



Building Health Check is a Division of Pure Air Control Services, Inc.

Building Health Check Report
Prepared for

Darryl Blair,
Energy Management Facilites Planning
Sarasota County Government
1001 Sarasota Center Blvd
Sarasota, FL 34240
941-861-0868

Date of Study: September 2, 2015
Date of Report: September 16, 2015

Report # 3929-19036

Sarasota County Government
Venice Library
300 S. Nokomis Ave.
Venice, FL 34285

Prepared By

Francisco T. Aguirre, CIAQP, CIEC
Director of Building Sciences

Indoor Environmental Diagnostic & Remediation Specialist

HVAC FL License # CAC057992

1(727) 572-4550

1(800) 422-7873

Copyright 2015 Pure Air Control Services, Inc.

September 16, 2015



Darryl Blair,
Energy Management Facilities Planning
Sarasota County Government
1001 Sarasota Center Blvd
Sarasota, FL 34240



**Re: Venice Public Library
Building Health Check Report 3929-19036**

Darryl Blair,

It is Pure Air Control Services, Inc. (Pure Air) privilege to submit this report that describes the Building Health Check evaluation undertaken at the Venice Library, 300 S. Nokomis Ave., Venice, FL for your review. Field assessments were completed on September 2, 2015 to address concerns related to the quality of the indoor air.



*Publisher of the
IEQ Review*

Thank you for providing Pure Air this opportunity to assist you with your indoor air quality concerns. If you should have any questions regarding this report provided, please call me at 1-800-422-7873, ext. 201.



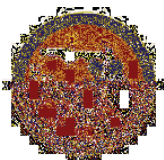
Respectfully Submitted,

PURE AIR CONTROL SERVICES, INC.

Francisco T Aguirre

HVAC FL License
#CAC057992

Francisco T. Aguirre
Director of Diagnostics and Building Sciences



Member



Enclosures



CONTENTS

INTRODUCTION	1
BACKGROUND	1
SCOPE OF WORK	1
ENVIRONMENTAL SUMMARY REPORT	2
CONCLUSIONS	7
RECOMMENDATIONS	9
PHOTOGRAPHS	10
LABORATORY RESULTS	28
METHODS	77
GUIDELINES FOR INDOOR AIR QUALITY	79
INDOOR AIR QUALITY CONSIDERATIONS	83
DISCLAIMERS	87



INTRODUCTION

This report describes the Building Health Check evaluation undertaken at Venice Library, 300 S. Nokomis Ave., Venice, FL. The assessment was completed on September 2, 2015 at the request of Mr. Darryl Blair of Sarasota County Government to address occupant concerns related to the quality of the indoor air.

BACKGROUND

Over the years the Venice Library has had numerous water intrusion events believed to be related to moisture infiltrating through the slab and/or at grade from water accumulation outside the building. In order to rule out other possible factors, Pure Air, an independent firm was called to perform a due diligence study on behalf of Sarasota County Government to ascertain the environmental conditions and to provide recommendations to address any deficiencies found. The results for such due diligence assessment are the subject of this report.

SCOPE OF WORK

The assays performed in this study included:

- Cultures for the assessment of viable bacterial and fungal concentrations suspended in the air.
- Spore Traps to determine the concentrations of fungal structures suspended in the air.
- Surface Tape Preparations to assess the distribution of fungal structures settled on the environment.
- Measurements of temperature and relative humidity for the assessment of comfort and conditions that might support microbial proliferation and chemical interactions.
- Measurements of carbon dioxide as a surrogate measure for ventilation adequacy.
- Particle counting of respirable-size as an indicator of air filtration efficiency and/or unusual dust levels.
- Infrared scan and direct contact moisture measurements for the detection of damp building materials.
- The assessment also included a visual inspection of the air handler and the air distribution system to address any potential sanitary conditions that may need attention.



ENVIRONMENTAL SUMMARY REPORT

Environmental assays were performed in 12 representative zones throughout the library. The Meeting Room was excluded from this assessment as it is already vacated and under containment. When pertinent, outside air samples were collected for comparative and control purposes. These environmental samples were submitted to the Environmental Diagnostics Laboratory (EDL), for analysis. The results derived from each assay were compared against the corresponding Guidelines to determine acceptability and were tabulated on the following page. Please note that the figures highlighted in yellow (if any) contain values moderately outside the recommended level and are treated as a transition gradient from a normal condition to abnormal or vice versa. Figures highlighted in red (if any) indicate with certainty that an abnormal or detrimental condition exists.



Air Quality

Matrix	Aspect	Unit	Guideline*	Ref.	Computer Learning Ctr	Friends of Library	Genealogy	Informatin Desk	Outside Air
Cultures	Bacteria	CFU/m ³	≤175 or 1/3 OA	3	118	106	424	601	35
	Fungi	CFU/m ³	≤350 or 1/3 OA	3	82	82	153	84	165
	Opaque Particles	cts/m ³	≤35,000 or 1/3 OA	3	43,700	NA	46,700	46,000	29,600
Spore Traps	Skin Cell Fragments	cts/m ³	≤7,500	3	3,020	NA	7,300	6,710	222
	Insect Biodetritrus	cts/m ³	≤200 or 1/3 OA	3	BDL	NA	BDL	BDL	22
	Fibers	cts/m ³	≤500	3	289	NA	511	622	88
	Fiberglass fibers	cts/m ³	≤5	3	BDL	NA	BDL	BDL	BDL
	Pollen	cts/m ³	≤15 or 1/3 OA	3	22	NA	BDL	BDL	BDL
Particle	Fungal Elements	cts/m ³	≤1000 or 1/3 OA	3	176	NA	754	331	2,840
	Other	cts/m ³	≤6000 or 1/3 OA	3	6,420	NA	6,060	10,200	1,110
	Respirable size	p/l	≤25,000 or 1/3 OA	3	22,357	NA	23,009	20,523	71,260
Comfort	Temperature	°F	72 to 78	1	81.1	NA	81.8	81.8	84.8
	Relative Humidity	%	30 to 60	1	52.4	NA	57.3	55.2	78.6
	Carbon Dioxide	ppm	700+OA	2	429	NA	562	602	305

Settled Aerosols in the Occupiable Space

Matrix	Aspect	Unit	Guideline*	Ref.	Computer Learning Ctr	Friends of Library	Genealogy	Informatin Desk	Outside Air
Tape Prep	Opaque Particles	cts/cm ²	≤3000	3	NA	NA	Book Caroline Cty	Book the Promise	Book The Best Plays 86-87
	Skin Cell Fragments	cts/cm ²	≤600	3	NA	NA	10,800	1,410	8,200
	Insect Biodetritrus	cts/cm ²	≤4	3	NA	NA	112	500	5,400
Foot Notes	Fibers	cts/cm ²	≤120	3	NA	NA	BDL	8	8
	Fiberglass Fibers	cts/cm ²	≤4	3	NA	NA	2,560	188	876
	Pollen	cts/cm ²	≤4	3	NA	NA	BDL	BDL	12
	Fungal Elements	cts/cm ²	≤50	3	NA	NA	4	BDL	BDL
Other	cts/cm ²	≤650	3	NA	NA	24	12	36	
							3,500	108	2,730

Foot Notes

Units	Reference	Notes
CFU/m ³ = Colony Forming Units per Cubic Meter of Air	1. ASHRAE 55 - 2010	BDL = Below Detectable Limit
cts/m ³ = Counts per Cubic Meter of Air	2. ASHRAE 62.1 - 2013	OA = Outside Air
cts/cm ² = Counts per square centimeter	3. Pure Air Control Services, Inc.	Red = Abnormal/Detrimental
p/l = Particles per liter of Air	4. Mollhave 1990	Yellow = Moderately elevated



Air Quality

Matrix	Aspect	Unit	Guideline*	Ref.	Juvenile Non Fiction	Large Print Area	Meeting Room	Non Fiction Area	Reading Room	Work Room	Outside Air
Cultures	Bacteria	CFU/m ³	≤175 or 1/3 OA	3	306	342	59	565	165	483	35
	Fungi	CFU/m ³	≤350 or 1/3 OA	3	71	24	165	59	660	59	165
Spore Traps	Opaque Particles	cts/m ³	≤35,000 or 1/3 OA	3	26,500	25,200	NA	32,700	34,200	31,300	29,600
	Skin Cell Fragments	cts/m ³	≤7,500	3	3,290	1,620	NA	6,970	5,210	4,110	222
Spore Traps	Insect Biodetritrus	cts/m ³	≤200 or 1/3 OA	3	BDL	BDL	NA	BDL	BDL	BDL	22
	Fibers	cts/m ³	≤500	3	178	156	NA	578	200	444	88
	Fiberglass fibers	cts/m ³	≤5	3	BDL	BDL	NA	44	BDL	BDL	BDL
	Pollen	cts/m ³	≤15 or 1/3 OA	3	BDL	BDL	NA	22	BDL	BDL	BDL
	Fungal Elements	cts/m ³	≤1000 or 1/3 OA	3	621	132	NA	133	553	199	2,840
Particle	Other	cts/m ³	≤6000 or 1/3 OA	3	4,110	5,200	NA	7,200	6,330	4,960	1,110
	Respirable size	p/l	≤25,000 or 1/3 OA	3	23,857	15,579	NA	20,297	23,187	19,351	71,260
Comfort	Temperature	°F	72 to 78	1	82.3	80.4	NA	83.2	82.4	82.1	84.8
	Relative Humidity	%	30 to 60	1	59.7	51.4	NA	49.2	53.9	46.2	78.6
	Carbon Dioxide	ppm	700+OA	2	524	678	NA	553	518	618	305

Settled Aerosols in the Occupiable Space

Matrix	Aspect	Unit	Guideline*	Ref.	Book Sound Recording	Book Money to Burn	NA	Book Key Ideas	NA	Upper Cabinet
Tape Prep	Opaque Particles	cts/cm ²	≤3000	3	24,000	336		6,500		588
	Skin Cell Fragments	cts/cm ²	≤600	3	232	220		1,710		906
	Insect Biodetritrus	cts/cm ²	≤4	3	BDL	BDL		BDL		BDL
	Fibers	cts/cm ²	≤120	3	356	300		124		578
	Fiberglass Fibers	cts/cm ²	≤4	3	16	BDL		BDL		BDL
Foot Notes	Pollen	cts/cm ²	≤4	3	BDL	BDL		4		BDL
	Fungal Elements	cts/cm ²	≤50	3	152	BDL		20		36
	Other	cts/cm ²	≤650	3	3,020	48		1,670		3,780

Foot Notes

Units	Reference	Notes
CFU/m ³ = Colony Forming Units per Cubic Meter of Air	1. ASHRAE 55 - 2010	BDL = Below Detectable Limit
cts/m ³ = Counts per Cubic Meter of Air	2. ASHRAE 62.1 - 2013	OA = Outside Air
cts/cm ² = Counts per square centimeter	3. Pure Air Control Services, Inc.	Red = Abnormal/Detrimental
p/l = Particles per liter of Air	4. Mollhave 1990	Yellow = Moderately elevated
		NA = Not Applicable
		* = See Guidelines Section



Air Quality

Matrix	Aspect	Unit	Guideline*	Ref.	Youth Program Rm.	Youth Services Desk	NA	NA	NA	Outside Air
Cultures	Bacteria	CFU/m ³	≤175 or 1/3 OA	3	82	483				35
	Fungi	CFU/m ³	≤350 or 1/3 OA	3	565	47				165
Spore Traps	Opaque Particles	cts/m ³	≤35,000 or 1/3 OA	3	NA	25,900				29,600
	Skin Cell Fragments	cts/m ³	≤7,500	3	NA	4,180				222
	Insect Biodetritrus	cts/m ³	≤200 or 1/3 OA	3	NA	BDL				22
Fibers	Fibers	cts/m ³	≤500	3	NA	267				88
	Fiberglass fibers	cts/m ³	≤5	3	NA	BDL				BDL
	Pollen	cts/m ³	≤15 or 1/3 OA	3	NA	BDL				BDL
Fungal Elements	Fungal Elements	cts/m ³	≤1000 or 1/3 OA	3	NA	242				2,840
	Other	cts/m ³	≤6000 or 1/3 OA	3	NA	4,980				1,110
	Respirable size	p/l	≤25,000 or 1/3 OA	3	NA	22,967				71,260
Comfort	Temperature	°F	72 to 78	1	NA	80.7				84.8
	Relative Humidity	%	30 to 60	1	NA	63.5				78.6
	Carbon Dioxide	ppm	700+OA	2	NA	463				305

Settled Aerosols in the Occupiable Space

Matrix	Aspect	Unit	Guideline*	Ref.	NA	Book Patents	NA	NA	NA
Tape Prep	Opaque Particles	cts/cm ²	≤3000	3		38,500			NA
	Skin Cell Fragments	cts/cm ²	≤600	3		188			
	Insect Biodetritrus	cts/cm ²	≤4	3		BDL			
Fibers	Fibers	cts/cm ²	≤120	3		120			
	Fiberglass Fibers	cts/cm ²	≤4	3		BDL			
	Pollen	cts/cm ²	≤4	3		BDL			
Fungal Elements	Fungal Elements	cts/cm ²	≤50	3		252			
	Other	cts/cm ²	≤650	3		5,400			

Foot Notes

Units	Reference	Notes
CFU/m ³ = Colony Forming Units per Cubic Meter of Air	1. ASHRAE 55 - 2010	BDL = Below Detectable Limit
cts/m ³ = Counts per Cubic Meter of Air	2. ASHRAE 62.1 - 2013	OA = Outside Air
cts/cm ² = Counts per square centimeter	3. Pure Air Control Services, Inc.	Red = Abnormal/Detrimental
p/l = Particles per liter of Air	4. Molhave 1990	Yellow = Moderately elevated
		NA = Not Applicable
		* = See Guidelines Section



Settled Aerosols in the Infrastructure

Matrix	Aspect	Unit	Guideline*	Ref.	Youth Game Room Interstitial	NA	NA	NA	NA	NA	
Tape Prep	Opaque Particles	cts/cm ²	≤6000	3	2,640						
	Skin Cell Fragments	cts/cm ²	≤1200	3	20						
	Insect Biodetritus	cts/cm ²	≤8	3	BDL						
	Fibers	cts/cm ²	≤240	3	32						
	Fibergalss Fibers	cts/cm ²	≤8	3	48						
	Pollen	cts/cm ²	≤8	3	BDL						
	Fungal Elements	cts/cm ²	≤100	3	40,700						
	Other	cts/cm ²	≤1300	3	561						

Foot Notes

Units	Reference	Notes
CFU/m ³ = Colony Forming Units per Cubic Meter of Air	1. ASHRAE 55 - 2010	BDL = Below Detectable Limit
cts/m ³ = Counts per Cubic Meter of Air	2. ASHRAE 62.1 - 2010	OA = Outside Air
cts/cm ² = Counts per square centimeter	3. Pure Air Control Services, Inc.	Red = Abnormal/Detrimental
p/l = Particles per liter of Air	4. Molhave 1990	Yellow = Moderately elevated
		NA = Not Applicable
		* = See Guidelines Section



CONCLUSIONS

Based on the results derived from the environmental samples collected no imminent health concerns were collected. However, large areas with moisture intrusion underneath the carpets and dusty environmental conditions exist throughout the library that some hypersensitive individuals may not find it suitable.

Air samples collected using the culture method for the assessment of microbial concentrations suspended in the air revealed markedly elevated levels of bacteria in five of the twelve representative zones evaluated, a condition likely impacted by the damp conditions underneath some of the carpeted areas and the dusty conditions found. The levels of fungi suspended in the air were moderately elevated in two of the twelve representative zones evaluated however the results raised no significant health concerns.

Air samples collected with the spore trap method (Air-O-Cell Cassettes) for the assessment of fungal structures suspended in the air revealed levels well within the recommended guideline in all zones assessed in the library. No concerns were raised by this assay method.

Surface tape preparations were collected to assess the settled distribution of fungal structures and other allergens with focus on the library books. The analytical results for the surface tape preparations collected from all representative books tested revealed markedly dusty conditions; however, the fungal content (settlement) was elevated only in two of the eight representative books sampled.

Dust particles whose overall diameter ranges from 0.3 to 5.0 microns are recognized as respirable-size particles. Respirable-size particles are generated by a broad variety of processes and activities and there are increasingly more studies linking associations between the concentrations of particles and health effects. In this case, the respirable-size particle concentrations detected in all of the zones evaluated were well within the recommended levels, which raised no concerns at this time.

The ventilation requirement for most buildings is supplied by the HVAC system and/or by infiltration of the outside air. Carbon dioxide (CO₂) concentrations are used as surrogate measure to roughly assess the adequacy of the ventilation system. The results for the CO₂ measurements made at the time of the field evaluation were well within the recommended guideline. No concerns were raised by this assay method.

Temperature and relative humidity measurements of the ambient air were used to assess comfort, as well as an environmental factor that may increase the prevalence of indoor air quality problems (e.g. microbial activity, indoor allergens, viral infections, allergic rhinitis, asthma, ozone production, odors, etc.). There is no specific set of



CONCLUSIONS (continued)

recommended values for temperature and relative humidity; however, comfort depends principally on these two factors combined. For indoor air quality and health reasons it is recommended that the relative humidity be maintained in the range of 30 to 60%. With some exceptions the temperature in the cooling mode needs to be maintained at a set point in the range of 73 to 79 °F and between 68 to 74 °F during the winter (see Standard Effective Temperature and ASHRAE Comfort Zone illustration provided for details). In this assessment, the relative humidity was well within the recommended levels for comfort and the control of allergens production; however the temperature ranging from 80.4 to 83.2 °F was considered hot for comfort throughout the library.

Two drywall areas with suspect water intrusion and mold growth were spotted during this assessment, the Youth Game Room, and the wall shared between the Meeting Room and the Youth Services Area. Both of these areas revealed evidence of fungal colonization which warrants remedial action (see photographs 29 to 42). In addition to the ceiling tiles identified with water stains in previous reports, some ceiling tiles in the work room area revealed water stains which appear to be associated with roof leaks but at this time the tiles revealed no visible mold growth and were dry (see photographs 3 to 8).

Air handlers and duct systems that contain excessive dust, debris, and moisture are places where bacteria and fungi may proliferate and release odors and potentially other contaminants into the air stream. In this case, the air handler located in the East Storage, AHU-4 and AHU-5 were inspected to assess the hygienic condition. In general, the air handlers are relatively new, but are beginning to show dust impactions on the cooling coils and blower wheels which appears to be a deficiency with the air filtration. Also, air handlers 4 and 5 were found with the insulation liner delaminated from the access panel which may release fiberglass fibers into the air stream. The supply air terminals were found with ghosting (dust build up) where microbial growth may proliferate (photographs 65 to 67). A more detailed assessment of the ductwork is recommended to assess the interior condition and address accordingly.



RECOMMENDATIONS

In addition to the recommendations provide in the Pure Air's prior report, the following recommendations were designed to resolve issues described in this report. No prioritization was implied by this listing, however, it was anticipated all items discussed would be addressed.

- ❖ The walls impacted wit mold growth in the Work Room and in the wall shred between the meeting Room and the Youth Services need to be remediated As minimum, remove one side of the affected walls and the insulation (if any) to 18 inches above the finished floor. Removal of drywall needs to continue in both lateral directions until 18 inches of unaffected drywall are found. All the dust and debris (encrusted or loose) in the immediately exposed wall cavities and framing need to be thoroughly removed using vacuums in combination with scrapers and/or wire brushes. The immediately exposed cavities and framing need to be treated with a biocide registered with the EPA and allowed to dry thoroughly. If after removing one side of the drywall it is determined that the structural properties of the remaining side have been compromised due to the water intrusion and/or mold growth the drywall thereof needs to be removed as well. Once all demolition has been completed, the remaining walls ceilings floors and containment need to be vacuumed and sanitized with an EPA registered biocide.
- ❖ The mold impacted drywall needs to be remediated under proper containment, personal protection and health and safety protocols along with following industry accepted guidelines (i.e. IICRC Reference Guide for professional Mold Remediation (IICRC S520) and/or the New York City Department of Health "Guidelines on Assessment and Remediation of Fungi in Indoor Environments", etc.
- ❖ It is recommended that cleaning all the books in the library be included in the environmental cleaning recommendation provided in the previous Pure air report.