Report of Findings

Brayton Elementary School

20 Brayton Hill Terrace

North Adams, MA 01247

Prepared for: The City of North Adams
10 Main Street
North Adams, MA 01247

Prepared by: GEM Environmental, Inc.
86 Sand Mill Hill Road
Cheshire, MA 01247

Job No: 24-1041

1.0 INTRODUCTION

GEM Environmental, Inc. was retained by the City of North Adams regarding air quality within the lower level of Brayton Elementary School. Concerns related to the potential of mold growth is the primary focus in this air quality investigation.

2.0 PROCEDURE

Visual Assessment

The purpose of a visual assessment is to identify visual mold contamination and/or conditions that may be conducive to mold growth. The visual inspection can also aid in determining remedial strategies as necessary. Visual mold growth can be evident on building surfaces (especially cellulose based materials such as sheetrock and wood products).

Air Sampling

Air samples were collected in eleven locations at the subject property using Zefon Air-O-Cell sampling cassettes. Air-O-Cell cassettes are a unique sampling device specifically designed for the rapid collection and analysis of a wide range of airborne aerosols. As particulate laden air enters the cassette it meets the sampling substrate upon which the particulates become impacted while the air flow continues out the exit orifice. The design of the air flow pathway creates a deposition of airborne particulate(s) upon the special glass slide contained in the cassette housing. A building exterior sample (control) was also performed. The control sample is utilized as the baseline (technically - mold grows in the natural environment, when you open doors and windows air mixes, therefore your baseline is outside air). If total spore counts are higher within the building vs. outside air, or if a particular species of mold is elevated vs. outside air, this may indicate potential mold growth within the building.

3.0 INVESTIGATION

Air Sampling Results Total Counts

Location	Result
B01 Rm 112	***7 count/m3***
B02 Rm 110	***7 count/m3***
B03 Rm 104	***40 count/m3***
B04 Rm 112	***27 count/m3***
B05 Main Hall (outside Rm 116)	***107 count/m3***
B06 Rm 122	***27 count/m3***
B07 Rm 123	***40 count/m3***
B08 Rm 116	***107 count/m3***
B09 Main Hal (outside Rm 104)	***1133 count/m3***
B10 (outside Rm 112)	***3107 count/m3***
B11 Building Exterior (outside air)	***713 count/m3***
B12 Main Hall (outside Rm 123)	***47 count/m3***

Location	Building Material	Moisture Level Recommendation
Rm 108	**Concrete Floor: 2.6% Concrete Wall: 0.9% Wood Door +: 7.1%**	**<5% <5% < 16 - 17%**
Hall (outside Rm 112)	**Concrete Floor: 1.7% Concrete Wall: 1.3% Wood Door: 7.5%**	**< 5% <5% < 16-17%**
Electrical Rm	**Concrete Floor: 4.8% Concrete Wall: 0.9% Wood & Boxes: 10.9 - 11.3%**	**< 5% <5% < 16-17%**
Boiler Rm	**Concrete Floor: 5.9% Concrete Wall: 1.2% Wood & Boxes: 6.5 - 7.4%**	**<5% <5% <16-17%**
Rm 114	**Concrete Floor: 1.4% Concrete Wall: 0.7% Wood Door, Chairs: 5.6-8.2% Wall Partitions: 5.3-5.8%**	**<5% <5% <16 - 17%**
Hall (outside Rm 120)	**Concrete Floor: 2.1% Concrete Wall: 0.7% Wood Door: 5.5%**	**<5% <5% <16-17%**
Stairwell	**Concrete Floor: 1.9% Concrete Wall: 0.7 % Wood Door: 5.6%**	**<5% <5% <16-17%**

➔ ***NOTE: Moisture level recommendations relate to the potential for mold growth. Keeping moisture levels below recommended levels helps to prevent possible mold growth.***

4.0 OBSERVATIONS, CONCLUSION & RECOMMENDATIONS

The visual assessment identified no visible mold growth on walls, floor systems and furniture on the day of testing (though it is noted that certain staff noted potential mold on stored furniture/items).

Air sample results showed total spore counts within the building to be considerably lower than building exterior levels (outside air), within the classroom areas tested. However, air samples performed within the main basement hallway locations showed elevated spore counts related to outside air (control). Though these levels are not considered overly high, they do suggest potential indoor amplification of mold spores (utilizing the control sample). These areas of elevated spore counts were in the vicinity of stored/moving furniture and items (actively handled and moved during testing).

Below is a guideline developed by Environmental Analysis Associates, Inc. to utilize when assessing mold airborne spore concentrations (using the Air-O-Cell testing methodology):

Typical Indoor Mold Spore Concentration Ranges		
Description	Spores (count/m^3)	Predominant Types *
"Clean" building	less than 2,000	Total for all spore types
	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
Inadequate flood cleanup or active	50,000 - 10,000,000	Penicillium, Aspergillus, Stachybotrys,
Indoor demolition of contaminated		Cladosporium, Chaetomium, Basiomycetes
		Tricoderma, Ulocladium, etc.

Determinations

Based on findings from this investigation, the following determinations and recommendations are presented:

- Air flow and make-up air are appropriate for the occupied rooms in the basement (the very low total spore counts in the classrooms represents this).
- Building materials tested showed moisture levels to be ideal for the prevention of mold growth.
- The elevated mold spore counts in the hallway/common areas were also where furniture and items were being stored/moved during the testing (if some of these items had any mold present,this was noted by some individuals, then the disturbance of these items could cause elevated air samples).

Recommendations

- Treat the hallway and common areas with an EPA registered disinfectant. This would include surface application and fogging of the space(s).
- Incorporate air scrubbers to change the air over and clean the air of non-viable mold spores.
- Perform an additional round of air monitoring to assess the completed procedures.

Mold Prevention Practices

Mold amplification requires- humidity (or dampness), a food source (cellulose-based materials such as sheetrock, wood, paper, carpet, insulation, etc.), and a warm environment. Steps or practices to help prevent mold growth include:

1. Dehumidification: A dehumidifier can be an excellent deterrent to help prevent mold growth. Ideal humidity within a building is 30% to 50% (if possible). Mold requires at

least 55% to amplify (the higher the humidity, the more conducive the environment becomes for potential mold growth).

2. Clean-up or remediate any water infiltration to the building interior as soon as possible.

3. Maintain a clean environment, mold can use dust or similar as a food source.

4. Limit storing items such as boxes, cellulose-based building products, carpeting, etc. within basements or potentially moist locations.

5. If sheetrock is in the basement (or on grade), a ~ 1" space between the cement floor and the sheetrock should be utilized to prevent possible moisture wicking from masonry.

6. Periodic treatment with a mild mold disinfectant/sanitizer.

Laboratory Report of Analysis

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North Adams, MA 01247

SanAir Technologies Laboratory

Name: Gem Environmental, Inc.
Address: 86 Sandmill Hill Rd.
Cheshire, MA 01225
Phone: 413-663-9884

Project Number: 24-1041
P.O. Number:
Project Name: Brayton Elm School
Collected Date: 8/30/2024
Received Date: 9/3/2024 12:05:00 PM

SanAir ID Number
24049809
FINAL REPORT
9/3/2024 3:03:30 PM

Analyst: Acharya, Uttam

Air Cassette Analysis

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

SanAir ID Number	24049809-001			24049809-002			24049809-003			24049809-004		
Analysis Using STL	105C			105C			105C			105C		
Sample Number	B01			B02			B03			B04		
Sample Identification	Rm 112 4906			Rm 110 9065			Rm 104 0753			Rm 112 3215		
Sample Type	Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15		
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	1+			1+			1+			1+		
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species												
Ascospores												
Aspergillus/Penicillium							3	20	50			
Basidiospores	1	7	>99	1	7	>99				4	27	>99
Cladosporium species							3	20	50			
Curvularia species												
Memnoniella species												
Pithomyces species												
Stachybotrys species												
TOTAL	**1**	**7**		**1**	**7**		**6**	**40**		**4**	**27**	

Signature: Uttam Acharya Date: 9/3/2024 Reviewed: L. Claire Macdonald Date: 9/3/2024

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SanAir ID Number	24049809-005			24049809-006			24049809-007			24049809-008		
Analysis Using STL	105C			105C			105C			105C		
Sample Number	B05			B06			B07			B08		
Sample Identification	Main Hall (Outside 116) 4888			Rm 122 0805			Rm 123 9159			Rm 116 3322		
Sample Type	Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15		
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	1+			1+			1+			1+		
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species												
Ascospores				1	7	25						
Aspergillus/Penicillium							4	27	67	5	33	31
Basidiospores	4	27	27	1	7	25	2	13	33	6	40	38
Cladosporium species	11	73	73	2	13	50				5	33	31
Curvularia species												
Memnoniella species												
Pithomyces species												
Stachybotrys species												
TOTAL	**15**	**100**		**4**	**27**		**6**	**40**		**16**	**107**	

Signature:  Date: 9/3/2024 Reviewed:  Date: 9/3/2024

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Analysis Using STL	105C			105C			105C			105C		
Sample Number	B09			B10			B11			B12		
Sample Identification	Main Hall (Outside 104) 3222			Common Area (Outside 112) 9161			Building Exterior 9078			Hall (Outside 123) 0812		
Sample Type	Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15			Air Cassette - Pro 15		
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	1+			2+			1+			1+		
Fungal Identification	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**	**Raw Count**	**Count/M³**	**%**
Alternaria species	1	7	< 1									
Ascospores							4	27	4			
Aspergillus/Penicillium	58	387	34	204	1360	44	18	120	17			
Basidiospores	32	213	19	2	13	< 1	85	567	79	6	40	86
Cladosporium species	74	493	44	253	1687	54				1	7	14
Curvularia species				1	7	< 1						
Memnoniella species				5	33	1						
Pithomyces species				1	7	< 1						
Stachybotrys species	5	33	3									
TOTAL	**170**	**1133**		**466**	**3107**		**107**	**713**		**7**	**47**	

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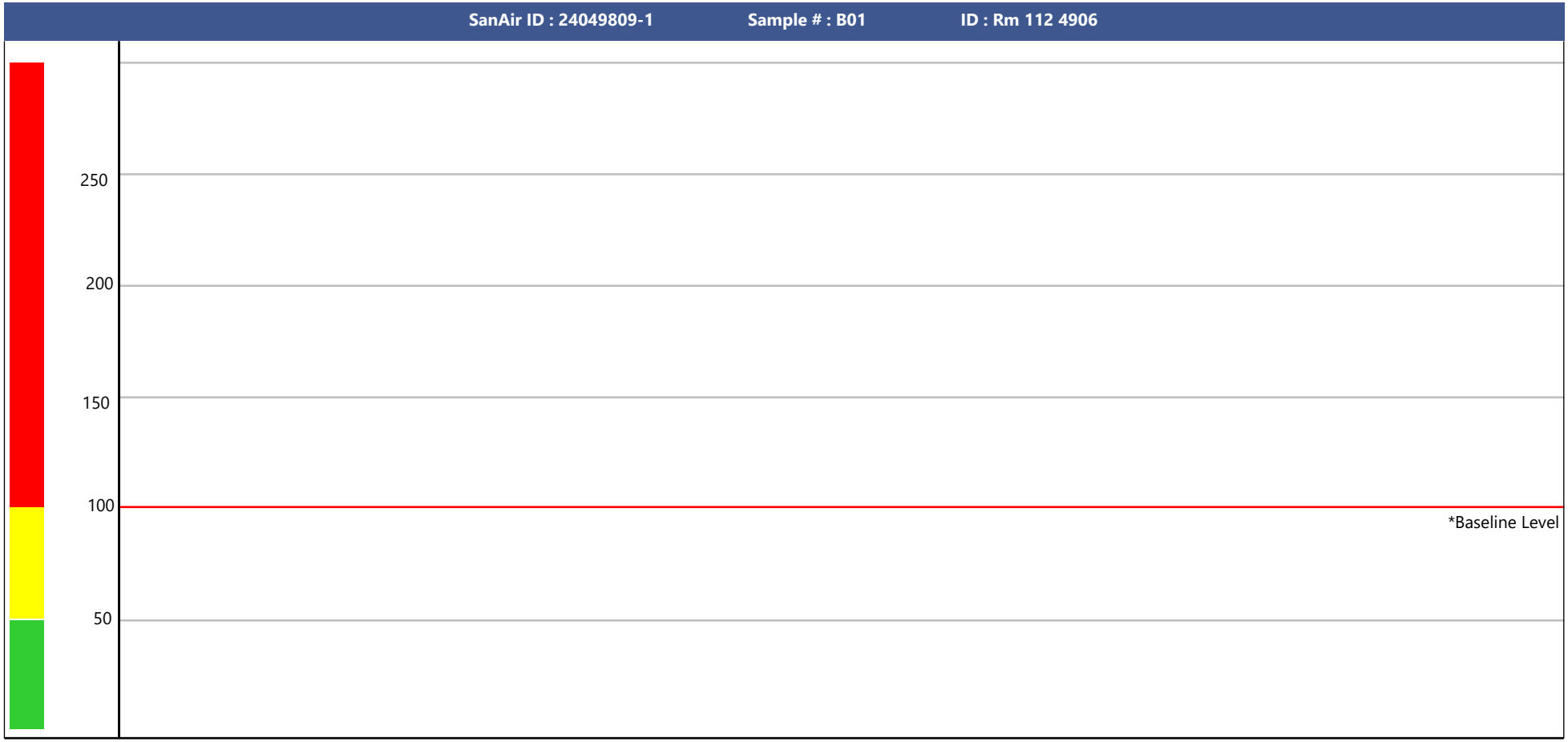

Count/m³ higher than Baseline
Count/m³ comparable to Baseline
Within 50% of Baseline Count/m³

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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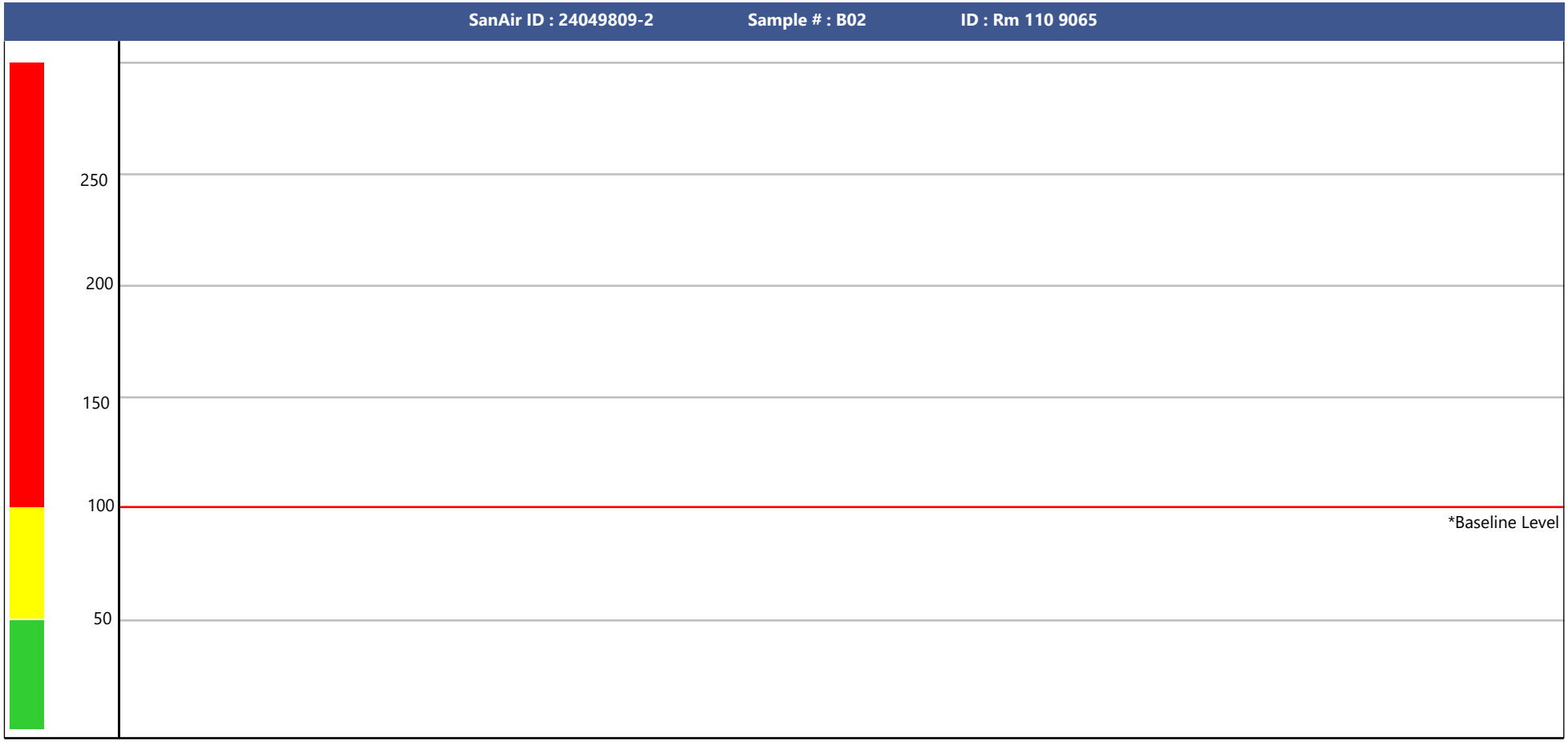

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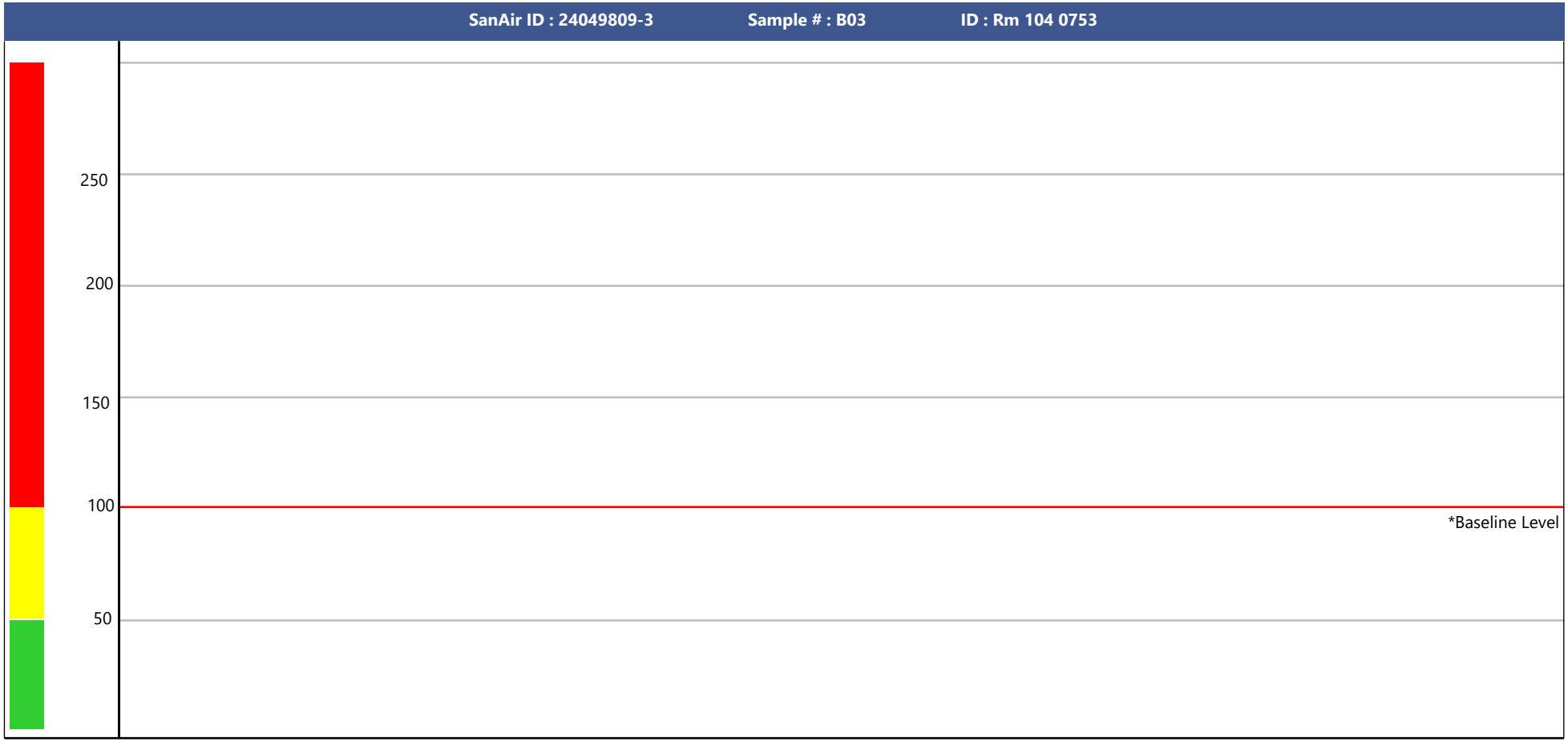

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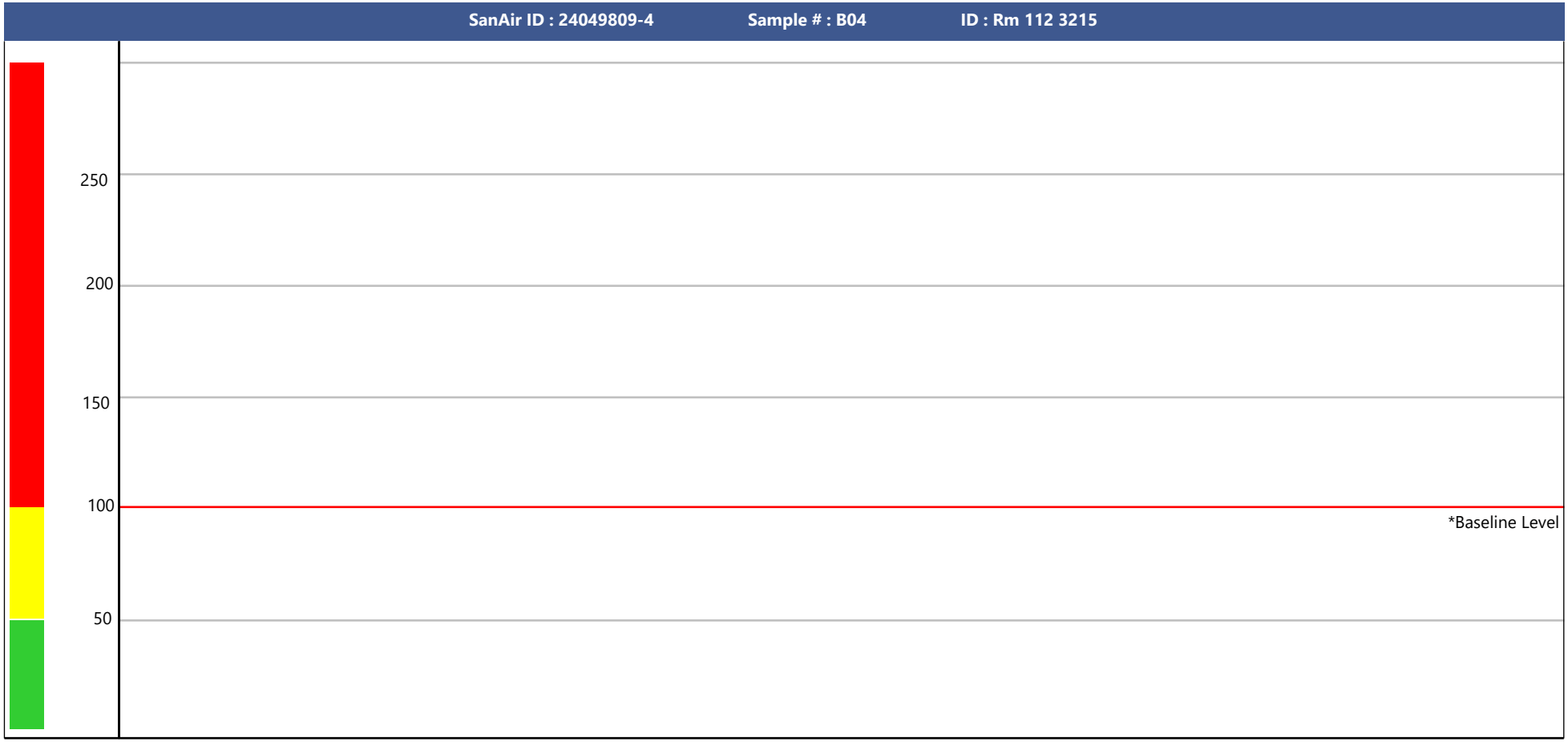

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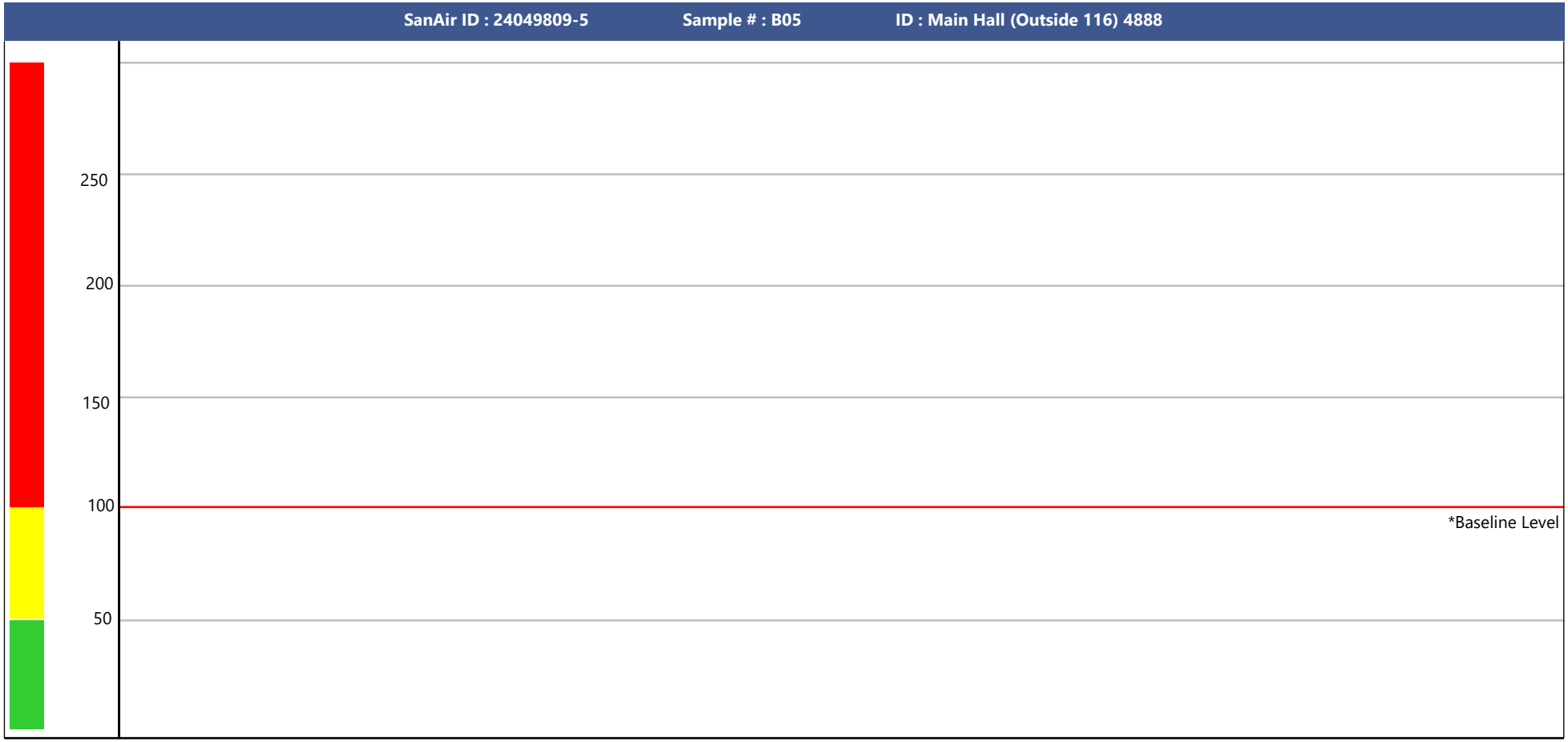

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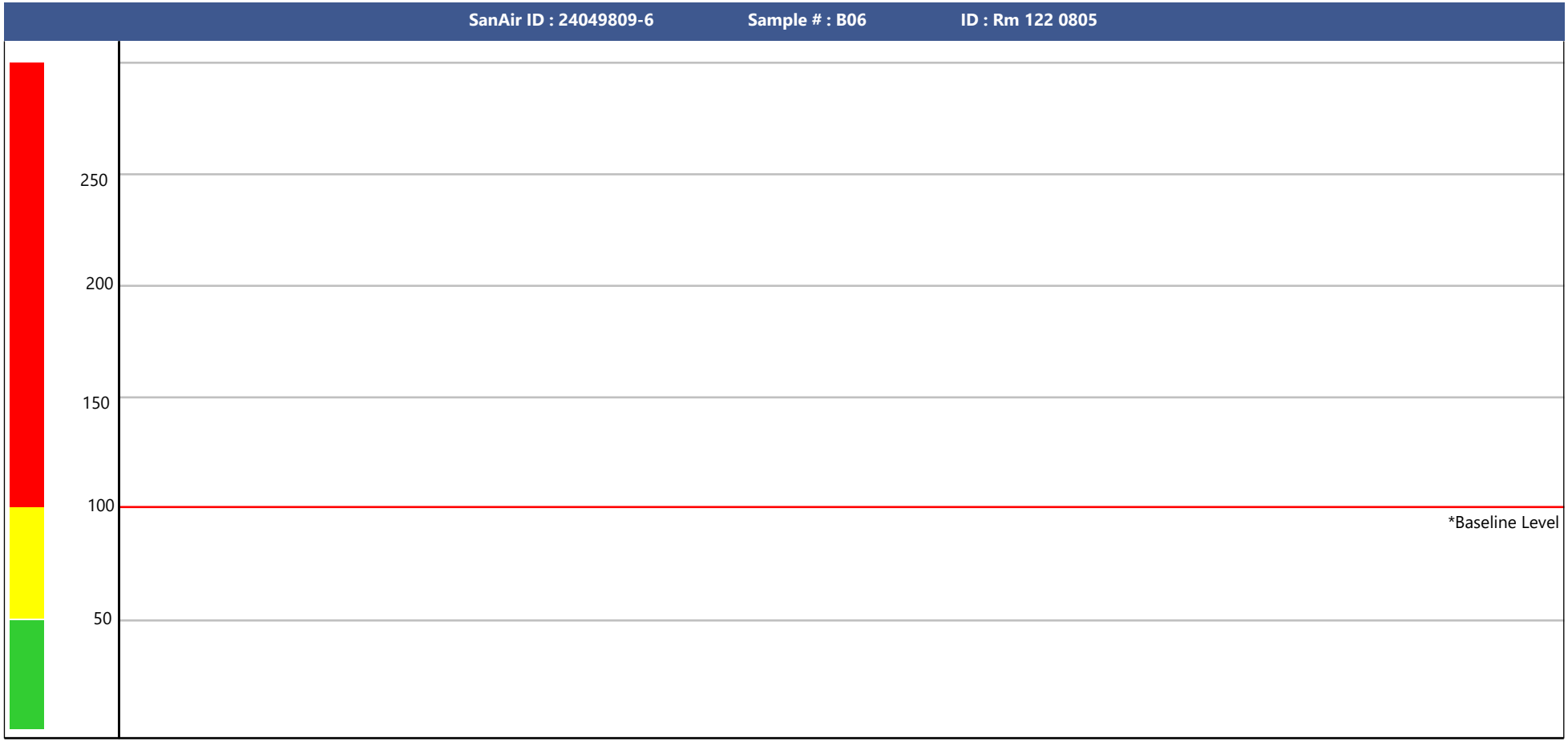

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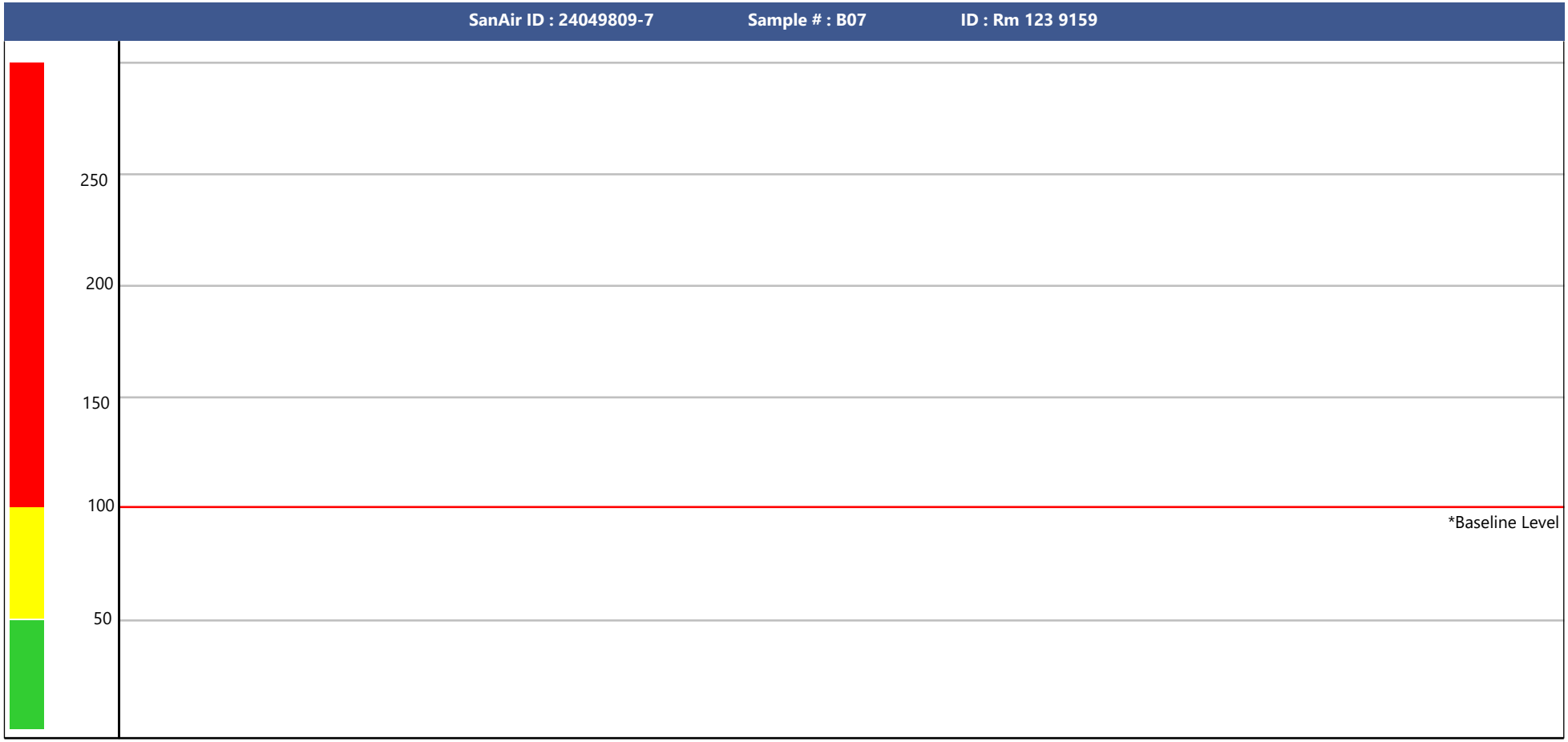

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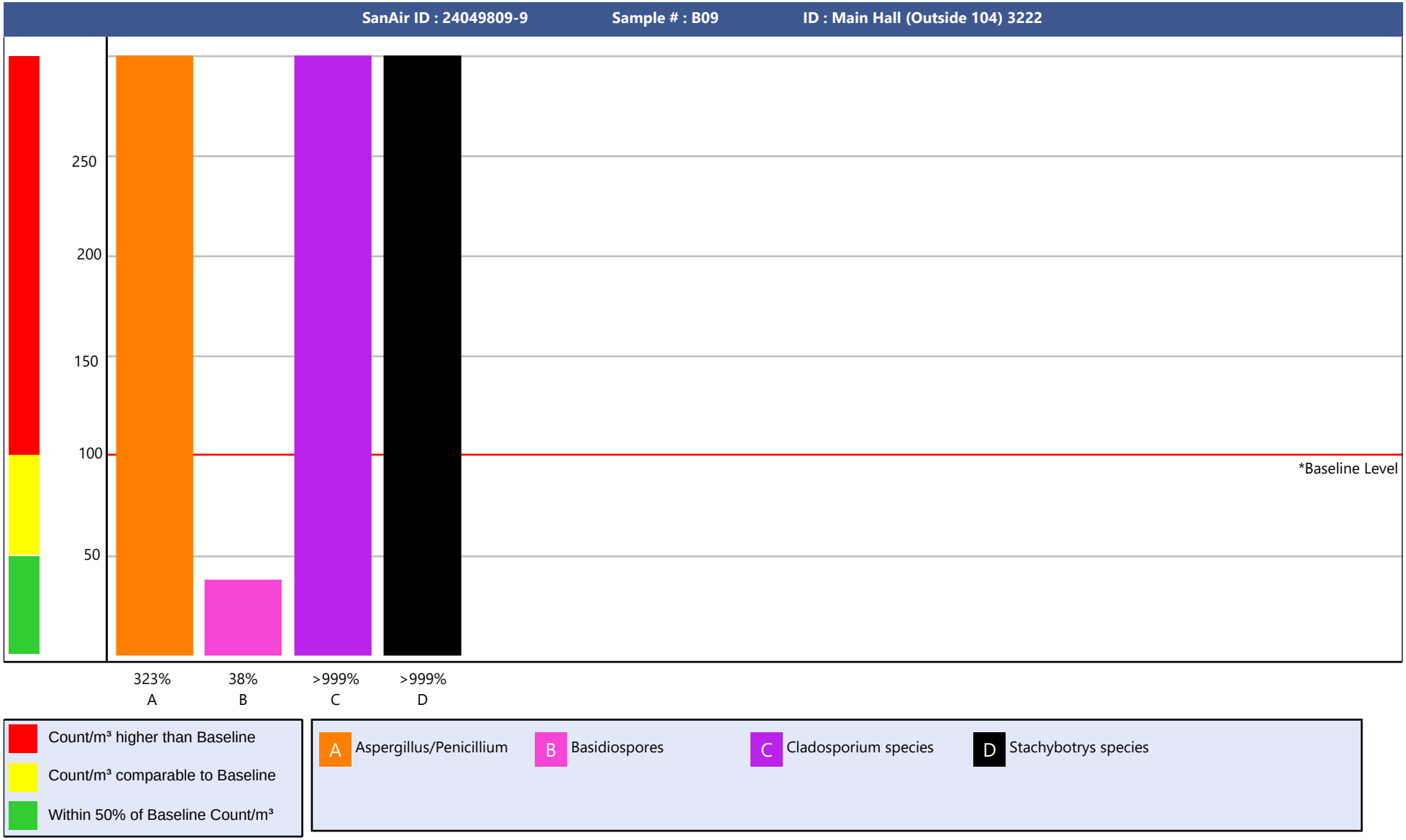

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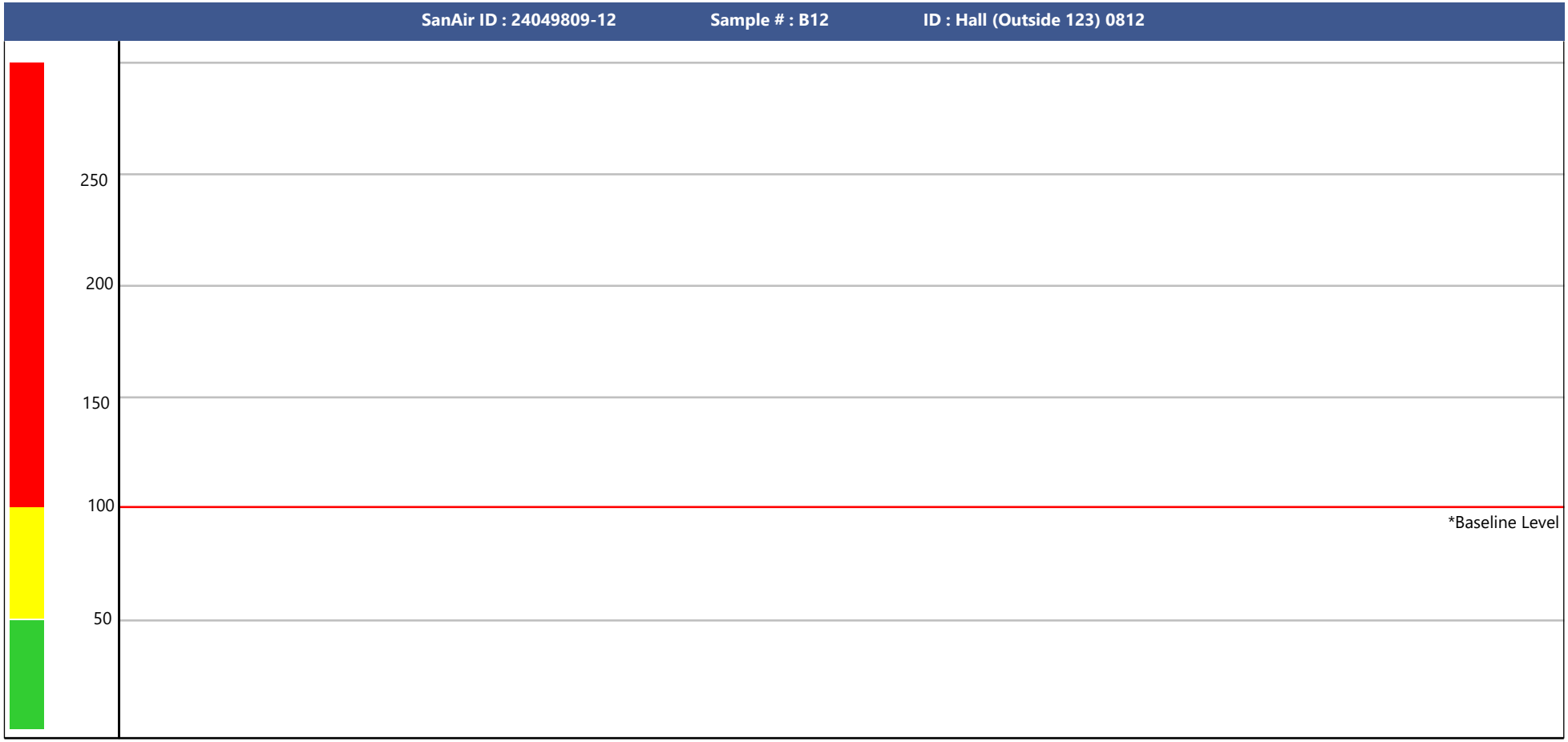

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Organism Descriptions

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.

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. This genus also includes species that were once identified as Ulocladium. Genetic testing has shown that the two are not phylogenetically distinct, and as such have been combined.
Health Effects: In humans, it is recognized to cause 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. London and NY: Taylor & Francis, 2001.de Hoog, G.S. et al. Atlas of Clinical Fungi. 4th ed. Foundation Atlas of Clinical Fungi. 2020

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/Penicillium - These spores are easily aerosolized. Only through the visualization of reproductive structures can the genera be distinguished. Also included in this group may be spores of the genera Acremonium, Phialophora, Verticillium, Paecilomyces, Talaromyces etc. Small, round to ovoid 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).

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.

SanAir Technologies Laboratory

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Name: Gem Environmental, Inc.
Address: 86 Sandmill Hill Rd.
Cheshire, MA 01225
Phone: 413-663-9884

Project Number: 24-1041
P.O. Number:
Project Name: Brayton Elm School
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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.

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. 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. London and NY: Taylor & Francis, 2001.de Hoog, G.S. et al. Atlas of Clinical Fungi. 4th ed. Foundation Atlas of Clinical Fungi. 2020

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 be a cause of allergic fungal sinusitis. It may cause corneal infections, mycetoma and infections in immune compromised hosts.
References: de Hoog, G.S. et al. Atlas of Clinical Fungi. 4th ed. Foundation Atlas of Clinical Fungi. 2020

Memnoniella species - Cellulolytic fungus very closely related to Stachybotrys. Both fungi have a worldwide distribution and often found together, and commonly found in soil. The major difference between the two fungi is that the conidia for Memnoniella are in long persistent chains (aggregated in slimy heads in Stachybotrys). Also the aerodynamic diameter of Memnoniella is smaller and it would be expected to have an even greater potential to penetrate deep into lungs than the conidia of Stachybotrys.
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.

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.

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.