From: Sheets, Mike - Purchasing
Sent: Thursday, September 12, 2019 8:59 PM
To: Melton, Gregory L <Gregory.L.Melton@wv.gov>; Whittaker, Frank M <Frank.M.Whittaker@wv.gov>
Cc: Barry, William D <William.D.Barry@wv.gov>; McVey, Allan L <Allan.L.McVey@wv.gov>
Subject: Re: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

Greg,

Your emergency is approved. Please follow emergency purchasing procedures as found in the Handbook and follow up with award documentation within 30 days.

Mike

From: Melton, Gregory L <Gregory.L.Melton@wv.gov>
Sent: Thursday, September 12, 2019 3:17:24 PM
To: Sheets, Mike - Purchasing <William.M.Sheets@wv.gov>; Whittaker, Frank M <Frank.M.Whittaker@wv.gov>
Cc: Barry, William D <William.D.Barry@wv.gov>; McVey, Allan L <Allan.L.McVey@wv.gov>
Subject: RE: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

GSD needs emergency authorization to proceed to mitigation of a mold issue at building 25, Parkersburg State Office Building detailed below. Remediation will definitely exceed $25K.

From: McVey, Allan L <Allan.L.McVey@wv.gov>
Sent: Thursday, September 12, 2019 3:58 PM
To: Melton, Gregory L <Gregory.L.Melton@wv.gov>
Cc: Barry, William D <William.D.Barry@wv.gov>
Subject: RE: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

Thanks Greg. Yes, please proceed as you have described. I forwarded this to Samantha and she will discuss with the GO.

Allan L. McVey
Cabinet Secretary
West Virginia Department of Administration
304 558-5466

From: Melton, Gregory L <Gregory.L.Melton@wv.gov>
Sent: Thursday, September 12, 2019 3:55 PM
To: McVey, Allan L <Allan.L.McVey@wv.gov>
Cc: Barry, William D <William.D.Barry@wv.gov>
Subject: FW: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

Boss,
Here is how'd I'd summarize my quick scan of the attached document:

1) We do have a mold issue in the lower levels of building 25
    a. Mold most likely exacerbated by poor house keeping (occupants and custodial), immediate most likely proximate cause of the fungi growth is believed to be carpet cleaning (approx. 7 weeks prior. Other potential contributing factors: loading dock door being open too much (had a contractor doing work) and possibly some of the rooms being infrequently used (will take more study to conclude that)
    b. Additional quantities of mold were found in two spots (one most likely a non issue (low concentration), second definitely an issue) GSD needs to proceed on an emergency basis to remediate.
    c. Prior to proceeding on b. GSD recommends notifying DHHR and drafting an updated informational news release
2) Path forward: proceed with recommendations of Boggs Environmental and strip carpet out of the surveyed areas and remediate (biggest impact and benefit to occupants); then follow up with a full building environmental assessment and HVAC system cleaning and recommissioning by a competent mechanical engineering firm.
    a. Other smaller items to be addressed as well in the phase 1 emergency as detailed in Boggs report, page 13 paragraph 5.2
    b. Follow on whole building environmental assessment and (as needed) remediation, most likely as a non emergency contracted action

One note of caution reading the report, mold growth can be an emotionally charged subject; Boggs Environmental does a good job citing learned, non emotional information that does a good job informing the reader if the reader takes the time to review all the information. Specifically, recommend reading and understanding page 12, paragraph 5.1.2 before building/releasing the informational news information.
Greg

From: Trout, Jonathan R <Jonathan.R.Trout@wv.gov>
Sent: Thursday, September 12, 2019 12:05 PM
To: Melton, Gregory L <Gregory.L.Melton@wv.gov>
Subject: FW: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

From: Ricky Robinson <rrobinson@boggsenvironmental.com>
Sent: Thursday, September 12, 2019 8:33 AM
To: Trout, Jonathan R <Jonathan.R.Trout@wv.gov>; Bowling, Marsha L <Marsha.L.Bowling@wv.gov>
Subject: [External] 12 September 2019 - Wood County DHHR - Limited BCA and IAQ Final Report

Marsha/Jonathan,

Attached is our final report, please take a look and let me know if you have any questions.

Talk soon, thanks

Richard C. Robinson | Vice President
BOGGS ENVIRONMENTAL CONSULTANTS, INC
200 W Main Street, Middletown, MD l 21769
o. 301.694.5687 m.304.266.7572
www.boggsenvironmental.com

LIMITED BUILDING CONDITION ASSESSMENT
&
INDOOR AIR QUALITY INVESTIGATION

FINAL TECHNICAL REPORT

Conducted at:

WOOD COUNTY DEPARTMENT OF HEALTH & HUMAN RESOURCES
400 5th Street,
Parkersburg, West Virginia 26101

Prepared for:

STATE OF WEST VIRGINIA DEPARMENT OF ADMINSITRATION
GENERAL SERVICES DIVISION
Building 4 – 5th Floor
112 California Avenue,
Charlestown, West Virginia 25305

ATTENTION: Mr. Marsha Bowling
Occupational Health and Safety Coordinator
Marsha.l.bowling@wv.gov

BEC Project #WV19028

Fieldwork Conducted: September 5, 2019 & September 6, 2019

Report Date: September 12, 2019

Prepared by:

BOGGS ENVIRONMENTAL CONSULTANTS
Middletown, MD ~ Morgantown, WV
Corporate Office: 200 W Main Street, Middletown, MD 21769
Tel: (301) 694-5687 ~ Fax: (301) 694-9799

ENVIRONMENTAL SCIENCE, ENGINEERING & INDUSTRIAL HYGIENE SERVICES

LIMITED BUILDING CONDITION ASSESSMENT
&
INDOOR AIR QUALITY INVESTIGATION

FINAL TECHNICAL REPORT

TABLE OF CONTENTS

BOGGS ENVIRONMENTAL CONSULTANTS, INC.

On-Site Fieldwork Performed by:

Richard M. Robinson
Vice President

Derrick A. Klein
Senior Environmental Specialist

SECTION 1.0 SUBJECT SITE DESCRIPTION & SCOPE OF WORK

Project Site:	**WOOD COUNTY DEPARTMENT OF HEALTH & HUMAN RESOURCES** 400 5th Street, Parkersburg, West Virginia 26101
Requester Name:	Ms. Marsha Bowling, Occupational Health and Safety Coordinator
Requestor Address:	**STATE OF WEST VIRGINIA DEPARTMENT OF ADMINISTRATION** GENERAL SERVICES DIVISION Building 4 – 5th Floor 112 California Avenue Charleston, West Virginia 25305

Subject Site Description & Scope of Work:

The subject site is The Wood County Department of Health & Human Resources (DHHR) building located at 400 5th Street, Parkersburg, West Virginia. The investigation focused on Indoor Air Quality "comfort" parameters such as ambient temperature and relative humidity utilizing hand held direct-read, real time display analytical instruments along with non-viable spore air samples. Prior to BEC's arrival, it was reported staff identified microbial growth within multiple locations within the first level (basement) of the subject site.

At the request of Ms. Marsha Bowling, BEC staff members Richard Robinson, Robert Warfel, and Derrick Klein conducted an indoor air quality (IAQ) study on September 5, 2019 and September 6, 2019. The IAQ study was conducted to identify environmental conditions, which would promote microbial growth. The study consisted of a non-intrusive visual inspection, ambient air testing for "comfort parameters", and non-viable microbial spore trap sampling. BEC did not observe any evidence of any recent water infiltration, mold growth and adverse environmental conditions did exist during the study.

BEC notes the interior construction features included, but were not necessarily limited to, gypsum board sheeting (GBS) interior dividing wall systems, carpet flooring systems, vinyl flooring systems, and suspended acoustical ceiling tile (ACT) systems. BEC noted the facility was clean and orderly.

BEC makes no representations regarding the presence or absence of deficient building conditions or elevated airborne microbial concentrations which may be present within areas of the subject site not included within the scope of this investigation.

SECTION 2.0 INTERIOR AMBIENT AIR TESTING

2.1 Interior Ambient Air Sampling Parameters

Temperature (°F) & Relative Humidity (% RH) Measurements:

BEC measured ambient temperature (°F) and relative humidity (%RH) utilizing the *VelociCalc* (Model #9565-X), a hand-held direct-read, real time display analytical instruments, as manufactured by TSI, Incorporated of St. Paul, Minnesota, USA. Temperature measurements are established via an internal Resistance Temperature Detector. This mechanism operates by measuring the degree to which the sample air resists an electrical current. This resistance is directly related to temperature via a mathematical formula inputted in the *VelociCalc.*

The *VelociCalc* uses capacitive polymer technology to determine relative humidity. With this methodology, a thin, dielectric film sits between two electrodes, constantly measuring conductivity. As the amount of moisture adsorbed or desorbed on the film changes, the electrodes can measure changes in conductivity based on the polarity of water. From the changes in conductivity, the sensor can determine the amount of moisture, and thus yield a relative humidity percent via an internal formula. This method is designed so that temperature is not needed to give the relative humidity.

SECTION 2.0 INTERIOR AMBIENT AIR TESTING

2.1 Interior Ambient Air Sampling Parameters

Recommended Levels: °F & % RH

BEC advises, based upon review of the American Society of Heating, Refrigerating and Air – Conditioning Engineers, Inc. (ASHRAE) standard "*Thermal Environmental Conditions for Human Occupancy"* (#55-2013), that for thermal comfort purposes, temperature could range from between approximately 67°F and 82 °F. A more specific range can be determined from the standard but depends on relative humidity, season, clothing worn, activity levels, and other factors. It is relevant to note, the ASHRAE Standards Committee (June 28, 2014) and Board of Directors (July 2, 2014) as well as the American National Standards Institute (July 31, 2014) approved Addendum a to Standard 55-2013 revising section 5.3.4.4 *Vertical Air Temperature Difference* as follows: "Air temperature difference between head level and ankle level shall not exceed 3°C (5.4°F) for seated occupants or 4°C (7.2°F) for standing occupants." The standard is based upon 80% of building occupants reporting satisfaction with environmental conditions.

BEC advises, based upon review of the ASHRAE standard "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), relative humidity in habitable spaces preferably should be maintained between 30% and 60% to minimize growth of allergenic or pathogenic organisms. Specifically, #62.1-2016 recommends that relative humidity in occupied spaces be controlled to less than 65% to reduce the likelihood of conditions that can lead to microbial growth.

Carbon Monoxide (CO) Gas Measurements:

BEC measured CO gas levels utilizing the *VelociCalc* (Model #9565-X), a hand-held direct-read, real time display analytical instruments, as manufactured by TSI, Incorporated of St. Paul, Minnesota, USA.

Recommended Levels: CO Gas

BEC presents, in tabular format, both legally-enforceable workplace CO gas levels and national consensus organization's recommended CO gas levels.

Recommended Levels	Carbon Monoxide
Occupational Safety and Health Administration (OSHA) PEL [1]	50 ppm
American Conference of Governmental Industrial Hygienists (ACGIH) TLV [2]	25 ppm
National Institutes for Occupational Safety & Health (NIOSH) REL [3]	35 ppm
ASHRAE	9 ppm

Notes:

1 OSHA Permissible Exposure Limit -- this level is a time-weighted average and is an enforceable standard that must not be exceeded during any eight-hour work shift of a 40-hour work week.
2 ACGIH Threshold Limit Value -- this level is a recommended time-weighted average upper limit exposure concentration for a normal eight to 10-hour workday and a 40-hour work week.
3 NIOSH Recommended Exposure Limit -- For NIOSH RELs, "TWA" indicates a time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek.

Note: these CO gas values are excerpted from Appendix C *Summary of Selected Air Quality Guidelines* of the ASHRAE standard "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016); see **Appendix E - IAQ Contaminants Levels – Expanded List** for additional information.

SECTION 2.0 INTERIOR AMBIENT AIR TESTING

2.1 Interior Ambient Air Sampling Parameters

Carbon Dioxide (CO_2) Gas Measurements:

BEC measured CO_2 levels utilizing the *VelociCalc* (Model #9565-X), a hand-held direct-read, real time display analytical instruments, as manufactured by TSI, Incorporated of St. Paul, Minnesota, USA.

Recommended Levels: CO_2 Gas

BEC advises, based upon review of the ASHRAE standard "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), states "At the activity levels found in typical office buildings, steady-state CO_2 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). CO_2 concentrations in outdoor air typically range from 300 to 500 ppm. Thus indoor CO_2 concentrations of 1000 to 1200 ppm in spaces housing sedentary people is an indicator that a substantial majority (80%) of visitors entering the space will be satisfied with respect to human bio-effluents (body odor). Note however that CO_2 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 CO_2 concentration is not a reliable indicator of overall building air quality."

2.2 Interior Ambient Air Sampling

TABLE A – SUMMARY OF INTERIOR AMBIENT AIR SAMPLING

Testing Location	Sampling Date	Ambient Temperature (F)	Relative Humidity (%)	Carbon Monoxide (ppm)	Carbon Dioxide (ppm)
Room #103	9/5/19	73.3	56.5	0.0	549
Room #126	9/5/19	73.6	62.5	0.0	748
Suite #110	9/5/19	73.7	62.2	0.0	865
Hall Near Room #116 (Stairs)	9/5/19	72.3	61.1	0.0	647
Room #108	9/5/19	72.2	62.9	0.0	501
Level A1 Landing Near Room #117	9/5/19	73.8	63.4	0.0	701
Storage Room Near Suite #110	9/5/19	74.5	61.2	0.0	660
5th Floor Hall Near Room #515	9/5/19	77.4	54.9	0.0	937
Room #113	9/5/19	72.4	60.9	0.0	558
Room #129 – Boiler Room	9/5/19	75.1	58.7	0.0	718
2nd Floor Hall Near Stairs	9/5/19	74.8	61.8	0.0	883
3rd Floor Hall Near Room #310	9/5/19	75.2	62.9	0.0	808
4th Floor Hall Near Stairs	9/5/19	75.7	60.3	0.0	746
Exterior South Elevation	9/5/19	85.1	40.9	0.0	235
Room #103	9/6/19	71.6	54.3	0.0	375
Suite #108	9/6/19	73.6	55.7	0.0	401
Room #129 – Boiler Room	9/6/19	74.4	57.0	0.0	385
Room #126	9/6/19	73.8	56.3	0.0	370
Suite #110	9/6/19	73.4	57.7	0.0	429
Hall Near Room #116 (Stairs)	9/6/19	72.8	59.8	0.0	418
Room #113	9/6/19	72.2	59.4	0.0	378
Level A1 Landing Near Room #117	9/6/19	73.0	60.6	0.0	450
2nd Floor Hall Near Room #209	9/6/19	71.4	57.5	0.0	414
3rd Floor Hall Near Room #310	9/6/19	74.2	56.5	0.0	395
4th Floor Hall Near Stairs	9/6/19	74.7	57.3	0.0	426

SECTION 2.0 INTERIOR AMBIENT AIR TESTING

2.2 Interior Ambient Air Sampling (continued)

TABLE A – SUMMARY OF INTERIOR AMBIENT AIR SAMPLING

Testing Location	Sampling Date	Ambient Temperature (F)	Relative Humidity (%)	Carbon Monoxide (ppm)	Carbon Dioxide (ppm)
5th Floor Hall Near Room #516	9/6/19	76.1	57.1	0.0	527
Exterior South Elevation	9/6/19	78.7	48.0	0.0	298

Ambient Temperature: IAQ screening revealed interior ambient air temperatures at environmental testing locations were within acceptable limits, based upon review/comparison of the ASHRAE standards "*Thermal Environmental Conditions for Human Occupancy*" (#55-2013) and "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), as measured on September 5, 2019 & September 6, 2019.

Relative Humidity: IAQ screening revealed interior ambient relative humidity at environmental testing locations were slightly elevated, based upon review/comparison of the ASHRAE standards "*Thermal Environmental Conditions for Human Occupancy*" (#55-2013) and "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), as measured on September 5, 2019 & September 6, 2019.

Carbon Monoxide: IAQ screening revealed interior ambient Carbon Monoxide (CO) levels at environmental testing stations were within acceptable limits, based upon review/comparison of the US OSHA/ASHRAE/NIOSH occupational exposure and environmental thresholds, as measured on September 5, 2019 & September 6, 2019.

Carbon Dioxide: IAQ screening revealed Carbon Dioxide (CO_2) levels at environmental testing locations were within acceptable limits, based upon review/comparison of the of ASHRAE standard "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), as measured on September 5, 2019 & September 6, 2019.

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.1 Fungal Growth Background

In order for typical mold species to grow in any environment, they need a food source, moisture, proper temperature and humidity, and a source of light. There will always be some fungi in any indoor environment, due to a variety of reasons, including building foot traffic, air infiltration via door/window openings, introduction of relief (make-up air)/outside fresh air to HVAC systems, etc. The primary factor in mold growth, typically easiest to control in any building, is moisture. Further, researchers report "Uncontrolled moisture in buildings can lead to a number of problems. Indoor moisture can originate from many sources, including transportation from the outdoors by vapor diffusion through the building envelope, groundwater intrusion, and penetration of precipitation; indoor activities, such as cooking, showering, and cleaning; and building design and/or operational issues, such as plumbing leaks and uncontrolled airflows. Such occurrences can result in a number of problems, including structural damage, material degradation, health concerns, and changes to microbial communities".[1]

As such, indoor fungal investigations typically focus on sources of water loss inside the building (e.g. from plumbing and operational processes) and/or sources of water intrusion from outside the building (e.g. leaking roof, window openings, door openings, etc.).

[1] "*Moisture Parameters and Fungal Communities Associated with Gypsum Drywall in Buildings*" (Sandra Dedesko & Jeffrey A. Siegel; *Microbiome* 2015 **3**:71)

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.1 Fungal Growth Background (continued)

Spore trap sampling was undertaken to complement the visual inspection investigative efforts during the IAQ study. The spore trap sampling provided a means, by which to index the operation of the building about its management of moisture/water, since fungi depend upon water and moisture sources within a building to flourish. Should data exhibit significant differences in the indoor airborne fungi (quantity and taxa), it suggests potential issues with design, construction, and/or management of a building (to include the HVAC system) in controlling moisture sufficiently.

Based upon recognized industry standards, rendering judgments on IAQ, relative to mold, involves comparing fungal species and concentrations detected at interior "affected" building areas to exterior ambient (background) levels and/or interior control "unaffected" areas. Specifically, in buildings without "mold problems" (i.e. free of visible water damage, visible mold growth), the qualitative diversity (types) of airborne fungal spores interior and exterior areas should be similar. Conversely, the dominating presence of one or two species of fungal spores identified at interior areas and the absence of the same species at exterior areas may indicate a moisture problem and degraded air quality. Additionally, the consistent presence of certain fungi such as *Stachybotrys*, *Aspergillus*, or various *Penicillium* species greater than exterior concentrations may indicate the occurrence of a moisture problem and a potential atypical mold presence at the interior of a building.

Fungi species present in the general exterior ambient environment are typically found within buildings at levels ranging from approximately ten (10) to fifty (50) percent of their levels in the exterior ambient air (reflects filtering of the air by the building's HVAC system). It has been reported "…in general, total mold spore levels in mechanically ventilated buildings without any visible mold infestation, airborne mold varies from 1,000 to 3,000 Spores/cubic meter"[2].

3.2 Non-Viable Fungal Spore Trap Sampling

BEC collected environmental air samples via a Buck BioAire® Sampling Pump (Model B520) equipped with fungal spore trap sampling cassettes (Air-O-Cell®, Zefon). The sampling pump was calibrated to draw air at a rate of 15 liters per minute for a sampling runtime of ten (10) minutes, to collect a total of 150 liters of air for each individual sample. (see **Appendix A: BEC Field Documentation**). BEC submitted the Air-O-Cell® cassettes to SanAir Laboratories (SanAir) of Powhatan, Virginia via commercial courier. SanAir is an American Industrial Hygiene Association accredited laboratory certified as proficient in environmental microbiological analysis (EMPAT # 162952).

BEC attached a Chain-of-Custody requesting Total Non-Viable Fungal Spore Count analysis to be completed within twenty-four (24) hours of the laboratory receipt of samples. BEC conducted non-viable fungal spore trap sampling at the following locations:

- Room #103 Center — One Morning & One Afternoon Sample
- Suite #110 Center — One Morning & One Afternoon Sample
- Level 1A Landing Near Room #117 — One Morning & One Afternoon Sample
- Storage Room Adjacent to Suite #110 — One Morning & One Afternoon Sample
- 5th Floor Hallway Near Room #515 — One Morning & One Afternoon Sample
- Exterior: South Elevation — One Morning & One Afternoon Sample

[2] Indoor Environmental Quality, Chapter Six: "*Biological Contaminants- Mold*" (Thad Godish, 2000)

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.2 Non-Viable Fungal Spore Trap Sampling (continued)

Non-viable fungal spore trap sampling results are presented hereunder in **Table B – Non-Viable Fungal Spore Trap Sampling Results** as well as in **Appendix B: SanAir Laboratory Analytical Results & Chain of Custody**.

TABLE B – NON-VIABLE FUNGAL SPORE TRAP SAMPLING RESULTS

Sample ID	Sampling Location	Sampling Date & Start Time	Fungal Species Identified	Raw Counts	Airborne Spore Concentration Count/m^3
2879 9997	Interior: Room #103	9/5/19 1311 Hrs	Alternaria species	3	20
			Ascospores	2	13
			Aspergillus/ Penicillium	1120	7467
			Basidiospores	1	7
			Bipolaris/Drechslera	3	20
			Cladosporium species	1	7
			Curvularia species	5	33
			Epicoccum species	1	7
			Pithomyces species	1	7
			Smuts/Myxomycetes	4	27
			Total	**1141**	**7607**
2879 9994	Interior: Suite #110	9/5/19 1330 Hrs	Alternaria species	1	7
			Aspergillus/Penicillium	2	13
			Basidiospores	1	7
			Cladosporium species	3	20
			Curvularia species	3	20
			Pithomyces species	3	20
			Smuts/Myxomycetes	5	33
			Total	**18**	**120**
2879 9988	Interior: Level 1A Landing Near Room #117	9/5/19 1403 Hrs	Alternaria species	1	7
			Aspergillus/Penicillium	133	887
			Basidiospores	6	40
			Cladosporium species	5	33
			Curvularia species	4	27
			Epicoccum species	1	7
			Pithomyces species	2	13
			Smuts/Myxomycetes	3	20
			Total	**155**	**1033**
2879 9987	Interior: Storage Room Adjacent to Suite #110	9/5/19 1416 Hrs	Ascospores	1	7
			Aspergillus/Penicillium	148	987
			Basidiospores	2	13
			Bipolaris/Drechslera	2	13
			Cladosporium species	2	13
			Curvularia species	2	13
			Pithomyces species	1	7
			Smuts/Myxomycetes	6	40
			Stachybotrys species	2	13
			Total	**166**	**1107**

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.2 Non-Viable Fungal Spore Trap Sampling (continued)

TABLE B – NON-VIABLE FUNGAL SPORE TRAP SAMPLING RESULTS

Sample ID	Sampling Location	Sampling Date & Start Time	Fungal Species Identified	Raw Counts	Airborne Spore Concentration CFU/m^3
2879 9984	Interior: 5th Floor Hallway Near Room #515	9/5/19 1430 Hrs	Basidiospores	1	7
			Bipolaris/Drechslera	1	7
			Total	**2**	**13**
2879 9980	Exterior: South Elevation	9/5/19 1445 Hrs	Alternaria species	3	20
			Ascospores	405	2700
			Aspergillus/Penicillium	39	260
			Basidiospores	513	3420
			Cercospora species	29	193
			Cladosporium species	1138	7587
			Curvularia species	42	280
			Epicoccum species	1	7
			Fusarium species	4	27
			Nigrospora species	3	20
			Pithomyces species	105	700
			Rusts	3	20
			Torula species	26	173
			Total	**2311**	**15407**
2879 9993	Interior: Room #103	9/6/19 1015 Hrs	Aspergillus/Penicillium	4	27
			Basidiospores	1	7
			Cladosporium species	2	13
			Smuts/Myxomycetes	2	13
			Stachybotrys species	26	173
			Total	**35**	**233**
22880 0001	Interior: Suite #110	9/6/19 1001 Hrs	Aspergillus/Penicillium	8	53
			Basidiospores	4	27
			Curvularia species	1	7
			Rusts	2	13
			Smuts/Myxomycetes	1	7
			Total	**16**	**107**
2879 9995	Interior: Level 1A Landing Near Room #117	9/6/19 0950 Hrs	Aspergillus/Penicillium	24	160
			Basidiospores	1	7
			Bipolaris/Drechslera	2	13
			Cladosporium species	1	7
			Curvularia species	2	13
			Pithomyces species	5	33
			Rusts	4	27
			Smuts/Myxomycetes	4	27
			Total	**43**	**287**

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.2 Non-Viable Fungal Spore Trap Sampling (continued)

TABLE B – NON-VIABLE FUNGAL SPORE TRAP SAMPLING RESULTS

Sample ID	Sampling Location	Sampling Date & Start Time	Fungal Species Identified	Raw Counts	Airborne Spore Concentration CFU/m^3
2879 9996	Interior: Storage Room Adjacent to Suite #110	9/6/19 0950 Hrs	Ascosporess	2	13
			Aspergillus/Penicillium	369	2460
			Pithomyces species	1	7
			Total	**372**	**2480**
2879 9991	Interior: 5th Floor Hallway Near Room #515	9/6/19 1002 Hrs	Aspergillus/Penicillium	1	7
			Basidiospores	1	7
			Pithomyces species	1	7
			Total	**3**	**20**
2879 9990	Exterior: South Elevation	9/6/19 1016 Hrs	Alternaria species	6	40
			Ascospores	165	1100
			Basidiospores	580	3867
			Cercospora species	1	7
			Cladosporium species	660	4400
			Curvularia species	15	100
			Epicoccum species	3	20
			Fusarium species	9	60
			Nigrospora species	1	7
			Pithomyces species	145	967
			Polythrincium species	2	13
			Rusts	17	113
			Smuts/Myxomycetes	4	27
			Torula species	3	20
			Total	**1611**	**10740**

CFU/m^3 = Colony Forming Units/Cubic Meter

As indicated by the data in Table B, Interior first level locations contain *Aspergillus*/*Penicillium* ranging from 27 counts/m^3 for the morning sample and 7467 counts/m^3 for the afternoon sample. Comparatively, *Aspergillus/ Penicillium* counts at the exterior control (background) sampling location sample were 0 counts/m^3 in the morning and 260 counts/m^3 in the afternoon sample.

BEC notes, a high variability in outdoor mold spore concentrations and distribution exists on a daily to hourly basis and is dependent on local vegetation and microclimate, the time of year, local weather patterns, and diurnal variation. As a result, caution must be used whenever rendering judgments on indoor fungal amplification conditions, solely based upon simple comparison of limited interior-exterior data sets, especially those generated from desert or snow covered environmental sampling conditions[3]. BEC provides reference information in Table C.

[3] "*Air-O-Cell Method Interpretation Guide*", Dan Baxter, January 2006, Environmental Analysis Associates,

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.2 Non-Viable Fungal Spore Trap Sampling (continued)

TABLE C – TYPICAL INDOOR MOLD SPORE CONCENTRATION RANGES

Description	Airborne Spore Concentration Count/m^3	Predominant Types
"Clean" Non-HVAC supplied Buildings	Less Than 2,000	Total for all spore types
"Clean" HVAC supplied buildings	Less Than 2,000	Total for all spore types
Both Types of Buildings	Less than 700	Penicillium, Aspergillus
Possible Indoor Amplification	1,000 – 5,000	Penicillium, Aspergillus, Cladosporium
Indoor Amplification likely present	5,000 – 10,000	Penicillium, Aspergillus, Cladosporium
Chronic Indoor Amplification	10,000 – 500,000	Penicillium, Aspergillus, Cladosporium

BEC provides the laboratory results associated with Dander, Fibers, Pollen sampling in **Table D – Dander, Fibers, Pollen Air Sampling Results** and are included in **Appendix B: SanAir Laboratory Analytical Results & Chains of Custody**.

TABLE D – DANDER, FIBERS, POLLEN AIR SAMPLING RESULTS

Sample ID	Sample Date & Sample Time	Sampling Location	Fungi / Dander, Fibers, Pollen	Total Raw Counts	Total Airborne Concentration Counts/m^3
2879 9997	9/5/19 1311 Hrs	Interior: Room #103	Dander	133	887
			Fibers	8	53
2879 9994	9/5/19 1330 Hrs	Interior: Suite #110	Dander	160	1067
			Fibers	1	7
			Mycelial Fragments	1	7
2879 9988	9/5/19 1403 Hrs	Interior: Level 1A Landing Near Room #117	Dander	322	2147
			Fibers	6	40
			Mycelial Fragments	1	7
2879 9987	9/5/19 1416 Hrs	Interior: Storage Room Adjacent to Suite #110	Dander	46	307
			Fibers	12	80
			Mycelial Fragments	1	7
2879 9984	9/5/19 1430 Hrs	Interior: 5th Floor Hallway Near Room #515	Dander	154	1027
			Fibers	3	20
2879 9980	9/5/19 1445 Hrs	Exterior: South Elevation	Dander	15	100
			Fibers	7	47
			Mycelial Fragments	22	147
			Pollen	27	180
2879 9993	9/6/19 1015 Hrs	Interior: Room #103	Dander	119	793
			Fibers	6	40
			Mycelial Fragments	2	13

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.2 Non-Viable Fungal Spore Trap Sampling (continued)

TABLE D – DANDER, FIBERS, POLLEN AIR SAMPLING RESULTS

Sample ID	Sample Date & Sample Time	Sampling Location	Fungi / Dander, Fibers, Pollen	Total Raw Counts	Total Airborne Concentration Counts/m^3
2880 0001	9/6/19 1001 Hrs	Interior: Suite #110	Dander	98	653
			Fibers	6	40
2879 9995	9/6/19 0950 Hrs	Interior: Level 1A Landing Near Room #117	Dander	364	2427
			Fibers	17	113
2879 9996	9/6/19 0950 Hrs	Interior: Storage Room Adjacent to Suite #110	Dander	84	560
			Fibers	7	47
2879 9991	9/6/19 1002 Hrs	Interior: 5th Floor Hallway Near Room #515	Dander	322	2147
			Fibers	13	87
2879 9990	9/6/19 1016 Hrs	Exterior: South Elevation	Dander	23	153
			Fibers	4	27
			Mycelial Fragments	2	13
			Pollen	6	40

Table D is total count for Dander Fibers and Pollen of which dander was most of the reported total. Dander is defined as human and animal skin cells fragments. Interior airborne dander concentrations ranged from 307 – 2,427 counts/m^3 and are within acceptable limits as outlined below in **Table D - Typical Airborne Skin Cell Fragment Concentration Ranges.** [4]

TABLE E – TYPICAL AIRBORNE SKIN CELL FRAGMENT CONCENTRATION RANGES

Sampling Location Description	Counts per Cubic Meter (cts/m^3)
Exterior Ambient (Outside) Air	50 – 1,000
Inside Air "Clean Building"	1,000 - 10,000
Inside Air "High Human Activity"	10,000 – 20,000
Inside Air "High Personnel Density And/or Poor Housekeeping"	20,000 – 10,000

[4] "*Air-O-Cell Method Interpretation Guide*", Dan Baxter, January 2006, Environmental Analysis Associates

SECTION 3.0 NON-VIABLE FUNGAL SPORE TRAP SAMPLING

3.3 Fungal Spore Trap Sampling Limitations

BEC advises that fungal spore trap sampling was conducted at the explicit request of the client. As such, BEC lists a brief synopsis of inherent limitations of this sampling methodology.

1. Sampling is done on a comparative basis where it is assumed that a building that doesn't exhibit fungi significantly different from the general surrounding environment (outdoor air) is acceptable. Results cannot definitively identify "safe" or "acceptable" in the same way that sampling for other regulated airborne contaminants can be compared for example, OSHA permissible exposure limits or EPA limits for air pollution. There is no jurisdiction at the federal or state level that has established acceptable or unacceptable "exposure" limits for fungi.

2. Viable and non-viable fungal spore trap sampling is generally utilized to provide an index of the operation of a building with regard to its management of moisture/water, since fungi depend upon water and moisture sources within a building to flourish. If in fact the data exhibits significant differences in the indoor airborne fungi, it suggests potential issues with design, construction, and/or management of a building (to include the HVAC system) which are not controlling moisture sufficiently.

3. The technology for fungal sampling only permits short term (i.e., a few minutes) sampling time. The result is that single sample results are extremely variable in both the indoor and outdoor (reference zone) air. The consequence is that many samples have to be collected throughout the same day in both the indoor test environment and outdoor air (with the HVAC operating), and the proper statistics have to be utilized to accurately analyze the data to generate scientifically defensible conclusions. This is a substantially more costly undertaking that is generally not embraced.

4. Notwithstanding the collection of fungal air samples and their associated data sets, the primary criterion for IAQ acceptability, relative to mold, remains the absence of (A) visible mold growth and (B) uncontrolled water/moisture conditions. Both are best assessed by visual inspection and moisture content testing/monitoring, and is the approach that is recommended and is consistent with guidelines (not regulations) provided by State and Federal regulatory agencies as well as national consensus organizations.

SECTION 4.0 VISUAL ASSESSMENT

4.1 Interior Visual Observations

BEC conducted the limited building condition assessment fieldwork on September 5, 2019 & September 6, 2019. BEC staff Richard Robinson, Robert Warfel, and Derrick Klein met with Mr. Phil Brooks, Building Engineer, to discuss the background information pertaining to the areas of concern. Mr. Brooks, escorted BEC field staff to the areas of concern and indicated that the area carpets had been recently cleaned by maintenance staff due to concerns of potential presence of surficial microbial contamination. The following summarizes the visual observations made by BEC staff:

- Visible microbial growth was observed at multiple locations at the time of the investigation., however, line of sight evaluation of building components for potential visible mold growth was not possible at "enclosed" locations (eg, exterior perimeter wall cavities, inaccessible ceiling plenums, etc.)

- Surficial Dust loading on ventilation diffusers were observed at multiple locations at the time of the investigation. Additionally, BEC notes dust agglomeration within multiple malleable/flex ductwork.

- Multiple portable dehumidifiers (DHU) were observed throughout the First level at the time of the investigation. Additionally, BEC observed multiple units were full and non-operational following water extraction from the collection pans the prior afternoon.

SECTION 4.0 VISUAL ASSESSMENT

4.1 Interior Visual Observations

Thermographic Infrared Scanning & Photography

BEC staff scanned and photographed the wall and ceiling surfaces present at the First Level utilizing an IR camera (FLIR Model E40) in an effort to identify enclosed (hidden) water infiltration/moisture intrusion conditions unable to be observed by routine critical visual inspection.

The IR thermographic scanning included, infrared testing of enclosed areas (wall cavities, ceiling plenums, mechanical chases, etc.) suspected to harbor moisture based upon visible water stains and/or protimeter readings.

- IR scanning did not reveal locations at the subject site which indicated ongoing water intrusion at the time of the investigation.

SECTION 5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

1. BEC concludes, based upon onsite environmental testing and review of analytical data, indoor ambient air "comfort" parameters at the testing locations were within acceptable limits except for a few locations with elevated relative humidity, based upon review/comparison of the ASHRAE standards "*Thermal Environmental Conditions for Human Occupancy*" (#55-2004) and "*Ventilation for Acceptable Indoor Air Quality*" (#62.1-2016), as measured on September 5, 2019 & September 6, 2019. It is BEC opinion based on review the analytical data, the carpet cleaning activities which introduced water vapor into the First level created a condition which promoted microbial growth.

2. The concentrations of total non-viable fungal spores ranged from 13 Counts/m^3 to a high of 7607 Counts/m^3. The predominate interior non-viable fungal species was *Aspergillus* /*Penicillium* species at 7467 Counts/m^3 within room #103. It is relevant to note that, the analysis revealed higher airborne concentrations of *Aspergillus* /*Penicillium* within the interior area at the time of this assessment in comparison to the control sampling areas. The *Aspergillus* /*Penicillium* concentrations indicate there is indoor amplification likely present within the building.

   As a general rule, total indoor airborne spore concentrations, in a typical clean building served with mechanically supplied HVAC system(s), are less than the "average" regional outside concentrations, and/or less than approximately 2,000 counts/m^3. Additionally, *Aspergillus* /*Penicillium* and other hyaline spores are on average are less than 700 counts/m^3, within a typical clean HVAC system served building. Indicator (or "marker") fungi such as *Stachybotrys*, *Chaetomium*, *Ulocladium* are often recovered in low concentrations in interior ambient air samples, as a function of normal exterior ambient air infiltration. Therefore, automatically assuming there is indoor growth when low concentrations of any indicator species are detected is inappropriate[5].

3. The interior dander, fiber, and pollen concentrations ranged from a low of 100 Counts/m^3 to a high of 2,147 counts/m^3 at the Level 1A Landing. BEC advises, typical airborne skin cell fragments concentrations within an interior high human activity area (such as office) could range from 10,000-20,000 counts/m^3.

4. BEC notes, based upon review of laboratory analytical data, the non-viable spore trap air samples indicate degraded indoor air quality may be present. This data suggests, that while a person in good health may not have any adverse reaction to the current air quality, individuals with potentially compromised health (I.e. respiratory issues, immune sensitivities, or mold sensitivity) could potentially experience health complications amplified by the building condition.

[5] "*Air-O-Cell Method Interpretation Guide*", Dan Baxter, January 2006, Environmental Analysis Associates

SECTION 5.0 CONCLUSIONS & RECOMMENDATIONS

5.2 Recommendations

1. BEC recommends, a critical visual inspection & building condition assessment be conducted throughout the remainder of the building to assess the potential microbial conglomeration. This recommendation is based upon observed visible mold growth within adjacent locations including but not limited to room #209 which were not within this scope of work.

2. BEC recommends, evaluation of current HVAC system of both "occupied" and "unoccupied" settings to determine if the system is adequately conditioning the air to the recommended level to prevent microbial growth. It is BEC understanding that the building goes into "unoccupied" settings outside of normal business hours. While the intent may be to reduce utility costs, the settings may be a contributing factor for degraded environmental conditions.

3. BEC recommends, preparation of a mold remediation workplan to govern the removal of building components adversely-affected with visible microbial growth and HVAC ductwork as observed on September 5, 2019 & September 6, 2019 and other surfaces adversely affected in the intervening time period from that date until commencement of the mold remediation work. It is relevant to note, the mold remediation workplan is necessarily-required to be site specific and not generalized boilerplate document, notwithstanding the requirement to incorporate the practices and procedures as detailed in the US EPA mold remediation guidelines and US OSHA mold remediation guidelines in preparation of the workplan.

4. BEC, recommends an Independent 3rd party technical inspections/environmental testing of the work continuously and complete the Post Remediation Verification (PRV) technical inspection/environmental testing, at the conclusion of the work in accordance with mold remediation workplan.

5. BEC recommends, calibration and balancing of all HVAC services zones by a licensed HVAC contractor in accordance with the National Air Duct Cleaners Association (NADCA) standard for the Assessment, Cleaning, and Restoration of HVAC Systems. Additionally, ensure HVAC units fan coils, condensation collection pans, ductwork, and condensate transfer lines (pipes) are routinely cleaned until free of visible dust, detritus, debris, residues, and/or visible microbial agglomeration.

APPENDIX A

BEC FIELD DOCUMENTATION

BOGGS
ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/5/2019

Environmental Technician(s) Onsite: RR/DK/RW **Project #:** WV19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room #107			73.4	57.3	DHU Present Visible Mold Diffuser
Room #103			74.1	53.1	DHV Present Visible Mold Diffuser
Suite #110			74.4	59.1	This area and adjoin offices are different style carpet and appears newer. This area carpet was not cleaned. No visible mold observed. Dust loading moderate on surfaces
Room #125			58.2	74.1	No visible mold observed dust loading moderate
Room #126			58.3	74.4	No visible mold observed

BOGGS
ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/5/2019

Environmental Technician(s) Onsite: RR/DK/RW **Project #:** WV19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room #108A			73.4	58.3	Visible mold growth supply diffuser
Room #108B			73.6	57.2	DHU present Visible mold growth on diffusers
Room #109 Storage room			73.8	56.3	Visible mold on TV/TV Stand
Room #104			74.6	58.1	(2) OHU's In office temp control, occupant noted it was 70% RH about (2) weeks ago. Air Cleaner Visible mold on diffuser
Room #105 Closet			75.3	59.8	Water stained pipe insulation, visible mold on pipe insulation
Room #106			74.1	57.7	2 DHU's Present Visible mold on diffuser, luggage

BOGGS
ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/5/2019

Environmental Technician(s) Onsite: RL / DK / RW **Project #:** WV19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room #112			72.7	58.7	NV visible mold/water staing return air vent heavily soiled
Room #113 Maintnance Storage			73.2	57.3	~~[illegible]~~ NV drop ceiling straight to deck Visible mold on peely paint along columns DHU present
Room #114 maintnance office			75.8	54.2	Visible mold on supply diffuser
Room #111 Hallway	Adjacent to HP1-6 / 1-7		73.2	58.8	Strong odor DHU present and full Southern side hallway NOT w/in HVAC zone, western end of hallway w/in (2) units
	Adjacent to Sun 110		73.4	61.0	
Room #129 MER (4 AHU's) present					NO visible mold Not within HVAC service zone

BOGGS
ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/5/2019

Environmental Technician(s) Onsite: RE/DK/RW **Project #:** WV19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room #123			71.8	61.6	DHU present and running Visible mold Growth on carpet Visible Mold on Supply diffuser No elevated moisture found with IR
Room #122			73.0	60.7	No visible mold/water staining
Room #119 1st floor Elevator Lobby			72.6	58.8	Return air grills heavily soiled Visible mold growth on supply diffuser
Room #121 Elevator Equipment Room - Unoccupied			75.2	58.9	No supply vent Stained ACT - Dry
Room #115 Janitors closet			74.2	57.1	No supply/return

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ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/5/2019

Environmental Technician(s) Onsite: RR / DR / RW **Project #:** WV19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room #127			75.18	58.0	No visible mold growth moderate dust loading
Room #128			71.8	58.7	No visible mold growth moderate dust loading
Room #102 storage/mer			71.2	55.5	visible mold on column and some equipment
Room #101 stairs			73.3	52.9	no supply/return
Room #124			72.8	56.4	no supply/return

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ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Woodgreen DHHR **Location:** Wood County DHHR **Date:** 9/6/2019

Environmental Technician(s) Onsite: RE/DK/RW **Project #:** W19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room # SE Storage Room No Room #			72.9	59.3	Suspect mold on GBS sill plate No Supply/returns Visible mold on plaster walls
Room #116 Stairwell 6th Street Side			73.5	55.9	
Room #118 Men Restroom			73.2	55.6	No visible ~~water~~ mold around Visible water stained ACT/Nothing above ceiling heavy dust loading on return/exhaust
Room #119 Women Restroom			73.6	56.9	Visible mold on supply diffuser
Room #117 Valve Room			74.2	58.4	Visible mold/water stain on pipe insulation No supply/return

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ENVIRONMENTAL CONSULTANTS

Boggs Environmental Consultants, Inc.

BUILDING CONDITION ASSESSMENT LOGSHEET

Project Name Wood County DHHR **Location:** Parkersburg, WV **Date:** 9/6/2019

Environmental Technician(s) Onsite: RR/DK/RW **Project #:** W19028

Location	CO_2	CO	Temp	RH%	Observation Notes (Visible Mold/Water Damage)
Room # 209			73.4	56.8	Visible mold on carpet, supply diffusers DHW present and full Return does not appear to be working

~~314~~
243

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ENVIRONMENTAL CONSULTANTS

IAQ TESTING LOGSHEET

BEC Job#: WV19028 **Location:** Parkersburg, WV

Date: 9/5/19 **Project Manager:** R. Robinson

Onsite Technician(s): Ricky Robinson, Derrick Klein, Robby Ware

Building Area	Temperature F	Relative Humidity %	Carbon Dioxide (PPM)	Carbon Monoxide
Room #103	73.3	56.5%	549	0.0
Room #126	73.6	62.4%	748	0.0
Suite #110	73.7	62.2%	865	0.0
Hall Near Room #120 (Stairs)	72.3	61.1%	647	0.0
Room #108	72.2°F	62.9%	501	0.0
Level 1A Landing Near Room #117	73.8°	63.4%	701	0.0
Storage Room Adjacent to Suite #110	74.5°	61.2%	1060	0.0
5th Floor Hall Landing Near Room #515	77.4°	54.9%	937	0.0
Room #113	72.4	60.9%	558	0.0
Room # 129 - Boiler Room	75.1	58.7%	715	0.0
2nd Floor Hall near Stairs	74.8	61.8%	883	0.0
3rd Floor Hall Near Room 310	75.7°	62.9%	808	0.0
4th Floor Hall Near Stairs	75.7°	60.3	746	0.0
South Exterior	85.1°	40.9%	235	0.0

Comments: 9/5/19
Weather Forcast - High 81° Partly Cloudy

Environmental Specialist

BOGGS
ENVIRONMENTAL CONSULTANTS

IAQ TESTING LOGSHEET

BEC Job#: NV19028 **Location:** Parkersburg, WV

Date: 9/6/19 **Project Manager:** R. Robinson

Onsite Technician(s): Robby Warfel

Building Area	Temperature F	Relative Humidity %	Carbon Dioxide (PPM)	Carbon Monoxide
Room #103	71.6°	54.3%	375	0.0
Suite #108	73.6°	55.7%	401	0.0
Room #129 - Boiler Room	74.4°	57.0%	385	0.0
Room #126	73.8°	56.3%	370	0.0
Suite #110	73.4	57.7%	429	0.0
Storage Room Near Suite #110	73.8°	59.2%	374	0.0
Hall Near Room #116 (Stairs)	72.3°	59.8%	418	0.0
Room #113	72.2°	59.4%	378	0.0
Level 1 Hallway Near Room #117	73.0°	60.0%	450	0.0
2nd Floor Hall Near Room #209	71.4	57.5%	414	0.0
3rd Floor Hall Near Room #310	74.2	56.5%	395	0.0
4th Floor Hall Near Stairs	~~74.7~~	57.3%	426	0.0
5th Floor Hall Near Room #510	76.1	57.1%	527	0.0
South Exterior	78.7	48.0%	298	0.0

Comments:

Environmental Specialist

BOGGS
ENVIRONMENTAL CONSULTANTS

142 end

DAILY OBSERVATION LOGSHEET

Date: 9/5/2019 Project Location: Wood County DHHR

BEC Onsite IH: Ricky Robinson / Derrick Klein Parkersburg, WV
Robbie Wentz

BEC Project No: WV1902.8 Project Manager: RR

1030	BEC arrives onsite and meets Phil Brooks (Maintnance) who provides following
	2 floors underground - 1st / 2nd floor, all remaining above
	~9 weeks ago carpets [redacted] cleaned on 1st floor
	~1 week ago maintenance staff returned cleaned visible mold that was on select property
	Occupied Settings ( )
	Unoccupied Settings ( ) 104, 302, 502
	Room 102 provides makeup air to 1st floor (3 makeup air total in Bldg)
	Filters for these changed monthly
	Water source heat pump system
	27/38 Heat pump units replaced - 38 zones total
	Filters changed every 3 months in all 38 units
	fresh air makeup / recirculate % amounts unknown
	Duct never cleaned, main trunks uninsulated, flex to diffusers
1215	BEC completes walkthrough and discussion with Phil and will begin to perform IAQ sampling, visual inspection and moisture survey
	BEC notes ceiling plenum space changes from mass core at ~2 to ~3 and outer core is ~5 - ~6'. Visible mold observed in plenums on old pivoted columns
1440	Phil Brooks changes water in DHUs, indicates changed daily

SHEET 1 OF 2

Industrial Hygienist: RR Date: 9/5/2019

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BUILDING CONDITION ASSESSMENT
OBSERVATION LOG

BEC Inspector: RR/OK/RW
BEC Project No: WV19028
Project Manager: RR
Date: 9/5/2018

1545	BEC completes testing for the day. Visible mold growth was observed in the majority of basement / (1st floor) level. All surfaces including carpets were dry via IR camera postmeter
1615	BEC packs up equipment and is offsite

SHEET 2 OF 2

BEC Environmental Technician: [signature]

Date: 9/5/2018

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DAILY OBSERVATION LOGSHEET

Date: 9/6/2019 Project Location: Wood County DHHR

BEC Onsite IH: Ricky Robinson / Derrick Klein Parkersburg, WV

BEC Project No: WV19028 (Robby Wortel) Project Manager: RR

815	BEC arrives onsite to complete building condition assessment
	BEC checks RH + temp in select areas to see if a change.
	A slight increase to RH above 60% is observed in some locations
	this possibly is from unoccupied setting creating this condition
	Waiting on feedback on these settings
	Some OHU's are full and non operational and were emptied
	yesterday afternoon
1020	BEC completes visual inspection portion of building areas
	within 1st floor and floor 1A. BEC requests clarification
	on fresh air intakes from Jett (HVAC Tech) on fresh air intakes

SHEET 1 OF 1

Industrial Hygienist: DH Date: 9/6/2019

APPENDIX B

SANAIR LABORATORY ANALYTICAL RESULTS

&

CHAIN OF CUSTODY

SanAir Technologies Laboratory

The Identification Specialists

Analysis Report
prepared for
Boggs Environmental Consultants, Inc

Report Date: 9/10/2019

Project Name: Wood Country DHHR

Project #: MV19028

SanAir ID#: 19045756

1551 Oakbridge Dr. Suite B | Powhatan, Virginia 23139-8061
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com

SanAir ID Number
19045756
FINAL REPORT
9/10/2019 1:09:34 PM

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769
Phone: 301-694-5687

Project Number: MV19028
P.O. Number: WV19028
Project Name: Wood Country DHHR
Collected Date: 9/5/2019 - 9/6/2019
Received Date: 9/9/2019 9:00:00 AM

Dear Robert Warfel,

We at SanAir would like to thank you for the work you recently submitted. The 12 sample(s) were received on Monday, September 09, 2019 via FedEx. The final report(s) is enclosed for the following sample(s): 28799980, 28799990, 28799993, 28800001, 28799995, 28799993, 28799991, 28799997, 28799994, 28799988, 28799987, 28799984.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

L. Claire Macdonald
Microbiology Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Air Cassette Analysis
- Disclaimers and Additional Information

Sample conditions:
- 12 samples in Good condition.

SanAir Technologies Laboratory

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769
Phone: 301-694-5687

Project Number: MV19028
P.O. Number: WV19028
Project Name: Wood Country DHHR
Collected Date: 9/5/2019 - 9/6/2019
Received Date: 9/9/2019 9:00:00 AM

SanAir ID Number
19045756
FINAL REPORT
9/10/2019 1:09:34 PM

Analyst: Pulliam, Tashema

Air Cassette Analysis

ND = None Detected. Blank spaces indicate no spores detected.

SanAir ID Number	19045756-001			19045756-002			19045756-003			19045756-004		
Analysis Using STL	105C			105C			105C			105C		
Sample Number	28799997			28799994			28799988			28799987		
Sample Identification	Room #103			Suite #110			Level 1A Landing Near Room #117			Storage Room Adjacent To Suite #110		
Sample Type	Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell		
Volume	150 Liters			150 Liters			150 Liters			150 Liters		
Analytical Sensitivity	7 Count/M³			7 Count/M³			7 Count/M³			7 Count/M³		
Background Density	2+			2			2+			2		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Dander	133	887	n/a	160	1067	n/a	322	2147	n/a	46	307	n/a
Fibers	8	53	n/a	1	7	n/a	6	40	n/a	12	80	n/a
Mycelial Fragments				1	7	n/a	1	7	n/a	1	7	n/a
Pollen												
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species	3	20	< 1	1	7	6	1	7	< 1			
Ascospores	2	13	< 1							1	7	< 1
Aspergillus/Penicillium	1120	7467	98	2	13	11	133	887	86	148	987	89
Basidiospores	1	7	< 1	1	7	6	6	40	4	2	13	1
Bipolaris/Drechslera	3	20	< 1							2	13	1
Cercospora species												
Cladosporium species	1	7	< 1	3	20	17	5	33	3	2	13	1
Curvularia species	5	33	< 1	3	20	17	4	27	3	2	13	1
Epicoccum species	1	7	< 1				1	7	< 1			
Fusarium species												
Nigrospora species												
Pithomyces species	1	7	< 1	3	20	17	2	13	1	1	7	< 1
Polythrincium species												
Rusts												
Smuts/Myxomycetes	4	27	< 1	5	33	28	3	20	2	6	40	4
Stachybotrys species										2	13	1
Torula species												
TOTAL	**1141**	**7607**		**18**	**120**		**155**	**1033**		**166**	**1107**	

Signature: Jashema Pulliam Date: 9/10/2019 Reviewed: Johnathan Wilson Date: 9/10/2019

SanAir Technologies Laboratory

Name: Boggs Environmental Consultants, Inc
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Phone: 301-694-5687

Project Number: MV19028
P.O. Number: WV19028
Project Name: Wood Country DHHR
Collected Date: 9/5/2019 - 9/6/2019
Received Date: 9/9/2019 9:00:00 AM

SanAir ID Number
19045756
FINAL REPORT
9/10/2019 1:09:34 PM

Analyst: Pulliam, Tashema

Air Cassette Analysis

ND = None Detected. Blank spaces indicate no spores detected.

SanAir ID Number	19045756-005			19045756-006			19045756-007			19045756-008		
Analysis Using STL	105C			105C			105C			105C		
Sample Number	28799984			28799980			28799993			28800001		
Sample Identification	5th Floor Hallway Near Room #515			South Exterior			Room #103			Suite #110		
Sample Type	Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell		
Volume	150 Liters			150 Liters			150 Liters			150 Liters		
Analytical Sensitivity	7 Count/M³			7 Count/M³			7 Count/M³			7 Count/M³		
Background Density	2			2			2			2		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Dander	154	1027	n/a	15	100	n/a	119	793	n/a	98	653	n/a
Fibers	3	20	n/a	7	47	n/a	6	40	n/a	6	40	n/a
Mycelial Fragments				22	147	n/a	2	13	n/a			
Pollen				27	180	n/a						
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species				3	20	< 1						
Ascospores				405	2700	18						
Aspergillus/Penicillium				39	260	2	4	27	11	8	53	50
Basidiospores	1	7	50	513	3420	22	1	7	3	4	27	25
Bipolaris/Drechslera	1	7	50									
Cercospora species				29	193	1						
Cladosporium species				1138	7587	49	2	13	6			
Curvularia species				42	280	2				1	7	6
Epicoccum species				1	7	< 1						
Fusarium species				4	27	< 1						
Nigrospora species				3	20	< 1						
Pithomyces species				105	700	5						
Polythrincium species												
Rusts				3	20	< 1				2	13	12
Smuts/Myxomycetes							2	13	6	1	7	6
Stachybotrys species							26	173	74			
Torula species				26	173	1						
TOTAL	**2**	**13**		**2311**	**15407**		**35**	**233**		**16**	**107**	

Signature: Tashema Pulliam Date: 9/10/2019 Reviewed: Johnathan Wilson Date: 9/10/2019

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SanAir ID Number
19045756
FINAL REPORT
9/10/2019 1:09:34 PM

Analyst: Pulliam, Tashema

Air Cassette Analysis

ND = None Detected. Blank spaces indicate no spores detected.

SanAir ID Number	19045756-009			19045756-010			19045756-011			19045756-012		
Analysis Using STL	105C			105C			105C			105C		
Sample Number	28799995			28799993			28799991			28799990		
Sample Identification	Level 1A Landing Near Room #117			Storage Room Adjacent To Suite #110			5th Floor Hallway Near Room #515			South Exterior		
Sample Type	Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell			Air Cassette - Air-O-Cell		
Volume	150 Liters			150 Liters			150 Liters			150 Liters		
Analytical Sensitivity	7 Count/M³			7 Count/M³			7 Count/M³			7 Count/M³		
Background Density	2+			2			2+			2		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Dander	364	2427	n/a	84	560	n/a	322	2147	n/a	23	153	n/a
Fibers	17	113	n/a	7	47	n/a	13	87	n/a	4	27	n/a
Mycelial Fragments										2	13	n/a
Pollen										6	40	n/a
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species										6	40	< 1
Ascospores				2	13	< 1				165	1100	10
Aspergillus/Penicillium	24	160	56	369	2460	>99	1	7	33			
Basidiospores	1	7	2				1	7	33	580	3867	36
Bipolaris/Drechslera	2	13	5									
Cercospora species										1	7	< 1
Cladosporium species	1	7	2							660	4400	41
Curvularia species	2	13	5							15	100	< 1
Epicoccum species										3	20	< 1
Fusarium species										9	60	< 1
Nigrospora species										1	7	< 1
Pithomyces species	5	33	12	1	7	< 1	1	7	33	145	967	9
Polythrincium species										2	13	< 1
Rusts	4	27	9							17	113	1
Smuts/Myxomycetes	4	27	9							4	27	< 1
Stachybotrys species												
Torula species										3	20	< 1
TOTAL	**43**	**287**		**372**	**2480**		**3**	**20**		**1611**	**10740**	

Signature: Tashema Pulliam Date: 9/10/2019 Reviewed: Johnathan Wilson Date: 9/10/2019

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SanAir ID Number
19045756
FINAL REPORT
9/10/2019 1:09:34 PM

Analyst: Pulliam, Tashema

Air Cassette Analysis - Spores % of Exterior Air

*The Baseline Level (100%) represents the average baseline sample counts. Counts above the baseline may indicate higher than expected levels of a given result.

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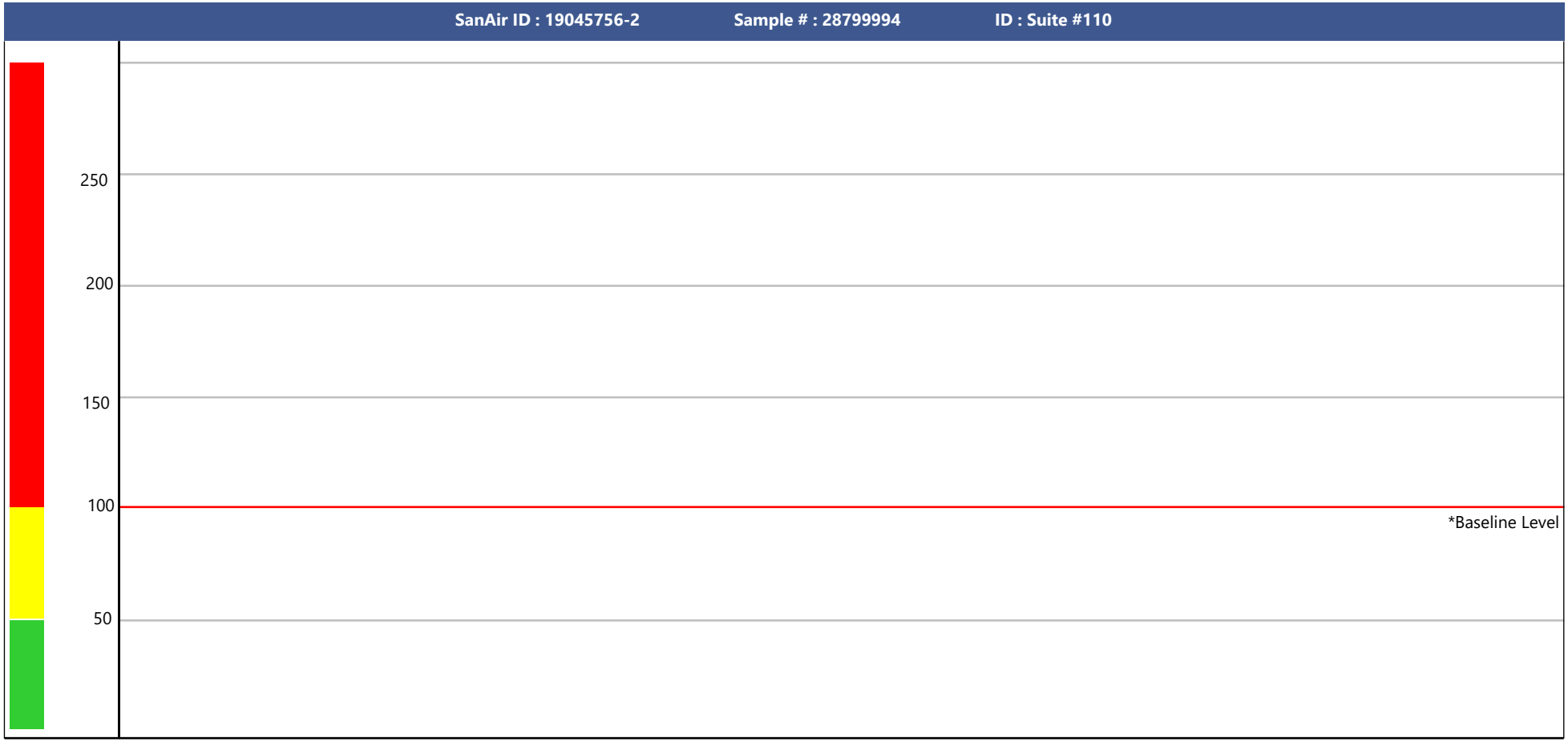
Air Cassette Analysis - Spores % of Exterior Air



Count/m³ higher than Baseline
Count/m³ comparable to Baseline
Within 50% of Baseline Count/m³

No organisms to graph. Normalized organism counts may not have exceeded the organism thresholds, or there were no organism counts for this sample. Please refer to the analysis report.

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Count/m³ higher than Baseline
Count/m³ comparable to Baseline
Within 50% of Baseline Count/m³

A Aspergillus/Penicillium

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A Aspergillus/Penicillium

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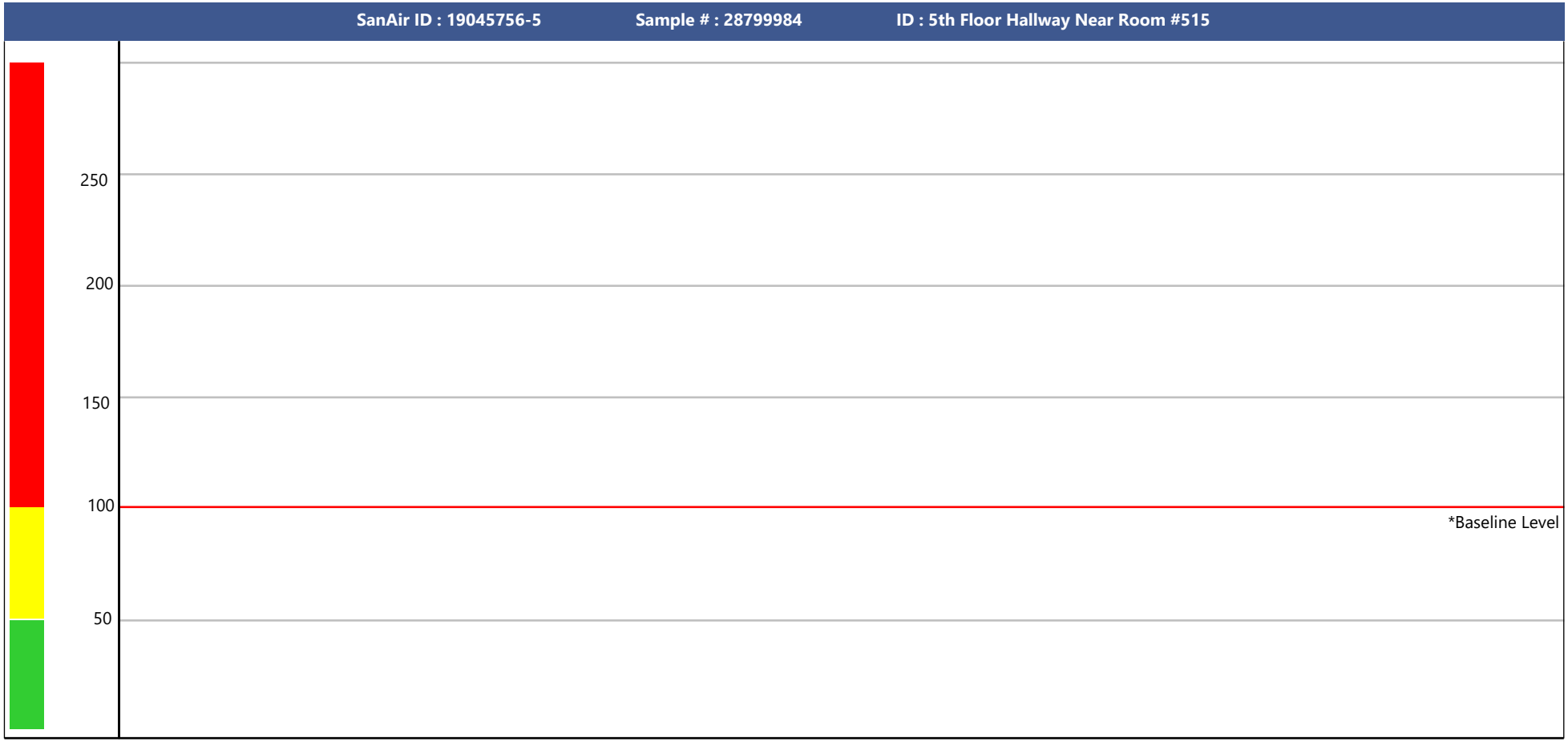
Air Cassette Analysis - Spores % of Exterior Air



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Air Cassette Analysis - Spores % of Exterior Air

Count/m³ higher than Baseline
Count/m³ comparable to Baseline
Within 50% of Baseline Count/m³

A Stachybotrys species

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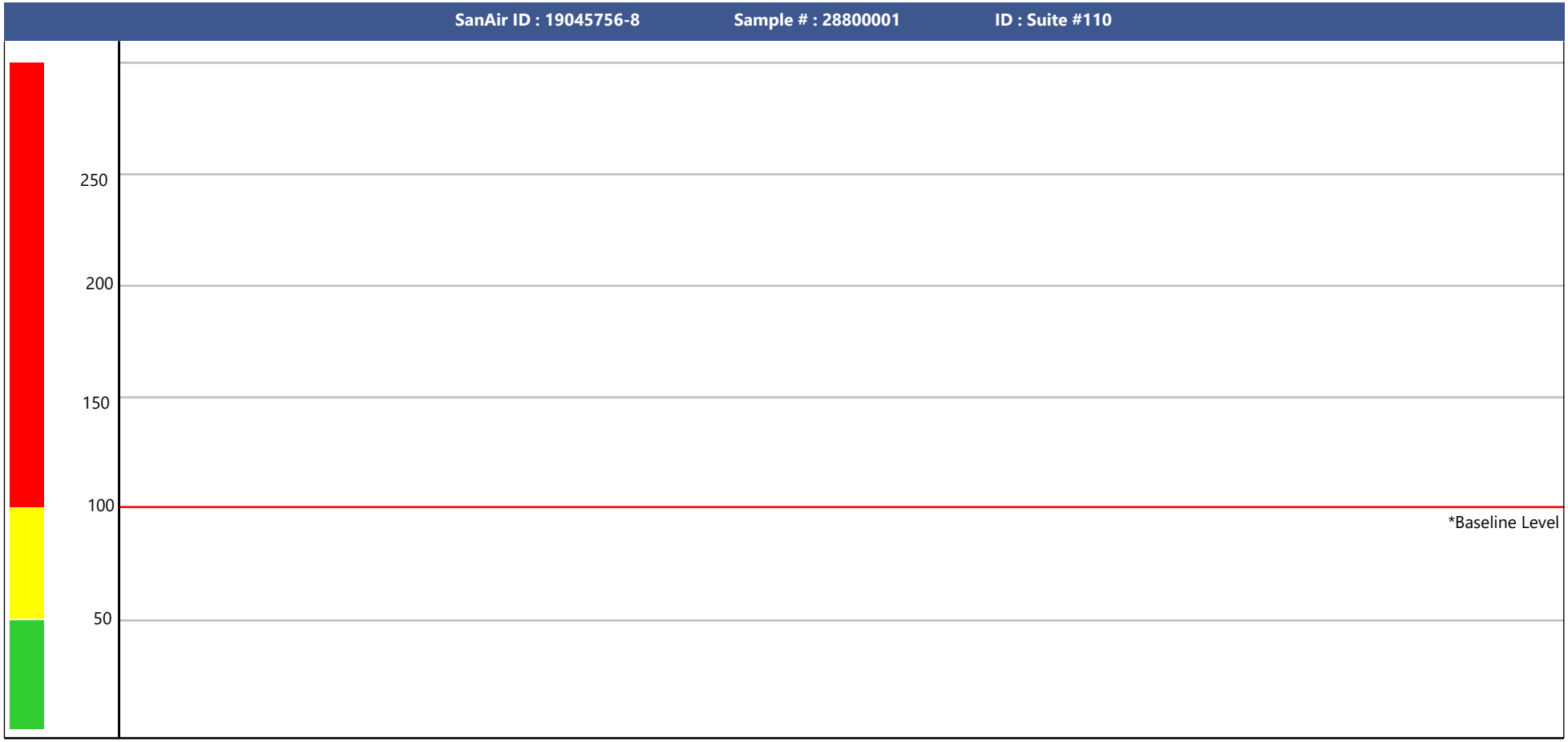
Air Cassette Analysis - Spores % of Exterior Air



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Count/m³ comparable to Baseline
Within 50% of Baseline Count/m³

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Organism Descriptions

The descriptions of the organisms presented are derived from various reference materials. The laboratory report is based on the data derived from the samples submitted and no interpretation of the data, as to potential, or actual, health effects resulting from exposure to the numbers of organisms found, can be made by laboratory personnel. Any interpretation of the potential health effects of the presence of this organism must be made by qualified professional personnel with first hand knowledge of the sample site, and the problems associated with that site.

Dander - Comprised of human and/or animal skin cells. Counts may be higher in carpeted rooms and in rooms with more traffic.
Health Effects: May cause allergies.

Fibers - This category can include clothing, carpet, and insulation fibers.

Mycelial Fragments - A mycelium (plural = mycelia) is the "body" of a fungus. It is a collective term for hyphae (singular = hypha), which are the tubular units of the mycelium usually composed of chitin. The terms hyphae and mycelial fragments are used interchangeably. [This information was referenced from the mycology text "The Fifth Kingdom"]In some cases a fungal identification cannot be obtained due to lack of sporulation. Only the mycelial fragments are present, and cannot be identified without the distinguishing characteristics of the spores or the structures they grow from.
Health Effects: Allergic reactions may occur in the presence of spores (conidia) or mycelial/hyphal fragments.

Pollen - Produced by trees, flowers, weeds and grasses. The level of pollen production can depend on water availability, precipitation, temperature, and light. Pollen is usually dispersed by either insects or the wind.
Health Effects: Mostly effects the respiratory tract with hay fever symptoms but has also been shown to trigger asthma in some people.

Alternaria species - This genus compromises a large number of saprobes and plant pathogens. It is one of the predominate airborne fungal spores indoor and outdoor. Outdoors it may be isolated from samples of soil, seeds, and plants. It is one of the more common fungi found in nature, extremely widespread and ubiquitous. Conidia are easily carried by the wind, with peak concentrations in the summer and early fall. It is commonly found in outdoor samples. It is often found in indoor environments, on drywall, ceiling tiles, in house dust, carpets, textiles, and on horizontal surfaces in building interiors. Often found on window frames.
Health Effects: In humans, it is recognized to cause type I and III allergic responses. Because of the large size of the spores, it can be deposited in the nose, mouth and upper respiratory tract, causing nasal septum infections. It has been known to cause Baker's asthma, farmer's lung, and hay fever. It has been associated with hypersensitivity pneumoniti, sinusitis, deratomycosis, onychomycosis, subcutaneous phaeohyphomycosis, and invasive infection. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchiospasms, chronic cases may develop pulmonary emphysema.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Ascospores - From the fungal Subphylum Ascomycotina. Ascospores are ubiquitous in nature and are commonly found in the outdoor environment. This class contains the "sac fungi" and yeasts. Some ascospores can be identified by spore morphology, however; some care should be excercised with regard to specific identification. They are identified on tape lifts and non-viable analysis by the fact that they have no attachment scars and are sometimes enclosed in sheaths with or without sacs. Ascomycetes may develop both sexual and asexual stages. Rain and high humidity may help asci to release, and dispurse ascospores, which is why during these weather conditions there is a great increase in counts.
Health Effects: This group contains possible allergens.

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Organism Descriptions

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Aspergillus/Penicillium - These spores are easily aerosolized. Only through the visualization of reproductive structures can the genera be distinguished. Also included in this group are the spores of the genera Acremonium, Phialophora, Verticillium, Paecilomyces, etc. Small, round spores of this group lack the necessary distinguishing characteristics when seen on non-viable examination.
Health Effects: Can cause a variety of symptoms including allergic reactions. Most symptoms occur if the individual is immunocompromised in some way (HIV, cancer, etc). Both Penicillium and Aspergillus spores share similar morphology on non-viable analysis and therefore are lumped together into the same group.

Basidiospores - From the Subphylum Basidiomycotina which contains the mushrooms, shelf fungi, and a variety of other macrofungi. They are saprophytes, ectomycorrhizal fungi or agents of wood rot, which may destroy the structure wood of buildings. It is extremely difficult to identify a specific genera of mushrooms by using standard culture plate techniques. Some basidiomycete spores can be identified by spore morphology; however, some care should be exercised with regard to specific identification. The release of basidiospores is dependant upon moisture, and they are dispersed by wind.
Health Effects: Many have the potential to produce a variety of toxins. Members of this group may trigger Type I and III fungal hypersensitivity reactions. Rarely reported as opportunistic pathogens.

Bipolaris/Drechslera - Found on grasses, grains, various plants, and decaying food. May grow in semi-dry environments. Some species are found in indoor environments. Because of the microscopic similarities between the two genera, they are grouped together on non-viable analyses.
Health Effects: Can occasionally cause corneal infection of the eye. This group of fungi constitutes the most commonly reported causes of allergic fungal sinusitis. They produce type I fungal hypersensitivity in humans.
References: St-Germain, Guy, and Richard Summerbell. Identifying Filamentous Fungi: A Clinical Laboratory Handbook. California: Star Publishing Co., 1996.

Cercospora species - Plant pathogen. Cercospora tends to grow on leaves. (Genera of Hyphomycetes, 1980)
References: J.W. Carmichael, W. Bryce Kendrick, I.L. Conners, Lynne Sigler Genera of Hyphomycetes University of Alberta Press, 1980

Cladosporium species - The most commonly identified outdoor fungus. The outdoor numbers are reduced in the winter and are often high in the summer. Often found indoors in numbers less than outdoor numbers. It is commonly found on the surface of fiberglass duct liner in the interior of supply ducts. A wide variety of plants are food sources for this fungus. It is found on dead plants, woody plants, food, straw, soil, paint and textiles. Often found in dirty refrigerators and especially in reservoirs where condensation is collected, on moist window frames it can easily be seen covering the whole painted area with a velvety olive green layer.
Health Effects: It is a common allergen. It can cause mycosis. Common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchiospasms, chronic cases may develop pulmonary emphysema. Illnesses caused by this genus can include phaeohyphomycosis, chromoblastomycosis, hay fever and common allergies.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

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Organism Descriptions

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Curvularia species - Curvularia is found on plant material and is considered a saprobe. It has also been isolated from dust samples and from wallpaper.
Health Effects: It has been reported to cause type I hypersensitivity and to be a cause of allergic fungal sinusitis. It may cause corneal infections, mycetoma and infections in immune compromised hosts.
References: De Hoog, G.S., J. Guarro, J. Gene, and M.J. Figueras. Atlas of Clinical Fungi, 2nd Edition. The Netherlands: CBS, 2000.

Epicoccum species - It is found in plants, soil, grains, textiles, and paper products. Frequently isolated from air and occasionally occurs in house dust. Is a saprophyte and considered a weakly parasitic secondary invader of plants, moldy paper and textiles. Epicoccum is usually isolated with either Cladosporium species or Aureobasidium species.
Health Effects: A common allergen. It also has the potential to produce type I fungal hypersensitivity reactions.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Fusarium species - A common soil fungus and plant pathogen. Fusarium is frequently isolated from plants and grains. It is often found in humidifiers and requires wet conditions to grow.
Health Effects: A type I allergen. Frequently involved in eye, skin and nail infections. Fusarium is the most common cause of mycotic keratitis and has been isolated from patients with a variety of infections. Some species produce mycotoxin. Food safety issues are related to some species of this genus.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Nigrospora species - Has been isolated from air and soil samples. Usually found in plant material as a saprobe.
Health Effects: It has been associated with type I allergic responses. No reported cases of infection.
References: St-Germain, Guy and Richard Summerbell. Identifying Filamentous Fungi: A Clinical Laboratory Handbook. California: Star Publishing Company., 1996.

Pithomyces species - Grows on dead grass in pastures and decaying plant material.
Health Effects: Causes facial eczema in ruminants.
References: St-Germain, Guy, and Richard Summerbell. Identifying Filamentous Fungi: A Clinical Laboratory Handbook. California: Star Publishing Co., 1996.

Polythrincium species - This fungus is often associated with leaves and other plant material. There are no reports of any clinical significance or allergenic properties.
References: Ellis, Martin B., Ellis, Pamela, Microfungi on Land Plants: An Identification Handbook. England, The Richmond Publishing Co. Ltd., 1997.

Rusts - From the group Uredinales, called Rusts due to the color of the spores, which are known for causing disease in plants.

Smuts/Myxomycetes - Smuts and Myxomycetes are parasitic plant pathogens. They are typically grouped together due to their association with plants, the outdoors and because they share similar microscopic morphology.
Health Effects: Can produce type I fungal hypersensitivity reactions.
References: Martin, G.W., C.J. Alexopoulos, and M.L. Farr. The Genera of Myxomycetes. Iowa City, Iowa: University of Iowa Press, 1983.

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FINAL REPORT
9/10/2019 1:09:34 PM

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769
Phone: 301-694-5687

Project Number: MV19028
P.O. Number: WV19028
Project Name: Wood Country DHHR
Collected Date: 9/5/2019 - 9/6/2019
Received Date: 9/9/2019 9:00:00 AM

Organism Descriptions

The descriptions of the organisms presented are derived from various reference materials. The laboratory report is based on the data derived from the samples submitted and no interpretation of the data, as to potential, or actual, health effects resulting from exposure to the numbers of organisms found, can be made by laboratory personnel. Any interpretation of the potential health effects of the presence of this organism must be made by qualified professional personnel with first hand knowledge of the sample site, and the problems associated with that site.

Stachybotrys species - This organism is rarely found in outdoor samples. It is usually difficult to find in indoor air samples unless it is physically disturbed because the spores are in a gelatinous mass. Grows well on wet media, preferably containing cellulose. It proliferates in the indoor environment with long term water damage, growing on wallpaper, gypsum board, and textiles. As a general rule, air cultures for Stachybotrys yields unpredictable results, mainly due to the fact that this fungus is usually accompanied by other fungi such as Aspergillus and Penicillium that normally are better aerosolized than Stachybotrys. This is a slow growing fungus on media. It does not compete well with other rapidly growing fungi. The black fungi grow on building material with high cellulose content and low nitrogen content. Appropriate media for the growth of this organism will have high cellulose content and low nitrogen content.
Health Effects: It has worldwide distribution and has been reported to cause dermatitis, cough, rhinitis, and headache, although no definitive reports of human infections have been verified. It has the ability to cause type I hypersensitivity. It is a documented mycotoxin producer.
References: Flannigan, Brian, Robert A. Samson, and J. David Miller, eds. Microorganisms in Home and Indoor Work Environments: Diversity, Health Impacts, Investigation, and Control. London and New York: Taylor & Francis, 2001.

Torula species - Torula is a saprophyte and therefore often found on plant material. It may be found on wood-containing products/materials.
Health Effects: Reported to produce type I fungal hypersensitivity.
References: Ellis, Martin B., Ellis, Pamela, Microfungi on Land Plants: An Identification Handbook. England, The Richmond Publishing Co. Ltd., 1997.

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Microbiology
Chain of Custody
Form 68, Revision 7, 5/18/18

SanAir ID Number: 19045756

Company: Boggs Environmental Consultants	Project Number: WV19028	Phone #: 3016945687
Address: 200 W Main Street	Project Name: Wood County DHHR	Phone #:
City, State, Zip: Middletown, MD 21769	Date Collected: 9/5/19 - 9/6/19	Fax #: 3018464246
Samples Collected By: Robert Warfel	P.O. Number: WV19028	Email:
Account #:		Email: allhands@boggsenvironmental.com

Sample Types		Analysis Types	Turn Around Time
AC	Air Cassette	A1 - Identification and Enumeration of Fungal spores, plus total dander, fiber, and pollen count	3/6/24/48 Hour
		A2 - Identification and Enumeration of Fungal spores only	3/6/24/48 Hour
T B S	Tape Bulk Swab	D1 - Direct Identification of Fungi	3/6/24/48 Hour
		D2 - Direct Identification of Mites, Insects, Pollen, etc.	3/6/24/48 Hour
		D3 – Direct Identification and Enumeration of Fungi	3/6/24/48 Hour
AP B S	Air Plate Bulk Swab	C1 - Culture Identification and Enumeration of Fungi only	5-10 Days
		C2 - Culture Identification and Enumeration of Bacteria only	2-4 Days
		C3 - Culture Identification and Enumeration of Fungi and Bacteria	5-10 Days
		C4 - Culture Identification and Enumeration of Thermophilic Bacteria with C2 or C3 analysis	2-4 or 5-10 Days
D	Dust	DA1 – Dust Mite Allergen Test	3/6/24/48 Hour

SanAir offers *Legionella* testing and other specialized culture analyses. Please call for details, COC and pricing.

Sample #	Sample Identification	Sample Type	Analysis Type(s)	Turn Around Time	Flow Rate (Liters/min)	Total Volume (L) or Area (in^2)	Time Start – Stop	
	Please See Attached BEC Sample Logsheet	AC	A 1	24 HR				

Special Instructions

Relinquished by	Date	Time	Received by	Date	Time
DL	9/6/19	1547	JG	9/9/19	9:00am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of $150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

BOGGS ENVIRONMENTAL CONSULTANTS

19095756

AIR SAMPLING LOG

Date: 9/5/19

BEC Onsite IH: Robby Warfel

Project Location: Parkersburg, WV

BEC Project No: WV19028

Project Manager: R. Robinson

Flow Rate Calibration (Rotameter, Dwyer Precision, Other): _____

Calibration Test Performed (Technician/Date): RT Wall

SAMPLE INFORMATION

Sample Number	Sample Location	Sample Description	Temp °F	Relative Humidity	Flow Rate LPM	Sampling Period			
						Begin	End	Total Minutes	Total Volume (L)
2879 9997	Room #103	Spare Trap	73.3°F	56.5%	15	1311	1321	10	150
2879 9994	Suite #110		73.2°	62.2%	15	1330	1340	10	150
2879 9988	Level 1A Landing Near Room #117		73.8°	63.4%	15	1403	1413	10	150
2879 9987	Storage Room Adjacent to Suite # 110		74.5°	62.2%	15	1416	1426	10	150
2879 9984	5th Floor Hallway Near Room # 515		77.4°	54.9%	15	1430	1440	10	150
2879 9980	South Exterior		85.8°	40.9%	15	1445	1455	10	150

Name: JWA WWF

Date: 9/5/19

JG 9/9/19 9:00am

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AIR SAMPLING LOG

Date: 9/6/19

BEC Onsite IH: Robby Warfel

Project Location: Parkersburg WV

BEC Project No: WV 19028

Project Manager: R Robinson

Flow Rate Calibration (Rotameter, Dwyer Precision, Other): _____

Calibration Test Performed (Technician/Date): _____

SAMPLE INFORMATION

Sample Number	Sample Location	Sample Description	Temp °F	Relative Humidity	Flow Rate LPM	Sampling Period			
						Begin	End	Total Minutes	Total Volume (L)
2879 9993	Room #103	Spare Trap	71.6°	54.3%	15	1015	1025	10	150
2880 0001	Suite #110		73.4°	57.7%	15	1001	1011	10	150
2879 9995	Level 1A Landing Near Room #117		73.0°	66.6%	15	950	1000	10	150
2879 9993	Storage Room Adjacent to Suite #110		73.5°	59.2%	15	950	1000	10	150
2879 9991	5th Floor Hallway Near Room #515		76.1°	57.1%	15	1002	1012	10	150
2879 9990	South Exterior		78.7°	48.0%	15	1016	1026	10	150

Name: _____

Date: 9/6/19

JG 9/9/19 9:00am

APPENDIX C

IAQ ENVIRONMENTAL TESTING LOCATIONS

FIRST LEVEL SAMPLING LOCATIONS

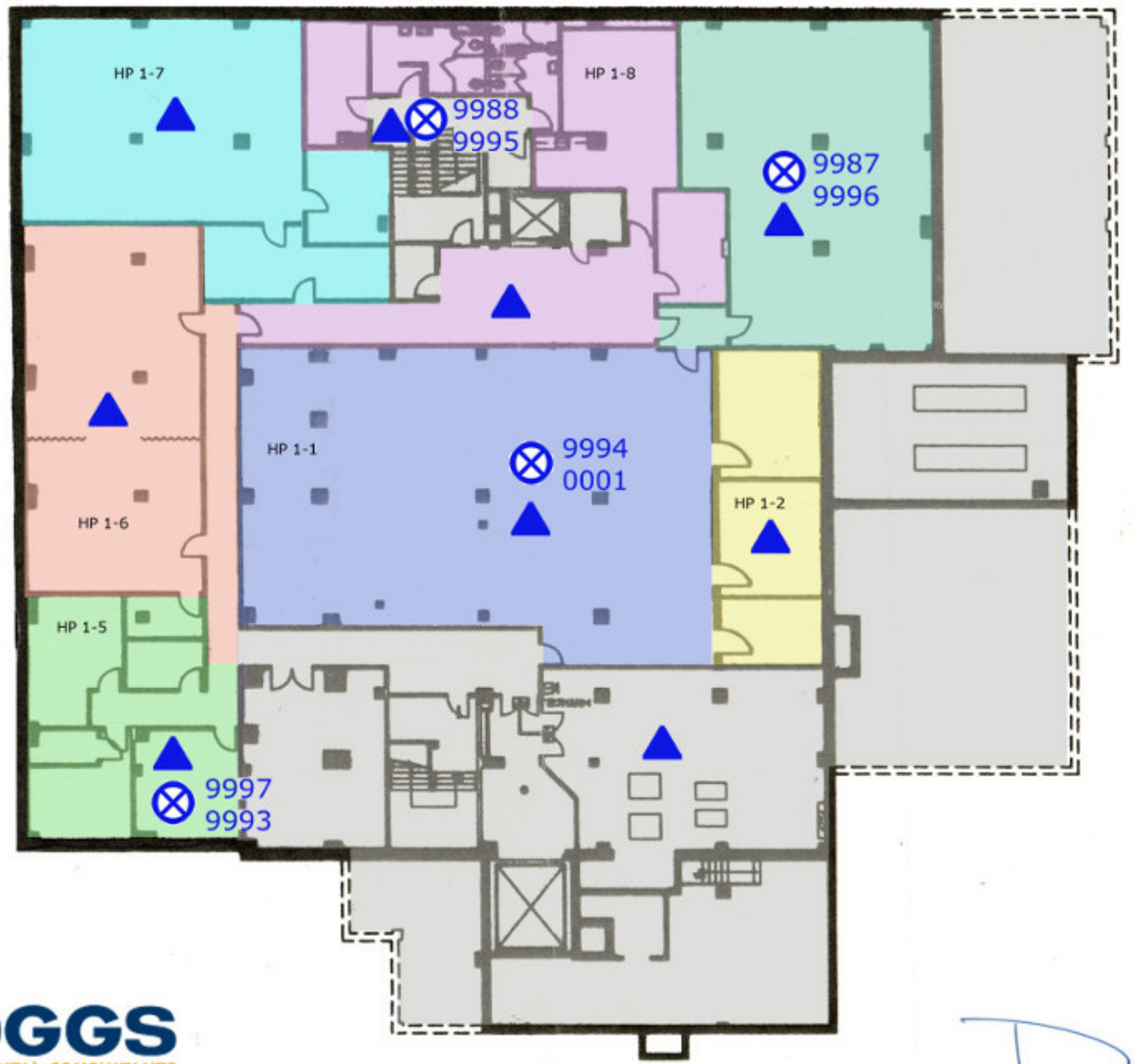
September 5, 2019
&
September 6, 2019

N

SYMBOL KEY

⊗ - Spore Trap Sampling Locations

▲ - Direct Read Sampling Locations



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SECOND & THIRD LEVEL SAMPLING LOCATIONS

September 5, 2019
&
September 6, 2019

N

SYMBOL KEY

⊗ - Spore Trap Sampling Locations

▲ - Direct Read Sampling Locations

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FOURTH & FIFTH LEVEL SAMPLING LOCATIONS

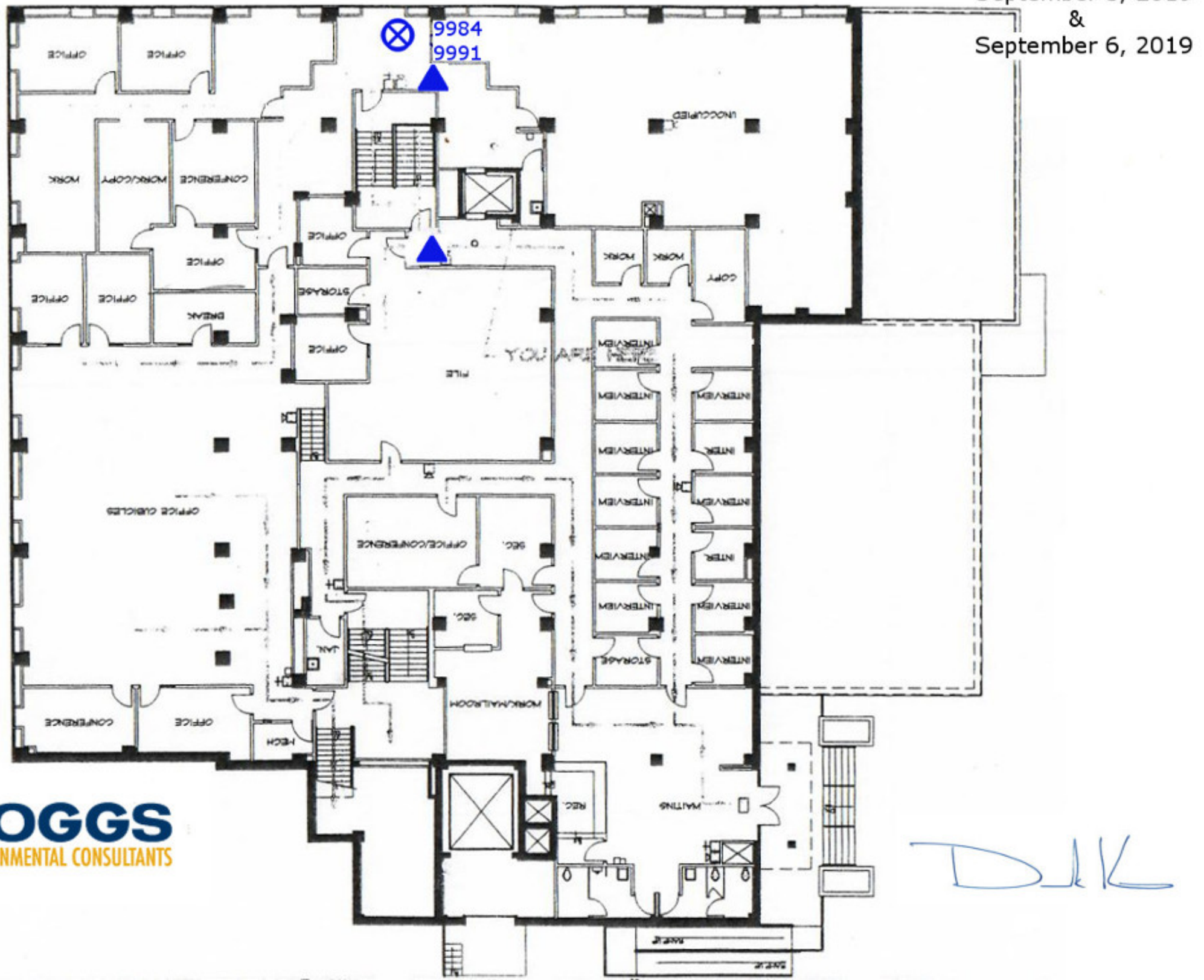
September 5, 2019
&
September 6, 2019

N

SYMBOL KEY

⊗ - Spore Trap Sampling Locations

▲ - Direct Read Sampling Locations



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APPENDIX D

IAQ PHOTOGRAPHIC DOCUMENATION

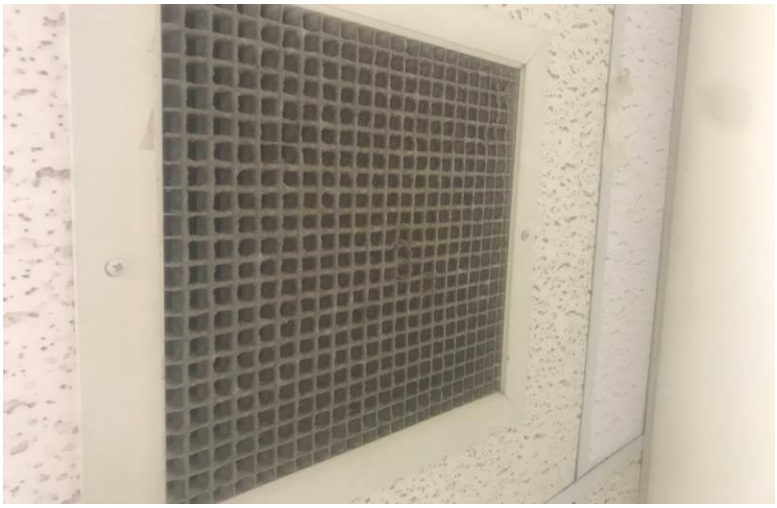
Visible Mold Growth & Water Staining on First Level Carpet

Visible Mold Growth on Supply Diffuser

Visible Mold Growth on Television

Visible Mold Growth on Briefcase & Luggage

Visible Mold Growth on Supply Diffuser

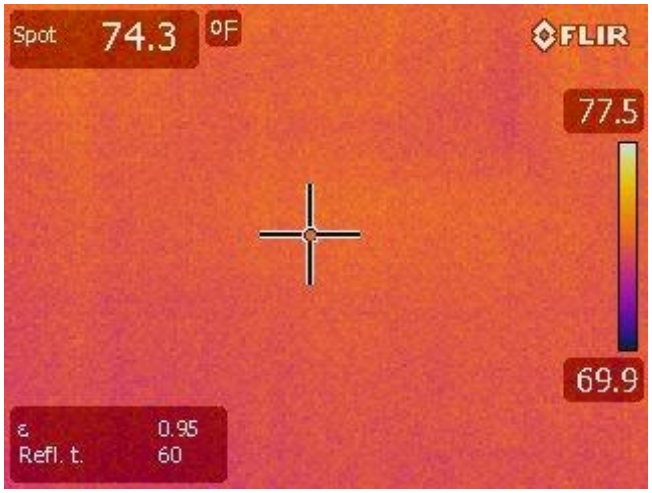


Visible Dust Loading on Return Vent

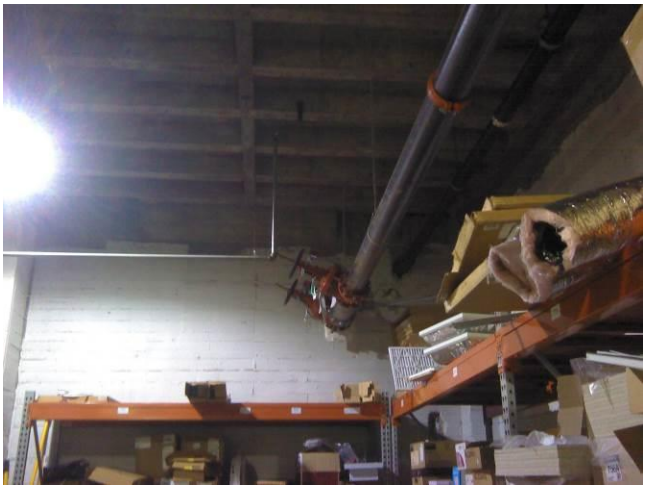
Visible Dust Accumulation on HVAC Ductwork

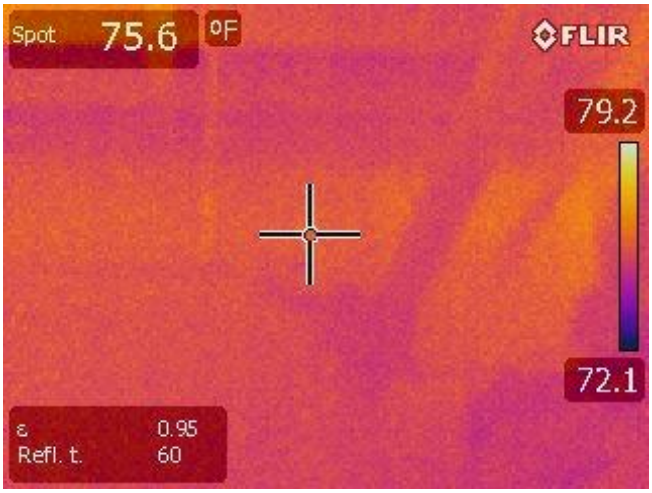
Visible Mold Growth on Plaster Walls

Visible Mold Growth on Carpet of Room #209

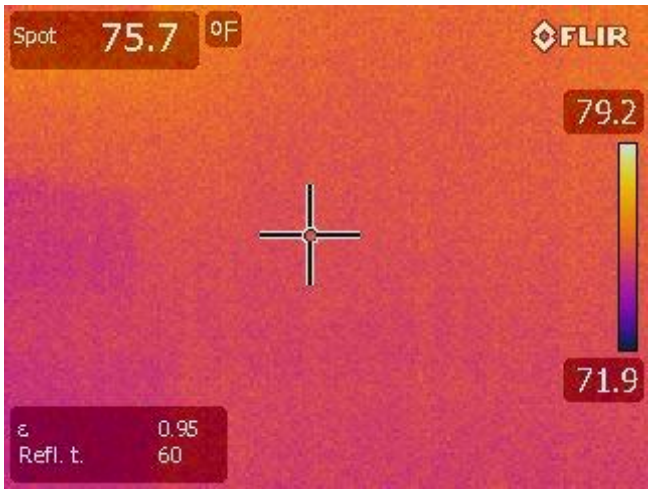


First Level Corridor Show not adverse conditions exist





Fist Level Pipe at Exterior Wall shows no adverse conditions exist at this location



First Level Microbial Growth on Column show current water infiltration

APPENDIX E

IAQ CONTAMINANTS LEVEL – EXPANDED LIST

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SUMMARY OF IAQ GUIDELINES

PARAMETER	BEC Recommendations	ASHRAE	OSHA PEL *	ACGIH TLV **	NIOSH REL ***
Ambient Temperature	68 - 75 (winter)	68 - 75 (winter)	N/A	N/A	N/A
	73 – 79 (summer)	73 - 79 (summer)			N/A
Airborne Asbestos	0.1 F/cc	N/A	0.1 F/cc	N/A	0.1 F/cc
Airborne Mold	Spore Count < 30% of Exterior Ambient	N/A	N/A	N/A	N/A
Asbestos Containing Building Construction Materials	> 1.0 %	N/A	> 1.0 %	N/A	> 1.0 %
Airborne Lead	50 µg/m^3	N/A	50 µg/m^3	50 µg/m^3	< 100 µg/m^3
Carbon Dioxide	1,000 ppm	1,000 ppm	5,000 ppm	5,000 ppm	5,000 ppm
	(<800 ppm preferred)				
Carbon Monoxide	9 ppm	9 ppm	50 ppm	25 ppm	35 ppm
Combustible Gases (Lower Explosive Limit)	< 20% of LEL	< 20% of LEL	< 20% of LEL	< 20% of LEL	< 20% of LEL
Hydrogen Sulfide	0.01 ppm	N/A	20 ppm	10 ppm	10 ppm
Formaldehyde	0.1 ppm (office)	N/A	0.75 ppm	0.3 ppm	0.016 ppm
	0.03 ppm (home)				
Fibers-In-Air	0.1 F/cc	N/A	0.1 F/cc	N/A	0.1 F/cc
Lead-In-Dust	HUD/US EPA 40.0 ppm (Floors) 250 ppm (Window Sills)	N/A	N/A	N/A	N/A
Ozone	0.08 ppm	N/A	0.1 ppm	0.05 ppm	N/A
Oxygen	19.5 % ≤ Safe ≤ 23.5 %	19.5 ≤ Safe ≤ 23.5 %	19.5 % ≤ Safe ≤ 23.5 %	19.5 ≤ Safe ≤ 23.5 %	19.5 ≤ Safe ≤ 25.0 %
Nitrogen Dioxide	5 ppm	N/A	1 ppm Ceiling	3 ppm	1 ppm STEL
Particulate Matter	US EPA NAAQS Standard 0.15 mg/m^3 (PM_{10}) (150 µg/m^3) 24-hr 0.065 mg/m^3 ($PM_{2.5}$) (65 µg/m^3) 24-hr	N/A	15 mg/ m^3 (Total Dust)	10 mg/m^3 (Total Dust)	N/A
			5 mg/ m^3 (Respirable)	3 mg/m^3 (Respirable)	N/A
Relative Humidity	20% - 60 %	30% - 60 %	N/A	N/A	N/A
Sulfur Dioxide	5.0 ppm	N/A	5.0 ppm	2.0 ppm	2.0 ppm
Total Volatile Organic Compounds	LEED – NC Guidelines 500 µg/m^3	N/A	N/A	N/A	N/A

* Occupational Safety and Health Administration Permissible Exposure Limit -- this level is a time-weighted average and is an enforceable standard that must not be exceeded during any eight-hour work shift of a 40-hour work week.

** American Conference of Governmental Industrial Hygienists Threshold Limit Value -- this level is a recommended time-weighted average upper limit exposure concentration for a normal eight to 10-hour workday and a 40-hour work week.

*** National Institutes for Occupational Safety & Health Recommended Exposure Limit -- For NIOSH RELs, "TWA" indicates a time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek.

N/A – Not Applicable or Not Established

FLAMMABLE/EXPLOSIVE LIMITS OF VARIOUS GASES & VAPORS (measured in % of volume by air)				
	COMPOUNDS		**LFL/LEL**	**UFL/UEL**
Alcohol	Methanol	CH_3OH	6.7	36
	Ethanol	CH_3CH_2OH	3.3	19
	Propanol	$CH_3CH_2CH_2OH$	2.2	14
Esters	Ethyl Acetate	$CH_3COOC_2H_5$	2.2	11
Ethers	Ethyl Ether	$CH_3CH_2OCH_2CH_3$	1.9	36
	Methyl Ether	CH_3OCH_3	3.4	27
Hydrocarbons	Methane	CH_4	5.0	15
	Propane	$CH_3CH_2CH_3$	2.1	9.5
	Butane	$CH_3CH_2CH_2CH_3$	1.8	8.4
	Hexane	$CH_3CH_2CH_2CH_2CH_2CH_3$	1.2	7.4
	Heptane	$CH_3CH_2CH_2CH_2CH_2CH_2CH_3$	1.05	6.7
	Acetylene	$HC\underline{=}CH$	2.5	100
	Gasoline (unleaded)		1.2	7.1
	Jet Fuel (JP-4)		1.3	8
	Naphtha		1.7	4.8
	Turpentine		0.7	
Cyclic Compounds	Toluene	$C_6H_5CH_3$	1.2	7.1
	Xylene	$C_6H_4(CH_3)_2$	1.1	6.4
	Ethylene Oxide	CH_2OCH_2	3.6	100
Ketones	Acetone	CH_3COCH_3	2.6	13
	Methyl Ethyl Ketone	$CH_3COC_2H_5$	1.4	10
Inorganic Gases	Carbon Monoxide	CO	12.5	74
	Hydrogen Sulfide	H_2S	4.0	44
	Ammonia	NH_3	15	28
	Hydrogen	H_2	4	75

Lower Explosive Limit (LEL) / Lower Flammable Limit (LFL)

The lower explosive limit (LEL) or lower flammable limit (LFL) of a combustible gas is defined as the smallest amount of the gas that will support a self-propagating flame when mixed with air (or oxygen) and ignited. In gas-detection systems, the amount of gas present is specified in terms of % LEL: 0% LEL being a combustible gas-free atmosphere and 100% LEL being an atmosphere in which the gas is at its lower flammable limit. The relationship between % LEL and % by volume differs from gas to gas. For data on other gases, refer to the most recent edition of the Handbook of Chemistry and Physics published by the C.R.C. Press. Typical settings for combustible gas detection units, the alarm circuit are set at 20% for the low alarm, 40% for the high alarm and 60% for the high-high alarm.

The LEL of a gas is affected by the temperature and pressure: as the temperature increases, the LEL decreases and hence the explosion hazard increases; the relationship between LEL and pressure is fairly complex, but at approximately one atmosphere- a pressure increase usually lowers the LEL.