FROEHLING & ROBERTSON, INC.
Engineering Stability Since 1881

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Record No: 62M-0589

March 8, 2011

City of Martinsville
Assistant City Manager
55 West Church Street
P.O. Box 1112
Martinsville, Virginia 24114
Phone: 276.403.5155
Fax: 276.252.7091

Attention: Mr. Leon Towarnicki (ltowarnicki@ci.martinsville.va.us)

Re: Limited Mold Survey with Remediation Protocol
West Piedmont Business Development Center
22 East Church Street
Martinsville, Virginia 24112
PO: 00001338-00

Mr. Towarnicki:

It is F&R's understanding that the West Piedmont Business Development Center (WPBDC) facility located in the City of Martinsville, Virginia was remodeled circa 2002. In September 2010, a roof leak occurred on the upper (third) level in the hall way between rooms 318B, 324, and 321 of the facility. In late summer 2010, visible mold was observed in several rooms at the facility, notably within rooms 309, 301, and 300B. Following the identification of visible mold, Johnson Controls repaired multiple nonfunctional thermostats and balanced the HVAC system. Following the repair work, Dusty Ducts of Lynchburg, Virginia conducted duct cleaning activities at the site. The visible mold was not abated; however, isolation of the heaviest impacted rooms has been attempted. F&R notes that the facility uses multiple HVAC units with units dedicated to each floor. F&R conducted a limited mold survey of the facility on February 24, 2010. It should be noted that, during the conduct of the survey, F&R was documenting the sample locations using an outdated set of plans. The locations provided in this report reflect current room numbers; the locations noted in the chain of custody and certificates of analysis reflect the older room numbers.

BACKGROUND AND PROCEDURE

F&R performed mold air testing to profile the air in the facility with regards to fungal air quality. Elevation of fungal air counts within these areas can be used as an indicator of the possible presence of fungal growth generated by sources of moisture within a building. We note, however, that the absence of elevated counts does not necessarily suggest the absence of moisture damage or lack of fungal growth.

For analysis of airborne fungal spores, samples were collected onto Allergenco-D disposable Indoor Air Quality (IAQ) Air Monitoring Cassettes. The samples were collected at a flow rate of 15 liters per minute (lpm) over a 10-minute period. Analytical data was requested for the total number of spores per cubic meter of air (count/m^3).

F&R also collected two direct lift tape samples: one from the apparent mold in room 309 from the wall, chairs, and folding louvered doors and one from the door jamb at room 300B. The tape samples were collected by pressing a clean, prepared slide with a transparent adhesive collection area across the surface where suspect microbial growth was observed. A slide cover was then placed over the collection surface and the entire slide was placed in a sealed container. It is important to note that this is a qualitative test and is only indicative of the location sampled.

Sanair Laboratories, Microbiology Laboratory located in Powhatan, Virginia performed all sample analysis. Sanair is an AIHA EMLAP accredited laboratory for microbial analysis.

F&R also measured the moisture content in select building materials using a moisture meter. Moisture readings were collected using a Protimeter® Moisture Measurement System (MMS) moisture meter. The instrument may be operated in either of two independent modes:

> The non-destructive "search mode" uses radio-frequency induction to detect moisture in a substrate. Using the search mode, the Protimeter is capable of detecting moisture in solid, homogeneous materials at depths up to 10 millimeters (0.39 inches). Readings were collected at approximately 1 to 2-foot intervals along the surfaces being measured. When operated in search mode, the Protimeter produces qualitative readings ("dry", "at risk", "wet") along with a numerical indication (relative) of the moisture content on a scale from 0 to 1000. In general, "Moisture Content (MC)" values of less than 170 are considered "dry," values greater than or equal to 170 but less than 200 are considered "at risk" for moisture damage, and values of 200 or greater are considered "wet."
>
> The Protimeter may also be used in "measure mode" to obtain actual moisture percentage readings in wood and other solid, non-conductive materials. Measurements are taken by inserting the pins of a moisture probe into the material

being tested. For wood substrates, the moisture percentage is expressed as "% Moisture Content (MC)"; for other materials this number is expressed as "% Wood Moisture Equivalent (WME)". In general, %MC or %WME values of less than 17 are considered "dry," values greater than or equal to 17 but less than 20 are considered "at risk" for moisture damage, and values of 20 or greater are considered "wet."

Note: This was not a comprehensive building moisture survey and only selected areas of the building were tested using non-intrusive techniques.

All sampling was performed under the general direction of a Certified Industrial Hygienist (CIH).

FINDINGS

TABLE I – Mold Testing Results – February 24, 2010

Sample Number	Sample Type	Sample Location	Analytical Results (count/$m^{3)}$	
AS-1	Air Cassette	Background # 1 – South of 1st Floor Entry	Total Fungal Spores	347
AS-2	Air Cassette	Room 101 with doors open	Total Fungal Spores	**1,273**
AS-3	Air Cassette	Room 202 @ Hallway	Total Fungal Spores	**553**
AS-4	Air Cassette	Room 211 @ Doorway to Room 203	Total Fungal Spores	347
AS-5	Air Cassette	2nd Floor Stairwell	Total Fungal Spores	**1,060**
AS-6	Air Cassette	Room 314 @ Hallway	Total Fungal Spores	207
AS-7	Air Cassette	Suite 317 – Executive Director's Office	Total Fungal Spores	140
AS-8	Air Cassette	Hall @ Room 321 – Former Roof Leak Area	Total Fungal Spores	160
AS-9	Air Cassette	Room 309 – Training Room	Total Fungal Spores	**427**
AS-10	Air Cassette	Suite 300/301 – Doorway between rooms	Total Fungal Spores	**4,873**
AS-11	Air Cassette	Hall @ Rooms 304 and 305	Total Fungal Spores	**2,352**
AS-12	Air Cassette	Background # 2 – North of 3rd Floor Entry	Total Fungal Spores	360

Sample Number	Sample Type	Sample Location	Analytical Results (count/m$^{3)}$
T1	Direct	Room 309 – Wall, Chair, Louvered Door	*Aspergillus sp.* Heavy
T2	Direct	Room 30o B Door Jamb	*Aspergillus/Penicillium* Moderate

Key: Count/m^3 = spores per cubic meter of air
Light = Possible indication of growth; some evidence of mycelial fragments, 10%-25% of tape covered
Moderate = Probable indication of growth; abundant evidence of mycelial fragments, 25%-50% of tape covered
Heavy = Significant indication of growth; evidence of mycelial fragments throughout, 50%-100% of tape covered

Note: There are currently no accepted regulatory standards or guidelines with respect to acceptable microbial levels inside buildings. This data has been interpreted qualitatively using general industry standards and previous experience. In general, industry standards call for inside microbial levels to be less than 25%-50% of outdoor levels in buildings with mechanically filtered air.

CONCLUSIONS

1. Based upon our observations, visible mold growth and/or water damage was noted in the following areas:

    - In the mechanical room on the first floor, on the inside of the door to Room 101,
    - In Room 309, the training room, on walls, fixtures, chairs, and doors,
    - On the partition wall in Room 301, which is shared with Room 300 A, above the window,
    - On the door and door jamb at the door from Room 300 A to Room 300 B
    - In the stairwell as evidenced by the 12x12 floor tiles curling at the edges, and
    - In room 211 on the carpet, as evidenced by apparent water damage.

2. Quantitative moisture readings taken from select wood framing and finish materials within the structure were in the “dry” range.

3. The direct tape sample collected from suspect mold growth on the wall, chair, and louvered door in Room 309 indicated heavy spore concentrations of *Aspergillus sp.*

4. The direct tape sample collected from suspect mold growth on the door jamb between Rooms 300 A and 300 B indicated moderate spore concentrations of *Aspergillus/Penicillium.*

5. Based upon the results of airborne spore count sampling data, total spore count levels detected in multiple areas inside the facility were elevated when compared to outside background levels. In samples collected in Room 101 (with the doors open), in the doorway of Room 202, in Room 211 near the doorway with Room 203, in the second floor stairwell, in Room 309, in the doorway between Rooms 301 and 300 A, and in the hall at Rooms 304 and 305, spore counts for the specific mold genera *Aspergillus/Penicillium* were significantly elevated when compared to the outside mold spore background levels.

   Additionally, concentrations of *Cladosporium sp.* were slightly elevated when compared to the outside mold spore background levels in Room 101, in Room 309, and in at the door between Rooms 300 A and Room 301. These elevations were relatively minor and are not considered significant.

6. While the highest concentrations of mold spores were detected in the samples collected on the third floor, the presence of elevated spore counts in several samples collected on the first and second floor and the contiguity of some of the areas indicates that there is transfer of mold spores throughout the facility. In addition, it was reported that the roof leak which occurred circa September 2010 was quickly stopped and the wetted materials dried; however, it is our understanding that some of the water damaged materials (ceiling tiles, etc.) that were removed during the cleanup were stockpile on the third floor in the area impacted by the roof leak. This practice may have also contributed to elevations in mold growth that were detected in the current airborne spore counts.

7. The following table summarizes environmental conditions at the time of the sampling:

Location	Temperature °F	Relative Humidity (%)
Outside	40.2	80.2
First Floor	65.2	33.9
Second Floor	69.2	≤20.0
Third Floor	67.7	24.5

   Additionally, light rain and drizzle began approximately 5 minutes prior to the first sample collection and continued throughout the testing period.

RECOMMENDATIONS

1. Based on our understanding of past conditions at the site, F&R believes that the mold growth on the third floor is the result of an imbalanced HVAC which resulted in high ambient humidity levels; reportedly, the unit has since been repaired. Moisture loading from roof leaks may have also occurred on the third floor which has contributed to the mold growth. Active mold growth does not appear to be continuing on the third floor since the moisture sources appear to have been corrected (removed).

   Mold growth in the first floor mechanical room is likely the result of condensation on the door where the occupied space of the building meets the mechanical room and the temperature and humidity gradient is significant.

   Elevated mold counts on the second floor and in the stairwell could be due to humidity issues related to HVAC problems and spreading of mold spores from other impacted areas; or other issues not identified during this survey that could include roof leaks or moisture intrusion issue along the exterior wall(s).

2. Based upon data obtained from this survey and visual observations, F&R recommends remediation of all water damaged/mold impacted materials in the facility. F&R recommends surficial cleaning of finishing materials throughout the building with particular attention to the vicinity of those areas where high counts were documented: Room 101, the stairwell, Room 202, Room 309, and the area including the Room 300/301 suite, the lobby, and the hallway past Room 305.

   Based on our observations made at the time of the survey and information relayed to us concerning past events at the site, it is anticipated that mold growth is limited and surficial and is not anticipated to be present inside wall cavities or behind moldings or other materials.

   Rooms 309, and 300/301 Suite:

   In order to minimize the spread of contamination during remediation, F&R recommends full containment as well as removal and cleaning of the contents of the rooms during cleaning in these areas where the highest spore counts were documented. Use plastic barriers and tape to create negative pressure containment. Seal all HVAC vents in the work area(s), as well as all penetrations and openings. Pressure differential in the containment should be -0.02 inches of water gauge between the outside and inside of containment. Provide HEPA-filtered local exhaust ventilation (negative air machine) directly adjacent to the area(s) being cleaned. Maintain negative pressure and HEPA filtration continuously inside the containment during remediation activities and prior to clearance sampling. Keep plastic barriers in place until the Industrial Hygienist grants clearance. Note: Discarding of

impacted upholstered chairs and other porous materials may be required if it is found that the cleaning is ineffective.

Clean all surfaces and mold impacted materials and HVAC duct exteriors, with a wide-acting anti-microbial agent, followed by HEPA vacuuming. If mold is discovered on solid wood surfaces such as framing, abatement may require sanding of the surface along with a treatment with a wide-acting anti-microbial agent, and application of encapsulant. If heavy growth is present, removal of the item may be necessary. Concurrent with remediation, the contractor should also verify that all materials to remain have been adequately dried. This should be verified with a calibrated moisture meter.

Entire Building:

F&R recommends a general cleaning of the entire building, with particular attention to areas where elevated mold spore counts were detected in the hallway and adjacent rooms around 305, Room 101, Room 202, the side stairwell.

This recommendation for cleaning the entire facility is based on the air sampling results which indicate that surficial mold spore contamination is likely to be widespread in settled dust throughout the remainder of the facility. Following containment and cleaning of the areas on the third floor specified above, F&R recommends that the remainder of the entire facility undergo a thorough cleaning following guidelines described in EPA's March 2001 document "Mold Remediation in Schools and Commercial Buildings." Since the contamination is likely to be to be surficial, F&R recommends cleaning in accordance with Table 2 – Small Areas (<10 feet). This will include cleaning of carpets, furnishings, and surface areas by wet wiping, and HEPA vacuuming.

In order to minimize the spread of contamination during cleaning and to prevent recontamination of cleaned areas, provide HEPA-filtered local exhaust ventilation (negative air machine) directly adjacent to the work area. Maintain HEPA filtration continuously during all cleaning activities. F&R recommends that each area be addressed sequentially, by beginning at one end of the building and working systematically toward the opposite end, cleaning all areas along the way and isolating the cleaned areas from un-cleaned areas by the placement of critical barriers at hallways and access doors.

Clean all surfaces and HVAC duct exteriors, with soap and water followed by HEPA vacuuming. If surficial mold is observed, wet wipe the impacted area with a wide-acting antimicrobial agent followed by HEPA vacuuming.

F&R also recommends "air washing" of the entire facility during remediation activities with HEPA-filtered negative air machines, as well as "aggressive" air disturbance of the facility interior during remediation in order to agitate spores which have been surficially deposited

and ensure that they are captured by the HEPA filters and removed.

3. Based on the air sampling results, F&R also recommends a thorough cleaning of the HVAC system serving the facility by a qualified contractor be performed concurrent to or after all remediation work is completed. Components that cannot be cleaned may require replacement. F&R recommends that any cleaning of the ducts and the HVAC unit be in accordance with the National Air Duct Cleaners Association (NADCA) guidelines.

4. All remediation activities should be performed in general accordance with the guidelines described in EPA's March 2001 document "Mold Remediation in Schools and Commercial Buildings." F&R recommends following the procedures given in Table 2: "Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water"

5. F&R recommends that all remediation work be performed by a qualified and experienced mold remediation contractor. All workers performing this work should wear proper personal protective equipment (PPE) including HEPA filtered respirators and disposable clothing (reference also appropriate OSHA standards for PPE).

6. In general, F&R recommends that the temperature and relative humidity levels inside the facility be maintained within the acceptable indoor guidelines as outlined by ASHRAE.

    a. Acceptable indoor relative humidity range is 20-60% RH (reference ASHRAE 55-2003).
    b. Acceptable indoor summer temperature range is 73-79 °F (reference ASHRAE 55-2004).
    c. Acceptable indoor winter temperature range is 68-74 °F (reference ASHRAE 55-2004).

7. Post-remediation sampling should be performed to verify reduction in mold levels. Prior to final clearance testing, the industrial hygienist will require that the negative air machines be turned off for a period of 24 - 48 hours.

8. Although outside the scope of work, F&R recommends that owner consult with an engineer or qualified contractor to verify that all sources of moisture intrusion have been identified, corrected, and remaining materials dried prior to, or concurrently with, any future remediation. Potential sources for excessive moisture intrusion include, but are not limited to, improper drainage and foundation water proofing, gutters and downspouts that discharge adjacent to the foundation, failing roofing materials, clogged exterior gutters/drains, pipe leaks, inadequate ventilation or air flow, or excessive humidity due to imbalances in HVAC systems.

9. Complete remediation of all microbial organisms within a building cannot be guaranteed. It is important to note that the reported mold levels are only reflective of conditions at the time of this test and that mold populations can vary over time, depending upon a number of conditions, including environmental factors (i.e., temperature and relative humidity). Because of the nature of this environment, a complete remediation of this space is difficult. If significant mold growth reappears, or if the occupants experience prolonged allergic-type health complaints, they should seek further investigation of the problem.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this letter, please do not hesitate to contact us.

Sincerely yours,
FROEHLING & ROBERTSON, INC.

Jesse D. Phillips
Environmental Scientist

Gregory L. Whitt
Environmental Group Manager

Encl.: References
Limitations
Analytical Reports

REFERENCES

Institute of Inspection Cleaning and Restoration Certification. IICRC S500: Standard and Reference Guide for Professional Water Damage Restoration. 2nd ed. Vancouver, WA: IICRC, 1999.

Institute of Inspection Cleaning and Restoration Certification. IICRC S520: Standard and Reference Guide for Professional Mold Remediation. 1st ed. Vancouver, WA: IICRC, 2003.

Macher, Janet, ed. Bioaerosols: Assessment and Control. Cincinnati: ACGIH, 1999.

U.S. Environmental Protection Agency. Office of Air and Radiation. Mold Remediation in Schools and Commercial Buildings. Washington, D.C.: Government Printing Office, March 2001.

LIMITATIONS

This report has been prepared for the exclusive use of the City of Martinsville and/or its authorized agents. This report has been prepared in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Our conclusions and findings are based, in part, upon information provided to us by others and our site observations. We have not verified the completeness or accuracy of the information provided by others. Our observations and findings are based upon conditions readily visible at the site at the time of our site visit, analytical tests, and upon current accepted industry standards. The scope of services performed was limited to those requested by the Client and does not constitute a full microbial assessment of the site or a comprehensive moisture survey of the site. **Because of the nature of this type of work (microbial contamination reduction) and the difficulties involved in conducting remediation work, F&R cannot guarantee that the methods or recommendations described in this report will eliminate all microbial contamination within the building, or prevent return of microbial contamination or re-growth under favorable conditions. Since monitoring the performance of the remediation work is beyond F&R's scope of services, F&R also cannot be held responsible for the performance or execution of the remediation work.**

It is important to note that microbial levels may fluctuate dependent upon a variety of factors including the weather and time of year. The data provided in this study is only indicative of conditions sampled at the immediate time of the study. Professional services and scientific analyses have been performed, and recommendations prepared in accordance with customary principles in the fields of engineering and analytical science. This warranty is in lieu of all other warranties expressed or implied. The work performed in conjunction with this assessment and the data developed is intended as a description of available information at the dates and locations given. This report does not warrant against future operations or conditions, nor does it warrant against extant, or future, conditions of a type or at a location not investigated.

F&R, by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies any conditions at the site that may present a potential danger to public health, safety, or the environment. In areas that require notification of local, state, or federal agencies as required by law, it is the Client's responsibility to so notify. Under this scope of services, F&R assumes no responsibility regarding any response actions or additional studies, which may be required as a result of these findings. Response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements, and should be performed by appropriate trained and qualified personnel, as warranted.

SanAir Technologies Laboratory

Analysis Report

prepared for

Froehling and Robertson Inc.

Report Date: 2/28/2011
Project Name: WPBDC
Project #: 62M-0589
SanAir ID#: 11002485

NVLAP LAB CODE 200870-0

AIHA LAP, LLC ACCREDITED LABORATORY ENVIRONMENTAL MICROBIOLOGY ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #102952

Virginia SBE Certification # 652931

Texas Licensed Mold Analysis Laboratory License # LAB0166

SanAir Technologies Laboratory

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SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
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Froehling and Robertson Inc.
3015 Dumbarton Road
Richmond, VA 23228

February 28, 2011

SanAir ID # 11002485
Project Name: WPBDC
Project Number: 62M-0589

Dear Jesse Phillips,

We at SanAir would like to thank you for the work you recently submitted. The 14 sample(s) were received on Monday, February 28, 2011 via FedEx. The final report(s) is enclosed for the following sample(s): AS1, AS2, AS3, AS4, AS5, AS6, AS7, AS8, AS9, AS10, AS11, AS12, T1, T2.

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
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
14 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number
11002485
FINAL REPORT

Name: Froehling and Robertson Inc.
Address: 3015 Dumbarton Road
Richmond, VA 23228

Project Number: 62M-0589
P.O. Number: 62M-0589
Project Name: WPBDC

Collected Date: 2/24/2011
Received Date: 2/28/2011 9:40:00 AM
Report Date: 2/28/2011 3:32:54 PM
Analyst: Tucker, Crystal

Air Cassette Analysis

ND = None Detected

SanAir ID Number	11002485-001			11002485-002			11002485-003			11002485-004		
Analysis Using STL:	105C			105C			105C			105C		
Sample Number	AS1			AS2			AS3			AS4		
Sample Identification	Background 1 - South Of 1st Fl Entry			Room 101 W/ Doors Open			Room 202 @ Hallway			Room 211 @ Doorway To Room 203		
Sample Type	Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D		
Volume	150 Liters			150 Liters			150 Liters			150 Liters		
Limit of Detection	7 Count/M³			7 Count/M³			7 Count/M³			7 Count/M³		
Background Density	2			3			2			2		
Other	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Mycelial Fragments	5	33	n/a	10	67	n/a	1	7	n/a	1	7	n/a
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores	20	133	38	16	107	8	2	13	2			
Aspergillus/Penicillium	5	33	10	131	873	69	78	520	94	51	340	98
Basidiospores	22	147	42	13	87	7	1	7	1			
Bipolaris/Drechslera												
Cladosporium species	2	13	4	24	160	13	1	7	1			
Curvularia species				1	7	< 1						
Epicoccum species	2	13	4									
Pestalotia- / Pestalotiopsis-like				1	7	< 1						
Pithomyces species												
Smuts/Myxomycetes	1	7	2	5	33	3	1	7	1	1	7	2
Total	**52**	**347**		**191**	**1273**		**83**	**553**		**52**	**347**	

Signature: Crystal Tucker Date: 2/28/2011 Reviewed: L. Claire Macdonald Date: 2/28/2011

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
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SanAir ID Number
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FINAL REPORT

Name: Froehling and Robertson Inc.
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Analyst: Tucker, Crystal

Air Cassette Analysis

ND = None Detected

SanAir ID Number	11002485-005			11002485-006			11002485-007			11002485-008		
Analysis Using STL:	105C			105C			105C			105C		
Sample Number	AS5			AS6			AS7			AS8		
Sample Identification	2nd Floor Stairwell			Room 314 @ Hallway			Suite 317 - Exec. Dir. Office			Hall @ Room 321 - Former Roof Leak		
Sample Type	Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D		
Volume	150 Liters			150 Liters			150 Liters			150 Liters		
Limit of Detection	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**	**%**
Mycelial Fragments	4	27	n/a	10	67	n/a	5	33	n/a	6	40	n/a
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores	3	20	2	4	27	13	1	7	5	3	20	12
Aspergillus/Penicillium	142	947	89	17	113	55	9	60	43	14	93	58
Basidiospores	11	73	7	2	13	6	1	7	5	2	13	8
Bipolaris/Drechslera							1	7	5			
Cladosporium species	1	7	< 1	6	40	19	5	33	24	1	7	4
Curvularia species												
Epicoccum species							2	13	10			
Pestalotia- / Pestalotiopsis-like												
Pithomyces species				1	7	3	1	7	5			
Smuts/Myxomycetes	2	13	1	1	7	3	1	7	5	4	27	17
Total	**159**	**1060**		**31**	**207**		**21**	**140**		**24**	**160**	

Signature: Crystal Tucker Date: 2/28/2011 Reviewed: L. Claire Macdonald Date: 2/28/2011

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number
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FINAL REPORT

Name: Froehling and Robertson Inc.
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Project Number: 62M-0589
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Project Name: WPBDC

Collected Date: 2/24/2011
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Analyst: Tucker, Crystal

Air Cassette Analysis

ND = None Detected

SanAir ID Number	11002485-009			11002485-010			11002485-011			11002485-012		
Analysis Using STL:	105C			105C			105C			105C		
Sample Number	AS9			AS10			AS11			AS12		
Sample Identification	Room 309 - Training Room			Suite 300 / 301 - Doorway			Hall @ Rooms 304 & 305			Background #2 - North Of 3rd Fl Entry		
Sample Type	Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D			Air Cassette - Allergenco-D		
Volume	150 Liters			150 Liters			165 Liters			150 Liters		
Limit of Detection	7 Count/M³			7 Count/M³			6 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**	**%**
Mycelial Fragments	11	73	n/a	24	160	n/a	13	79	n/a	1	7	n/a
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Ascospores				2	13	< 1	1	6	< 1	26	173	48
Aspergillus/Penicillium	51	340	80	714	4760	98	378	2291	97	15	100	28
Basidiospores	2	13	3	2	13	< 1	2	12	< 1	4	27	7
Bipolaris/Drechslera							1	6	< 1			
Cladosporium species	9	60	14	13	87	2	6	36	2	3	20	6
Curvularia species	1	7	2									
Epicoccum species												
Pestalotia- / Pestalotiopsis-like												
Pithomyces species	1	7	2									
Smuts/Myxomycetes										6	40	11
Total	**64**	**427**		**731**	**4873**		**388**	**2352**		**54**	**360**	

Signature: Crystal Tucker Date: 2/28/2011 Reviewed: L. Claire Macdonald Date: 2/28/2011

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
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SanAir ID Number

11002485

FINAL REPORT

Name: Froehling and Robertson Inc.
Address: 3015 Dumbarton Road
Richmond, VA 23228

Project Number: 62M-0589
P.O. Number: 62M-0589
Project Name: WPBDC

Collected Date: 2/24/2011
Received Date: 2/28/2011 9:40:00 AM
Report Date: 2/28/2011 3:32:54 PM
Analyst: Tucker, Crystal

Direct Identification Analysis

SanAir ID: 11002485-013 Sample #: T1 ID: Room 309 - Wall, Chair, Door

D1-Direct ID Analysis on Tape using STL 104
Direct ID of Mold

Fungi	Estimated Amount
Aspergillus species	Heavy

SanAir ID: 11002485-014 Sample #: T2 ID: Room 300 Door Jamb

D1-Direct ID Analysis on Tape using STL 104
Direct ID of Mold

Fungi	Estimated Amount
Aspergillus/Penicillium	Moderate

Certification

Signature: Crystal Tucker Date: 2/28/2011

Reviewed: L. Claire Macdonald Date: 2/28/2011

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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.

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"]

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.

ASPERGILLUS SPECIES - A genus of fungi containing over 180 recognized species. Members of this genus have been recovered from a variety of habitats, but are especially common as saprophytes on decaying vegetation, soils, stored food, and feed products in tropical and subtropical regions. Some species are xerophilic. Some species are parasitic on insects, plants and animals, including man. Some species are reported mycotoxin producers. Both Penicillium and Aspergillus spores share similar morphology on non-viable analysis and therefore are lumped together into the same group. Only through the visualization of reproductive structures can the genera be distinguished. *Health Effects:* Can produce type I and III fungal hypersensitivities. All of the species contained in this genus should be considered allergenic. Various Aspergillus species are a common cause of extrinsic asthma (immediate-type hypersensitivity: type I). Acute symptoms include edema and bronchiospasms. Chronic cases may develop pulmonary emphysema. Members of this genus are reported to cause a variety of opportunistic infections of the ears and eyes. Severe pulmonary infections may also occur.
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.

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 both viable and non-viable analysis. *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.

CLADOSPORIUM SPECIES - The most commonly identified outdoor fungus. The outdoor numbers are reduced in the

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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.

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.

PESTALOTIA- / PESTALOTIOPSIS-LIKE - This group consists of several genera. Mostly plant pathogens.

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.

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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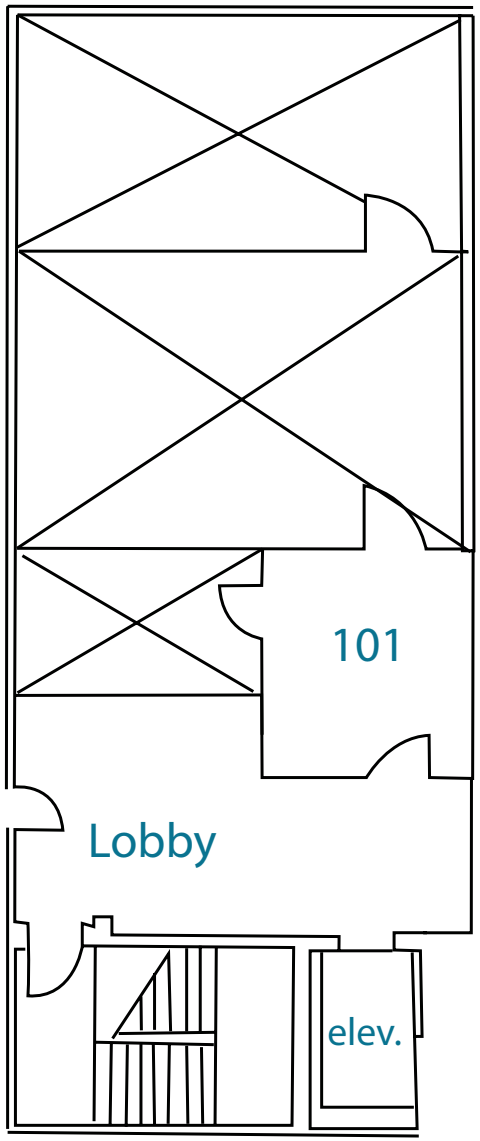
First Floor Layout



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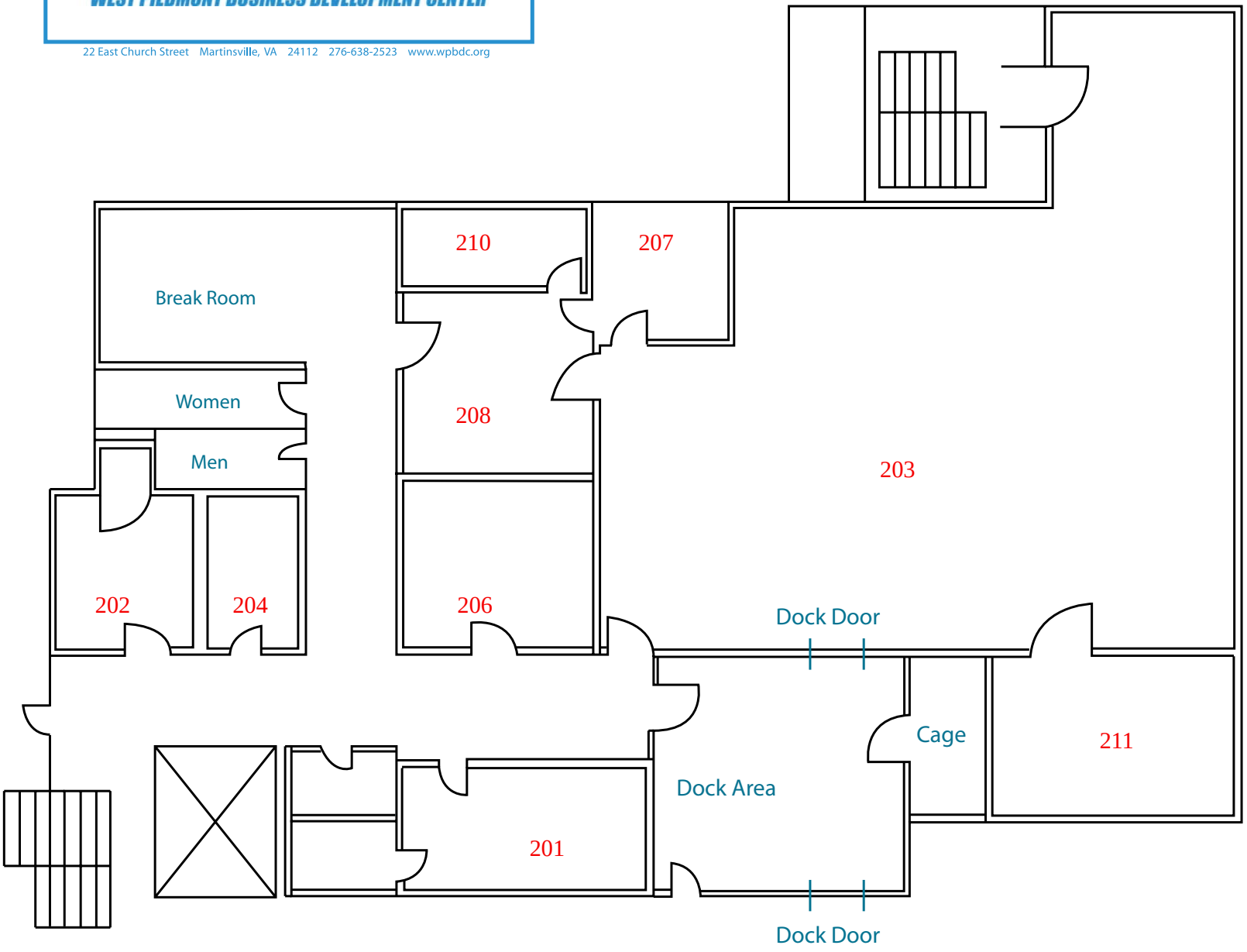
Second Floor Layout



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Third Floor Layout