluminum evaporator coils, but also offered replacement coils for systems currently in the field.

CO2 levels within those interior areas, which were determined by TO-15 methodology, ranged between 630 ppm and 640 ppm. CO2 levels within those indoor areas sampled were less than the OSHA PEL (5,000 ppm) 8-hour, TWA exposure limit. Based upon current regulatory standards and industry guidelines, the CO2 levels within those locations sampled are not considered to be hazardous or life-threatening situation. The CO2 indoor levels within were not considered in excess of “comfort levels” for a typical indoor environment (>1000 ppm). As compared to previous CO2 measurements obtained within the building on 8/29/18 (1312 ppm to 1506 ppm), the CO2 levels have decreased by approximately 50% or more. The decrease is likely attributed to additional outdoor make-up being introduced into the building.

No specific VOC compounds, which were identified within Rooms 833 or Hall B, were in excess of NIOSH or OSHA permissible exposure levels. However, total calculated VOCs (TVOC: 1100 ug/m3; 1.1 ppm) within Room 833 and Hall B (TVOC:1100 ug/m3 1.1 ppm) were above the considered threshold of 500 ppb (0.5 ppm) toluene units within normal indoor environments. The predominant VOCs identified within Rooms 833 and Hall B, which included compounds such as Ethanol and Acetone, and .alpha.-Pinene, are usually associated with such items as personal care products hand sanitizers, rubbing alcohol, and various cleaning products. Though no VOC measure measurements could be obtained from Room 802 due to equipment failure, the overall TVOC’s (TVOC:1100 ug/m3 1.1 ppm) have decreased significantly from those levels identified on the testing dates of 8/28/18 to 8/28/18 (Room 802; 3.2 ppm & Room 803 5.5 ppm). The decrease is also likely attributed to additional outdoor make-up being introduced into the building. Any further control of VOC’s would likely have to be facilitated through source management, product substitution or additional control equipment (i.e. air purifiers with carbon filtration).

Should problems reoccur or symptoms persist, additional testing or long-term monitoring may be prudent in order to ascertain whether levels of potential indoor contaminants are adequately controlled. If additional sampling is deemed necessary, sample methodology to further quantify and identify chemicals or bio aerosols (mold, fungi, bacteria, etc.) should be applied.

A physician should be consulted to determine if any aliments suffered by the building occupants are related to specific chemical or contaminants identified.

Limitations:

The scope of this limited investigation is to qualify the presence of potential airborne chemical contaminants in specific interior areas of the subject building at the time of the site investigation. If testing has been performed, quantification of samples is limited to comparison of mold spores identified by Air-O-Cell methodology and direct examination. Any sampling effort undertaken can only quantify the air-borne concentrations of

bioaerosols at the time of sampling. Any testing is not intended to quantify the absolute airborne concentration of biological contaminants or identify all biological contaminants present throughout the entire building. These tests are no guarantee that mold does not exist in other areas of the building. The scope of the surface swab or bulk sampling of materials is to qualify the presence mold associated with the sample submitted. Identification of Air-O-Cells, swab samples, tape lift samples and carpet samples is limited to spore-type identification analysis by direct examination. It is not possible to differentiate Aspergillus/Penicillium spores through direct examination methodology.

The sampling effort undertaken can only qualify those mold types present and accessible at the time of sampling. This report or protocol is not warranted or guaranteed in any way. Only a qualified physician can determine whether health effects are associated with biological organisms/pathogens or bio aerosol exposure.

Microbiological growth could reoccur if the source of moisture is not remedied. No responsibility is assumed that the sources of excessive moisture resulting in fungal growth at the subject property have been or will be appropriately corrected, or that mold growth will not recur as a result of inappropriate repair and periodic maintenance of the same.

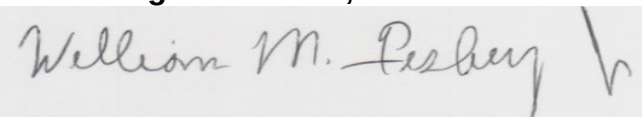
Any and all statements, opinions and/or recommendations, expressed or implied, made by Air Testing Associates, LLC, either written or verbal, are based solely upon the service provided in accordance with the assigned scope of the investigation as presented by our client, and have not been based upon scientific tasks or procedures beyond the assigned scope of services or the time and budgetary constraints imposed upon Air Testing Associates, LLC by its client. Furthermore, any and all statements, opinions and/or recommendations, expressed or implied, made by Air Testing Associates, LLC, either written or verbal, are for the sole use of our client only, and shall not be used by any other party, for any reason. Should any other party elect to interpret and/or rely upon any of the conclusions reached or recommendations rendered by Air Testing Associates, LLC, it shall do so at its own risk and without recourse in any manner against Air Testing Associates, LLC.

The scope of this report does not include identification of specific structural components or engineering controls to determine delineate or correct sources of water intrusion. No responsibility is assumed that the sources of excessive moisture resulting in fungal growth at the subject property have been or will be appropriately corrected, or that mold growth will not recur as a result of inappropriate repair and periodic maintenance of the same.

This report is based on the information available to us at this time. Should additional information become available, we reserve the right to determine the impact, if any, of the new information on our opinions and conclusions, and to revise our opinions and conclusions if necessary and warranted. The scope of this report is limited to the above items and is not warranted or guaranteed in any way.

Please feel free to contact me, should you have any comments regarding the above report or any additional questions arise regarding this matter.
Respectfully submitted,

Air Testing Associates, LLC



William M. Feaheny, Jr
Microbiologist/Senior Environmental Scientist

/wmfjr
Enclosures

Appendix 1

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18, 11/2/18

Photo Log & Photos

Photo Log

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18, 11/2/18

Photo #	Date	Location	Description
Photo 1	11/1/18	Room 802	Location
Photo 2	11/1/18	Room 802	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 3	11/1/18	Room 802	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 4	11/1/18	Room 802	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 5	11/1/18	Room 802	TO-15 Sample Location; Bad Canaster/non-functioning Regulator
Photo 6	11/1/18	Room 802	TO-15 Sample Location Temperature and Humidity Reading: 52.9% H 69° F
Photo 7	11/1/18	Room 833	Location
Photo 8	11/1/18	Room 833	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 9	11/1/18	Room 833	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 10	11/1/18	Room 833	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 11	11/1/18	Room 833	TO-15 Sample Location; Start -30.0 Hg Canister Vacuum Pressure Reading
Photo 12	11/1/18	Room 833	Sample Location Temperature and Humidity Reading: 42% H 75° F
Photo 13	11/1/18	Hall B (common Kitchen Area)	Location
Photo 14	11/1/18	Hall B (common Kitchen Area)	TO-15 Sample Location; Start -30.0 Hg Canister Vacuum Pressure Reading
Photo 15	11/1/18	Hall B (common Kitchen Area)	Sample Location Temperature and Humidity Reading: 45% H 69° F

Photo 16	11/1/18	Hall B (common Kitchen Area)	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 17	11/1/18	Hall B (common Kitchen Area)	AC Unit/Acetic Acid and Formic Acid Condensate Sample (Gathered with Syringe)
Photo 18	11/2/18	Room 802	Location
Photo 19	11/2/18	Room 802	TO-15 Sample Location; Bad Canaster/non-functioning Regulator
Photo 20	11/2/18	Room 802	Sample Location Temperature and Humidity Reading: 51.8% H 75° F
Photo 21	11/2/18	Room 833	Location
Photo 22	11/2/18	Room 833	TO-15 Sample Location
Photo 23	11/2/18	Room 833	TO-15 Sample Location; End -7.0 Hg Canister Vacuum Pressure Reading
Photo 24	11/2/18	Room 833	Sample Location Temperature and Humidity Reading: 39.5% H 74° F
Photo 25	11/2/18	Hall B (common Kitchen Area)	TO-15 Sample Location
Photo 26	11/2/18	Hall B (common Kitchen Area)	TO-15 Sample Location; End -6.5 Hg Canister Vacuum Pressure Reading
Photo 27	11/2/18	Hall B (common Kitchen Area)	Sample Location Temperature and Humidity Reading: 46.5% H 76.6° F

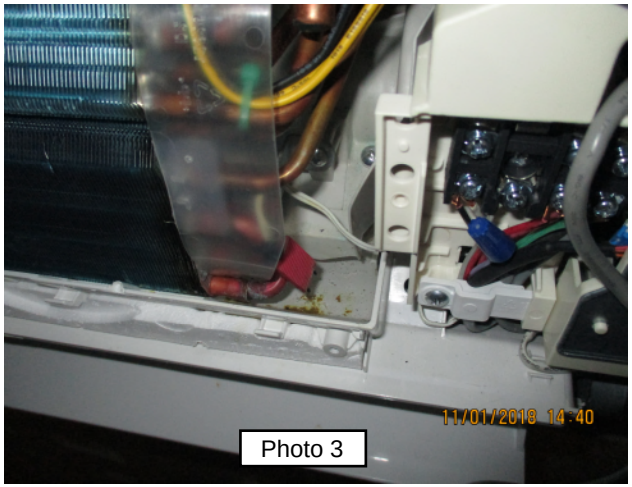
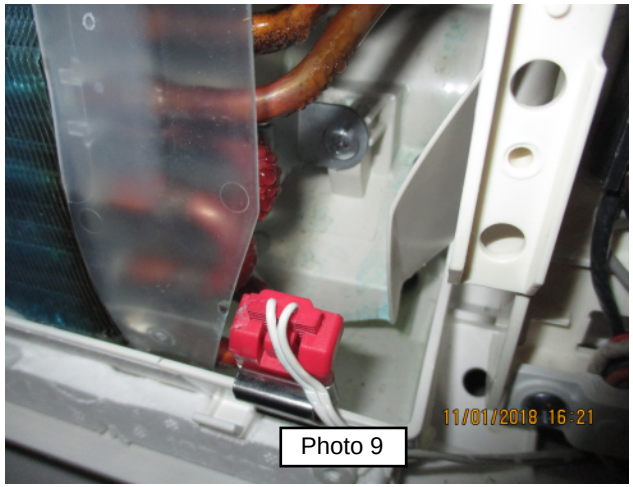


Photo 3

Photo 6



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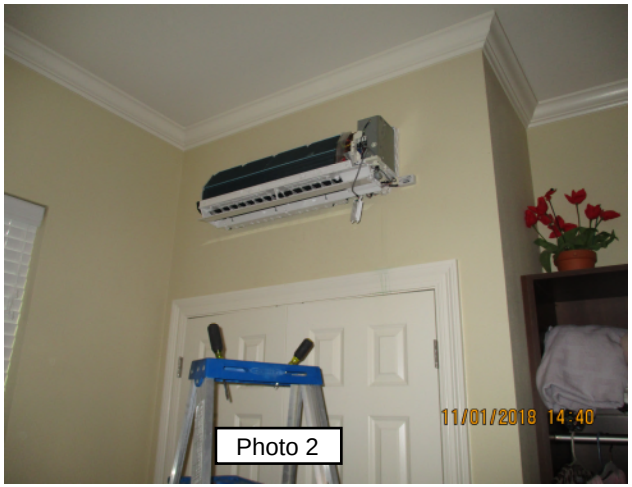

Photo 2

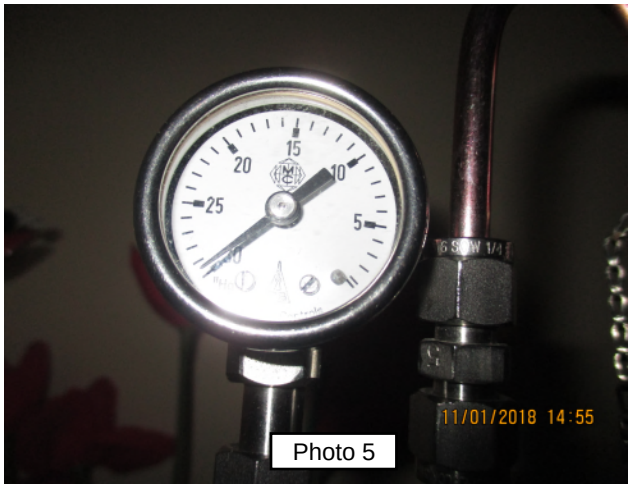

Photo 5

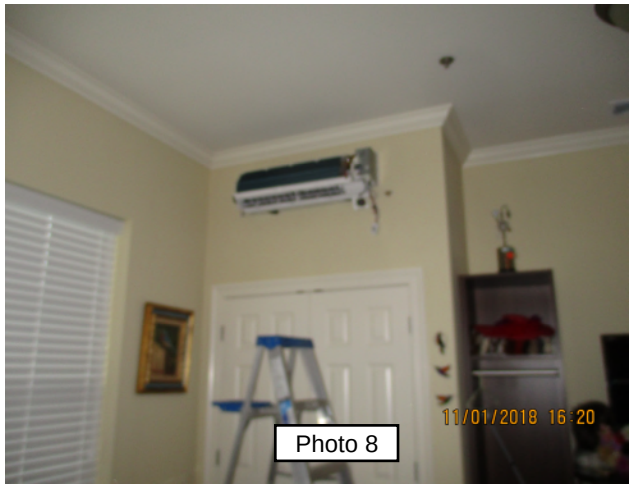

Photo 8

Photo 1

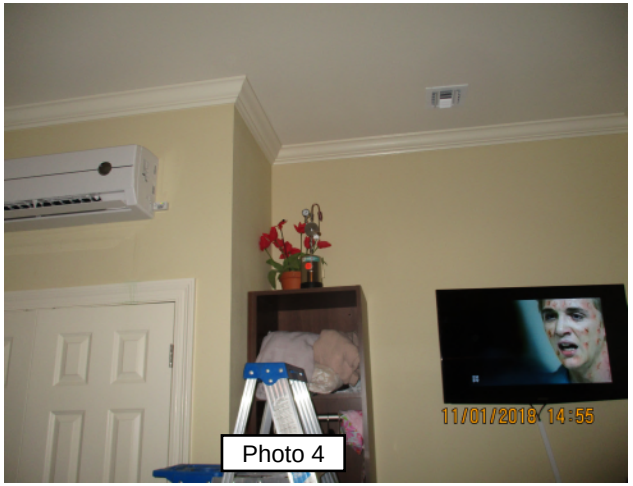

Photo 4

Photo 7

Photo 12

Photo 15

Photo 18

Photo 11

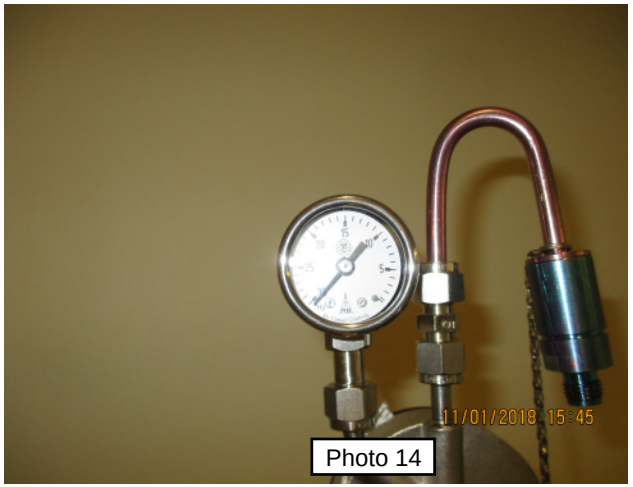

Photo 14

Photo 17

Photo 10

Photo 13

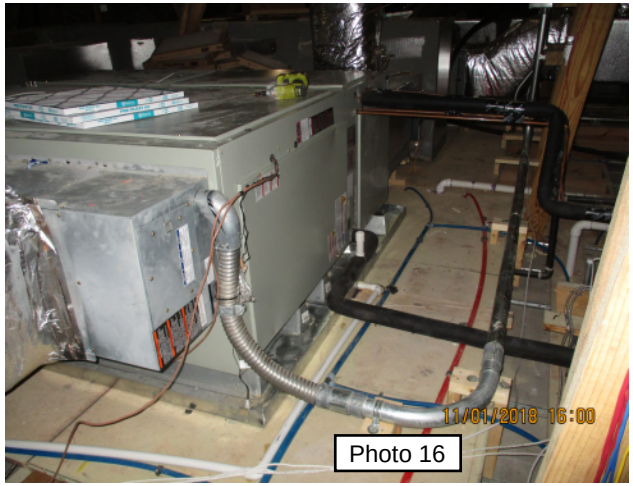

Photo 16

Photo 21

Photo 24

Photo 27

Photo 20

Photo 23

Photo 26

Photo 19

Photo 22

Photo 25

Appendix 2

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18

EMSL Analytical, Inc.
Acetic Acid and Formic Acid
NIOSH Method

Analytics Corporation
10329 Stony Run Lane
Ashland, Va 23005
Phone: (804) 365-3000 Fax: (804) 365-3002
AIHA-LAP, LLC Accreditation ID 100531

December 13, 2018

BILL FEAHENY
AIR TESTING ASSOCIATES
110 ATHANIA PKWY
STE B
METAIRIE, LA 70001

Laboratory Workorder ID: W306101

Client Project ID:	CHRISTWOOD COGNITIVE
Received:	November 2, 2018
Reported:	December 13, 2018

Attached are the results we obtained on the analysis of your samples submitted to Analytics. Any Chains-of-Custody associated by this sample group are enclosed. Air concentrations are calculated as a convenience to the client and the overall accuracy of this result depends on both the accuracy of the air volume and the amount found by analysis. Theoretical air volumes for passive monitors are calculated using the sampling time submitted and the manufacture's listed sampling rate for each compound. Results provided in this report relate only to the items tested.

For blanks and non-detects the results indicated with a '<' value represents the reporting limit for the analysis. Unless otherwise noted results are not corrected for blank values.

Unless the signature of the appropriate manager(s) appears on this report, this report should be considered PRELIMINARY and is subject to change.

We appreciate your confidence in allowing Analytics to be your testing laboratory. Any questions regarding this report can be addressed by calling our customer services department at (800) 888-8061.

Andrew L. Teague, CIH
Technical Director

Enclosures

Analytics Corporation
10329 Stony Run Lane
Ashland, Va 23005
Phone: (804) 365-3000 Fax: (804) 365-3002
AIHA-LAP, LLC Accreditation ID 100531

Final Report

Work Order W306101

AIR TESTING ASSOCIATES
110 ATHANIA PKWY
STE B
METAIRIE, LA 70001

Customer: 17101030
Attention: BILL FEAHENY
PO Number 18-0056.01

Date Received: 11/02/18
Client Project ID CHRISTWOOD COGNITIVE

Lab ID: W306101001 Sample ID: ROOM 802 Media: Water Sample Date: 11/1/2018 Sampling Time:

Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Acetic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	170 ug/ml	170 ug/ml
Formic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	25.3 ug/ml	25.3 ug/ml

Lab ID: W306101002 Sample ID: ROOM 833 Media: Water Sample Date: 11/1/2018 Sampling Time:

Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Acetic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	98.1 ug/ml	98.1 ug/ml
Formic Acid	NIOSH 2011M	12/05/18	1	5.0 ug/ml	NA	NA	7.13 ug/ml	7.13 ug/ml

Lab ID: W306101003 Sample ID: HALL B c.a. Media: Water Sample Date: 11/1/2018 Sampling Time:

Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Acetic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	90.4 ug/ml	90.4 ug/ml
Formic Acid	NIOSH 2011M	12/05/18	1	5.0 ug/ml	NA	NA	13.8 ug/ml	13.8 ug/ml

Analytics Corporation
10329 Stony Run Lane
Ashland, Va 23005
Phone: (804) 365-3000 Fax: (804) 365-3002
AIHA-LAP, LLC Accreditation ID 100531

Final Report

Work Order W306101

Lab ID: W306101004 Sample ID: FIELD BLANK Media: Water Sample Date: 11/1/2018 Sampling Time:

Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Acetic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	< 5 ug/ml	< 5 ug/ml
Formic Acid	NIOSH 2011M	12/04/18	1	5.0 ug/ml	NA	NA	< 5 ug/ml	< 5 ug/ml

Analytics Corporation
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Ashland, Va 23005
Phone: (804) 365-3000 Fax: (804) 365-3002
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Final Report

Work Order W306101

General Laboratory Comments

Abbreviations:
ug = micrograms; mg=milligrams; g = grams, ppm=parts per million (volume), ppb = parts per billion (volume), mg/M3=milligrams per cubic meter of air, ug/M3=micrograms per cubic meter of air; Min=minutes, Qual=Qualifiers

LABORATORY TEST REQUEST

ACCOUNT NUMBER, NAME AND ADDRESS

ANAL
10329 Stony
Ashland, V
(804) 365-3000
TOLL FREE (800) 888-8061
FAX (804) 365-3002

W3 0 6 1 0 1

DATE SHIPPED	# OF SAMPLES	SAMPLE TYPE/MEDIA	PROJECT NAME OR NUMBER
11-1-18	4	Water (A/C cond.)	Christwood Cognitive Care Unit

PURCHASE ORDER NO.	CONTACT	TELEPHONE NUMBER
18-0056.01	Bill Feaheny	(504) 813-5580

TURN AROUND TIME
* ☐ SAME DAY ☐ 2 DAY
* ☐ 1 DAY ☑ STANDARD
* ☐ CALL FOR AVAILABILITY *EXTRA CHARGE

SPECIAL INSTRUCTIONS AND/OR UNUSUAL CONDITIONS:
A/C condensate for formate and acetate analysis by modified NIOSH 2011 methodology

☐ FAX RESULTS FAX NUMBER:
( ) _____
☑ EMAIL RESULTS - EMAIL:
bfeaheny@msn.com

FOR LABORATORY USE ONLY	SAMPLE # OR SAMPLE AREA	SAMPLE DATE	SAMPLE VOLUME/LITERS	ANALYSS REQUESTED - PLEASE USE SEPARATE LABORATORY TEST REQUEST FOR EACH SAMPLE TYPE
	Room 802	11-1-18	20 ml	Acetate
	Room 802	11-1-18	20 ml	Formate
	Room 833	11-1-18	20 ml	Acetate
	Room 833	11-1-18	20 ml	Formate
	Hall B c.a.	11-1-18	20 ml	Acetate
	Hall B c.a.	11-1-18	20 ml	Formate
	field blank	11-1-18	20 ml	Acetate
	field blank	11-1-18	20 ml	Formate

CHAIN OF CUSTODY RECORD

SAMPLES HAVE VEEN SEALED FOR TRANSPORT AND DELIVERED TO LABORATORY VIA:

FEDEX
CARRIER

IF "ANALYTICS COURIER" SIGN HERE

William M. Feaheny
SIGN HERE TO INITIATE CHAIN OF CUSTODY

11-1-18
DATE

DATE/TIME	CONDITION OF SAMPLE	SAMPLES RECEIVED BY:	SAMPLES RELEASED BY:
11/2/18 1245	INTACT	SIGNATURE(SAMPLE RECEIVING)	SIGNATURE(SAMPLE RECEIVING)
		SIGNATURE(SAMPLE ADMINISTRATION)	SIGNATURE(SAMPLE ADMINISTRATION)
		SIGNATURE(LAB)	SIGNATURE(LAB)
		SIGNATURE(LAB)	SIGNATURE(LAB)

PLEASE RETAIN A COPY FOR YOUR RECORDS

Appendix 3

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18 to 11/2/18

EMSL Analytical, Inc.
TO-15 Analyses
Carbon Dioxide (CO2) Results

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Project: **Christwood C.C.U.**

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Fixed Gas Analysis by Using The Draeger CMS (Chip Measurement System)
Laboratory Report- Sample Summary

EMSL Sample ID.	Client Sample ID.	Start Sampling Date	Start Sampling Time
491801083-0001	Room 833	11/1/2018	3:33 PM
491801083-0002	Hall B	11/1/2018	3:45 PM

If "Preliminary Report" is displayed in the signature box; this indicates that there are samples that have not yet been analyzed, that are in a preliminary state, or that analysis is in progress but not completed at the time of report issue.

Report Date:	Report Revision	Revision Comments
11/12/2018	R0	Initial Report

Marjorie Howley, Laboratory Manager
or other approved signatory

Test results meet all NELAP requirements unless otherwise specified.

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The results are not blank corrected unless otherwise noted. Interpretation and use of test results are the responsibility of the client. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Project: **Christwood C.C.U.**

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**
Date Analyzed: **11/12/2018**
Analyst: **Robiana Renna**

Fixed Gas Analysis by Using The Draeger CMS (Chip Measurement System)
Laboratory Report- Sample Summary

Sample ID.	Identification	Compound	Detection Limit (ppmV)	Sample Result (ppmV)
491801083-0001	Room 833	Carbon Dioxide	250	640
491801083-0002	Hall B	Carbon Dioxide	250	630

If "Preliminary Report" is displayed in the signature box; this indicates that there are samples that have not yet been analyzed, that are in a preliminary state, or that analysis is in progress but not completed at the time of report issue.

Report Date:	Report Revision	Revision Comments
11/12/2018	R0	Initial Report

Marjorie Howley, Laboratory Manager
or other approved signatory

Test results meet all NELAP requirements unless otherwise specified.

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The results are not blank corrected unless otherwise noted. Interpretation and use of test results are the responsibility of the client. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

USEPA TO-15

External Chain of Custody/ Field Test Data Sheet

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Ph. (800) 220-3675
Fax (856) 786-0327

EMSL ANALYTICAL, INC.

EMSL Order Number (Lab Use Only): 491801083

Report To Contact Name: Bill Feaheny	Bill To Company: SAME (AIRE25)	Sampled By (Sign): William M. Feahey Jr
Company Name: Air Testing Associates LLC	Attention To:	Sampled By (Name): William M. Feaheny Jr.
Address 1: 110 Athania Pkwy. Ste B	Address 1:	Total # of Samples: 2
Address 2: Metairie, LA 70001	Address 2:	Date Shipped: 11-5-18
Phone No.: 504-813-5580 Fax: 504-734-3386	Phone No.: Fax:	Sample Collection Zip Code: 70433
Email Results To: bfeaheny@msn.com	Project Name: Christwood C.C.U.	Purchase Order: 18-0058.01

Turnaround Time (In Business Days): ☒ 10 Day Standard ☐ 5 Day ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day ☐ Other

Reporting Format: ☒ Results Only (Standard Lab Report) ☐ Full Deliverables (Surcharge may apply) ☐ Other

Field Use - All Information Required! | Lab Use Only

EMSL Sample Identifier	Client Field Sample Identification	Sampling Start Information Barometric Pres. ("Hg): 29.7 Start Date	Time (24 hr clock)	Canister Pressure ("Hg)	Interior Temp. (F)	Sampling Stop Information Barometric Pres. ("Hg): 29.9 Stop Date	Time (24 hr clock)	Canister Pressure ("Hg)	Interior Temp. (F)	Canister Information Canister ID	Size (L)	Can Cert Batch ID	Outgoing Pressure ("Hg)	Incoming Pressure ("Hg)	Flow Contoller Reg. ID	Cal Flow (ml/min)	Analysis: USEPA TO-15	NJDEP LLTO-15	LIBRARY SEARCH	Other (Specify) CO2	Matrix: Indoor/ Ambient Air	Soil Gas	Landfill/ Vent
	Room 802*	11-1-18	1455	-30	69	*				HP4362	1.4	H0484	-29.0		3686	0.8							
	Room 833	11-1-18	1533	-30	75	11-2-18	1541	-7	74	4364	↓	↓	↓		3743	↓	X		X	X	X		
	Hall B	11-1-18	1545	-30	70	11-2-18	1551	-6.5	75	4374	↓	↓	↓		5968	↓	X		X	X	X		

Comments: *Do not analyze Room 802 sample; Broken Regulator
Project: 18-0058.01 Christwood Cognitive Care Unit

Lab Canister Certification
Analyst Signature (TO-15):

Relinquished by:	Date/ Time	Received by:	Date/ Time	Seal #/Intact	Reason for Exchange (circle appropriate)
	10/29/18 1619			336	(Shipping) Courier Receiving Sampling Other:
		William M. Feahey	10-31-18/1030	336	Shipping Courier (Receiving) Sampling Other:
William M. Feahey Jr	11-5-18 1955	VIF FX	11-6-18 9:50	337	(Shipping) Courier Receiving Sampling Other:
VIF FX	11-6-18 9:50				Shipping Courier Receiving Sampling Other:
					Shipping Courier Receiving Sampling Other:

OrderID: 491801083

491801083

TO-FM-12 Sample Information
Revision 10
Effective Date: May 25, 2018

TO-15 Sample Information

Please fill out this worksheet in addition to the Chain of Custody form. This information helps us to best analyze your samples, achieve requested TAT, and provide you with helpful interpretation information.

Company: Air Testing Associates LLC

Contact Person:

Name: William M. Feaheny Jr.

E-mail: bfeaheny@msn.com

Additional E-mails: bill@airtestingassociates.com

Telephone #: 504-813-5580

Library Search requested: [X] YES [ ] NO

A library search (*aka Tentatively Identified Compounds*) will identify up to 20 of the largest, non-target peaks that are not part of the standard TO-15 list of 74 compounds. If you are performing an Indoor Air Quality or odor investigation, the library search is recommended to provide you with all available information for your sample.

Sample Type:

[X] Indoor Air Quality (Home/Office)
[ ] IAQ (Industrial)
[ ] Other:
[ ] Soil Gas/Sub Slab

Sample Description: Indoor Air Samples From Room 833 and Hall B (common kitchen Area)

PLEASE NOTE: The result forms we provide will not indicate whether your results have exceeded any Exposure Limit criteria established by any regulatory agency. If you would like that information, please check off below which regulatory comparison forms you would like to receive.

[X] OSHA PELs/NIOSH RELs *combined form*

[ ] EPA RSLs - *11/2017; default is THQ 0.1* Residential Industrial

[ ] EPA VISLs - *3/2012* IA/SG

[ ] NJ DEP - *1/2018* - Circle one: VI-Indoor AQ VI-Soil Gas

[ ] NC DENR - *4/2014* - Circle one: Residential Non-residential

[ ] PA DEP - *11/2016* Indoor Air

[ ] PA DEP - 11/2016: Sub Slab Soil Gas OR Near Source Soil Gas

[ ] CA HHSL - *11/2004* - Circle one: Indoor Air Soil Gas

[X] Potential Sources of Compounds found in your IAQ sample

[X] TVOC (Library Search Required for this format)

[ ] NH DES_WMD - *2/2012* Indoor Air Soil Gas

[ ] Ohio - *4/2013* - Circle one: Residential Commercial

[ ] Indiana Dept Env Mgmt Screeening Levels - *3/2016*

[ ] Vermont DEP IROCP - *4/2012* (soil gas only)

[ ] California OEHHA - *2/2012*

[ ] Other; these are the compounds I want reported:

RECEIVED
EMSL
CINNAMINSON, N.J.
2018 NOV -9 A 9:50

Please note: There is an additional charge for any of the tests below. **USEPA TO-3 AND ASTM 5504 analyses can be performed from your canister at the Cinnaminson NJ Laboratory.**

US EPA TO-3 via GC/FID **(choose one below):**

[ ] C_1-C_6 hydrocarbons
[ ] Methane only

ASTM-D5504 *via GC/SCD* **(choose one below):***

[ ] Sulfur Scan (H_2S, COS, MeSH, EtSH, DMS)
[ ] H_2S only

Note** : **Hold time for sulfur gases is 1 day from collection. Please schedule your sample collection so samples are received in the lab prior to noon on Friday. Analysis performed out of hold time will have a notation in the report.

We can provide the following CMS tests from your canisters at the **Cinnaminson and Huntington Beach** laboratories. Please note these tests are to be used for IAQ/Screening purposes ONLY. EMSL recommends alternate field sampling techniques for these parameters (with the exception of water vapor); please contact your sales rep for the proper media. Please note: There is an additional charge for any of the tests below.

Draeger CMS Analyzer:
[ ] CO [X] CO_2 [ ] NH_3 [ ] O2 [ ] Water Vapor

***Sample Retention Policy:** All canisters are guaranteed to be retained for one day after results are reported. Please review your results promptly to ensure your project scope is fully addressed. Cans may be retained for a longer period of time, but arrangements to hold your cans must be made through your customer account representative quickly. Thank you.*

Appendix 4

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18 to 1/2/18

EMSL Analytical, Inc.
TO-15 VOC Analyses

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**

Project: **Christwood C.C.U.**

Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Laboratory Report- Sample Summary

EMSL Sample ID.	Client Sample ID.	Start Sampling Date	Start Sampling Time
491801083-0001	Room 833	11/1/2018	3:33 PM
491801083-0002	Hall B	11/1/2018	3:45 PM

If "Preliminary Report" is displayed in the signature box; this indicates that there are samples that have not yet been analyzed, that are in a preliminary state, or that analysis is in progress but not completed at the time of report issue.

Report Date	Report Revision	Revision Comments
11/20/2018	R0	Initial Report

Marjorie Howley, Laboratory Manager
or other approved signatory

Test results meet all NELAP requirements unless otherwise specified.
NJDEP Certification #: 03036

The samples associated with this report were received in good condition unless otherwise noted. This report relates only to those items tested as received by the laboratory. The results are not blank corrected unless otherwise noted. Interpretation and use of test results are the responsibility of the client. This report may not be reproduced except in full and without written approval by EMSL Analytical, Inc.

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**

Project: **Christwood C.C.U.**

Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Case Narrative

Method Reference
USEPA: Compendium Method TO-15, “Determination of Volatile Organic Compounds (VOCs) in Air…" Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

Column
Restek RTX-502.2, 60m, 0.25mm ID, 1.4um

Concentrator Traps:
Entech Dual Cold Traps: (1) 1/8” No Packing, (2) 1/8” Tenax.

Gas Standards:
Certified Gas standards were used for all analyses.

Sample Volumes:
Sample volume aliquots for this procedure are 250cc for indoor/ ambient air and 25cc for soil gas. Other volumes for sample dilutions are reflected on each result page.

Holding Times:
Standard holding times of 30 days were met for all samples.

Sampling Pressures:
All samples were received at acceptable pressure/vacuum unless listed below.

Sample Dilutions:
Diluitions reported are designated by the sample # with a "DL" suffix resulting from initial analysis having compounds exceeding calibration as reported with an "E" qualifier. Ethanol and Isopropanol are not diluted for and may be reported with an "E" qualifier on the final result.

QA/QC criteria outside method specifications are listed below (if applicable).

Initial Calibration
All Initial Calibratiion criteria met method specification.

Initial Calibration Verification Standard (ICVS)- Second Source
ICVS met method specification with 70-130% recovery for 100% of compounds.

Laboratory Control Sample (LCS)
LCS met method specification with 70-130% recovery for 100% of compounds.*(If the LCS does not meet criteria but any compounds which have recoveries >130% are not found in the samples, samples may be reported)*

Continuing Calibration Verification Standard (CCVS)
CCVS met method specification with all compounds within 30% deviation.

Ending Calibration Verification Standard (ECVS)
ECVS met method specification with all compounds within 30% deviation.

Method Blanks (MB)
Method Blank met method specification.

Reporting Limit Laboratory Control Samples (RLLCS)
RLLCS met method specification with 90% of compounds within the 60-140% recovery range. Individual compounds outside of the recovery range may be listed below.

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
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http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**

Project: **Christwood C.C.U.**

Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Case Narrative

Manual Integration *: -Listed below if applicable. Before and after documentation provided in extended deliverable packages.*

The following data qualifiers that may have been reported with the data,

ND- Non Detect. This notation would be used in the results column in lieu of a "U" qualifier.

U- Compound was analyzed for but not detected at a listed and appropriately adjusted reporting level.

J- Estimated value reported below adjusted reporting limit for target compounds or estimating a concentration for TICs where a 1:1 response is assumed

B- Compound found in associated method blank as well as in the sample.

E- Estimated value exceeding upper calibration range of instrument. Ethanol and isopropyl alcohol are not specifically targeted to dilute within calibration range.

D- Compound reported from additional diluted analysis.

N- indicates presumptive evidence of a compound based on library search match.

EMSL Analytical, Inc. certifies that this data package is in compliance with the terms and conditions of this contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer –readable data submitted on diskette has been authorized by the laboratory manager or his/her designee, as verified by the following signature.

Report Date	Report Revision	Revision Comments
11/20/2018	R0	Initial Report

Marjorie Howley, Laboratory Manager
or other approved signatory

Test results meet all NELAP requirements unless otherwise specified.

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
EMSL Sample #: **491801083-1**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
Propylene	115-07-1	42.08	ND	1.0		ND	1.7	
Freon 12(Dichlorodifluoromethane)	75-71-8	120.9	ND	0.50		ND	2.5	
Freon 114(1,2-Dichlorotetrafluoroethan	76-14-2	170.9	ND	0.50		ND	3.5	
Chloromethane	74-87-3	50.49	**0.61**	0.50		**1.3**	1.0	
n-Butane	106-97-8	58.12	**6.5**	0.50		**15**	1.2	
Vinyl chloride	75-01-4	62.50	ND	0.50		ND	1.3	
1,3-Butadiene	106-99-0	54.09	ND	0.50		ND	1.1	
Bromomethane	74-83-9	94.94	ND	0.50		ND	1.9	
Chloroethane	75-00-3	64.52	ND	0.50		ND	1.3	
Ethanol	64-17-5	46.07	**300**	2.5	DE	**570**	4.7	***Reported Dilution #1***
Bromoethene(Vinyl bromide)	593-60-2	106.9	ND	0.50		ND	2.2	
Freon 11(Trichlorofluoromethane)	75-69-4	137.4	ND	0.50		ND	2.8	
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	**18**	0.50		**45**	1.2	
Freon 113(1,1,2-Trichlorotrifluoroethan	76-13-1	187.4	ND	0.50		ND	3.8	
Acetone	67-64-1	58.08	**53**	2.5	D	**120**	5.9	***Reported Dilution #1***
1,1-Dichloroethene	75-35-4	96.94	ND	0.50		ND	2.0	
Acetonitrile	75-05-8	41.00	ND	0.50		ND	0.84	
Tertiary butyl alcohol(TBA)	75-65-0	74.12	ND	0.50		ND	1.5	
Bromoethane(Ethyl bromide)	74-96-4	108.0	ND	0.50		ND	2.2	
3-Chloropropene(Allyl chloride)	107-05-1	76.53	ND	0.50		ND	1.6	
Carbon disulfide	75-15-0	76.14	ND	0.50		ND	1.6	
Methylene chloride	75-09-2	84.94	ND	0.50		ND	1.7	
Acrylonitrile	107-13-1	53.00	ND	0.50		ND	1.1	
Methyl-tert-butyl ether(MTBE)	1634-04-4	88.15	ND	0.50		ND	1.8	
trans-1,2-Dichloroethene	156-60-5	96.94	ND	0.50		ND	2.0	
n-Hexane	110-54-3	86.17	ND	0.50		ND	1.8	
1,1-Dichloroethane	75-34-3	98.96	ND	0.50		ND	2.0	
Vinyl acetate	108-05-4	86.00	ND	0.50		ND	1.8	
2-Butanone(MEK)	78-93-3	72.10	**1.4**	0.50		**4.2**	1.5	
cis-1,2-Dichloroethene	156-59-2	96.94	ND	0.50		ND	2.0	
Ethyl acetate	141-78-6	88.10	**4.6**	0.50		**17**	1.8	
Chloroform	67-66-3	119.4	ND	0.50		ND	2.4	
Tetrahydrofuran	109-99-9	72.11	ND	0.50		ND	1.5	
1,1,1-Trichloroethane	71-55-6	133.4	ND	0.50		ND	2.7	
Cyclohexane	110-82-7	84.16	ND	0.50		ND	1.7	
2,2,4-Trimethylpentane(Isooctane)	540-84-1	114.2	ND	0.50		ND	2.3	
Carbon tetrachloride	56-23-5	153.8	ND	0.50		ND	3.1	
n-Heptane	142-82-5	100.2	ND	0.50		ND	2.0	
1,2-Dichloroethane	107-06-2	98.96	ND	0.50		ND	2.0	
Benzene	71-43-2	78.11	ND	0.50		ND	1.6	
Trichloroethene	79-01-6	131.4	ND	0.50		ND	2.7	
1,2-Dichloropropane	78-87-5	113.0	ND	0.50		ND	2.3	
Methyl Methacrylate	80-62-6	100.12	ND	0.50		ND	2.0	
Bromodichloromethane	75-27-4	163.8	ND	0.50		ND	3.3	
1,4-Dioxane	123-91-1	88.12	ND	0.50		ND	1.8	
4-Methyl-2-pentanone(MIBK)	108-10-1	100.2	ND	0.50		ND	2.0	

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EMSL Order #: **491801083**
EMSL Sample #: **491801083-1**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
cis-1,3-Dichloropropene	10061-01-5	111.0	ND	0.50		ND	2.3	
Toluene	108-88-3	92.14	**0.74**	0.50		**2.8**	1.9	
trans-1,3-Dichloropropene	10061-02-6	111.0	ND	0.50		ND	2.3	
1,1,2-Trichloroethane	79-00-5	133.4	ND	0.50		ND	2.7	
2-Hexanone(MBK)	591-78-6	100.1	ND	0.50		ND	2.0	
Tetrachloroethene	127-18-4	165.8	ND	0.50		ND	3.4	
Dibromochloromethane	124-48-1	208.3	ND	0.50		ND	4.3	
1,2-Dibromoethane	106-93-4	187.8	ND	0.50		ND	3.8	
Chlorobenzene	108-90-7	112.6	ND	0.50		ND	2.3	
Ethylbenzene	100-41-4	106.2	ND	0.50		ND	2.2	
Xylene (p,m)	1330-20-7	106.2	ND	1.0		ND	4.3	
Xylene (Ortho)	95-47-6	106.2	ND	0.50		ND	2.2	
Styrene	100-42-5	104.1	ND	0.50		ND	2.1	
Isopropylbenzene (cumene)	98-82-8	120.19	ND	0.50		ND	2.5	
Bromoform	75-25-2	252.8	ND	0.50		ND	5.2	
1,1,2,2-Tetrachloroethane	79-34-5	167.9	ND	0.50		ND	3.4	
4-Ethyltoluene	622-96-8	120.2	ND	0.50		ND	2.5	
1,3,5-Trimethylbenzene	108-67-8	120.2	ND	0.50		ND	2.5	
2-Chlorotoluene	95-49-8	126.6	ND	0.50		ND	2.6	
1,2,4-Trimethylbenzene	95-63-6	120.2	ND	0.50		ND	2.5	
1,3-Dichlorobenzene	541-73-1	147.0	ND	0.50		ND	3.0	
1,4-Dichlorobenzene	106-46-7	147.0	ND	0.50		ND	3.0	
Benzyl chloride	100-44-7	126.0	ND	0.50		ND	2.6	
1,2-Dichlorobenzene	95-50-1	147.0	ND	0.50		ND	3.0	
1,2,4-Trichlorobenzene	120-82-1	181.5	ND	0.50		ND	3.7	
Hexachloro-1,3-butadiene	87-68-3	260.8	ND	0.50		ND	5.3	
Naphthalene	91-20-3	128.17	ND	0.50		ND	2.6	
Total Target Compound Concentrations:			**380**	**ppbv**		**780**	**ug/m3**	

Surrogate	Result	Spike	Recovery
4-Bromofluorobenzene	9.9	10	99%

Qualifier Definitions

ND = Non Detect

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

Method Reference

USEPA: Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air…" Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

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EMSL Order #: **491801083**
EMSL Sample #: **491801083-1**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
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Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

Tentatively Identified Compound Results Summary

Tentatively Identified Compounds	CAS#	MW(1)	Result ppbv	Q	Result ug/m3	Retention Time	Comments
Ethane, 1,1-difluoro-	000075-37-6	66	4.5	JN	12	5.52	
Dimethyl ether	000115-10-6	46	4.3	JN	8.0	6.04	
Acetaldehyde	000075-07-0	44	2.3	JN	4.1	6.95	
Butane, 2-methyl-	000078-78-4	72	1.2	JN	3.5	8.09	
Pentane	000109-66-0	72	2.1	JN	6.1	9.02	
Cyclopentane	000287-92-3	70	1.3	JN	3.6	13.42	
unknown		92	3.3	JN	12	20.54	
Hexanal	000066-25-1	100	11	JN	44	23.71	
.alpha.-Pinene	000080-56-8	136	21	JN	120	26.87	
Decane	000124-18-5	142	1.7	JN	10	27.39	
.beta.-Pinene	000127-91-3	136	6.5	JN	36	28.18	
Octanal	000124-13-0	128	2.8	JN	14	28.50	
3-Carene	013466-78-9	136	2.6	JN	15	28.70	
D-Limonene	005989-27-5	136	8.7	JN	48	29.08	
Nonanal	000124-19-6	142	2.4	JN	14	30.50	
Total TIC Concentrations:			**76**	**ppbv**	**350**	**ug/m3**	

Qualifier Definitions

(1) = If unknown, MW is assigned as equivalent Toluene (92) for ug/m3 conversion purposes.

B = Compound also found in method blank.

J= Estimated value based on a 1:1 response to internal standard.

N= Presumptive evidence of compound based on library match.

Method Reference

USEPA: Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air…" Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

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Customer ID: **AIRE25**
Customer PO: **18-0058.01**

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Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

Total Volatile Organic Compounds (TVOC) Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
Chloromethane	74-87-3	50.49	**0.61**	0.50		**1.3**	1.0	
n-Butane	106-97-8	58.12	**6.5**	0.50		**15**	1.2	
Ethanol	64-17-5	46.07	**300**	2.5	DE	**570**	4.7	***Reported Dilution #1***
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	**18**	0.50		**45**	1.2	
Acetone	67-64-1	58.08	**53**	2.5	D	**120**	5.9	***Reported Dilution #1***
2-Butanone(MEK)	78-93-3	72.10	**1.4**	0.50		**4.2**	1.5	
Ethyl acetate	141-78-6	88.10	**4.6**	0.50		**17**	1.8	
Toluene	108-88-3	92.14	**0.74**	0.50		**2.8**	1.9	
Total Target Compound Concentrations:			**380**	**ppbv**		**780**	**ug/m3**	

Qualifier Definitions

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

Tentatively Identified Compounds	CAS#	MW(1)	Result ppbv		Q	Result ug/m3	Retention Time	Comments
Ethane, 1,1-difluoro-	000075-37-6	66	**4.5**		JN	**12**	5.52	
Dimethyl ether	000115-10-6	46	**4.3**		JN	**8.0**	6.04	
Acetaldehyde	000075-07-0	44	**2.3**		JN	**4.1**	6.95	
Butane, 2-methyl-	000078-78-4	72	**1.2**		JN	**3.5**	8.09	
Pentane	000109-66-0	72	**2.1**		JN	**6.1**	9.02	
Cyclopentane	000287-92-3	70	**1.3**		JN	**3.6**	13.42	
unknown		92	**3.3**		JN	**12**	20.54	
Hexanal	000066-25-1	100	**11**		JN	**44**	23.71	
.alpha.-Pinene	000080-56-8	136	**21**		JN	**120**	26.87	
Decane	000124-18-5	142	**1.7**		JN	**10**	27.39	
.beta.-Pinene	000127-91-3	136	**6.5**		JN	**36**	28.18	
Octanal	000124-13-0	128	**2.8**		JN	**14**	28.5	
3-Carene	013466-78-9	136	**2.6**		JN	**15**	28.7	
D-Limonene	005989-27-5	136	**8.7**		JN	**48**	29.08	
Nonanal	000124-19-6	142	**2.4**		JN	**14**	30.5	
Total TIC Concentrations:			**76**	**ppbv**		**350**	**ug/m3**	

Qualifier Definitions

(1) = If unknown, MW is assigned as equivalent Toluene (92) for ug/m3 conversion purposes.

B = Compound also found in method blank.

J= Estimated value based on a 1:1 response to internal standard.

N= Presumptive evidence of compound based on library match.

Total Volatile Organic Compounds (TVOCs):	460	ppbv	1100	ug/m3

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EMSL Order #: **491801083**
EMSL Sample #: **491801083-2**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
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Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
Propylene	115-07-1	42.08	ND	1.0		ND	1.7	
Freon 12(Dichlorodifluoromethane)	75-71-8	120.9	ND	0.50		ND	2.5	
Freon 114(1,2-Dichlorotetrafluoroethan	76-14-2	170.9	ND	0.50		ND	3.5	
Chloromethane	74-87-3	50.49	**0.56**	0.50		**1.2**	1.0	
n-Butane	106-97-8	58.12	**5.4**	0.50		**13**	1.2	
Vinyl chloride	75-01-4	62.50	ND	0.50		ND	1.3	
1,3-Butadiene	106-99-0	54.09	ND	0.50		ND	1.1	
Bromomethane	74-83-9	94.94	ND	0.50		ND	1.9	
Chloroethane	75-00-3	64.52	ND	0.50		ND	1.3	
Ethanol	64-17-5	46.07	**280**	2.5	DE	**530**	4.7	***Reported Dilution #1***
Bromoethene(Vinyl bromide)	593-60-2	106.9	ND	0.50		ND	2.2	
Freon 11(Trichlorofluoromethane)	75-69-4	137.4	ND	0.50		ND	2.8	
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	**20**	0.50		**49**	1.2	
Freon 113(1,1,2-Trichlorotrifluoroethan	76-13-1	187.4	ND	0.50		ND	3.8	
Acetone	67-64-1	58.08	**48**	2.5	D	**110**	5.9	***Reported Dilution #1***
1,1-Dichloroethene	75-35-4	96.94	ND	0.50		ND	2.0	
Acetonitrile	75-05-8	41.00	ND	0.50		ND	0.84	
Tertiary butyl alcohol(TBA)	75-65-0	74.12	ND	0.50		ND	1.5	
Bromoethane(Ethyl bromide)	74-96-4	108.0	ND	0.50		ND	2.2	
3-Chloropropene(Allyl chloride)	107-05-1	76.53	ND	0.50		ND	1.6	
Carbon disulfide	75-15-0	76.14	ND	0.50		ND	1.6	
Methylene chloride	75-09-2	84.94	ND	0.50		ND	1.7	
Acrylonitrile	107-13-1	53.00	ND	0.50		ND	1.1	
Methyl-tert-butyl ether(MTBE)	1634-04-4	88.15	ND	0.50		ND	1.8	
trans-1,2-Dichloroethene	156-60-5	96.94	ND	0.50		ND	2.0	
n-Hexane	110-54-3	86.17	ND	0.50		ND	1.8	
1,1-Dichloroethane	75-34-3	98.96	ND	0.50		ND	2.0	
Vinyl acetate	108-05-4	86.00	ND	0.50		ND	1.8	
2-Butanone(MEK)	78-93-3	72.10	**1.2**	0.50		**3.6**	1.5	
cis-1,2-Dichloroethene	156-59-2	96.94	ND	0.50		ND	2.0	
Ethyl acetate	141-78-6	88.10	**7.0**	0.50		**25**	1.8	
Chloroform	67-66-3	119.4	ND	0.50		ND	2.4	
Tetrahydrofuran	109-99-9	72.11	ND	0.50		ND	1.5	
1,1,1-Trichloroethane	71-55-6	133.4	ND	0.50		ND	2.7	
Cyclohexane	110-82-7	84.16	ND	0.50		ND	1.7	
2,2,4-Trimethylpentane(Isooctane)	540-84-1	114.2	ND	0.50		ND	2.3	
Carbon tetrachloride	56-23-5	153.8	ND	0.50		ND	3.1	
n-Heptane	142-82-5	100.2	ND	0.50		ND	2.0	
1,2-Dichloroethane	107-06-2	98.96	ND	0.50		ND	2.0	
Benzene	71-43-2	78.11	ND	0.50		ND	1.6	
Trichloroethene	79-01-6	131.4	ND	0.50		ND	2.7	
1,2-Dichloropropane	78-87-5	113.0	ND	0.50		ND	2.3	
Methyl Methacrylate	80-62-6	100.12	ND	0.50		ND	2.0	
Bromodichloromethane	75-27-4	163.8	ND	0.50		ND	3.3	
1,4-Dioxane	123-91-1	88.12	ND	0.50		ND	1.8	
4-Methyl-2-pentanone(MIBK)	108-10-1	100.2	ND	0.50		ND	2.0	

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Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

Target Compound Results Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
cis-1,3-Dichloropropene	10061-01-5	111.0	ND	0.50		ND	2.3	
Toluene	108-88-3	92.14	**0.95**	0.50		**3.6**	1.9	
trans-1,3-Dichloropropene	10061-02-6	111.0	ND	0.50		ND	2.3	
1,1,2-Trichloroethane	79-00-5	133.4	ND	0.50		ND	2.7	
2-Hexanone(MBK)	591-78-6	100.1	ND	0.50		ND	2.0	
Tetrachloroethene	127-18-4	165.8	ND	0.50		ND	3.4	
Dibromochloromethane	124-48-1	208.3	ND	0.50		ND	4.3	
1,2-Dibromoethane	106-93-4	187.8	ND	0.50		ND	3.8	
Chlorobenzene	108-90-7	112.6	ND	0.50		ND	2.3	
Ethylbenzene	100-41-4	106.2	ND	0.50		ND	2.2	
Xylene (p,m)	1330-20-7	106.2	ND	1.0		ND	4.3	
Xylene (Ortho)	95-47-6	106.2	ND	0.50		ND	2.2	
Styrene	100-42-5	104.1	ND	0.50		ND	2.1	
Isopropylbenzene (cumene)	98-82-8	120.19	ND	0.50		ND	2.5	
Bromoform	75-25-2	252.8	ND	0.50		ND	5.2	
1,1,2,2-Tetrachloroethane	79-34-5	167.9	ND	0.50		ND	3.4	
4-Ethyltoluene	622-96-8	120.2	ND	0.50		ND	2.5	
1,3,5-Trimethylbenzene	108-67-8	120.2	ND	0.50		ND	2.5	
2-Chlorotoluene	95-49-8	126.6	ND	0.50		ND	2.6	
1,2,4-Trimethylbenzene	95-63-6	120.2	ND	0.50		ND	2.5	
1,3-Dichlorobenzene	541-73-1	147.0	ND	0.50		ND	3.0	
1,4-Dichlorobenzene	106-46-7	147.0	ND	0.50		ND	3.0	
Benzyl chloride	100-44-7	126.0	ND	0.50		ND	2.6	
1,2-Dichlorobenzene	95-50-1	147.0	ND	0.50		ND	3.0	
1,2,4-Trichlorobenzene	120-82-1	181.5	ND	0.50		ND	3.7	
Hexachloro-1,3-butadiene	87-68-3	260.8	ND	0.50		ND	5.3	
Naphthalene	91-20-3	128.17	ND	0.50		ND	2.6	
Total Target Compound Concentrations:			**360**	**ppbv**		**740**	**ug/m3**	

Surrogate	Result	Spike	Recovery
4-Bromofluorobenzene	9.8	10	98%

Qualifier Definitions

ND = Non Detect

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

Method Reference

USEPA: Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air…" Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

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Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

Tentatively Identified Compound Results Summary

Tentatively Identified Compounds	CAS#	MW(1)	Result ppbv	Q	Result ug/m3	Retention Time	Comments
Ethane, 1,1-difluoro-	000075-37-6	66	5.1	JN	14	5.52	
Dimethyl ether	000115-10-6	46	4.9	JN	9.3	6.03	
Acetaldehyde	000075-07-0	44	2.2	JN	3.9	6.95	
Pentane	000109-66-0	72	2.0	JN	5.9	9.02	
Silanol, trimethyl-	001066-40-6	90	1.2	JN	4.5	13.54	
unknown		92	2.7	JN	10	20.53	
Hexanal	000066-25-1	100	9.0	JN	37	23.71	
Nonane	000111-84-2	128	1.5	JN	7.9	25.08	
unknown hydrocarbon		92	1.4	JN	5.4	26.52	
.alpha.-Pinene	000080-56-8	136	19	JN	110	26.87	
Decane	000124-18-5	142	2.2	JN	13	27.38	
.beta.-Pinene	000127-91-3	136	5.6	JN	31	28.17	
Octanal	000124-13-0	128	2.0	JN	10	28.50	
3-Carene	013466-78-9	136	2.3	JN	13	28.70	
D-Limonene	005989-27-5	136	8.1	JN	45	29.08	
Nonanal	000124-19-6	142	1.5	JN	8.6	30.50	
Total TIC Concentrations:			**71**	**ppbv**	**330**	**ug/m3**	

Qualifier Definitions

(1) = If unknown, MW is assigned as equivalent Toluene (92) for ug/m3 conversion purposes.

B = Compound also found in method blank.

J= Estimated value based on a 1:1 response to internal standard.

N= Presumptive evidence of compound based on library match.

Method Reference

USEPA: Compendium Method TO-15, "Determination of Volatile Organic Compounds (VOCs) in Air…" Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS), January 1999, (EPA/625/R-96/010b).

EMSL Analytical
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856)858-4800 / (856)858-4571
http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
EMSL Sample #: **491801083-2**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

Total Volatile Organic Compounds (TVOC) Summary

Target Compounds	CAS#	MW	Result ppbv	RL ppbv	Q	Result ug/m3	RL ug/m3	Comments
Chloromethane	74-87-3	50.49	**0.56**	0.50		**1.2**	1.0	
n-Butane	106-97-8	58.12	**5.4**	0.50		**13**	1.2	
Ethanol	64-17-5	46.07	**280**	2.5	DE	**530**	4.7	***Reported Dilution #1***
Isopropyl alcohol(2-Propanol)	67-63-0	60.10	**20**	0.50		**49**	1.2	
Acetone	67-64-1	58.08	**48**	2.5	D	**110**	5.9	***Reported Dilution #1***
2-Butanone(MEK)	78-93-3	72.10	**1.2**	0.50		**3.6**	1.5	
Ethyl acetate	141-78-6	88.10	**7.0**	0.50		**25**	1.8	
Toluene	108-88-3	92.14	**0.95**	0.50		**3.6**	1.9	
Total Target Compound Concentrations:			**360**	**ppbv**		**740**	**ug/m3**	

Qualifier Definitions

B = Compound also found in method blank.

E= Estimated concentration exceeding upper calibration range.

D= Result reported from diluted analysis.

Tentatively Identified Compounds	CAS#	MW(1)	Result ppbv		Q	Result ug/m3	Retention Time	Comments
Ethane, 1,1-difluoro-	000075-37-6	66	**5.1**		JN	**14**	5.52	
Dimethyl ether	000115-10-6	46	**4.9**		JN	**9.3**	6.03	
Acetaldehyde	000075-07-0	44	**2.2**		JN	**3.9**	6.95	
Pentane	000109-66-0	72	**2.0**		JN	**5.9**	9.02	
Silanol, trimethyl-	001066-40-6	90	**1.2**		JN	**4.5**	13.54	
unknown		92	**2.7**		JN	**10**	20.53	
Hexanal	000066-25-1	100	**9.0**		JN	**37**	23.71	
Nonane	000111-84-2	128	**1.5**		JN	**7.9**	25.08	
unknown hydrocarbon		92	**1.4**		JN	**5.4**	26.52	
.alpha.-Pinene	000080-56-8	136	**19**		JN	**110**	26.87	
Decane	000124-18-5	142	**2.2**		JN	**13**	27.38	
.beta.-Pinene	000127-91-3	136	**5.6**		JN	**31**	28.17	
Octanal	000124-13-0	128	**2.0**		JN	**10**	28.5	
3-Carene	013466-78-9	136	**2.3**		JN	**13**	28.7	
D-Limonene	005989-27-5	136	**8.1**		JN	**45**	29.08	
Nonanal	000124-19-6	142	**1.5**		JN	**8.6**	30.5	
Total TIC Concentrations:			**71**	**ppbv**		**330**	**ug/m3**	

Qualifier Definitions

(1) = If unknown, MW is assigned as equivalent Toluene (92) for ug/m3 conversion purposes.

B = Compound also found in method blank.

J= Estimated value based on a 1:1 response to internal standard.

N= Presumptive evidence of compound based on library match.

Total Volatile Organic Compounds (TVOCs):	430	ppbv	1100	ug/m3

EMSL Analytical
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http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
EMSL Sample #: **491801083-2**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

Total Volatile Organic Compounds (TVOC) Summary

USEPA TO-15
External Chain of Custody/ Field Test Data Sheet

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
Ph. (800) 220-3675
Fax (856) 786-0327

EMSL ANALYTICAL, INC.

EMSL Order Number (Lab Use Only): 491805083

Report To Contact Name: Bill Feaheny	Bill To Company: SAME (AIRE25)	Sampled By (Sign): William M. Feaheny
Company Name: Air Testing Associates LLC	Attention To:	Sampled By (Name): William M. Feaheny Jr.
Address 1: 110 Athania Pkwy. Ste B	Address 1:	Total # of Samples: 2
Address 2: Metairie, LA 70001	Address 2:	Date Shipped: 11-5-18
Phone No.: 504-813-5580 Fax: 504-734-3386	Phone No.: Fax:	Sample Collection Zip Code: 70433
Email Results To: bfeaheny@msn.com	Project Name: Christwood C.C.U.	Purchase Order: 18-0058.01

Turnaround Time (In Business Days): ☒ 10 Day Standard ☐ 5 Day ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day ☐ Other

Reporting Format: ☒ Results Only (Standard Lab Report) ☐ Full Deliverables (Surcharge may apply) ☐ Other

EMSL Sample Identifier	Client Field Sample Identification	Field Use - All Information Required! Sampling Start Information Start Date	Start Time (24 hr clock)	Start Canister Pressure ("Hg)	Start Interior Temp. (F)	Sampling Stop Information Stop Date	Stop Time (24 hr clock)	Stop Canister Pressure ("Hg)	Stop Interior Temp. (F)	Lab Use Only Canister Information Canister ID	Size (L)	Can Cert Batch ID	Outgoing Pressure ("Hg)	Incoming Pressure ("Hg)	Flow Contoller Reg. ID	Flow Contoller Cal Flow (ml/min)	Analysis USEPA TO-15	NJDEP LLTO-15	LIBRARY SEARCH	Other (Specify) CO2	Matrix Indoor/ Ambient Air	Soil Gas	Landfill/ Vent
	Room 802*	11-1-18	1455	-30	69	*				HD4362	1.4	H0484	-29.0	-30.0	3686	0.8							
	Room 833	11-1-18	1533	-30	75	11-2-18	1541	-7	74	4364	↓	↓	↓	-7.0	3743	↓	X		X	X	X		
	Hall B	11-1-18	1545	-30	70	11-2-18	1551	-6.5	75	4374	↓	↓	↓	-6.0	5968	↓	X		X	X	X		

Comments: * Do not analyze Room 802 sample; Broken Regulator Project: 18-0058.01 Christwood Cognitive Care Unit

Lab Canister Certification
Analyst Signature (TO-15):

Relinquished by:	Date/ Time	Received by:	Date/ Time	Seal #/Intact	Reason for Exchange (circle appropriate)
	10/29/18 1619			336	Shipping Courier Receiving Sampling Other:
		William M. Feaheny	10-31-18/1030	336	Shipping Courier Receiving Sampling Other:
William M. Feaheny	11-5-18 1955	VG FX	11-6-18 9:50	337	Shipping Courier Receiving Sampling Other:
VG FX	11-6-18 9:50		11/06/18/1132		Shipping Courier Receiving Sampling Other:
					Shipping Courier Receiving Sampling Other:

4/9/801083

TO-15 Sample Information

Please fill out this worksheet in addition to the Chain of Custody form. This information helps us to best analyze your samples, achieve requested TAT, and provide you with helpful interpretation information.

Company: Air Testing Associates LLC

Contact Person:

Name: William M. Feaheny Jr.

E-mail: bfeaheny@msn.com

Additional E-mails: bill@airtestingassociates.com

Telephone #: 504-813-5580

Library Search requested: [X] YES [ ] NO

A library search (*aka Tentatively Identified Compounds*) will identify up to 20 of the largest, non-target peaks that are not part of the standard TO-15 list of 74 compounds. If you are performing an Indoor Air Quality or odor investigation, the library search is recommended to provide you with all available information for your sample.

Sample Type:

[X] **Indoor Air Quality (Home/Office)** [ ] **Soil Gas/Sub Slab**
[ ] **IAQ (Industrial)**
[ ] **Other:**

Sample Description: Indoor Air Samples From Room 833 and Hall B (common kitchen Area)

PLEASE NOTE: The result forms we provide will not indicate whether your results have exceeded any Exposure Limit criteria established by any regulatory agency. If you would like that information, please check off below which regulatory comparison forms you would like to receive.

[X] **OSHA PELs/NIOSH RELs**	*combined form*		[X] **Potential Sources of Compounds found in your IAQ sample**		
[ ] **EPA RSLs** - *11/2017; default is THQ 0.1*	Residential	Industrial	[X] **TVOC (Library Search Required for this format)**		
[ ] **EPA VISLs** - *3/2012*	IA/SG		[ ] **NH DES_WMD** - *2/2012*	Indoor Air	Soil Gas
[ ] **NJ DEP** - *1/2018* - **Circle one:**	VI-Indoor AQ	VI-Soil Gas	[ ] **Ohio** - *4/2013* - **Circle one:**	Residential	Commercial
[ ] **NC DENR** - *4/2014* - **Circle one:**	Residential	Non-residential	[ ] **Indiana Dept Env Mgmt Screeening Levels** - *3/2016*		
[ ] **PA DEP** - *11/2016*	Indoor Air		[ ] **Vermont DEP IROCP** - *4/2012* **(soil gas only)**		
[ ] **PA DEP** - 11/2016: Sub Slab Soil Gas **OR** Near Source Soil Gas			[ ] **California OEHHA** - *2/2012*		
[ ] **CA HHSL** - *11/2004* - **Circle one:**	Indoor Air	Soil Gas	[ ] **Other; these are the compounds I want reported:**		

2018 NOV -6 A 9:50
RECEIVED EMSL CINNAMINSON, N.J.

Please note: There is an additional charge for any of the tests below. **USEPA TO-3 AND ASTM 5504 analyses can be performed from your canister at the Cinnaminson NJ Laboratory.**

US EPA TO-3 via GC/FID **(choose one below):**

[ ] **C_1-C_6 hydrocarbons**
[ ] **Methane only**

ASTM-D5504 *via GC/SCD* **(choose one below):***

[ ] **Sulfur Scan (H_2S, COS, MeSH, EtSH, DMS)**
[ ] **H_2S only**

Note** : **Hold time for sulfur gases is 1 day from collection. Please schedule your sample collection so samples are received in the lab prior to noon on Friday. Analysis performed out of hold time will have a notation in the report.

We can provide the following CMS tests from your canisters at the **Cinnaminson and Huntington Beach** laboratories. Please note these tests are to be used for IAQ/Screening purposes ONLY. EMSL recommends alternate field sampling techniques for these parameters (with the exception of water vapor); please contact your sales rep for the proper media. Please note: There is an additional charge for any of the tests below.

Draeger CMS Analyzer:
[ ] **CO** [X] **CO_2** [ ] **NH_3** [ ] **O2** [ ] **Water Vapor**

Sample Retention Policy: All canisters are guaranteed to be retained for one day after results are reported. Please review your results promptly to ensure your project scope is fully addressed. Cans may be retained for a longer period of time, but arrangements to hold your cans must be made through your customer account representative quickly. Thank you.

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http://www.EMSL.com to15lab@EMSL.com

EMSL Order #: **491801083**
EMSL Sample #: **491801083-1**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	N.E.		N.E.	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.90	ND		ND	4900000		4900000	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.90	ND		ND	7000000		7000000	
Chloromethane	NC	74-87-3	50.49	0.61		1.3	LFC		210000	
n-Butane	--	106-97-8	58.12	6.5		15	1900000		1900000	
Vinyl chloride	C	75-01-4	62.50	ND		ND	LFC		2600	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	LFC		2200	
Bromomethane	NC	74-83-9	94.94	ND		ND	LFC		78000	
Chloroethane	NC	75-00-3	64.52	ND		ND	LFC		2600000	
Ethanol	--	64-17-5	46.07	300	DE	570	1900000		1900000	
Bromoethene(Vinyl bromide)	C	593-60-2	106.90	ND		ND	LFC		N.E.	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.40	ND		ND	5600000		5600000	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.10	18		45	980000		980000	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.40	ND		ND	7700000		7700000	
Acetone	NC	67-64-1	58.08	53	D	120	590000		2400000	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	790000		790000	
Acetonitrile	NC	75-05-8	41.00	ND		ND	34000		67000	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	ND		ND	300000		300000	
Bromoethane(Ethyl bromide)	--	74-96-4	108.00	ND		ND	880000		880000	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.53	ND		ND	3100		3100	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	3100		62000	
Methylene chloride	C	75-09-2	84.94	ND		ND	LFC		87000	
Acrylonitrile	C	107-13-1	53.00	ND		ND	2200		4300	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	N.E.		N.E.	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	790000		790000	
n-Hexane	NC	110-54-3	86.17	ND		ND	180000		1800000	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	400000		400000	
Vinyl acetate	NC	108-05-4	86.00	ND		ND	14000		N.E.	
2-Butanone(MEK)	NC	78-93-3	72.10	1.4		4.2	590000		590000	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	790000		790000	
Ethyl acetate	NC	141-78-6	88.10	4.6		17	1400000		1400000	
Chloroform	C	67-66-3	119.40	ND		ND	9800		240000	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	590000		590000	
1,1,1-Trichloroethane	NC	71-55-6	133.40	ND		ND	1900000		1900000	
Cyclohexane	NC	110-82-7	84.16	ND		ND	1000000		1000000	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.20	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.80	ND		ND	13000		63000	
n-Heptane	NC	142-82-5	100.20	ND		ND	350000		2000000	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	4000		200000	
Benzene	C	71-43-2	78.11	ND		ND	320		3200	
Trichloroethene	C	79-01-6	131.40	ND		ND	130000		540000	
1,2-Dichloropropane	C	78-87-5	113.00	ND		ND	LFC		350000	
Methyl Methacrylate	NC	80-62-6	100.12	ND		ND	410000		410000	
Bromodichloromethane	C	75-27-4	163.80	ND		ND	N.E.		N.E.	

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Customer ID: **AIRE25**
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110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
1,4-Dioxane	C	123-91-1	88.12	ND		ND	3600		360000	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.20	ND		ND	200000		410000	
cis-1,3-Dichloropropene**	C	10061-01-5	111.00	ND		ND	4500		N.E.	
Toluene	NC	108-88-3	92.14	**0.74**		**2.8**	380000		750000	
trans-1,3-Dichloropropene**	C	10061-02-6	111.00	ND		ND	4500		N.E.	
1,1,2-Trichloroethane	C	79-00-5	133.40	ND		ND	55000		55000	
2-Hexanone(MBK)	NC	591-78-6	100.10	ND		ND	4100		410000	
Tetrachloroethene	C	127-18-4	165.80	ND		ND	LFC		680000	
Dibromochloromethane	--	124-48-1	208.30	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.80	ND		ND	350		150000	
Chlorobenzene	NC	108-90-7	112.60	ND		ND	N.E.		350000	
Ethylbenzene	C	100-41-4	106.20	ND		ND	430000		430000	
Xylene (p,m)	NC	1330-20-7	106.20	ND		ND	430000		430000	
Xylene (Ortho)	NC	95-47-6	106.20	ND		ND	430000		430000	
Styrene	NC	100-42-5	104.10	ND		ND	210000		430000	
Isopropylbenzene (cumene)	NC	98-82-8	120.19	ND		ND	250000		250000	
Bromoform	C	75-25-2	252.80	ND		ND	5200		5200	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.90	ND		ND	6900		34000	
4-Ethyltoluene	--	622-96-8	120.20	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.20	ND		ND	120000		120000	
2-Chlorotoluene	--	95-49-8	126.60	ND		ND	260000		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.20	ND		ND	120000		120000	
1,3-Dichlorobenzene	--	541-73-1	147.00	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.00	ND		ND	LFC		450000	
Benzyl chloride	C	100-44-7	126.00	ND		ND	5200		5200	
1,2-Dichlorobenzene	NC	95-50-1	147.00	ND		ND	300000		300000	
1,2,4-Trichlorobenzene	NC	120-82-1	181.50	ND		ND	37000		N.E.	
Hexachloro-1,3-butadiene	C	87-68-3	260.80	ND		ND	210		N.E.	
Naphthalene	C	91-20-3	128.17	ND		ND	52000		52000	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

The > column is used to flag exceedences as marked

Exposure Limit Definitions
REL= Recommended Exposure Limit, PEL= Permissable Exposure Limit

Agency Definitions
NIOSH= The National Institute for Occupational Safety and Health

Reference
Occupational Safety and Health Administration (OSHA) General Industry Air Contaminants Standard (29 CFR 1910.1000)
Toxicity Class (EPA Regionional Screening Levels (RSL) Table, Nov 2017)

Carcinogenic (C) Exceedence
Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected. Thus is a theoretical risk and not an actual epidemiological one.

NonCarcinogenic (NC) Exceedence
Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deliterious health effects. Thus is a theoretical risk and not an actual epidemiological one.

Compound Exposure Definitions
NE= No Limit Established
LFC= Lowest Feasible Concentration
NS= No Sscreening Value

Qualifier Definitions
ND = Non Detect
B = Compound also found in method blank.
E= Estimated concentration exceeding upper calibration range.
D= Result reported from diluted analysis.

EMSL Analytical
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EMSL Order #: **491801083**
EMSL Sample #: **491801083-1**
Customer ID: **AIRE25**
Customer PO: **18-0058.01**

Attn: **Bill Feaheny**
Air Testing Associates, LLC.
110 Athania Pkwy
Ste B
Metairie, LA 70001

Phone: **504-813-5580**
Fax: **504-734-3386**
Date Collected: **11/1/2018**
Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Room 833

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17910.D	HD4364	307.5 cc	1
Dilution1	11/14/2018	TP	K17926.D	HD4364	61.5 cc	5

Possible Background Sources of Contaminants

Target Compounds	CAS#	Result ppbv	Q	Result ug/m3	Use and Possible Sources
Chloromethane	74-87-3	0.61		1.3	Most (99%) of the chloromethane in the environment comes from natural sources. Because chloromethane is made in the oceans by natural processes, it is present in air all over the world. In most areas, the outside air contains less than 1 part of chloromethane in a billion parts of air (ppb). In cities, human activities, mostly combustion and manufacturing, add to the chloromethane in the air, resulting in somewhat higher levels, up to 1 ppb. Cigarette smoke, polystyrene insulation, and aerosol propellants; home burning of wood, coal, or certain plastics; and chlorinated swimming pools.[4]
n-Butane	106-97-8	6.5		15	Aerosol spray products for some paints, cosmetics, automotive products, leather treatments, pesticides.[2]
Ethanol	64-17-5	300	DE	570	Hand sanitizers, disinfecting wipes. Personal care products: nail polish, nail polish remover, colognes, perfumes, rubbing alcohol, hair spray. [2]
Isopropyl alcohol(2-Propanol)	67-63-0	18		45	Eye Glass Cleaners. Disinfecting wipes. Personal care products: nail polish, nail polish remover, colognes, perfumes, rubbing alcohol, hair spray.[2]
Acetone	67-64-1	53	D	120	Rubber cement, cleaning fluids, scented candles and nail polish remover.[1]
2-Butanone(MEK)	78-93-3	1.4		4.2	2-Butanone is produced in large quantities. Nearly half of its use is in paints and other coatings because it will quickly evaporate into the air and it dissolves many substances.[4] Can occur from automobile exhaust, printing inks, fragrance/flavoring agent in candy and perfume, paint, glue, cleaning agents and cigarette smoke.[1]
Ethyl acetate	141-78-6	4.6		17	Personal care products: nail polish, nail polish remover, colognes, perfumes, rubbing alcohol, hair spray.[2]
Toluene	108-88-3	0.74		2.8	Toluene is produced in the process of making gasoline and other fuels from crude oil and making coke from coal. Will occur in gasoline exhaust. Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.[4]

Qualifier Definitions
ND = Non Detect
B = Compound also found in method blank.
E= Estimated concentration exceeding upper calibration range.
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Sources References
(1) NJDEP "Common Household Sources of Background Indoor Air Contamination". June 26, 2012
(2) NYSDOH "Volatile Organic Compounds (VOCs) in Commonly Used Products", 2007
(3) EPA, Air & Radiation, TTN Web - Technology Transfer NetworkAir Toxics Web site, various years.
(4) Agency for Toxic Substances and Disease Registry (ATSDR). U.S. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA. 1998.
(5) OFFICE OF POLLUTION PREVENTION AND TOXICS, U.S. ENVIRONMENTAL PROTECTION AGENCY, August 1994, EPA 749-F-94-012a
(6) U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, OH. 1985.
(7) World Health Organization,
(8) Product Safety Assessment, Revised: November 19, 2010 The Dow Chemical Company

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Target Compounds	CAS#	Result ppbv	Q	Result ug/m3	Use and Possible Sources

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Date Received: **11/6/2018**

Project: **Christwood C.C.U.**

Sample ID: Hall B

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	N.E.		N.E.	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.90	ND		ND	4900000		4900000	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.90	ND		ND	7000000		7000000	
Chloromethane	NC	74-87-3	50.49	0.56		1.2	LFC		210000	
n-Butane	--	106-97-8	58.12	5.4		13	1900000		1900000	
Vinyl chloride	C	75-01-4	62.50	ND		ND	LFC		2600	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	LFC		2200	
Bromomethane	NC	74-83-9	94.94	ND		ND	LFC		78000	
Chloroethane	NC	75-00-3	64.52	ND		ND	LFC		2600000	
Ethanol	--	64-17-5	46.07	280	DE	530	1900000		1900000	
Bromoethene(Vinyl bromide)	C	593-60-2	106.90	ND		ND	LFC		N.E.	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.40	ND		ND	5600000		5600000	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.10	20		49	980000		980000	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.40	ND		ND	7700000		7700000	
Acetone	NC	67-64-1	58.08	48	D	110	590000		2400000	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	790000		790000	
Acetonitrile	NC	75-05-8	41.00	ND		ND	34000		67000	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	ND		ND	300000		300000	
Bromoethane(Ethyl bromide)	--	74-96-4	108.00	ND		ND	880000		880000	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.53	ND		ND	3100		3100	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	3100		62000	
Methylene chloride	C	75-09-2	84.94	ND		ND	LFC		87000	
Acrylonitrile	C	107-13-1	53.00	ND		ND	2200		4300	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	N.E.		N.E.	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	790000		790000	
n-Hexane	NC	110-54-3	86.17	ND		ND	180000		1800000	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	400000		400000	
Vinyl acetate	NC	108-05-4	86.00	ND		ND	14000		N.E.	
2-Butanone(MEK)	NC	78-93-3	72.10	1.2		3.6	590000		590000	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	790000		790000	
Ethyl acetate	NC	141-78-6	88.10	7.0		25	1400000		1400000	
Chloroform	C	67-66-3	119.40	ND		ND	9800		240000	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	590000		590000	
1,1,1-Trichloroethane	NC	71-55-6	133.40	ND		ND	1900000		1900000	
Cyclohexane	NC	110-82-7	84.16	ND		ND	1000000		1000000	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.20	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.80	ND		ND	13000		63000	
n-Heptane	NC	142-82-5	100.20	ND		ND	350000		2000000	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	4000		200000	
Benzene	C	71-43-2	78.11	ND		ND	320		3200	
Trichloroethene	C	79-01-6	131.40	ND		ND	130000		540000	
1,2-Dichloropropane	C	78-87-5	113.00	ND		ND	LFC		350000	
Methyl Methacrylate	NC	80-62-6	100.12	ND		ND	410000		410000	
Bromodichloromethane	C	75-27-4	163.80	ND		ND	N.E.		N.E.	

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Project: **Christwood C.C.U.**

Sample ID: Hall B

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Initial	11/13/2018	TP	K17911.D	HD4374	307.5 cc	1
Dilution1	11/14/2018	TP	K17927.D	HD4374	61.5 cc	5

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
1,4-Dioxane	C	123-91-1	88.12	ND		ND	3600		360000	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.20	ND		ND	200000		410000	
cis-1,3-Dichloropropene**	C	10061-01-5	111.00	ND		ND	4500		N.E.	
Toluene	NC	108-88-3	92.14	**0.95**		**3.6**	380000		750000	
trans-1,3-Dichloropropene**	C	10061-02-6	111.00	ND		ND	4500		N.E.	
1,1,2-Trichloroethane	C	79-00-5	133.40	ND		ND	55000		55000	
2-Hexanone(MBK)	NC	591-78-6	100.10	ND		ND	4100		410000	
Tetrachloroethene	C	127-18-4	165.80	ND		ND	LFC		680000	
Dibromochloromethane	--	124-48-1	208.30	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.80	ND		ND	350		150000	
Chlorobenzene	NC	108-90-7	112.60	ND		ND	N.E.		350000	
Ethylbenzene	C	100-41-4	106.20	ND		ND	430000		430000	
Xylene (p,m)	NC	1330-20-7	106.20	ND		ND	430000		430000	
Xylene (Ortho)	NC	95-47-6	106.20	ND		ND	430000		430000	
Styrene	NC	100-42-5	104.10	ND		ND	210000		430000	
Isopropylbenzene (cumene)	NC	98-82-8	120.19	ND		ND	250000		250000	
Bromoform	C	75-25-2	252.80	ND		ND	5200		5200	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.90	ND		ND	6900		34000	
4-Ethyltoluene	--	622-96-8	120.20	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.20	ND		ND	120000		120000	
2-Chlorotoluene	--	95-49-8	126.60	ND		ND	260000		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.20	ND		ND	120000		120000	
1,3-Dichlorobenzene	--	541-73-1	147.00	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.00	ND		ND	LFC		450000	
Benzyl chloride	C	100-44-7	126.00	ND		ND	5200		5200	
1,2-Dichlorobenzene	NC	95-50-1	147.00	ND		ND	300000		300000	
1,2,4-Trichlorobenzene	NC	120-82-1	181.50	ND		ND	37000		N.E.	
Hexachloro-1,3-butadiene	C	87-68-3	260.80	ND		ND	210		N.E.	
Naphthalene	C	91-20-3	128.17	ND		ND	52000		52000	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

The > column is used to flag exceedences as marked

Exposure Limit Definitions
REL= Recommended Exposure Limit, PEL= Permissable Exposure Limit

Agency Definitions
NIOSH= The National Institute for Occupational Safety and Health

Reference
Occupational Safety and Health Administration (OSHA) General Industry Air Contaminants Standard (29 CFR 1910.1000)
Toxicity Class (EPA Regionional Screening Levels (RSL) Table, Nov 2017)

Carcinogenic (C) Exceedence
Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected. Thus is a theoretical risk and not an actual epidemiological one.

NonCarcinogenic (NC) Exceedence
Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deliterious health effects. Thus is a theoretical risk and not an actual epidemiological one.

Compound Exposure Definitions
NE= No Limit Established
LFC= Lowest Feasible Concentration
NS= No Sscreening Value

Qualifier Definitions
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n-Butane	106-97-8	5.4		13	Aerosol spray products for some paints, cosmetics, automotive products, leather treatments, pesticides.[2]
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Appendix 4

Christwood Cognitive Care
100 Christwood Boulevard
Covington, LA 70433

11/1/18 to 1/2/18

EMSL Analytical, Inc.
TO-15 VOC Analyses

Indoor Coil Corrosion

Industry Research Report

Carrier®

turn to the experts℠

Identifying Common Sources

Introduction

Indoor coil corrosion leading to coil failure is an issue that affects coils manufactured by the entire HVAC industry today. A leading cause of coil corrosion is formicary acid, an organic acid that can be formed in the home. Although the occurrence rate of these failures is low nationwide, some geographic areas have experienced higher incidence rates. For instance, some homes experience multiple corrosion-related failures while those around them have none. Failures are typically characterized by leaks that form in the fin pack area of the coil after one to four years of installation and use.

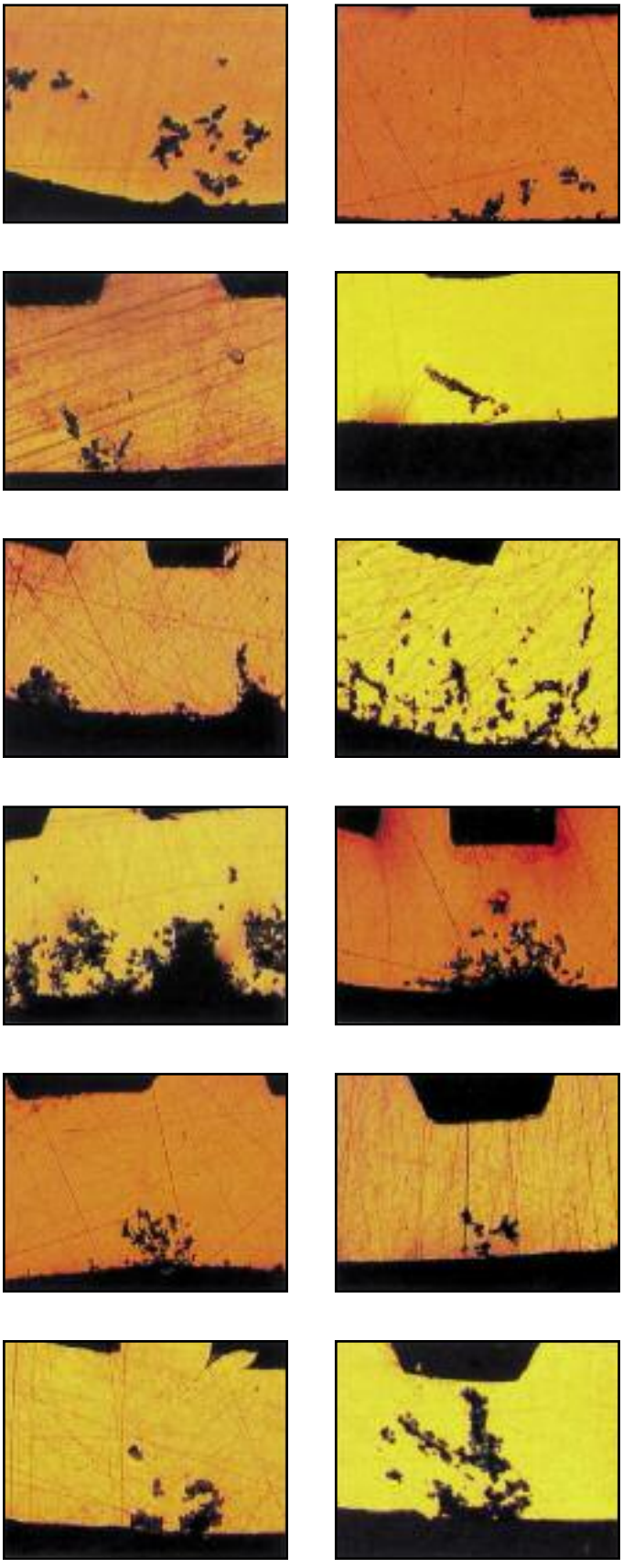
Carrier was the first to identify formicary corrosion and provide our dealers with an effective solution. With the aluminum coil, we are incorporating advanced manufacturing techniques to provide the next generation solution to formicary corrosion.

Formicary corrosion affects coils industry-wide. A competitive study has shown identical corrosion failure leaks in all coil brands investigated. The photos at right show magnified tubing cross-sections from failed coils. The progression of the corrosion is from the exterior of the tube inward, eating away at the copper, until penetration occurs and a leak results. Due to the corrosion process, some photos look better than others, but all corroded through the tube causing a leak at that point. All these coils failed in the time period characteristic of such a failure.

Manufacturers represented in photos:

- ADP
- Airpro (Coleman)
- American Standard
- Aspen
- Carrier
- Goodman
- ICP
- Janitrol
- Rheem
- Superior
- Trane
- York

Fin Pack Leaks – Formicary Corrosion

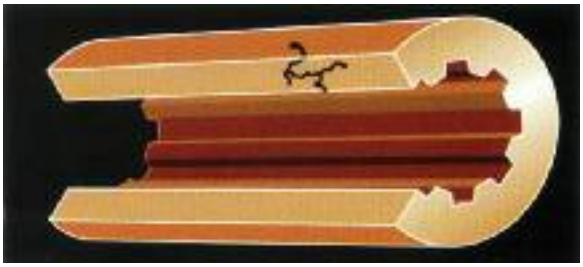


Corrosion Mechanisms

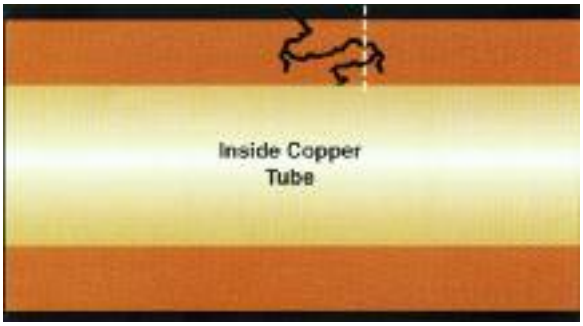
There are many potential causes of coil leaks in indoor coils, ranging from manufacturing or process-related defects to corrosion of the metal. Additionally, there are several different corrosion mechanisms that can affect copper tubing. The following discussion focuses on pitting corrosion failures of indoor coils.

There are two main forms of pitting corrosion found in indoor coils: (1) general pitting; and (2) formicary corrosion, sometimes called “ant’s nest” corrosion.

Illustration of Typical Corroded Tube



3-D representation of corrosion through tube



Side view of leak

Cross-section showing portion of corrosion (leak)

The illustrations above depict the characteristics of the corrosion process: at top, how a single leak might perforate the copper tube; center, where that tube might be cross-sectioned; and bottom, how the final cross-sectioned piece would look magnified.

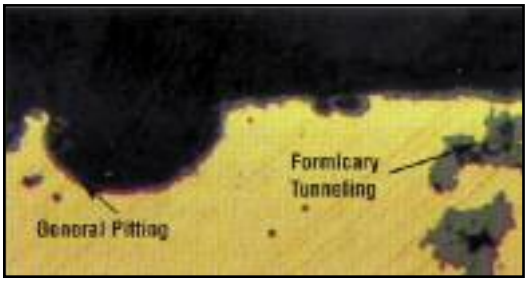


Fig. 1 General Pitting and Formicary Corrosion

General pitting corrosion is caused by aggressive anion attack on the copper tube. An anion is a negatively charged chemical species. Due to this negative charge, anions aggressively search for positively charged species called cations. Copper is an abundant source of cations. Large pits resembling bite marks characterize the footprint of general pitting. These pits can often be observed with the human eye. Chlorides are the most common source of the aggressive anions known to cause general pitting corrosion.

Common household substances that may contain chlorides include:[1-3]

- Aerosol sprays
- Carpeting
- Degreasing and detergent cleaners
- Dishwasher detergents
- Laundry bleach
- Fabric softeners
- Paint removers
- Tub and tile cleaners
- Vinyl fabrics
- Vinyl flooring
- Wallpaper

Formicary corrosion, on the other hand, appears as multiple tiny pinhole leaks at the surface of the copper tube that are not visible to the human eye. Upon microscopic examination, the formicary corrosion pits show networks of interconnecting tunnels through the copper wall, hence the association with ants’ nests. The agents of attack involved in this corrosion mechanism are organic acids.

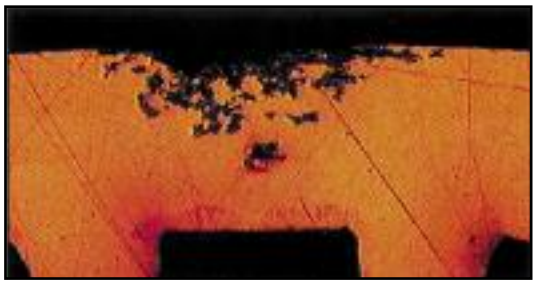


Fig. 2 Formicary Corrosion Tunneling

There are many possible sources of organic acids, which are volatile organic compounds (VOCs), in both the coil application (i.e. the home) and coil production environment. The most common organic acids are formic and acetic acids. Formaldehyde can be converted to formic acid and then to formate in moisture. Acetic acid is converted to acetate in water. All of these compounds are aggressive to copper, resulting in the ant's nest corrosion footprint.

Common household sources that may contain formic acid, formaldehyde, or formate include:[1-7]

- Building materials
  - Adhesives
  - Cabinets
  - Carpets
  - Countertops
  - Foam insulation
  - Laminates
- Cosmetics
- Disinfectants and deodorizers
- Tobacco and wood smoke
  - Paints (latex and oil based)
  - Paneling
  - Particle boards
  - Plywood

Typical household sources of acetic acid or acetate include:[1-7]

- Building materials
  - Adhesives
  - Cabinets
  - Carpets
  - Countertops
  - Foam insulation
  - Laminates
  - Paints (oil based)
- Cleaning solvents
- Vinegar
  - Paneling
  - Particle boards
  - Plywood
  - Silicone caulking
  - Wallboard
  - Wallpaper

There are three conditions required for formicary corrosion to occur:[7]

- The presence of oxygen
- The presence of a chemically corrosive agent (organic acid)
- The presence of moisture

If multiple corrosive agents are present, the result will be multiple corrosion footprints, as depicted in Fig. 1 (page 3), which shows both general pitting and formicary corrosion.

Research Findings

Environmental Factors

The fact that coils made by many manufacturers are experiencing identical failures shows that external environmental factors are playing a role. While each manufacturer has a different assembly process and multiple sources of raw materials, a chemical analysis of corroded coils can identify the presence of corrosive agents.

Carrier has thoroughly inspected its manufacturing processes, materials and environment, including all oils and lubricants, to ensure corrosive agents are not present in the production environment.

The evidence suggests the home environment is the primary contributor to coil corrosion. The trend in home construction is to improve energy efficiency by making homes "tighter." This decreased ventilation results in higher concentration levels of indoor contaminants.

The evidence suggests the home environment is the primary contributor to coil corrosion.

Research Study

A year 2000 study was conducted to measure the volatile organic compound concentrations and emission rates in new manufactured and site-built houses.[8] The E.O. Lawrence Berkeley National Laboratory performed this research with the support of the U.S. Department of Energy.

This study shows that many materials used in the construction of new houses emit VOCs, including formaldehyde. Plywood, engineered wood products such as flooring and cabinetry, latex paint, and sheet vinyl flooring have been identified as major sources for these compounds. Measurements of acetic acid, formaldehyde, and acetaldehyde concentrations taken inside homes in this study were significantly higher than levels measured outside the homes. These elevated emission rates were seen to persist over a period of at least nine months while these homes were being studied. In fact, the measured levels of acetic acid increased during the study.

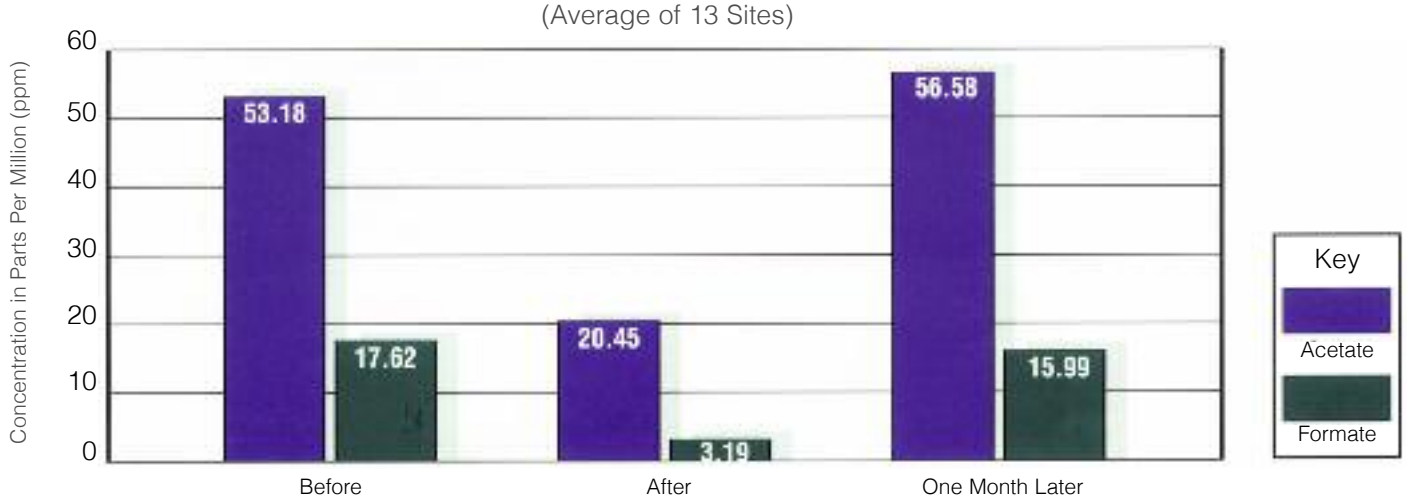
Another study specifically investigated the emission rates of wooden products in test chambers.[9] This testing supports the theory that wood is a source of organic acids, especially formic and acetic acids.

In addition, building materials, including woods and furniture, are generally the main sources of volatile organic compounds in the indoor environment.

Condensate Analysis

As part of Carrier's efforts to research this problem, coil condensate sampling was performed at coil failure sites. The analysis of these samples confirmed the presence of significant levels of formate and acetate in the household environments in which the corroded coils were installed. These samples were collected just prior to coil replacement and immediately after the coils were replaced. Additional samples were then taken at some sites during follow-up assessments a month later.

The following chart shows the average trend of acetate and formate levels from 13 sites located in the Houston, Mobile, St. Louis, Indianapolis and Memphis areas. The levels are elevated prior to coil replacement. When condensate is drawn immediately from the new coil, the levels decrease dramatically. Finally, after a short period of operation, the levels return to previously elevated levels. These measurements are also an indication that the corrosive agents are not tied to the new replacement coils because the condensate samples drawn directly off the new coils show decreased levels of acetate and formate. After the coil has been installed for a period of time, the levels of these agents once again reflect the operating environment of the coil.



The Carrier® Solution

Today, Carrier is proud to offer aluminum coils designed to resist the effects of formicary corrosion as well as many other forms of coil corrosion. As with virtually all of our products, these coils are backed with our 10-year parts limited warranty. Carrier was the first HVAC manufacturer to deliver an acceptable solution to the indoor copper coil corrosion issue, providing yet another example of our industry leadership in developing indoor comfort technology.

Our aluminum evaporator coil is significantly more resistant than traditional copper and equal to tin-plated coils to corrosive agents found in the home that cause formicary corrosion.

Aluminum coils provide enhanced durability and reliability:

- Testing to ensure durability and reliability: Running coils through more than 44,000 cooling cycles and over 2.5 years of accelerated corrosion testing
- Burst testing up to 2100 psi
- Each coil is leak checked in a helium leak chamber, allowing the detection of leaks as small as 0.1 ounces per year, prior to leaving the factory
- Aluminum to copper transitions are designed to resist corrosion attacks through the selection of specific alloys for fillers, joint geometry and location. Transition joints are also fatigue tested over 250,000 times with hydraulic fluids and jar tested in mixed acids as determined from 1,000 condensate samples from across the country to ensure their durability and reliability

Advantages of aluminum coils include:

- Aluminum protects against formicary as well as various other types of corrosion, preventing rusty tube sheets and pinhole leaks, while providing comfort and peace of mind to the homeowner
- The selection of tube enhancements matching current tube performance allows Carrier to maintain the same dimensions and performance of current copper and tin-plated copper coils
- Aluminum to Copper transition of the suction and liquid lines mean the installer will braze copper to copper in the field using standard procedures
- Each coil is tested with pressurized helium allowing the detection of leaks as small as 0.1 ounces per year prior to leaving the factory
- Aluminum coils are easier to handle and transport because they weigh less than copper coils
- Aluminum coils are being phased in throughout our product line with sizing for virtually all new and existing Carrier installations
- Ten-year warranty provides added value in areas not affected specifically by formicary corrosion

Conclusions

There is increasing evidence linking the primary cause of indoor coil leak failures to agents present in the household environment. Significant levels of corrosive agents known to cause these failures have been quantified in indoor condensate sampling. The trend toward decreased home ventilation rates likely contributes to the elevated levels of indoor contaminants.

Carrier has conducted extensive field and laboratory testing and research efforts to identify an effective method of preventing coil failures caused by agents in the household environment.

The IAQ Solution

As a part of a total home defense against formicary corrosion, you can also recommend Carrier fresh air ventilators. A properly matched Carrier HRV or ERV will help minimize the opportunity for formicary corrosion to develop by continually exhausting stale, indoor air and its potentially corrosive agents outside. At the same time, the customer will enjoy the benefits of a consistent infusion of fresh, outdoor air into the home.

A Complete Line of New and Replacement Coils

Carrier offers a comprehensive family of Performance™ series aluminum evaporator coils for split-system residential and RCD. In addition to models that match our current product line, we offer replacement coils for systems currently in the field.

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