Nova Group

Inspired Solutions by Nova Group

LIMITED INDOOR AIR QUALITY SURVEY

Property

Fire Station #2
1212 W. Worley Street
Columbia, MO 65203

Prepared For

City of Columbia
701 E. Broadway
Columbia, MO 65205

Prepared By

Nova Group, GBC
5320 West 23rd Street, Suite 270
St. Louis Park, MN 55416

Web: novagroupgbc.com

Rick Leines
VP - Industrial Hygiene

Nova Project No: Q23-8090
Inspection Date: October 18, 2023

Nova Group Carbon Neutral Report

novagroupgbc.com/carbonneutral

Nova Group

CORPORATE HEADQUARTERS
Minneapolis, MN

Inspired Solutions by Nova Group

October 31, 2023

City of Columbia
Attn: Kent Hayes
701 E. Broadway
Columbia, MO 65205

Re: Limited Indoor Air Quality Survey
Fire Station #2
1212 W. Worley Street
Columbia, MO 65203
Nova Project No.: Q23-8090

In accordance with our agreement, Nova Group, GBC (Nova) has performed a Limited Indoor Air Quality (IAQ) Survey at the above referenced property in accordance with the authorized scope of work. Please find a copy of the report enclosed.

Should you have any questions, please contact us at your earliest convenience.

Respectfully submitted,

Nova Group, GBC

Reviewed by:

Rick Leines
VP - Industrial Hygiene

EXECUTIVE SUMMARY

Nova conducted a Limited Indoor Air Quality (IAQ) Survey of the Fire Station #2 facility located at 1212 W. Worley Street in Columbia, Missouri.

NOTE: There are currently no Federal standards regarding permissible levels of airborne fungi that may be present in buildings.

The following summary provides an overview of activities conducted, findings, and conclusions. This report should be read in it's entirety.

- Fire Station #2 was unoccupied during Nova's site visit.
- No damp or musty odors were observed.
- Drywall water intrusion/staining was observed. Suspect fungal growth was observed on HVAC exterior ductwork.
- Plaster wall cracks and damage was observed.
- Interior duct insulation was observed with dust accumulation.
- General poor housekeeping and the presence of dust accumulation was observed on window ledges, HVAC louvers, walls and dormitory fans.
- Temperature, Relative Humidity, and Carbon Dioxide were reported with ASHRAE and EPA recommended levels.
- No elevated moisture meter readings were observed.
- Four interior ambient air samples plus two exterior comparison samples were collected and submitted to an AIHA laboratory for mold analysis. Molds most commonly associated with indoor mold growth in buildings with long-term water intrusion issues, reported as Water Indicator, were not reported in the samples collected from the Living Room/Kitchen, East Office/Bedroom, Dormitory, or Weight Room/Bathroom. The Living Room/Kitchen and Dormitory samples reported two and four raw mold spores, respectively, of Unspecified spores (common habitat being various) which are found predominantly outdoors. Background debris in the interior ambient air samples were reported as Light and Moderate.
- Five surface samples were collected and submitted to an AIHA laboratory for mold analysis. Background debris in the surface samples were reported as Trace and Heavy. Surface sample molds were reported with MGR's ranging from 0 to 4.

RECOMMENDATIONS:

Given the above information/observations, Nova recommends the following:

- Maintain temperatures within ASHRAE recommended levels.
- Investigation of the roof and exterior sealants for effective water barriers and repair as necessary.
- Interior areas of water impact and suspect fungal growth on building materials should be cleaned and then coated with an EPA registered antimicrobial solution to aide in the prevention of potential mold growth.

- Additional housekeeping/cleaning is recommended.
- After cleaning activities, including interior duct cleaning, replacement of HVAC filter(s) is recommended.
- Investigate associated landscaping to ensure appropriate drainage away from building.

Table of Contents

1.0 INTRODUCTION

On October 18, 2023, Nova Group, GBC (Nova) conducted a Limited Indoor Air Quality (IAQ) Survey of the Fire Station #2 facility located at 1212 W. Worley Street in Columbia, MO. The purpose of the investigation was to evaluate potential building-associated problems related to water infiltration and evidence of suspect mold growth. The investigation was conducted by Rick Leines.

Nova's observations and test results can be found in the following text.

1.1 Scope of Work

Nova provided an industrial hygienist to conduct a limited indoor air quality survey in accordance with our October 16, 2023 proposal.

The survey included a limited visual assessment of the building interior, the collection of random moisture meter readings, the collection of comfort parameter readings, and the collection of random surface and ambient air samples for mold analysis by an accredited laboratory.

If specific areas of water/moisture intrusion or suspect mold growth were observed, these areas were photographed.

1.2 Facility Usage

Fire Station #2 was unoccupied during Nova's site visit. Nova understands that the building was vacated two days prior to Nova's visit. The building is slab on grade construction and consisted of a living room, dining room, kitchen, dormitory, office/bedroom, laundry room, utility room, weight room, and restrooms.

2.0 VISUAL INSPECTION

2.1 Exterior

The survey focused on the building interior due to information provided by the client. The building exterior is constructed of brick with a sloped roof. The roof was not accessed.

2.2 Interior

Nova did not observe any evidence of damp or musty odors during the site visit on October 18, 2023.

Nova did observe evidence of water intrusion/staining on the Bathroom (weight room) wall beneath louver.

Suspect mold growth was observed on HVAC ductwork and louver located at the ceiling of the laundry room door entrance.

Wall cracks/damage were observed on the interior and exterior of the building. Delaminating/peeling paint was observed in the HVAC room/Utility closet. Repair to the weight room ceiling was observed.

The interior return ductwork was lined with insulation and observed with dust accumulation (observed in Kitchen/Dining room).

General poor housekeeping and the presence of dust accumulation observed on HVAC louvers, walls, dormitory fans, and window ledges.

2.3 HVAC System

The HVAC system was located within the utility room accessed through the laundry room. HVAC louvers and interior duct insulation was observed with dust accumulation.

Carbon Dioxide, Temperature, and Relative Humidity

Environmental conditions including temperature, relative humidity and carbon dioxide were monitored using a TSI IAQ Calc air quality monitor. The purpose of these tests was to determine if carbon dioxide levels were present above recommended levels, or if temperature and humidity were at levels to promote the growth of microorganisms.

Below is a table summarizing the findings of the site visit direct-readings. Results were then compared to the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) and Environmental Protection Agency (EPA) recommended levels.

Readings in bold font were reported to exceed ASHRAE and EPA recommended levels.

TSI IAQ-CALC INDOOR AIR QUALITY MONITORING RESULTS			
Location	**Temperature (°F)**	**Relative Humidity (%)**	**Carbon Dioxide (parts per million-ppm)**
Kitchen/Dining Area	71.5	46.6	678
Living Room	71.3	46.4	630
Dispatch Office	70.9	46.5	653
Laundry	69.5	46.0	550
East Office/Bedroom	71.0	47.1	660
Apparatus Bay	70.9	46.2	485
Dormitory (West Bedroom)	67.3	44.4	500
Weight Room	67.8	41.5	500
Bathroom (weight room)	67.5	42.0	485
Bathroom	67.4	44.5	494
Outside (South)	75.6	38.3	408

Recommended Levels:

Carbon Dioxide	<1000 ppm	Recommended by ASHRAE
Temperature	65-75 degrees	ASHRAE Comfort Zone
Relative Humidity	30-60%	ASHRAE Comfort Zone

3.0 MOISTURE TESTING

Sheetrock on exterior wall surfaces was tested with the Demhorst BD-2100 by inserting the sensor probes into the material. Digital readouts provide percent moisture readings. 0-0.5% indicates a sufficiently dry moisture level, 0.5-1.0% indicates a borderline situation and greater than 1% is considered wet. Prolonged periods of wet conditions are favorable to mold growth.

Random readings collected throughout the building indicated dry conditions.

4.0 FUNGI SAMPLING

4.1 Spore Trap Air Samples for Mold Spores

Ambient air samples were collected on October 18, 2023.

A total of four (4) interior ambient air samples were collected, plus two (2) outside (exterior of building) comparison samples. Samples are interpreted by comparing sample results of the interior samples to that of the exterior control. Interior samples should exhibit like fungal types to the exterior, but in lower overall concentrations.

Please refer to the bold font concentration numbers presented in the table below for: a) spore types that were not reported in the outside comparison samples; and b) spore types that were reported above the outside comparison samples. Spore concentrations are measured in spore counts per meter cubed (spore/m^3).

Laboratory results are included in Appendix A.

SPORE TRAP AIR SAMPLES FOR MOLD SPORES			
Sample Number	**Location**	**Concentration (spores/ m3)**	**Spore Type**
2A	Exterior Comparison - Outside (Southwest)	80 560 1800 80 400 15960 19000	*Alternaria* Ascospores Basidiospores *Periconia*/Smuts *Aspergillus/Penicillium* *Cladosporium* *TOTAL Fungi*
2B	Living Room/Kitchen	80 40 **80** 200 400	Ascospores Basidiospores **Unspecified spores** *Cladosporium* *TOTAL Fungi*
2C	East Office/Bedroom	40 80 160 280	Ascospores Basidiospores *Cladosporium* *TOTAL Fungi*

SPORE TRAP AIR SAMPLES FOR MOLD SPORES			
Sample Number	**Location**	**Concentration (spores/ m3)**	**Spore Type**
2D	Dormitory (West Bedroom)	80 360 **160** 40 120 760	Ascospores Basidiospores **Unspecified spores** *Aspergillus/Penicillium* *Cladosporium* *TOTAL Fungi*
2E	Weight Room/Bathroom	40 40 320 200 240 840	*Alternaria* Ascospores Basidiospores *Aspergillus/Penicillium* *Cladosporium* *TOTAL Fungi*
2F	Exterior Comparison - Outside (Southwest)	80 240 1520 40 120 40 10760 13000	*Alternaria* Ascospores Basidiospores *Epicoccum* *Periconia*/Smuts Rusts *Cladosporium* *TOTAL Fungi*

4.2 Surface Lift Samples for Fungi

Surface samples were collected on October 18, 2023.

The purpose for collecting surface samples is to confirm the presence of mold growth and to identify the general area of visible growth on a surface.

Nova collected a total of five (5) surface samples from areas of suspected fungal growth. The summary table below identifies the sample number, approximate sample location, reported background debris, mold growth factor, and spore type.

Laboratory results are included in Appendix A.

SURFACE LIFT SAMPLES FOR FUNGI				
Sample Number	**Location**	**Background Debris**	**Mold Growth Rating (MGR)**	**Spore Identification**
2G	Weight Room Bathroom - Below Supply Duct	1	4 3 1 1	*Ulocaldium* Fungal mycelial fragements *Alternaria* *Cladosporium*
2H	Bedroom - Supply Louver	1	0	No Fungi Detected
2I	Kitchen - Interior Return Duct Insulation	4	2 1 1 1	Fungal mycelial fragements *Periconia*/Smuts *Epcioccum* Basidiospores
2J	Laundry - Supply Duct	1	4 1	Unspecified spores Fungal mycelial fragments
2K	Hallway to Laundry - Exterior Duct	1	3 3 3	*Cladosporium* Fungal mycelial fragements Unspecified spores

The laboratory defines Background Debris as the amount of non-fungal particulates present in the trace including dust, fibers, skin scales, dust mites, and insect parts. Background Debris reported values are defined below:

0 = None Detected. No debris observed.

1 = Trace. Field of view obscured < 5%.

2 = Light. Field of view obscured 5% to 25%.

3 = Moderate. Field of view obscured 25% to 75%.

4 = Heavy. Field of view obscured 75% to 90%.

5 = Very Heavy. Field of view obscured > 90%.

The laboratory report defines Mold Growth Rating (MGR) values as defined below:

0 = No fungal matter was detected

1 = Trace amounts of fungal matter detected

2 = Up to 25% of sample surface is covered with fungal matter; Probably indicates active growth at some point in time.

3 = 26-50% of sample surface is covered with fungal matter; Indicates active growth at some point in time.

4 = 51-75% of sample surface is covered with fungal matter; Indicates active growth at some point in time.

5 = >75% of sample surface is covered with fungal matter; Indicates active growth at some point in time.

5.0 CONCLUSION AND RECOMMENDATIONS

Nova performed a Limited IAQ Survey of Fire Station #2 located in Columbia, Missouri.

There is not a regulatory standard that has been set that states what level of mold is safe or can affect health as every individual is different with different susceptibilities.

NOTE: There are currently no Federal standards regarding permissible levels of airborne fungi that may be present in buildings. Mold spores are ubiquitous and it is expected that some spores will be present in normal indoor environments. A general guideline that is widely accepted in the industrial hygiene industry is that the types and number of mold spores present in the indoor environment should be similar to those present in the outdoor environment. If the inside spore counts are substantially higher than outside counts, this may indicate a potential mold problem. The comparison of outdoor and indoor spore types and concentrations is a useful tool in assessing abnormal mold contamination; however, it should not be the sole determining factor in evaluating health risks and remediation strategies.

Based upon the information obtained from the laboratory analysis of the samples collected during the investigation and our observations during the October 18, 2023, site visit, Nova concludes the following:

- Generally, interior ambient air samples exhibited like fungal types to the exterior and in lower overall concentrations within the interior East Office/Bedroom and the Weight Room/Bathroom.
  - The ambient air samples collected within the Living Room/Kitchen and Dormitory reported 2 and 4 raw counts of Unspecified spores, respectively, which were not reported in the outside comparison samples. Unspecified spores (common habitat being various) are found predominantly outdoors.

- Surface sample results:
  - Sample 2G – Weight Room Bathroom (water staining beneath HVAC louver): reported "trace" amounts of background debris with Mold Growth Rating (MGR) of 4 (*Ulocladium* - common habitat soil, grasses, wood, paper - water indicator), 3 (Fungal mycelial fragments - connectivity with mold spores), 1 (*Alternaria* - common habitat soil, seeds, plants, carpet, textiles, window frames, air - found predominantly outdoors) and 1 (*Cladosporium* - common habitat plants, food, soil, paint, textiles, carpet, HVAC, air - found indoors and outdoors).

  - Sample 2H – Dormitory (HVAC Louver): reported "trace" amounts of background debris with MGR of 0 (No Fungi Detected).

  - Sample 2I – Kitchen (interior return duct): reported "heavy" amounts of background debris with MGR of 2 (Fungal mycelial fragments - refer to above), 1 (*Periconia*/Smuts - common habitat being plants, air - predominantly found outdoors), 1 (*Epcioccum* - common habitat being plants, soil, seeds, carpet, air - found predominantly outdoors), and 1 (Basidiospores - common habitat being soil, plants, wood, cellulose-containing materials, air - found predominantly outdoors).

  - Sample 2J – Laundry (HVAC louver): reported "trace" amounts of background debris with MGR of 4 (Unspecified spores - refer to above) and 1 (Fungal mycelial fragments - refer to above).

- Sample 2K – Hallway to Laundry (HVAC ductwork): reported “trace” amounts of background debris with MGR of 3 (*Cladosporium - refer to above*), 3 (Fungal mycelial fragments - refer to above), and 3 (Unspecified spores - refer to above).

In addition:

- No elevated moisture readings were observed.
- No musty odors were observed.
- Water intrusion/staining was observed (Bathroom/weight room wall).
- Suspect mold growth was observed on HVAC ductwork and louver located at the ceiling of the laundry room door entrance.
- Collected interior temperature readings were reported within ASHRAE Comfort Zone levels of 65-75 degrees
- Collected interior relative humidity were reported within ASHRAE Comfort Zone levels of 30-60%
- Collected interior Carbon Dioxide were reported within ASHRAE recommended level of <1,000 ppm
- Standing water in buckets were observed in the Apparatus Bay
- Wall cracks/damage were observed on the interior and exterior of the building. Delaminating/ peeling paint was observed in the HVAC room/Utility closet. Repair to the weight room ceiling was observed.
- The Kitchen/Dining room return ductwork interior was lined with insulation and observed with dust accumulation (observed in Kitchen/Dining room).
- General poor housekeeping and the presence of dust accumulation observed on HVAC louvers, walls, dormitory fans, and window ledges.
- Exterior - evidence of wall/foundations cracks, poor drainage, elevated landscaping (above concrete foundation)was observed

RECOMMENDATIONS:

Given the above information/observations, Nova recommends the following:

- Maintain temperatures within ASHRAE recommended levels.
- Investigation of the roof and exterior sealants for effective water barriers and repair as necessary.

- Interior areas of water impact and suspect fungal growth on building materials should be cleaned and then coated with an EPA registered antimicrobial solution to aide in the prevention of potential mold growth.
- Additional housekeeping/cleaning is recommended.
- After cleaning activities, including interior duct cleaning, replacement of HVAC filter(s) is recommended.
- Investigate associated landscaping to ensure appropriate drainage away from building.

6.0 LIMITATIONS

Information contained herein was obtained by means of on-site observations and analytical data. Conclusions of this survey are based on reasonably accessible information pertaining specifically to this survey. However, this is not to suggest that the information obtained is a complete compilation of all existing information that may be pertinent to this site. The intent of this survey is to sample the indoor atmospheric conditions as they relate to the intent of the building's structure and content to ensure that conditions remain parallel to comfort levels established by regulatory agencies which govern indoor atmospheric conditions. This survey is not intended to represent an exhaustive research of all-potential hazards or conditions that may exist.

This report does not purport to represent future indoor conditions or events. Situations or activities that transpire subsequent to this report that result in adverse environmental, construction and/or engineering impacts are not to be construed as relevant to this study.

The scope of services performed in execution of the evaluation may not be appropriate to satisfy the needs of other users, and the use or re-use of this document or the finding, conclusions, or recommendations is at the risk of said user.

We appreciate the opportunity to be of service to you on this project.

Prepared By:

Nova Group, GBC

Rick Leines
VP - Industrial Hygiene

APPENDIX A: LABORATORY RESULTS

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MOLD SPORE TRAP REPORT

Nonviable Direct Microscopy

Prepared for

Nova Group GBC

CLIENT PROJECT: F.S. #2, Q23-

LAB CODE: M234560

TEST METHOD: CEI Method 110

RECEIVED DATE: 10/19/23

REPORT DATE: 10/23/23

Tianbao Bai, Ph.D., CIH
Laboratory Director

All samples received in acceptable condition. Information provided by customer includes customer sample ID, location and volume. Analytical results are not corrected for field and laboratory blanks.

Test results relate only to the items tested and cannot be extrapolated to anything larger than their original intent. This report may not be reproduced, except in full, without written approval by Eurofins CEI (CEI). CEI bears no responsibility for client sampling methods and makes no warranty representation regarding the accuracy of client-supplied information in preparing and presenting analytical results. CEI maintains liability limited to the cost of analysis, except for CEI's own willful misconduct or gross negligence. Interpretation of the analytical results is the sole responsibility of the customer.

The overall intralaboratory relative standard deviation (Sr) for the lab = 0.26.

The intralaboratory Sr for each spore range are as follows:
10-100 spores: 0.35; 101-350 spores: 0.12 >350 spores: 0.13

MICROBIOLOGY LABS ISO/IEC 17025:2017 Accredited Laboratory AIHA LAP, LLC AIHAACCREDITEDLABS.ORG Lab ID # 103025

730 SE Maynard Road • Cary, NC 27511 • 919.481.1413

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MOLD SPORE TRAP REPORT: NONVIABLE DIRECT MICROSCOPY

CLIENT Nova Group GBC
5320 West 23rd St, Suite 270
St. Louis Park, MN 55416

Lab Code: M234560
Date Received: 10-19-23
Date Analyzed: 10-23-23
Date Reported: 10-23-23

PROJECT: F.S. #2, Q23-

		2A				2B				2C			
Client ID		2A				2B				2C			
Lab ID		M015426				M015427				M015428			
Location		Outside - (SW)				Living Rm / Kitchen				East Bedroom / Office			
Volume (L)		25				25				25			
	IDENTIFICATION	Raw Counts	% Analyzed	Spores per m^3	% of Total	Raw Counts	% Analyzed	Spores per m^3	% of Total	Raw Counts	% Analyzed	Spores per m^3	% of Total
Predominantly Outdoor	*Alternaria*	2	100	80	<1								
	Arthrinium												
	Ascospores	14	100	560	3	2	100	80	20	1	100	40	14
	Basidiospores	45	100	1800	10	1	100	40	10	2	100	80	29
	Bipolaris/Drechslera												
	Cercospora												
	Curvularia												
	Epicoccum												
	*Helicomyces**												
	Nigrospora												
	Oidium/Peronospora												
	Periconia/Smuts**	2	100	80	<1								
	Pithomyces												
	Rusts												
	Spegazzinia												
	Stemphylium												
	Tetraploa												
	Torula												
	Unspecified spores					2	100	80	20				
Indoor / Outdoor	*Aspergillus/Penicillium*	10	100	400	2								
	Cladosporium	399	100	15960	85	5	100	200	50	4	100	160	57
	Fusarium												
Water Indicator	*Chaetomium*												
	Stachybotrys												
	Trichoderma												
	Ulocladium												
	Total	**470**		**19000**	**100%**	**10**		**400**	**100%**	**7**		**280**	**100%**
	Background Debris	2				2				2			
	Pollen Count												
	Hyphal Fragments									2			
	Analytical Sensitivity (Spores/m^3)	40				40				40			

** Heliocomyces includes Helicosporium; ** Periconia/Smuts includes Myxomycetes*
Spores per m^3 (final counts) reported to 2 significant figures
Spores of Aspergillus, Penicillium, and others are small with few distinguishing features and therefore can not be differentiated.
If % analyzed is <100%, spores per m^3 is based on extrapolation and not actual count.
Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST: Vidyakr
Vidya Natarajan

APPROVED BY: Tianbao Bai
Tianbao Bai, Ph.D., Laboratory Director

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MOLD SPORE TRAP REPORT: NONVIABLE DIRECT MICROSCOPY

CLIENT Nova Group GBC
5320 West 23rd St, Suite 270
St. Louis Park, MN 55416

Lab Code: M234560
Date Received: 10-19-23
Date Analyzed: 10-23-23
Date Reported: 10-23-23

PROJECT: F.S. #2, Q23-

		2D				2E				2F			
Client ID		2D				2E				2F			
Lab ID		M015429				M015430				M015431			
Location		West Bedroom				Weight Rm / Bathroom				Outside - (SW)			
Volume (L)		25				25				25			
	IDENTIFICATION	Raw Counts	% Analyzed	Spores per m^3	% of Total	Raw Counts	% Analyzed	Spores per m^3	% of Total	Raw Counts	% Analyzed	Spores per m^3	% of Total
Predominantly Outdoor	*Alternaria*					1	100	40	5	2	100	80	1
	Arthrinium												
	Ascospores	2	100	80	11	1	100	40	5	6	100	240	2
	Basidiospores	9	100	360	47	8	100	320	38	38	100	1520	12
	Bipolaris/Drechslera												
	Cercospora												
	Curvularia												
	Epicoccum									1	100	40	<1
	*Helicomyces**												
	Nigrospora												
	Oidium/Peronospora												
	Periconia/Smuts**									3	100	120	1
	Pithomyces												
	Rusts									1	100	40	<1
	Spegazzinia												
	Stemphylium												
	Tetraploa												
	Torula												
	Unspecified spores	4	100	160	21								
Indoor / Outdoor	*Aspergillus/Penicillium*	1	100	40	5	5	100	200	24				
	Cladosporium	3	100	120	16	6	100	240	29	269	100	10760	84
	Fusarium												
Water Indicator	*Chaetomium*												
	Stachybotrys												
	Trichoderma												
	Ulocladium												
Total		**19**		**760**	**100%**	**21**		**840**	**100%**	**320**		**13000**	**100%**
Background Debris		3				2				3			
Pollen Count													
Hyphal Fragments		2								8			
Analytical Sensitivity (Spores/m^3)		40				40				40			

** Heliocomyces includes Helicosporium; ** Periconia/Smuts includes Myxomycetes*
Spores per m^3 (final counts) reported to 2 significant figures
Spores of Aspergillus, Penicillium, and others are small with few distinguishing features and therefore can not be differentiated.
If % analyzed is <100%, spores per m^3 is based on extrapolation and not actual count.
Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST: Vidyakr
Vidya Natarajan

APPROVED BY: Tianbao Bai
Tianbao Bai, Ph.D., Laboratory Director

SPORE CLASSIFICATION:

For purposes of this report, identified mold spores are classified into three general categories depending on environmental conditions the spore is most commonly associated with:

1) **PREDOMINANTLY OUTDOOR:** Most commonly found growing outdoors and are not usually associated with indoor mold sources.
2) **INDOOR / OUTDOOR:** Commonly grow in both indoor and outdoor environments.
3) **WATER INDICATOR**: Most commonly associated with indoor mold growth in buildings with long-term water intrusion issues.

PREDOMINANTLY OUTDOOR	INDOOR / OUTDOOR	WATER INDICATOR

BACKGROUND DEBRIS:

Background debris is the amount of non-fungal particulates present in the trace including dust, fibers, skin scales, dust mites, and insect parts. A debris rating is assigned each trace from 0 (lowest) to 5 (highest). A higher debris rating means samples are more difficult to analyze, and spores, especially smaller spores like *Aspergillus / Penicilium*, may be obscured. Counts with debris ratings of 4 or 5 should be regarded as minimal counts with actual counts assumed to be significantly higher. A further explanation of the debris rating is listed below:

0 - None Detected. No debris observed.
1 - Trace. Field of view obscured < 5%. Counts unaffected.
2 - Light. Field of view obscured 5% to 25%. Counts slightly affected.
3 - Moderate. Field of view obscured 25% to 75% . Actual counts may be higher than reported counts.
4- Heavy. Field of view obscured 75% to 90% . Actual counts may be significantly higher than reported counts.
5 - Very Heavy. Field of view obscured > 90% . Actual counts may be significantly higher than reported counts. Resampling may be necessary.

DEFINITION OF TERMS:

Analytical Sensitivity: Spore per cubic meter (concentration) divided by raw count.
Limit of Detection: One Spore
Hyphal Fragments: Hyphal fragments are broken pieces of fungal hyphae and constitute the vegetative structure of the fungus.
Pollen Count: Pollen grains (Pollen) are the male reproductive structures of Angiosperm plants. These are counted only as pollen and not classified to Genus level.
Raw Counts: The number of spores counted by the analyst.
% Analyzed: The amount of the trace that was analyzed for each individual spore type. If large amounts of any spore type(s) exist, counts may be extrapolated.
% of Total: Percentage of the sample that is made up of each spore type.

INDOOR AND OUTDOOR COMPARISONS:

There are no current Federal standards regarding permissible levels of airborne fungi that may be present in buildings. Mold spores are ubiquitous to our planet and it is expected that some spores will be present in normal indoor environments. A general guideline that is widely accepted in the industrial hygiene industry is that the types and numbers of mold spores present in the indoor environment should be similar to those present in the outdoor environment. If inside spore counts are significantly higher than outside counts this may indicate a potential mold problem. The comparison of outdoor and indoor spore types and concentrations is a useful tool in assessing abnormal mold contamination; however, it should not be the sole determining factor in evaluating health risks and remediation strategies.

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SPORE INFORMATION

	SPORE NAME	COMMON HABITAT	ALLERGENIC POTENTIAL	MYCOTOXIN POTENTIAL
Predominantly Outdoor	*Alternaria*	Soil, seeds, plants, carpet, textiles, window frames, air	X	X
	Arthrinium	Soil, plant materials, decaying wood	X	
	Ascospores	Plants, soil, cellulose-containing materials, air		
	Basidiospores	Soil, plants, wood, cellulose-containing materials, air		
	Bipolaris/Drechslera	Grasses, plant material, decaying food, soil		
	Cercospora	Plants		
	Curvularia	Soil, plant materials, cellulose-containing materials	X	
	Epicoccum	Plants, soil, seeds, carpet, air	X	
	*Helicomyces**	Plants		
	Nigrospora	Plants, soil		
	Oidium/Peronospora	Plants		
	Periconia/Smuts**	Plants, air	X	
	Pithomyces	Soil, plant material, air		
	Rusts	Grasses, trees, other plants	X	
	Spegazzinia	Soil, plants		
	Stemphylium	Dead plants, cellulose-containing materials		
	Tetraploa	Plants		
	Torula	Soil, plants		
	Unspecified spores	Various		
	** Heliocomyces includes Helicosporium; * Periconia/Smuts includes Myxomycetes*			
Indoor / Outdoor	*Aspergillus/Penicillium*	Soil, food, carpet, HVAC, air	X	X
	Cladosporium	Plants, woody plants, food, soil, paint, textiles, carpet, HVAC, air	X	
	Fusarium	Soil, plants, seed, fruits, grains		X
Water Indicator	*Chaetomium*	Cellulose-containing materials, soil, seeds, dung	X	X
	Stachybotrys	Paper, wallpaper, gypsum board	X	X
	Trichoderma	Soil, decaying wood, plant material, cellulose-containing materials	X	X
	Ulocladium	Soil, grasses, wood, paper		

MOLD / MATERIALS IDENTIFICATION CHAIN OF CUSTODY

(6)

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730 SE Maynard Road, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

LAB USE ONLY:
ECEI Lab Code: M234560
ECEI Lab I.D. Range: M015426

COMPANY INFORMATION	PROJECT INFORMATION
ECEI CLIENT #:	Job Contact: Rick Lewis
Company: Nova Group GBC	Email / Tel: same
Address:	Project Name: F.S. #2
St. Louis Park MN	Project ID# 023-
Email: rick.lewis@novagroupgbc.com	PO #:
Tel: 913-297-4733 Fax:	STATE SAMPLES COLLECTED IN: MN

IF TAT IS NOT MARKED STANDARD 3 DAY TAT APPLIES.

MICROBIOLOGY	METHOD	TURN AROUND TIME						
		4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY	7-10 DAY
MOLD NON-VIABLE *	TAPE LIFT, BULK, SWAB	☐	☐	☐	☒	☐	☐	
MOLD NON-VIABLE *	SPORETRAP	☐	☐	☐	☒	☐	☐	
MOLD VIABLE	IMPACTOR							☐
MOLD VIABLE	BULK, SWAB, DUST							☐
DUST CHARACTERIZATION	PLM	☐	☐	☐	☐	☐	☐	☐
PARTICLE IDENTIFICATION	PLM	☐	☐	☐	☐	☐	☐	☐
COMBUSTION-BY-PRODUCTS	ASTM D6602-13	☐	☐	☐	☐	☐	☐	☐
COMBUSTION-BY-PRODUCTS WITH TEM CONFIRMATION OF SOOT	ASTM D6602-13		☐	☐	☐	☐	☐	☐
OTHER:		☐	☐	☐	☐	☐	☐	☐

*Blanks should be taken from the same sample lot as field samples.

FIELD ID #	SAMPLE LOCATION	AREA (in²)	VOLUME(L)
2A	Outside - (SW)		25 L
2B	Living Rm / Kitchen		↓
2C	East Bedroom / office		
2D	West Bedroom		
2E	Weight Rm / Bathroom		↓

REMARKS:

☒ BMB Accept Samples
☐ Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	10/18/23 1700	BMB	10/19/23 9:30

By submitting samples, you are agreeing to ECEI's Terms and Conditions.
Samples will be disposed of 30 days after analysis.

MOLD / MATERIALS IDENTIFICATION

eurofins | CEI

SAMPLING FORM

COMPANY CONTACT INFORMATION	
Company: Nova Group, GBC	Job Contact: Rick Leines
Project Name: F.S. #2	
Project ID #: Q23-	Tel: 913 297 4733

FIELD ID #	SAMPLE LOCATION	AREA (SQ. INCH)	VOLUME (LITRES)
2F	Outside - (SW)		25 L
2G	weight room bathroom - below supply duct		
2H	Bedroom - supply louver		
2I	kitchen - interior return duct		
2J	Laundry - supply duct		
2K	Hallway to Laundry - Exterior duct		

pg. 2 of 2

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MOLD BULK REPORT
Nonviable Methodology

Prepared for

Nova Group GBC

CLIENT PROJECT: F.S. #2, Q23-

LAB CODE: M234551

TEST METHOD: CEI Method 120

RECEIVED DATE: 10/19/23

REPORT DATE: 10/23/23

Tianbao Bai, Ph.D., CIH
Laboratory Director

All samples received in acceptable condition. Information provided by customer includes customer sample ID and location. Analytical results are not corrected for field and laboratory blanks.

Test results relate only to the items tested and cannot be extrapolated to anything larger than their original intent. This report may not be reproduced, except in full, without written approval by Eurofins CEI (CEI). CEI bears no responsibility for client sampling methods and makes no warranty representation regarding the accuracy of client supplied information in preparing and presenting analytical results. CEI maintains liability limited to the cost of analysis, except for CEI's own willful misconduct or gross negligence. Interpretation of the analytical results is the sole responsibility of the customer.

MICROBIOLOGY LABS ISO/IEC 17025:2017 Accredited Laboratory AIHA LAP, LLC AIHAACCREDITEDLABS.ORG Lab ID # 103025

730 SE Maynard Road • Cary, NC 27511 • 919.481.1413

LABORATORY REPORT

Fungal Characterization

CLIENT: Nova Group GBC
5320 West 23rd St, Suite 270
St. Louis Park, MN 55416

PROJECT: F.S. #2, Q23-

Lab Code: M234551
Date Received: 10-19-23
Date Analyzed: 10-23-23
Date Reported: 10-23-23
Sampling Method: Tape/Bulk/Swab

LAB ID	CLIENT ID	SAMPLE LOCATION	BACKGROUND DEBRIS	MGR	IDENTIFICATION
M015397	2G	Weight Room Bathroom - Below Supply Duct	1	4	*Ulocladium*
				3	Fungal mycelial fragments
				1	*Alternaria*
				1	*Cladosporium*
M015398	2H	Bedroom - Supply Louver	1	0	No Fungi Detected
M015399	2I	Kitchen - Interior Return Duct	4	2	Fungal mycelial fragments
				1	*Periconia*/Smuts**
				1	*Epicoccum*
				1	Basidiospores
M015400	2J	Laundry - Supply Duct	1	4	Unspecified spores
				1	Fungal mycelial fragments
M015401	2K	Hallway to Laundry - Exterior Duct	1	3	*Cladosporium*
				3	Fungal mycelial fragments
				3	Unspecified spores

LABORATORY REPORT

Fungal Characterization

CLIENT: Nova Group GBC
5320 West 23rd St, Suite 270
St. Louis Park, MN 55416

PROJECT: F.S. #2, Q23-

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Date Analyzed: 10-23-23
Date Reported: 10-23-23
Sampling Method: Tape/Bulk/Swab

LAB ID	CLIENT ID	SAMPLE LOCATION	BACKGROUND DEBRIS	MGR	IDENTIFICATION

*** Periconia/Smuts includes Myxomycetes**

ANALYST: Vidya Natarajan

APPROVED BY: Tianbao Bai, Ph.D.
Laboratory Director

MGR = MOLD GROWTH RATING

0 - No fungal matter was detected; Debris present is not consistent with fungal matter.

1 - Trace amount of fungal matter detected; A few random appearances of fungal matter indicated. Probably due to settling. Does not indicate active growth.

2 - Up to 25% of the sample surface is covered with fungal matter; Probably indicates active growth at some point in time.

3 - 26%-50% of the sample surface is covered with fungal matter; Indicates active growth at some point in time.

4 - 51%-75% of the sample surface is covered with fungal matter; Indicates active growth at some point in time.

5 - >75% of the sample surface is covered with fungal matter; Indicates active growth at some point in time.

BACKGROUND DEBRIS

0 - None Detected. No debris observed.

1 - Trace. Field of view obscured < 5%.

2 - Light. Field of view obscured 5% to 25%.

3 - Moderate. Field of view obscured 25% to 75%.

4 - Heavy. Field of view obscured 75% to 90%.

5 - Very Heavy. Field of view obscured >90%.

MOLD / MATERIALS IDENTIFICATION CHAIN OF CUSTODY

(5)

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730 SE Maynard Road, Cary, NC 27511
Tel: 866-481-1412; Fax: 919-481-1442

LAB USE ONLY:
ECEI Lab Code: M234551
ECEI Lab I.D. Range: M015397

COMPANY INFORMATION	PROJECT INFORMATION
ECEI CLIENT #:	Job Contact: Rick Lewis
Company: Nova Group GBC	Email / Tel: same
Address:	Project Name: F.S. #2
St. Louis Park MN	Project ID#: 023-
Email: rick.lewis@novagroupgbc.com	PO #:
Tel: 913-297-4733 Fax:	STATE SAMPLES COLLECTED IN: MN

IF TAT IS NOT MARKED STANDARD 3 DAY TAT APPLIES.

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MOLD NON-VIABLE *	SPORETRAP	☐	☐	☐	☒	☐	☐	
MOLD VIABLE	IMPACTOR							☐
MOLD VIABLE	BULK, SWAB, DUST							☐
DUST CHARACTERIZATION	PLM	☐	☐	☐	☐	☐	☐	☐
PARTICLE IDENTIFICATION	PLM	☐	☐	☐	☐	☐	☐	☐
COMBUSTION-BY-PRODUCTS	ASTM D6602-13	☐	☐	☐	☐	☐	☐	☐
COMBUSTION-BY-PRODUCTS WITH TEM CONFIRMATION OF SOOT	ASTM D3602-13		☐	☐	☐	☐	☐	☐
OTHER:		☐	☐	☐	☐	☐	☐	☐

*Blanks should be taken from the same sample lot as field samples.

FIELD ID #	SAMPLE LOCATION	AREA (in^2)	VOLUME(L)
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2B	Living Rm / Kitchen		↓
2C	East Bedroom / Office		
2D	West Bedroom		
2E	Weight Rm / Bathroom		↓

REMARKS:

BWB Accept Samples
☐ Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	10/18/23 1700	BWB	10/19/23 9:30

By submitting samples, you are agreeing to ECEI's Terms and Conditions.
Samples will be disposed of 30 days after analysis.

MOLD / MATERIALS IDENTIFICATION

eurofins | CEI

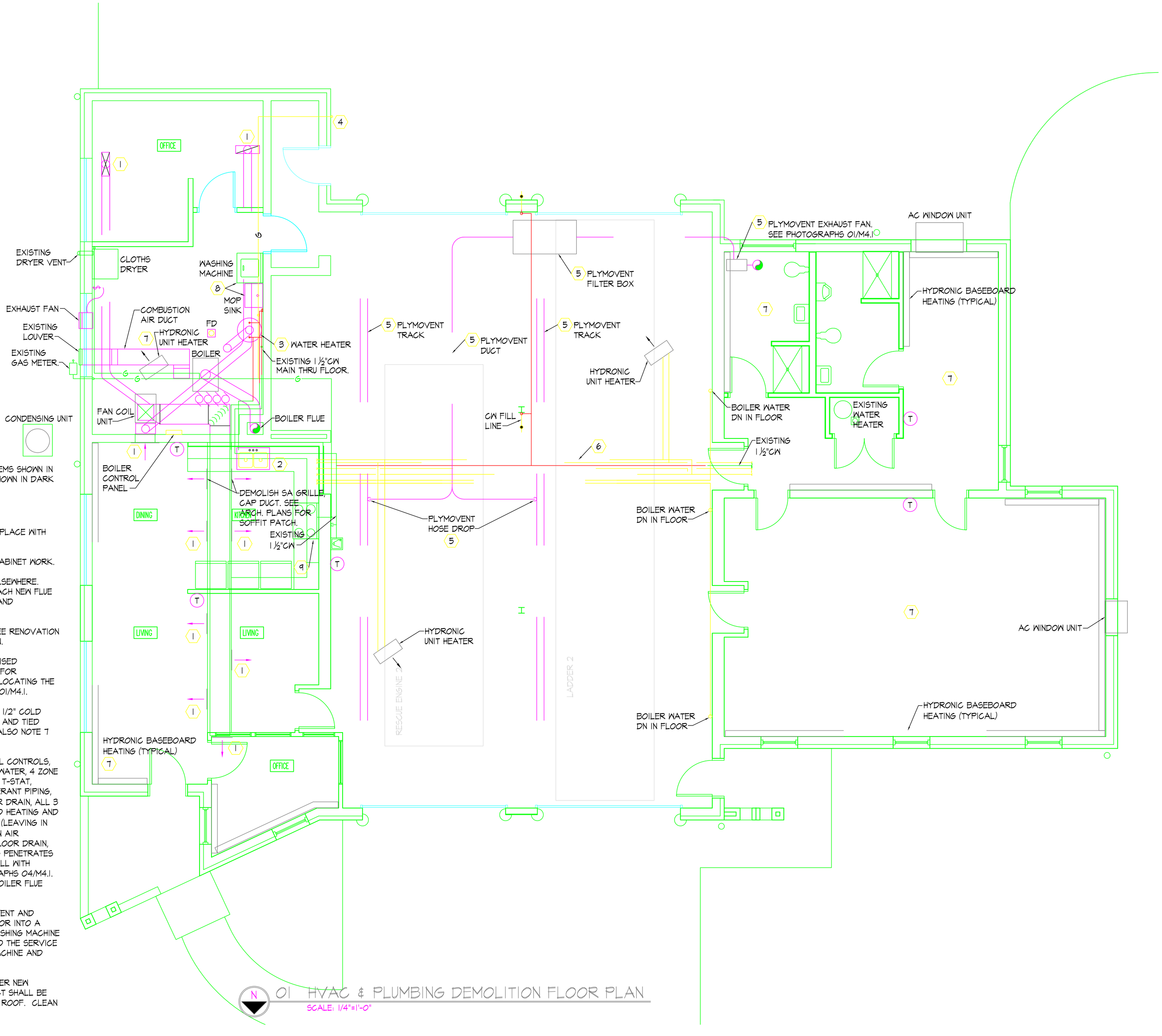
SAMPLING FORM

COMPANY CONTACT INFORMATION	
Company: Nova Group, GBC	Job Contact: Rick Lowes
Project Name: F.S. #2	
Project ID #: 023-	Tel: 913 297 4733

FIELD ID #	SAMPLE LOCATION	AREA (SQ. INCH)	VOLUME (LITRES)
2F	Outside - (5 r)		25 L
2G	weight room bathroom - below supply duct		
2H	Bedroom - supply louver		
2I	kitchen - interior return duct		
2J	Laundry - supply duct		
2K	Hallway to laundry - Exterior duct		

pg. 2 of 2

APPENDIX B: BUILDING PLANS



01 HVAC & PLUMBING DEMOLITION FLOOR PLAN

SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED ELSEWHERE, EXISTING ITEMS SHOWN IN FADE-AWAY PEN, NEW AND OR RELOCATED ITEMS SHOWN IN DARK HEAVY PEN.

NOTES:

1. DEMOLISH RETURN AND SUPPLY AIR GRILLES AND REPLACE WITH NEW.
2. REMOVE DOUBLE BIN SINK AND RE-INSTALL IN NEW CABINET WORK.
3. GAS FIRED WATER HEATER SHALL BE RELOCATED ELSEWHERE. DEMOLISH FLU UP TO PENETRATION IN ROOF. REATTACH NEW FLUE TO EXISTING PENETRATION. SEE RENOVATION PLAN AND PHOTOGRAPHS 01/M4.1.
4. DEMOLISH GAS PIPING FOR OUTSIDE GAS GRILLE. SEE RENOVATION PLAN FOR EXTENDING GAS TO NEW GRILLE LOCATION.
5. PLYMOVENT VEHICLE EXHAUST SYSTEM SHALL BE RAISED APPROXIMATELY 4' HIGHER. SEE RENOVATION PLAN FOR EXTENDING THE TRACKS AND EXHAUST DUCT AND RELOCATING THE EXHAUST FAN AND FILTER BOX. SEE PHOTOGRAPHS 01/M4.1.
6. ALL HYDRONIC PIPING SHALL BE DEMOLISHED. THE 1 1/2" COLD WATER PIPING SHALL BE RAISED APPROXIMATELY 4' AND TIED BACK IN AT BOTH SIDES OF APPARATUS BAY. SEE ALSO NOTE 7 BELOW.
7. THE FOLLOWING SHALL BE DEMOLISHED: BOILER, ALL CONTROLS, ALL BOILER PIPING THROUGHOUT BUILDING, MAKE-UP WATER, 4 ZONE PUMPS, FLUE DUCT, FAN COIL UNIT AND ASSOCITATED T-STAT, DUCTWORK WHERE SHOWN, CONDENSING UNIT, REFRIGERANT PIPING, GRILLES AND REGISTERS (SEE NOTE 1 ABOVE), FLOOR DRAIN, ALL 3 HYDRONIC UNIT HEATERS, ALL HYDRONIC BASEBOARD HEATING AND ASSOCITATED T-STATS, COMBUSTION AIR DUCTWORK (LEAVING IN PLACE THE EXTERIOR LOUVER FOR REUSE), 2 WINDOW AIR CONDITIONING UNITS, TRHU THE WALL EXHAUST FAN, FLOOR DRAIN, HOSE BIBS, CW FILL LINE, ETC. WHERE BOILER PIPING PENETRATES CONCRETE FLOOR, CONTRACTOR SHALL PLUG AND FILL WITH GROUTE FLUSH WITH FINISHED FLOOR. SEE PHOTOGRAPHS 04/M4.1. SEE ARCHITECTURAL PLANS FOR CAPPING OFF OF BOILER FLUE THROUGH ROOF.
8. DEMOLISH SERVICE SINK AND ASSOCIATED HW, CW, VENT AND WASTE PIPING. MAKE WASTE PENETRATION INTO FLOOR INTO A CLEAN OUT FLUSH WITH FINISHED FLOOR. CLOTHS WASHING MACHINE SHALL BE RELOCATED. THE WASTE LINE DRAINS INTO THE SERVICE SINK. DEMOLISH CW AND HW SUPPLY TO WASHING MACHINE AND SERVICE SINK.
9. REMOVE EXISTING RANGE HOOD AND REINSTALL AFTER NEW CABINETS ARE INSTALLED. 10x4 RANGE EXHAST DUCT SHALL BE RAISED ON THE ROOF 6" TO ACCOMODATE FOR NEW ROOF. CLEAN BIRDSCREEN.

CM ENGINEERING
700 Cherry Street
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Columbia, Missouri
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Columbia, Missouri 65201
Ph:(573) 449-2683 Fax:(573) 442-6213

CITY OF COLUMBIA FIRE STATION #2

Drawn: JS	Project Number: 05123
Checked: RH	CAD File Name (Number): 05123.dwg

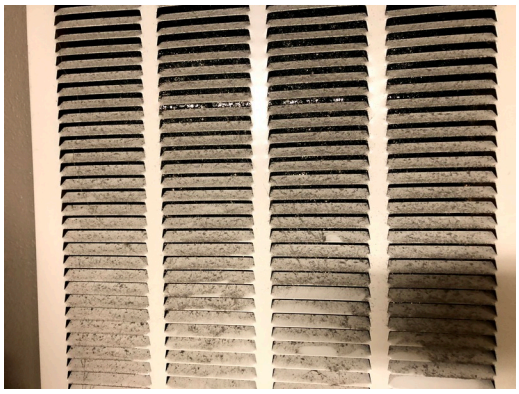
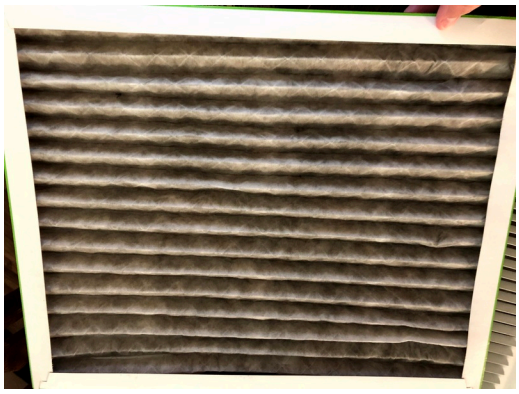
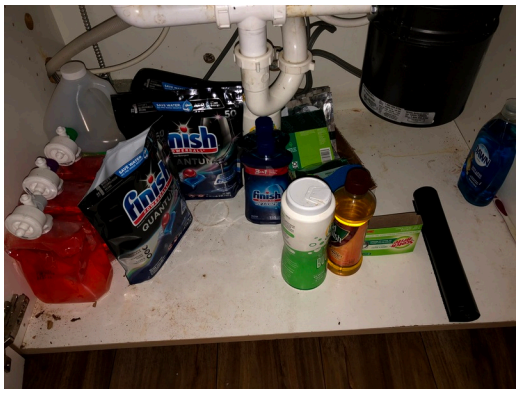
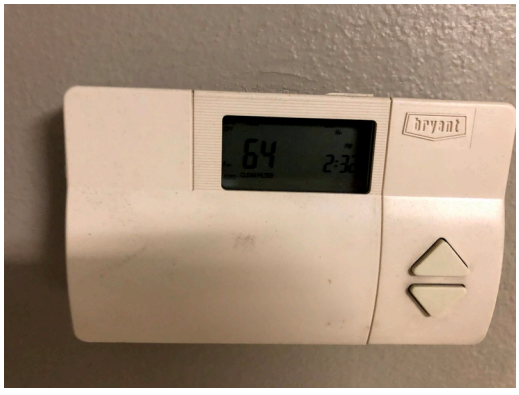
Drawing Title: MECHANICAL DEMOLITION

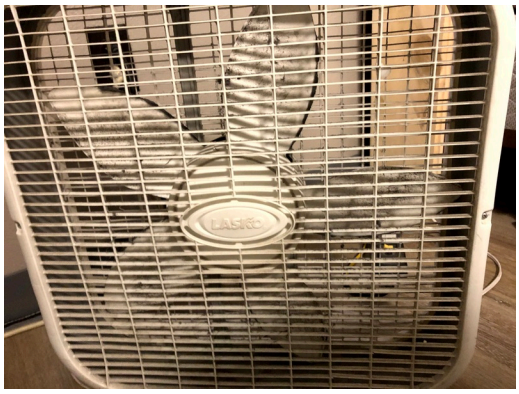
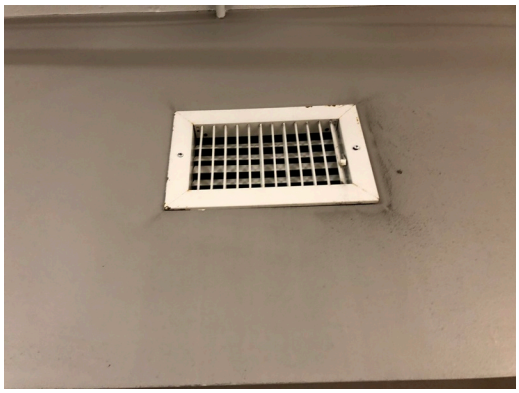
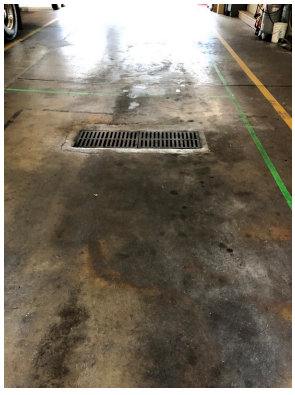
No.	Revisions:	Date:

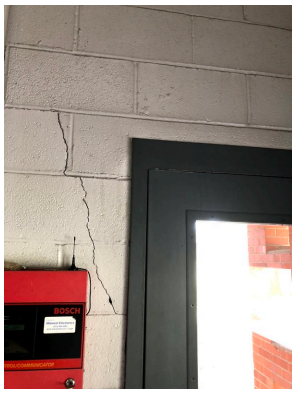
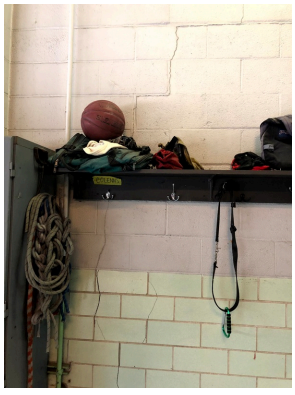
Submission Date: 04-18-06	Drawing Number: M1.1
Plot Date: 04-18-06	

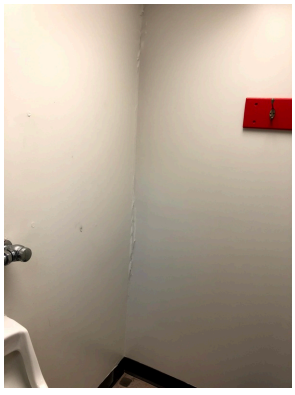
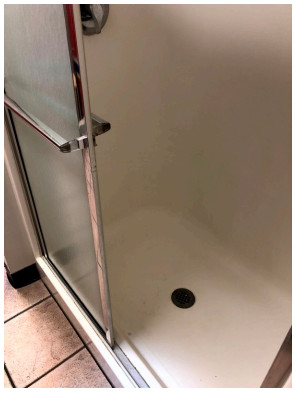
APPENDIX C: PHOTOGRAPHS

	
1. Fire Station #2	2. Living Room
	
3. Living Room	4. Damaged Wall (Living Room)
	
5. Damaged Wall (Living Room)	6. HVAC Louver (Living Room)

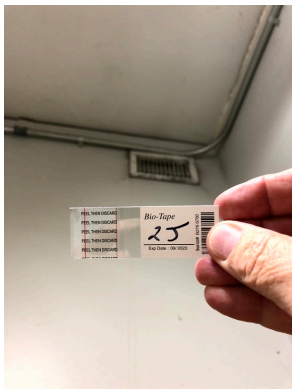
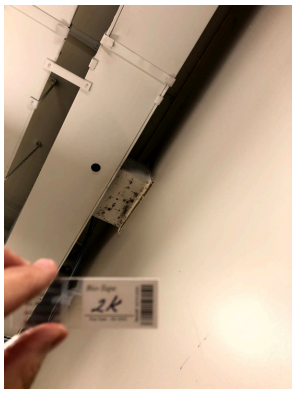
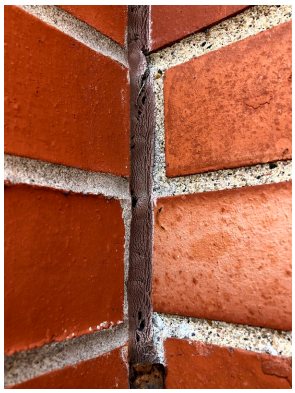
	
7. Kitchen/Dining - HVAC return louver	8. Kitchen/Dining - HVAC filter (behind louver)
	
9. Kitchen/Dining - Interior Ductwork	10. Kitchen - beneath sink
	
11. Dormatory (West Bedroom)	12. Dormatory Thermostat

	
13. Dormatory - dirty fan	14. Dormatory - HVAC Louver
	
15. Dormatory - HVAC Louver	16. Dormatory - window ledge
	
17. Apparatus Bay	18. Floor Drain within Apparatus Bay

	
19. Laundry Area within Apparatus Bay	20. Housekeeping
	
21. Apparatus Bay - damaged wall	22. Apparatus Bay - ceiling drywall tape damage
	
23. Apparatus Bay - damaged wall	24. Laundry Room

	
25. HVAC duct at doorway to laundry room	26. Laundry Room - HVAC louver
	
27. HVAC Room	28. HVAC Room - damaged paint
	
29. Bathroom - drywall tape damage	30. Shower

	
31. Weight Room - repaired ceiling	32. Bathroom Louver
	
33. Weight Room louver	34. Bathroom (weight room) Stained Area - Location of Surface Sample 2G
	
35. Dormatory HVAC Louver - Location of Surface Sample 2H	36. Kitchen/Dining - Interior Ductwork - Location of Surface Sample 2I

	
37. Laundry Room HVAC Louver - Location of Surface Sample 2J	38. Hallway to Laundry Room - HVAC Ductwork - Location of Surface Same 2K
	
39. Exterior - Brick Damage	40. Exterior - Brick Damage
	
41. Exterior - Brick Damage	42. Exterior - weather sealant

43. Exterior - weathered sealants

44. Exterior - Elevated Landscaping

45. Exterior - Elevated Landscaping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