LIMITED INDOOR AIR QUALITY SURVEY

PERFORMED AT

BAYPINES VA HOSPITAL
BUILDING 100 3D

PREPARED FOR

BLUE CORD DESIGN & CONSTRUCTION

PREPARED BY

5420 Bay Center Drive, Suite 100
Tampa, Florida 33609
Phone: (813) 626-8156

OHC PROJECT NO. 160159A

PREPARED ON

October 14, 2016

October 14, 2016

Mr. Kaina Kaio
Blue Cord Design & Construction
1837 Edgewater Drive
Orlando, FL 32804

Re: Limited Indoor Air Quality Survey
C.W. Bill Young VAMC, Building 100 3D
OHC Project No. 150159-IA

Dear Mr. Kaio,

OHC Environmental Engineering Inc. (OHC) is pleased to present the report for the Limited Indoor Air Quality Survey conducted on October 6 & 7, 2016 at building 100 rooms 3D-127, 3D-132, 3D-133, 3D-139, 3D-141, and 3D-143. The survey was limited in scope to the investigation and resolution of moisture concerns for the rooms listed above only.

If we can be of further assistance, please contact us at your convenience.

Sincerely,

Report Prepared by:

James F. Rizk, CIH

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1.0 INTRODUCTION

OHC Environmental Engineering, Inc., (OHC), was contracted by Mr. Kaina Kaio with Blue Cord Design & Construction, to perform a limited indoor air quality survey at building 100 rooms 3D-127, 3D-132, 3D-133, 3D-139, 3D-141, and 3D-143. The purpose of this survey was limited in scope to investigating extent of moisture intrusion and water damage in areas listed above. A representative from OHC Environmental Engineering Inc., Mr. James F. Rizk, CIH performed the assessment on October 6 & 7, 2016.

1.1 Executive Summary

Ms. Rizk conducted a moisture intrusion assessment and water damaged material inspection of several rooms located on 3D of building 100. These rooms undergone a major renovation which was completed in April 2016. During the renovation it was observed that there was significant water intrusion through the exterior building envelop causing moisture and condensation on building material especially behind the exterior walls and above the drop ceiling which are open to the wall cavity shared by the exterior soffit. Since April 2016, The VA performed a limited building envelope study to determine the cause of the moisture intrusion and determined that many of the exterior caulking was failing. The VA proceeded with replacing the caulking in that area which seems to control most of the moisture intrusion but not completely.

During the assessment we discovered that moisture is still penetrating through the building envelop in some areas evidenced by elevated moisture levels in the exterior wall cavity and condensation above the drop ceiling. Upon discovery of the elevated moisture level in the rooms the VA responded immediately by sealing off these rooms and installation of dehumidifiers in each of these rooms accompanied by installation of HEPA vacuum negative air machines to capture any mold spores in these areas. Follow up inspection conducted on October 7 indicated that these control measures were very effective in reducing the moisture level in the rooms tested and very little condensation was observed above the drop ceiling. The rooms remain isolated from the building environment until full corrective actions are implemented.

Swab and bulk samples of the yellow fiberglass insulation placed on the deck indicated elevated levels of Aspergillus and Cladosporium.

2.0 OBSERVATIONS AND ASSESSMENTS

2.1 Visual Observations

Initial investigation was conducted on October 6 and 7, 2016 to investigate moisture intrusion concerns in area under renovation location at building 100- 3D. The rooms evaluated include rooms 3D-127, 3D-132, 3D-133, 3D- 138, 3D-139, and 3D-141. The evaluation was in performed using a combination of Infra-Red Spectrophotometry (I-R camera) and non-intrusive moisture meter.

Room 3D-127- There was elevated moisture readings detected the IR camera and the moisture meter on any of the exterior wall. There was no condensation or moisture damage or Visible Presumptive Fungal Growth (VPFG) observed in any of the building material.

Room 3D-132 There was no elevated level of moisture detected on the exterior wall using the IR camera and the moisture meter. A slight condensation was detected on the Structural members above the drop ceiling. VPFG was observed on the drywall located above the drop ceiling. Destructive sampling did not indicate any VPFG on the backside of drywall below the window but VPFG was detected on the soffit and on the ceiling insulation. Sample of the yellow insulation on the deck indicated a significant-abundant level of Aspergillus/Penicillium.

Room 3D- 133 There was elevated moisture readings on the exterior wall below and on the side of the windows. Visual condensation observed above the drop ceiling on building components. Visual mold observed on drywall above drop ceiling. Destructive sampling did not indicate any VPFG on the backside of drywall on exterior wall beneath the window, soffit and on side of window.

Room 3D- 138 There was no elevated moisture readings detected on exterior wall. Destructive sampling did not indicate any VPFG on the backside of drywall on exterior walls. VPFG was identified on drywall and yellow fiberglass insulation above drop ceiling.

Room 3D-139 There was no elevated moisture readings on exterior walls. Some discoloration was observed on the yellow insulation on the deck. Destructive sampling indicated VPFG on backside of drywall located beneath the window. Swab and bulk sample of the insulation located on the deck indicated a Minor – Significant levels of Aspergillus/Penicillium and Significant level of Cladosporium.

Room 3D- 141 There was elevated moisture levels detected using the I-R camera in the soffit, below the window and on either side of the window. VPFG was observed on the Drywall above the drop ceiling. Destructive sampling indicated

VPFG on the backside of the drywall on exterior wall, beneath window, soffit and on with side of the window. Swab sample of the yellow insulation on deck indicated and abundant level of Aspergillus sp. and a significant level of Cladosporium sp.

Currently, there are no tolerance levels or absolute guidelines established for indoor concentrations of fungal spores. The current industry standard is to compare indoor fungal spore concentrations with samples collected from outside areas, with all the samples collected during the same sampling period. Indoor levels are generally considered as acceptable if the airborne fungal spores are less than outside levels and that the biodiversity of the spores for both sets of samples are the same. Due to the ubiquitous nature of fungal spores, it is not uncommon to have an analysis in which one spore is detected on an interior sample not noted on exterior samples.

Refer to Appendix I for laboratory reports.

Cladosporium is a genus of fungi including some of the most common indoor and outdoor molds. The many species of Cladosporium are commonly found on living and dead plant material. Some species are plant pathogens, others parasitize other fungi. Cladosporium spores are wind-dispersed and they are often extremely abundant in outdoor air. Indoors Cladosporium species may grow on surfaces when moisture is present. Cladosporium species are rarely pathogenic to humans, but have been reported to cause infections of the skin and toenails, as well as sinusitis and pulmonary infections. If left untreated, these infections could turn into respiratory infections like pneumonia. The airborne spores of Cladosporium species are significant allergens, and in large amounts they can severely affect asthmatics and people with respiratory diseases. Cladosporium species produce no major mycotoxins of concern, but do produce volatile organic compounds (VOCs) associated with odors.

Aspergillus - This genus of fungi includes over 185 species. Members of this genus are known as organisms that cause deterioration of materials. Among all filamentous fungi, Aspergillus is the most commonly isolated in invasive and opportunistic infections. Aspergillosis is the group of diseases caused by Aspergillus. The most common subtype among paranasal sinus infections associated with aspergillosis is A. fumigatus. The symptoms include fever, cough, chest pain, or breathlessness, which also occur in many other illnesses, so diagnosis can be difficult. Usually, only patients with already weakened immune systems or who suffer other lung conditions are susceptible.

2.4 Environmental Conditions

On October 6, 2016 Dry bulb temperature (T_{db}) and relative humidity (RH) measurements were collected. Interior average temperature ranged from 69.9 to 72.0°F and the Interior RH ranged from 63.9 to 67.3%.

On October 7, 2016 Dry bulb temperature (T_{db}) and relative humidity (RH) measurements were collected again to see if the dehumidifiers installed in these rooms were effective in lowering the relative humidity levels. Interior average temperature ranged from 74.3°F to 79.8 and the Interior RH ranged from 44.2 to 52.9%. Therefore the dehumidifiers were very successful in controlling the relative humidity level in these rooms.
Observed environmental conditions are summarized in Table 1 below.

TABLE 1: ENVIRONMENTAL MONITORING RESULTS
B-100- 3D
OCTOBER 6, 2016

LOCATION NAME	ENVIRONMENTAL TEST RESULTS		
	CARBON DIOXIDE CO_2 (ppm)	DRY BULB TEMPERATURE (°F)	RELATIVE HUMIDITY (%)
Room 127	455	69.5	59.7
Room 132	514	70.1	64.5
Room 133	493	71.3	67.3
Room 139	469	72.0	58.0
Room 141	407	69.9	69.9

TABLE 1: ENVIRONMENTAL MONITORING RESULTS
B-100- 3D
OCTOBER 7, 2016

LOCATION NAME	ENVIRONMENTAL TEST RESULTS		
	CARBON DIOXIDE CO_2 (ppm)	DRY BULB TEMPERATURE (°F)	RELATIVE HUMIDITY (%)
Room 132	453	79.7	43.4
Room 133	586	76.9	59.0
Room 139	536	74.3	48.0
Room 141	511	76.3	52.9

3.0 RECOMMENDATIONS

Based on the findings of the air quality survey we recommend the following:

1.0 Mold remediation of all the drywall exhibiting mold growth and VPFG.
2.0 If possible remove any yellow fiberglass insulation on the deck. If that is not a viable option then the mold growth appears to be mainly on the surface of the insulation remove one layer of the fiberglass insulation, approximately half inch in thickness and encapsulate the insulation with mold inhibitor.
3.0 Perform additional repairs of the exterior building envelop to prevent moisture intrusion.

4.0 SAMPLING METHODS

4.1 Thermal Comfort

Temperature and relative humidity measurements are often collected as part of an IAQ investigation because they affect the perception of comfort in an indoor environment. The American Society of Heating and Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) guidance standard 55-2004 Thermal Environmental Conditions for Human Occupancy (ASHRAE 55) specifies conditions or a "comfort zone" in which 80% of occupants would be expected to find the environment thermally acceptable the comfort zone is determined by temperature and humidity, and assumes clothing worn by and activity levels of occupants to be typical of those in office spaces. For the purposes of this investigation, dry bulb temperature is assumed to be the same as "operative temperature" described in ASHRAE 55. In addition, ASHRAE recommends that relative humidity be maintained below 65% to inhibit fungal growth on building surfaces.

Thermal comfort conditions for temperature and relative humidity were samples using a TSI Q-Trak Model 7565x during the investigation.

APPENDIX I

LABORATORY ANALYTICAL RESULTS

LABORATORY ANALYSIS REPORT

Bldg 100 3D

October 11, 2016

Air Quality Environmental, Inc.
Environmental Consultants & Laboratory Services
9325 Seminole Boulevard, Seminole, Florida 33772 (727) 398-0900 FAX (727) 398-0996

Client: OHC Envionmental Engineering
5420 Bay Center Drive
Suite 100
Tampa, FL 33609-

Attention: Jim Rizk

Date: October 11, 2016

Project/Job # 38147

Laboratory Analysis Report / Project:
Bldg 100 3D, Samples received on 10/11/2016.

Dear Jim Rizk;

Air Quality Environmental, Inc is pleased to submit the enclosed laboratory report for the above referenced project.
This is a proprietary / confidential document. Please do not contact the laboratory if you are not the intended or addressed client of this lab report.

Sincerely,

Jennifer Baker

Jennifer Baker, MS
Microbiologist

This test data shall not be reproduced except in full without written approval of the testing laboratory, AQE, Inc.
The report data is to be interpreted only by the person(s) or investigator whom have collected the samples.

Air Quality Environmental, Inc.
Environmental Consultants & Laboratory Services
9325 Seminole Boulevard, Seminole, Florida 33772 (727) 398-0900 FAX (727) 398-0996

General Laboratory Analytical Guidelines

Interpretation of an environmental assessment should NOT be based on laboratory analysis alone . Walk throughs, visual inspections, environmental measurements, etc. should be considered for a complete report / evaluation.

ALL ANALYSIS

- Sample identifications are analyzed by using a Stereoscope, Direct Microscopy, and/or Compound Brightfield microscopy.
- **LOD** (Limit Of Detection) is the concentration or quantity derived from the smallest measure that can be detected with reasonable certainty. LOD=(cubic meter of air (m^3) / Total Liters) x % of trace recorded. Total Counts = LOD x raw counts.
- **TMTC** (Too Many To Count or >300 CFU's) indicates colonies that grow together and cannot be individually counted.
- **ND** (None Detected) indicates that there were no detectable organisms and/or particulates.

NON-VIABLE / VIABLE AIR SAMPLES (SPORE TRAPS)

- All counts represent organisms and particulates in one cubic meter of air.
- All Air-O-Cells are analyzed 100% at 1000X magnification; M5's are analyzed at 600X magnification.
- Particulate counts are based on relative concentrations of the following criteria:

Low	Up to concentration levels of approximately 30,000 per cubic meter.
Medium	Between 30,000 and 70,000 per cubic meter.
High	Greater than 70,000 per cubic meter.
Overloaded	Extremely high debris / particulate counts can both impact the efficiency of accurate spore collection as well as obscure the detection and enumeration of spores. Spore counts may possibly be higher than the reported value.

TAPE LIFT / BULK / RANDOM AIR

- Samples are based on a relative concentration of 5 random passes. Analysis is for the provided sample only.

Trace	Ubiquitous / normal amounts (≤5 spores)
Minor	Indicates possible growth, or prolonged exposure to ubiquitous mold (>5 spores total)
Significant	Indicates some limited contamination may exist (2-5 spores per field)
Abundant	Indicates colonization / contamination (too many spores to count)

VIABLE CULTURES

- All air impact cultures are listed as Colony Forming Units per cubic meter (CFU's / m^3).
- All swab and bulk culture quantities are reported as Colony Forming Units (CFU's) only.
- Anderson air impacts are calculated using "Positive Hole Conversion Adjustment".
- Bacterial cultures are identified using the BioLog MicroStation ID System.
- Legionella testing is performed using "Culture Methodology for *Legionella* Species" by Janet E. Stout, Ph.D.

DUST MITE ALLERGEN TESTING

- Samples are analyzed for Group 2 Allergens of common house dust mites (*Dermatophagoides pteronyssinus* and *D. farinae*). These allergens cause sensitization in approximately 90% of individuals allergic to mites.

ASBESTOS

- All bulk asbestos is analyzed by Polarized Light Microscopy coupled with dispersion staining per EPA 600/R-93/116.
- All PCM asbestos air samples are analyzed by Phase Contrast Microscopy in general accordance with NIOSH 7400.
- **NAD** (No Asbestos Detected).
- Floor tile and other resinously bound materials, when analyzed by the EPA method, may yield false negative results because of the limitations in separating closely bound fibers and in detecting fibers of small length and diameter. When a definitive result is required AQE recommends utilizing alternative methods of identification, including Transmission Electron Microscopy.

Specific Laboratory protocols are available upon request.

Sincerely;

Jennifer Baker

Jennifer Baker, MS
Laboratory Manager / Microbiologist **AIHA EMPAT PROFICIENCY #164534** **NVLAP Lab Code: 200759-0**

AIR QUALITY ENVIRONMENTAL SAMPLE ANALYSIS

Client Name: OHC Envionmental Engineering
5420 Bay Center Drive
Suite 100
Tampa FL 33609-

Project Name Bldg 100 3D
Date Collected: 10/11/2016
Analysis Date: 10/11/2016

Bulk / Tape Lift / Random Air

Lab Number	328606	328607	328608	328609					
Customer Number	B-139-1	B-139-2	B-141-3	B-132-4					
Customer ID	yellow insulation on deck	yellow insulation on deck by exterior	yellow insultaon on deck	Discoloration on ceiling deck					
Hyphae	Significant	Minor	Abundant	Sig-Abundant					
Aspergillus / Penicillium-like	Minor-Sig	Minor-Sig		Sig-Abundant					
Aspergillus sp.			Abundant						
Cladosporium sp.		Significant	Significant	Minor					
Total Mold Spores	Minor-Sig	Significant	Abundant	Sig-Abundant					

Comments:

Jennifer Baker

Analyzed by: Jennifer Baker, MS
Microbiologist

DEFINITIONS AND PATHOGENICITY OF ORGANISMS DETECTED

Aspergillus/Penicillium-like – These organisms are from samples containing spores without other identifying structures and are essentially indistinguishable from various other genera using standard microscopy analysis. Spores of Aspergillus and Penicillium are usually small, rounded or ovoid and may be seen in chains. Spores of the following groups may be identified as Aspergillus/Penicillium-like spores: *Aspergillus, Penicillium, Trichoderma, Acremonium, Cladosporium* (young-spores), *Absidia, Phialomphora, Gliocladium, Mucor, Paecilomyces*, etc. If required, cultured specimens can provide additional characteristics that will make identification of the genus and species possible. Aspergillus and Penicillium are of the most common group of organisms. These can potentially be allergenic, toxinigenic, and/or pathogenic.

Aspergillus sp. (Ass-per-jill-us) - A diverse group of common molds with a worldwide distribution, inhabiting virtually all terrestrial environments. They are frequently isolated from soil, organic debris, forage products, grains, nuts, cotton, and water- damaged organic building materials. When conditions in indoor environments are favorable for fungal growth, *Aspergillus spp.* are one of the primary colonizers of man-made materials. Their rapid growth and production of large numbers of small, dry, easily aerosolized spores makes them a significant contaminant with regards to IAQ. There are more than 175 species of *Aspergillus*, sixteen of which have been documented as etiological agents of human disease. *Aspergillus spp.* are well-known allergens causing Type I allergies while *A. fumigatus* is one of the most prevalent causes of Type III allergies (hypersensitivity pneumonitis and allergic sinusitis). The diseases caused by some species of *Aspergillus* are relatively uncommon and usually occur in immuno-compromise individuals. However, due to the substantial increase in populations of individuals with HIV, chemotherapy patients and those on corticosteroid treatment, contamination of building substrates with *Aspergillus* is of concern. These fungi are frequently secondary opportunistic pathogens in patients with bronchiectasis, carcinoma, other mycosis, sarcoid, and tuberculosis. Aspergillosis is the second most common type of fungal infection requiring hospitalization following Candida. Many species produce mycotoxins that may be associated with diseases in humans and other animals. Toxin production is dependent on the species or strain within the species and on the food source for the fungus. Some of these toxins are carcinogenic including aflatoxins and ochratoxin.

Cladosporium sp. (Clad-o-spore'ee-um) - This fungal genus is one of the most common. It is widespread and is regularly encountered in both outdoor and indoor air. Outdoors it is commonly isolated from air, rotten organic material, food, straw, and soil. Indoors it can thrive in various environments, appearing light green to black. It may be found growing on leather goods, paint, textiles, and is frequently found in elevated levels on water-damaged materials. It commonly grows in HVAC systems on the surface of fiberglass duct liners within the interior of supply ducts, and on cold, condensing surfaces (the black mold on air vent grills is usually Cladosporium). The genus Cladosporium includes over 30 species. Cladosporium spores are easily made airborne and as such are a common cause of respiratory problems. It is a known and documented allergen causing Type I allergies (i.e. asthma, hay fever) and it may be an agent for hypersensitivity diseases. It has been reported to be an opportunistic pathogen causing edema, keratitis, onychomycosis, pulmonary infections, and sinusitis.

Hyphae (hī-fee) - A long, branching filament found primarily in fungi but also in fungus-like bacteria such as *Actinomyces* and *Streptomyces.* It is the principal element of the growing or vegetative form of a mold (filamentous fungi) characterized by branching tube-like growth. When a spore germinates, hypha emerges. It is the part of the fungus that feeds, grows, and ultimately may produce some kind of reproductive structure. The hypha is suited for actively penetrating, exploring and exploiting solid substrates. In general, staining or discoloration of building products is a good indicator that some microorganism has started growing into the wood, or wallboard, etc.

				Date: October 11, 2016
				Inspector: James F. Rizk
				Project Number: 160159
		OHC		Total # of Samples: 4
				Project Name: Bldg 100 3D
		Building Name/Address:		
HAS	**Sample #**	**Material Description**	**Sample Location**	**Homogenous Area Location**
1	B-139-1	Swab sa,ple of yellow insulation on deck	3D-139	
2	B-139-2	Bulk sample of yellow insulation on deck by exterior window. Dark Discoloration on fiberglass insulation	3D-139	
3	B-141-3	Swab sample of yellow insulation on deck	3D-141	
4	B-132-4	Discoloration on ceiling deck	3D-132	
			Sample Type:	Biological Samples
			Turn Around Time	24 hours
			Analysis	Biological Samples
			Relinquished by:	James F. Rizk
			Date:	10/10/2016
			Received by:	
			Date:	
			Send Resutls to	jrizk@ohcnet.com

3286606-328609

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OCT 11 2016
BY: 11:00 Am

Job No. 38147